FORM AND FREQUENCY OF COGNITIVE INTERVENTION: IMPACT ON ADHERENCE AND MANAGEMENT OF PRIMARY HYPERTENSION

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DOCTOR OF PHILOSOPHY IN PSYCHOLOGY

by

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This is to certify that the thesis entitled *"Form and Frequency of Cognitive Intervention: Impact on Adherence and Management of Primary Hypertension"* submitted by Asher Andrew, Senior Research Fellow, UGC-MANF, bearing Registration Number 12CPPH01 in partial fulfilment of the requirements for award of Doctor of Philosophy in Psychology in the Centre for Health Psychology under School of Medical Sciences is a bonafide work carried out by him under my supervision and guidance.

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Further, the student has the following publications before submission of the thesis for adjudication and has produced evidence for the same in the form of the reprint in the relevant area of his research:

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Course Code	Name	Credits	Pass/Fail
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2. HP 827	Book Review (Paper II)	4	Pass
3. HP 828	Review Paper (Paper III)	4	Pass
4. HP 829	Empirical Paper (Paper IV)	4	Pass

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ABSTRACT

The exponential rise in the prevalence of hypertension and the resultant surge in cardiac emergencies highlight the urgent need for management of primary hypertension. Hypertension, being a chronic illness mandates high clinical adherence for effective management resulting in good prognosis. Optimizing adherence behaviour is possible through Cognitive Intervention. The purpose of Cognitive Intervention is to enhance knowledge and form a cognitive base about the seriousness of the disease and significance of its management. This in turn is expected to create a conviction and affect state that culminates in enhancing adherence behaviour. The research study examined the differential impact of the Cognitive Intervention modules varying in form and frequency on adherence and management of primary hypertension. Using a pretest-posttest control group quasi experimental design, five groups of patients were compared. Group 1 called 'Direct Interaction Single Exposure Group' (DIS) received Cognitive Intervention through Direct Interaction (DI) mode, where a qualified doctor through a session exposed them to the functional knowledge on primary hypertension. Group 2 called as 'Direct Interaction Double Exposure (DID)' received the same DI form of Cognitive Intervention twice with a gap of 15 days. Group 3 is referred to as 'Audio Visual Single Exposure Group' (AVS) which received the Cognitive Intervention through Audio-visual recorded form (AV) without the physical presence of the doctor while group 4, referred to as 'Audio Visual Double Exposure Group' (AVD) was given the same AV form twice with a gap of 15 days between them. All these four intervention groups were compared with group 5, called as Control Group (C) that was given mere standard medical care. A sample of 450 participants was sequentially assigned to the five groups in the order of DIS, DID, AVS, AVD and Control. The participants were assessed before and after intervention using

Hypertension Knowledge Test, Hypertension Compliance Scale, Hospital Anxiety and Depression Scale, Multidimensional Scale of Perceived Social Support and Hypertension Self Efficacy Scale. To assess hypertension management, Blood pressure readings were recorded thrice before and thrice after the intervention with a gap of one week between the recordings. In a three month follow up the groups were compared on adherence and management before and after the intervention. ANCOVA results showed that cognitive intervention was successful in impacting the adherence and management of hypertension. Particularly the Direct interaction form when repeated had the highest impact on the adherence and management. The audio visual form when repeated proved counterproductive on management of hypertension. In addition, the Cognitive Intervention through direct interaction when repeated reduced the levels of depression compared to the control group. Cognitive Intervention also enhanced the levels of perceived social support land Hypertension specific self-efficacy. Further the study attempted to trace the pathway between the intervention and the management of hypertension. By means of pathway modeling using multiple regression analyses, pathways evolved for both the direct interaction modules (DIS and DID). The knowledge enhancements by the exposure to these modules enhanced self-efficacy. This in turn enhanced hypertension management through enhanced clinical adherence. Thus indispensability of integrating Cognitive Intervention into the hypertension care alongside standard medical treatment is the key conclusion. Implications, strengths and limitations of the study are also discussed.

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LIST OF ABBREVIATIONS

ANCOVA	Analysis of Covariance
APA	American Psychological Association
AVS	Audio-Visual Single exposure group
BP	Blood Pressure
CNTRL	Control Group
CVD	Cardio Vascular Diseases
DASH	Dietary Approach to Stop Hypertension
DBP	Diastolic Blood Pressure
DID	Direct Interaction Double Exposure group
DIS	Direct Interaction Single exposure group
ESC	European Society of Cardiology
ESH	European Society of Hypertension
HADS	Hospital Anxiety and Depression Scale
HBP	High Blood Pressure
HKT	Hypertension Knowledge Test
HSES	Hypertension Self Efficacy Scale
HTN	Hypertension
HyCompS	Hypertension Compliance Scale
JNC	Joint National Committee
LCD	Liquid Crystal Display
MAP	Mean Arterial Pressure
MSPSS	Multidimensional Scale of Perceived Social Support
NCD	Non-Communicable Disease
PBC	Perceived Behavioural Control
SBP	Systolic Blood Pressure
TPB	Theory of Planned Behaviour
WHO	World Health Organisation

CHAPTER I

INTRODUCTION

CHAPTER-I

INTRODUCTION

"Today's unhealthy behaviours are tomorrow's risk factors. Today's risk factors are tomorrow's disease". Failure to understand this quote led to the epidemic of hypertension. The subcontinent of India heading towards the epidemic of Hypertension or high blood pressure is a warning cry for the research fraternity. The survival of 37.2 trillion cells in a human body hinges on the oxygen being carried by the blood circulation. Blood circulation is facilitated by the pressure called 'Blood Pressure'. Blood Pressure (BP) is the force exerted by the circulating blood against the walls of the blood vessels. Thus Blood pressure is one of the most important facets of survival for everyone. However the shoot up of pressure over 140/90 mm/Hg, considered as High Blood Pressure or Hypertension is a devastating silent killer. The upper number measure (systolic) is the force required to pump the blood to the different organs of the body by the heart. The lower measure (diastolic) is the pressure of the blood on the vessels in resting state to prevent its collapse. High B.P may result from four common conditions such as when the heart pushes more blood every minute, when the total volume of blood in the body increases, when thickness of blood increases requiring the heart to push harder and lastly when the blood vessels become narrow. The 'Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VI)' stated that the *diagnosis of hypertension* 'is made when the average of 2 or more diastolic BP measurements on at least 2 subsequent visits is ≥90 mm Hg or when the average of multiple systolic BP readings on 2 or more subsequent visits is consistently ≥140 mm Hg' (Chobanian et al., 2003). A person is said to be hypertensive if systolic blood

pressure is ≥140 mm Hg or the diastolic blood pressure is ≥90 mmHg, or both, on repeated examination.

A healthy person has a systolic BP between 100–140 millimeters mercury (mmHg) and diastolic BP within a range of 60–90 mmHg. For most of the adults to be considered as hypertensive, the resting BP should persistently range above 140/90 mmHg (Poulter et al., 2015). Presence of persistent high BP is used as a criterion of diagnosis of hypertension. Persistence is quantified as monthly interval measurements of BP using sphygmomanometer for three times. National Institute of Clinical Excellence recommends that the period is to be three months. American Heart Association has recommended at least three resting measurements of BP on two distinct health care visits (Aronow et al., 2011). Joint National Committee (JNC) 7 has classified blood pressure into six categories (Chobanian et al., 2003)—Normal category (systolic BP: 90–119 mmHg, diastolic BP: 60–79mmHg), high normal or prehypertension category (systolic BP: 120–139 mmHg, diastolic BP: 80–89 mmHg), stage I hypertension (systolic BP: 140 – 159mmHg, diastolic BP: 90 – 99mmHg), stage II hypertension (systolic BP: 160–179mmHg, diastolic BP: 100–109mmHg), stage III hypertension or hypertensive emergency (systolic BP: ≥180mmHg, diastolic BP: ≥ 110mmHg), and isolated systolic hypertension (systolic BP: ≥140mmHg, diastolic BP: <90mmHg).

Hypertension is of two types, namely primary hypertension and secondary hypertension. Primary hypertension is also called as idiopathic hypertension. American Heart Association defines *primary hypertension* as 'high BP in which secondary causes such as renovascular disease, renal failure, pheochromocytoma, aldosteronism, or other causes of secondary hypertension or mendelian forms (monogenic) are not present' (Carretero, & Oparil, 2000). This is seen in more than

95% of the cases where arterial blood pressure is chronically elevated and there is no specific underlying cause. European Society of Cardiology (ESC) and European Society of Hypertension (ESH) and Eighth Joint National Committee (JNC 8) arrived at a consensus and defined *Primary hypertension* 'as BP ≥140/90 mmHg, with no secondary cause identified' (James et al., 2014; Mancia et al., 2009; Mancia et al., 2013). The secondary hypertension is the high blood pressure that is secondary to a disease. In 5 % of cases, hypertension could be a consequence of a specific disease or abnormality leading to sodium retention and peripheral vasoconstriction which is called as secondary hypertension. In most of the conditions it is reversible. If the systemic cause is treated the condition can be reversed.

The study of global burden of disease in the year 2015 reported that hypertension was the principle cause of mortality and was responsible for 10-11% of annual deaths worldwide (Forouzanfar et al., 2015). In India, It is alarming to notice that in the same year hypertension was the principal risk factor for disease burden affecting 3.39 crore disability adjusted life years and also was the cause for 16 lakh deaths (Hay et al., 2017). It was estimated that hypertension levied an economic burden of Indian rupees of 43 billion out of the 251 billion losses due to non-communicable diseases (Muruganathan, 2016) which is a humongous burden for a developing country's state exchequer. The Global burden of disease study in the year 2015 analyzing the findings from 188 countries, observed a serious trend in India. It observed an increase in deaths due to ischemic heart disease and cardio vascular diseases in India (Forouzanfar et al., 2015) while contrastingly there was a decreasing trend (30-70% decline) in developed and middle income countries including china (Gupta, Guptha, Joshi, & Xavier, 2011; Krishnamurthi et al., 2015). The study by World Heart Federation found that one third of the deaths due to cardiovascular

events can be prevented if hypertension is controlled (Sacco et al., 2016). This calls for immediate measures for effective management of hypertension.

The United Nations goal for sustained development emphasized the importance of hypertension control in order to achieve 1/3rd reduction in Non-Communicable disease mortality rates by the year 2030 (Norheim et al., 2015). Research in India estimated that better hypertension management can result in prevention of 4 to 5 lakh premature deaths (Gupta, & Xavier, 2018). However the health care scenario in India witnessed an opposite trend. The last few years has witnessed a phenomenal spurt in the prevalence of Hypertension in India which according to WHO (2014) has increased by 10% from 2010 to 2014.

A joint statement by American Society of Hypertension (ASH) and the International Society of Hypertension (ISH) defines effective management of hypertension as achieving the goal to 'reduce blood pressure to levels below the numbers used for making the diagnosis'. Thus effective management can be defined as 'the blood pressure reading of systolic blood pressure usually <140 mm Hg and diastolic blood pressure <90 mm Hg (Weber et al., 2014). Operationally *effective management* of hypertension is defined as conscious effort of the patient to sustain the blood pressure reading below 140 mmHg of systolic and 90 mmHg as diastolic reading. Sustaining the BP below this level calls for a number of steps involving lifestyle factors.

The science advisory of the American Heart Association, the Centers for Disease Control and Prevention, and American College of Cardiology (Go et al., 2014) primarily recommend three broad strategic areas such as, lifestyle modifications, pharmacotherapy and self-monitoring. American Heart Association

recommends lifestyle modification if the hypertension is in stage 1. If the hypertension is in stage 2, then pharmacotherapy is prescribed. In lifestyle modification, diet was found to play a significant role. Lifestyle modifications include inculcating health promoting behaviours and weaning away from the health risk behaviours and more importantly sustaining both. This calls for significant change in diet, physical activity, abstinence from smoking and moderation in alcohol consumption.

Joint National Committee's (JNC) recommendations under 'Dietary Approaches to Stop Hypertension' (DASH) picked up momentum across the globe. DASH emphasized on intake of fruits, vegetables and low fat dairy products and avoidance of saturated fats, energy drinks, preserved and frozen food. This was found to sustain Blood Pressure levels within normal limits (Blumenthal et al., 2010; Chobanian et al., 2003; Gupta, 2004). The second significant step towards effective management in hypertension was weight reduction (Go et al., 2014; Stevens et al., 2001). One of the measures for weight reduction is regular exercise and physical activity integrated into lifestyle. Physical inactivity and non-adherence to dietary regimen were found to be the two main causes of uncontrolled blood pressure (Buttar, Li, & Ravi, 2005). Strong adherence to diet and physical activity can be achieved by setting up appropriate reinforcements for strengthening the health promoting behaviour. The reverse is necessary to weaken the health risk behaviour such as smoking and alcohol consumption. Tobacco smoking was found to be the aggravating factor for hypertension as it reduced the response to anti-hypertensive medication (Mahmud, Wadi, Feely, & Silke, 2015). Heavy alcohol consumption was found to increase the blood pressure by changing the glomerular morphology and thus irreversibly complicate the condition of hypertension (Leal, Jorge, Joana, Maria, &

Isabel, 2017). Appropriate punishments and negative reinforcement have to be identified and applied for weakening such health risk behaviours and prevention of entropy after abstinence.

Initiation, practice and sustenance of lifestyle changes is a difficult task. It requires a strong conviction. This is possible only with a robust cognitive base built with adequate knowledge woven into appropriate logic combined with lucid communication. Only then the conviction is likely to invoke strong motivation to withstand obstacles of procrastination, entropy, and socio-environmental barriers to sustain the lifestyle changes. The difficulty of lifestyle changes is more a factor of denial (Telford, Kralik, & Koch, 2006) of the diagnosis and the natural 'resistance to change' (Stewart et al., 2005) from the well-established and deeply rooted life pattern. Thus effective management of hypertension calls for a paradigm shift in treatment approach. In majority of cases, the approach in vogue is a dyadic communication between the physician and the patient, where the communication is limited to the doctor informing the patient about the diagnosis, prescribing medication and 'advising' the patient to go on low salt, low fat diet and enhance physical activity (Swain, Hariharan, Rana, Chivukula, & Thomas, 2015). Technically this may be termed as 'Biomedical' approach. The reductionist approach of the biomedical model in looking at the disease from a mere medical aspect could not effectively control the blood pressure in the patients. The health care system in India, by undermining the lifestyle factors that includes psychological and social aspects of the patient has failed to attack the problem holistically. As a result, even though effective medications have been prescribed the patient did not understand the need for taking the medication because of poor knowledge about the nature of hypertension and importance of regular medication (Bender and Bender, 2005). They did not consider the seriousness

of uncontrolled hypertension (Wexler, Elton, Taylor, Pleister, & Feldman, 2009) nor appreciated the importance of management (Ponnusankar, Surulivelrajan, Anandamoorthy, & Suresh, 2004). This led to poor adherence to treatment regimen, which is the behavioural aspect of the patient that propels the management of the illness. Active participation of the patient in the disease management depends on the cognitive base of the patient. Thus the deficient outlook of the biomedical model which observes the mind and body as separate units cannot be applied. In fact the scenario of mind body dualism needs to be replaced with mind and body impacting each other and thus the suggestions of Astin, Shapiro, Eisenberg, & Forys (2003) that psychosocial support integration in the management of chronic disease is to be urgently considered. Thus management of hypertension needs to be multifactorial and multifaceted. This emphasizes the need for a paradigm change to biopsychosocial model. The biopsychosocial model of health (Engel, 1977) emphasizes that health is the interplay of three pathways (Oken, 2000; Moss, 2003) Such as biological (pathology), psychological (knowledge-cognitions, health beliefs, self-efficacy, anxiety, depression, fear, stress, adherence behaviour) and sociological (social support, role of caregiver). The psychological paradigm of the bio psychosocial model covers the psychological aspects of the patient in the disease management (Smith & Ruiz, 2002) such as knowledge about the disease and the management, self-efficacy or the motivation for the behavioural change and management of the disease, the affect states such as fear, anxiety, depression, stress and other emotional states which cloud the behaviours of the patient. The sociological paradigm of the biopsychosocial model focuses on the social aspects of the patient such as the social support systems including adequate financial resources for procuring medicines which enable the

patient in active disease management. This answers the question as to why many patients do not take the medications as prescribed.

The medical advice on diet and exercise involves behaviour/habit change calling for a deeper understanding of the phenomenon so as to build strong conviction which in turn constitutes the base for motivating the patient for change in behaviour or habit. Any change in behaviour that involves change in day to day lifestyle can be sustained only on the pillars of strong cognition.

Neisser (2014) defined cognitions as 'the activity of knowing: the acquisition, organization, and use of knowledge'. Health Psychologists applied this term in the context of health. 'Health cognition' is defined as 'the items of knowledge or beliefs about health and illness'. The intervention that aimed at enhancing the cognitions was called as cognitive intervention. '*Cognitive Intervention'* in the context of hypertension refers to the efforts at imparting the essential knowledge about the nature, causes, course, consequences and care of hypertension having a bearing on day to day life, the consequences of neglecting the condition as well as the signals for emergency care in simple, non-technical language so as to bring an altered behaviour. Knowledge refers to the concrete input while cognition refers to the mechanism of processing knowledge. The word 'cognition' originates from Latin. The western philosophers translated it as 'knowledge'. This resulted in the use of the two terms interchangeably. Thus the term 'Knowledge Intervention' and 'Cognitive Intervention' are found as synonyms in the literature. The cognition of the patients with hypertension needs to be targeted by knowledge input. Research evidence suggests that hypertensive patients have inadequate knowledge about the condition and also carry several misconceptions about the disease (Kusuma, 2009), nature of hypertension and importance of regular medication (Bender and Bender, 2005),

diluting the seriousness of uncontrolled hypertension (Wexler, Elton, Taylor, Pleister, & Feldman, 2009) and importance of management (Ponnusankar, Surulivelrajan, Anandamoorthy, & Suresh, 2004).

Several theories highlighted the importance of adequate information sharing as the stepping stone for success in the interventions which are aimed at hypertension management. The theories logically argued the close relationship between cognition and adherence behaviour that constitutes the essential antecedent of hypertension management. 'Information-Motivation-strategy model' (IMS) (DiMatteo & DiNicola, 1982) which was later revised by DiMatteo, Haskard-Zolnierek, and Martin (2012) posited three step formula to enhance adherence by starting with providing the patients not only the accurate information of 'why' and 'what' of disease but also of 'how' to adhere. This functional knowledge dissemination is proposed as the principal step in the doctor patient communication. Secondly, create an urge in the patients to become motivated to adhere by addressing the cognitive, social and contextual aspects. Thirdly, empower the patients with the road map of overcoming the practical barriers in the process of disease management. 'Information-motivation-behavioural skills model' (Fisher, Fisher, & Harman, 2003) emphasized the role of complete set of information about the disease, motivation and imparting of behavioural skills as the preliminary steps of enhancing adherence. When the two theories have aimed at enhancing the self-efficacy and adherence of the hypertension management, the Informational social support (Cohen, 1988) received by the patient would also serve as a resource that assuages the anxiety about the illness. This would target the cessation of anxiety and depression levels of the patient. Additionally, the 'theory of planned behaviour' (TPB) also called as 'Perceived Behavioural Control' PBC model (Fishbein & Ajzen 1975; Ajzen & Fishbein 1980) emphasized that self-efficacy about

the disease management propels the adherence behaviour. The self-efficacy is grounded on the principle that patients make rational, logical decisions by appraising the information provided to them.

Based on all the above theories, the formulation of an intervention that encompassed the principles of above mentioned theories by providing accurate knowledge about hypertension and its management could be planned. This would be named as cognitive intervention. Its principal content is knowledge and its principal aim is to enhance the cognitive base.

This cognitive intervention can be delivered to the patient in any form. *Form* is defined as the medium of dissemination of Hypertension knowledge to the patient with primary hypertension. Three major forms of knowledge dissemination are considered based on the work of Snyder-Ramos et al. (2005). They refer to- Direct Doctor Patient communication, Audio-visual form, and printed material form (brochures and pamphlets). However the review also found that the knowledge need not necessarily be absorbed by the patient in one interaction session as patients failed to recall the medical information shared to them (Schillinger et al., 2003; Kessels, 2003; Sherlock & Brownie, 2014). Thus the facilitation of repetition of the intervention can be considered as a principal factor determining the impact of intervention. The number of times the participant is exposed to cognitive intervention in any form is referred as *Frequency*.

Cognitive Intervention is expected to work upon one's health belief. Health belief has been theoretically explained through health belief model. It explains that the cognitive base formed through health perception is one of the influential means in promoting health behaviours. The central theme of health belief model is that it

addresses a person's perceptions about the risk of health problem and accompanied appraisal of recommended behaviour for managing or preventing the problem. Application of this model has yielded highly successful results in the form of promoting behaviours, like usage of seat belt, medical compliance, and health screening. Initially the health belief model had four key concepts—perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. Subsequently, the concept of 'cues for action' has been added to stimulate behaviour. The behaviour can be stimulated only if the self-efficacy is strong. Hence 'self-efficacy' has been added to address the challenges of habitual unhealthy behaviours, such as smoking and overeating. Apart from Health Belief Model (Strecher & Rosenstock, 1997), self-efficacy constitutes the key component in major theories that explain health behaviour, e.g. health belief model protection motivation theory (Maddux & Rogers, 1983; Rogers & Prentice-Dunn, 1997), and theory of reasoned action/planned behaviour (Fishbein & Ajzen, 1975). Furthermore, it is observed that when self-efficacy is improved, individuals successfully change and maintain behaviours that are crucial for health. These behaviours include improvement in physical activity, diet, stress management, cessation of smoking, adherence to treatment and prevention regimens, and involvement in self-examinations referring to disease detection behaviours. *Self-efficacy* as defined by Bandura (1997) refers to 'the conviction that one can successfully execute the behaviour required to produce the outcomes'. Self-efficacy also affects health through influencing various biological processes, which in turn, influence health and disease. Indeed, self-efficacy is found to change physiological response to stress including immune system, whereas lack of perceived control on environmental demands make the persons more vulnerable to infections and acceleration of disease progression (Bandura, 1977). Research

conducted on self-efficacy has contributed to our knowledge about how and why individuals adopt certain types of health behaviours (healthy or unhealthy), and how can we possibly change these behaviours in order to improve their health (Bandura, 1997). Self-efficacy generally affects health in two ways—(i) influencing adaptation to healthy behaviours and cessation of unhealthy behaviours, and (ii) maintenance of healthy behavioural changes even during difficult and challenging situations. This summarizes the significant role of self-efficacy in enhancing adherence in terms of lifestyle changes in addition to compliance with medication.

Adherence in holistic terms includes adherence to medication, diet, exercise and self-monitoring referred as clinical adherence. According to WHO, "Adherence is the extent to which a person's behaviour—taking medication, following a diet, and/or executing lifestyle changes—corresponds with agreed recommendations from a healthcare provider" (Burkhart & Sabate, 2003; Sabate, 2003). A more recent definition by World Health Organization (2009) reiterates the same as 'those actions which correspond with agreed recommendations from health care provider'. One of the classic definitions of *adherence* by Haynes and Sackett (1976) is 'the extent to which patients' behaviours coincide with health care providers' recommendations for health and medical advice'. Adherence in the present study focuses primarily on the patient-related factors referring to sustaining behaviours such as taking medication, maintaining diet, following physical exercise, and self-monitoring as prescribed by the health care providers.

The behaviour of *adherence* forms the fulcrum of effective management of hypertension. Four out of five hypertensive patients had reservations in taking the hypertensive medications (Benson & Britten, 2004). Globally, adherence was found to be only 50 percent (Krousel-Wood, Thomas, Muntner, & Morisky, 2004). However

in India, the adherence levels among hypertensive were abysmally poorer with only 18.3% (Gupta et al. 2008). These findings emphasize the need to study the construct of adherence. It is well documented that patients show poor adherence to the treatment regimens, because it demands changes in their behaviours. Kohler and Baaghdadi-Sabeti (2011) have observed that lack of adherence to the recommendations of the health care provider significantly increases the financial cost, morbidity, and increased mortality rates. Despite these risks, it is surprising that almost 50 percent of the patients with chronic diseases do not adhere to their treatment regimens (Sabate, 2003). In this background, it is imperative to understand factors involved in non-adherence behaviours and make use of appropriate theoretical framework that helps to predict these factors and develop interventions.

Theory of planned behaviour is one of the theories used to predict adherence behaviours in chronically ill patients (Ajzen, 1991). This theory is widely applied and proved to be effective in predicting different behaviours including physical activity, dietary behaviours, and health screening behaviours (Hagger & Chatzisarantis, 2009; McEachan et al., 2011). Applying the theory of planned behaviour has also enhanced our understanding of adherence to dietary patterns (Kor & Mullan, 2011), exercise (Courneya et al., 2008), and medication (Vissman et al., 2011).

Adherence is a complex and dynamic process. Partial or total adherence to the treatment is observed among patients depending upon the timing and circumstances. Lack of adherence results in morbidity, mortality, complications, hospital admissions, increased health costs, and dissatisfaction in both patients and doctors (Pisano & Gonzalez, 2014). Some of the beliefs, like fear of side effects, addiction to medication, or dependence on medication are the most popular reasons for many patients to fear anti-hypertensive medications. Chances of side effects from anti-

hypertensive medications are very rare and generally not serious in nature. Moreover, lack of adherence to the medication can have devastating consequences like damaging of organs. These myths have been the breeding ground for non-adherence. Thus lack of proper knowledge of the illness (Wang et al., 2015; Karaeren et al., 2009), complacence about the disease because of its high prevalence (Herrera, Moncada, & Defey, 2017), absence of fear of serious consequences of non-adherence (Herrera, Moncada, & Defey, 2017), inertia due to depression (Morrinon, 2013; DiMatteo, Lepper, & Croghan, 2000) or higher levels of anxiety inhibiting motivation and memory (Murphy, Chuma, Mathews, Steyn, & Levitt, 2015; Waldstein, Ryan, Manuck, Parkinson, & Bromet, 1991) have been found as some of the reasons for non-adherence. Thus, it may be stated that adherence is related to self-efficacy while non-adherence or inadequate adherence is related to one's affect state. Two of the major affect states that influence adherence are anxiety and depression.

The definitions adapted by 'American Psychological Association' viewed Anxiety as 'a state of tensed feelings, worrisome thoughts, and excitatory physical signs' while *depression* is defined as 'pervasive sadness and lack of motivation to engage in routine activities that may be accompanied by poor concentration, severe weight reduction or gain, lethargy, sleeplessness or oversleeping, heightened guilt and worthlessness and suicidal ideation' (Kazdin, 2000). The negative emotional states such as anxiety and depression hampered the effective disease management among patients with primary hypertension. Kim, Han, Hill, Rose, & Roary (2003) admitted that depression had a negative impact on the adherence to medications and lifestyle modification in patients with hypertension. In addition to depression, anxiety negatively impacted the adherence to medication in the hypertensive patients (Tlili et al., 2015). There was also susceptibility for the hypertensive patients for developing

negative affect states such as anxiety and depression due to the intense emotions that are rampant due to the physiological nature of the disease (DeJean, Giacomini, Vanstone, & Brundisini, 2013; Vetere, Ripaldi, Ais, Korob, Kes, & Villamil, 2007). Anxiety and adherence are observed to have positive correlation in persons with primary hypertension. Persistent feeling of anxiety in higher form is however, likely to worsen the disease condition. Although the levels of anxiety were short term, the repeated heightened levels of anxiety in the hypertensive patients proved to endanger the situation as it decreased vascular variability. This leads to blood vessels offering persistent resistance, thus aggravating the condition of hypertension (Fujino et al., 2004). Studies have observed high levels of anxiety among the patients with primary hypertension (Saboya, Zimmerman, & Bodanese, 2010; Grimsrud, Stein, Seedat, Williams, & Myer, 2009; Pan et al., 2015). Anxiety also was detrimental in the management of hypertension as it delayed the lifestyle modification (Khatib et al., 2014). Thus there is an immense need to study the constructs of anxiety and depression. The relationship between depression and hypertension was found to have been partially mediated by social support (Heard, Whitfield, Edwards, Bruce & Beech, 2011). Strong relationship was found between perceived social support and the psychological distress (Chivukula, Swain, Rana, & Hariharan, 2013).

With the advent of 21st century, India is at the cross roads of socio-structural transformation. The family size has been diminishing with the change in job demands operating on time, resource and work pressures (kumar 2011). The biopsychosocial framework in its third paradigm looks into the social aspects of the management of the disease. The basis for the model stands so because experience of the patient always happens in a social context. People around the patient influence the behaviour of the individual either positively or negatively. The role of social support in

impacting adherence cannot be disputed (Trivedi, & Piette, 2015). Additionally, several studies observed social support as an important contributor in the management of primary hypertension (Holt-Lunstad, & Uchino, 2015; Ivarsson, Rådegran, Hesselstrand, & Kjellström, 2017). Perceived social support is more apt as a construct as it measures the individual's subjective appraisal of the availability of support from the relationship (procidano & smith, 1997). Zimlet, Dahlem, Zimet, and Farley (1988) defined the *Perceived Social Support* as the 'Individual's report or perceptions of the level of support that he or she receives from different interpersonal relationships such as friends, family and significant other people'. Perceived social support is an overall innate cognitive understanding of whether the support matches one's expectations or not. If the perception is positive, it can assuage the emotional stress as it acts like a buffer in taking the deleterious effects of stress (Cohen & Wills, 1985). This buffering effect has been theoretically conceptualized by means of the information based model and the social influence model. According to the information-based model, an individual may be comforted by the perception that social support can provide her or him the relevant information to re-evaluate the situation and reduce its harmful impact. The social influence model explains that an individual may perceive confidence over a stressful situation because social support would influence him/her for coping in a fruitful manner. In addition, social support was found to play a mediating role between anxiety or depression and hypertension. In the hypertensive patients, the informational social support provided by the doctor as part of doctor patient communication was found to have strong relationship with the outcome of hypertension adherence (Swain, Hariharan, Rana, Chivukula, & Thomas, 2015).

Thus it is of interest to examine if knowledge input aimed at enhancing cognitive base (hence called cognitive intervention) is successful in improving adherence behaviours and thereby hypertension management. If so, which form of intervention and in what frequency brings the most effective outcome? Further, does the cognitive intervention influence self-efficacy , anxiety and depression levels, and perceived social support which have a significant bearing on adherence behaviour and thereby the management of hypertension.

This study advocates and partially tests the biopsychosocial approach to treatment of primary hypertension. The cognitive Intervention presented in two forms and frequencies is expected to create robust cognitive base triggering self-efficacy leading to higher levels of adherence behaviour that optimizes the management of hypertension. Thus the study in a way is a deviation from body mind dualism to the integral functioning of both requiring a symbiotic approach to treatment so as to enhance the outcome.

Chapter II

REVIEW OF LITERATURE

Chapter-II

Review of Literature

In this chapter, a comprehensive literature review in the form of descriptions and critique of concepts and empirical findings related to the topic of study is presented thematically. The focal point of the review presents the scenario of hypertension in India and highlights the management of the condition and the devastating cardiac emergencies in the event of inadequate management. The review also presents the plausible solutions to the existing endemic of hypertension crisis and attempts to rationalize the need for restructuring of the faulty health cognitions as a result of inadequate knowledge base. The review includes evidence based literature in support of the impact of knowledge level on adherence and thereby the positive impact on the management of hypertension with a special emphasis on Indian context where necessary. The literature that would be presented herein largely confines to the publications related to hypertension management from the year 2000 till date. Nevertheless, if there was a need to support a historical or theoretical foundation, sources earlier to the year 2000 have been referred.

Facts and Figures related to Hypertension

Hypertension is one of the Non Communicable Diseases (NCD) that poses a great threat at global as well as local level. The other NCDs found to have high prevalence are diabetes, arthritis and depression. The Non Communicable Diseases are viewed as epidemic posing the greatest global challenge to the 21st Century (Bloom et al., 2012; Reddy, 2003). Collectively, NCDs account for 63% of all deaths worldwide with 80% of those taking place in developing countries (Narayan, Ali, & Koplan, 2010; WHO, 2013). According to a report by WHO (2002), it is expected

that chronic diseases will account for 73% of deaths and 60% of the global disease burden by 2020, and also for major percentage of diseases and deaths in India.

Hypertension is of two types namely Primary and Secondary. Primary Hypertension is a condition where the cause of the high Blood Pressure is unknown. It is asymptomatic and is accidentally discovered in significant number of cases. Left untreated it could lead to cardiovascular diseases (CVD) that may turn fatal. Hence it is called a silent killer. Hypertension is defined as the blood pressure of 140/90 mmHg and above (Poulter et al., 2015). Based on this definition the prevalence is progressively on the rise in rural India (Gupta 2004) and is on rapid increase in urban India (Gupta &Gupta, 2009). Recent years have witnessed a humongous escalation in the prevalence of hypertension. One in three adults is affected by the condition globally (World Health Organization, 2013). It is alarming to notice the prevalence at 29.8% in India (Anchala et al., 2014).

Future projections of hypertension for 2025 sounded a caution with a predicted prevalence at 29% among men and 29.5% among women globally (Kearney et al., 2005). The same study further added in coordination with the projections of Directorate General of Health Services and Family Welfare, Government of India, the prevalence of hypertension in India by the year 2020 will be 159.46 per 1000 population. Further from the same study, in its analysis of worldwide data from the global burden of disability study projected that by the year 2025, 22.9% among Indian men and 23.6% among Indian women would suffer from hypertension. It gives a startling and grim revelation considering the projections by the World Health Organization (WHO) data that by 2025 the world wide burden of high blood pressure will increase by 60% which would be 156 crore individuals' worldwide (Kearney et al., 2005). Should we consider this as a mere number or should desire the researchers

to plan interventions to prevent that projected scenario? The task force report of the American College of Cardiology and American Heart Association issued the latest guidelines for defining Hypertension as the blood pressure reading of 130/80 mm Hg of systolic and diastolic pressures and above considered as hypertension instead of 140/90 mm Hg of systolic and diastolic blood pressures (Whelton et al., 2017) is likely to add to the present numbers.

Consequences of hypertension can be viewed in two ways, viz the adversities suffered by the patient and the disease burden at national and global level. According to WHO reports a major portion of 45% of deaths are due to heart disease and 51% of deaths due to stroke, thus accounting for 9.4 million deaths worldwide every year (World Health Organization, 2013). The statistics related to India is worse than the aggregate global scenario. It is not surprising that a very low percentage of patients to the extent of 6.5- 15% in rural and 11.6-28.7% in urban India have their Blood Pressure under control (Anchala et al., 2014). This explains the findings of Gupta (2004) that India witnesses 57% of cerebrovascular deaths and 24% of all deaths due to coronary heart diseases attributed to uncontrolled hypertension. The result of uncontrolled hypertension due to ignorance leads to sudden cardiac emergencies such as cardio vascular disease or stroke. It was reported by the Indian Council of Medical Research (ICMR) that hypertension was the cause of 24% acute myocardial infarction, 21% peripheral vascular diseases and 16% ischemic heart disease (Subramanian, Soudarssanane, Jayalakshmy, Thiruselvakumar, Navasakthi, Sahai, &Saptharishi, 2011).

Global Burden of Disease Study conducted by Lim *et al*. (2013) reported high blood pressure as the most important risk factor responsible for 9.4 million deaths and 7 % Disability Adjusted Life Years (DALYs) across the world . Hypertension levied a

considerable economic burden of 10 percent of global expenditure on health care underlining the serious implications for developing countries with constrained economic resources (Gaziano, Bitton, Anand, Weinstein, 2009). Annual income losses in India due to cardiovascular diseases and hypertension were tantamount to more than one third of all income losses (Mahal, Karan, & Engelgau , 2010).

Need for paradigm shift in management of Hypertension

While the projected prevalence rate rings an alarm, what triggers a greater concern is the ignorance of hypertensive condition of one self among the patients. Ignorance of the patients can be categorized as ignorance of the fact that they suffer from primary hypertension as well as lack of awareness about the condition called 'hypertension' and its seriousness. As Hypertension is an asymptomatic condition, most of the patients are unaware of their hypertensive status for years. The asymptomatic nature of hypertension contributes to unawareness of the condition among patients until accidentally diagnosed. Mohan, Deepa, Farooq, Dutta, and Deepa (2007) in their survey in south India found that 67% of those who had hypertension were unaware of their condition, which corroborates with the data of World Hypertension League that states that more than 50% hypertension population are ignorant of their condition (Witten, Vuuren, &Learmonth, 2013; Chockalingam, 2008). Even among those who were aware of their condition, ignorance about the nature of hypertension was evident. In a study by Oliveria, Chen, McCarthy, Davis, and Hill (2005), although 91% of hypertensive patients knew that controlling B.P would enhance health, 41% of the patients were unaware of their level of blood pressure. Only 34% rightly spotted Systolic Blood Pressure (SBP) as the 'top' number; 32% spotted Diastolic Blood Pressure (DBP) as the 'bottom' number of their reading; comprehensively, only 30% of patients were able to accurately recognize

both systolic and diastolic readings. These findings demonstrate that majority do not have a comprehensive understanding about the reading of BP.

Studies related to knowledge level in specific areas of hypertension cited under different head in this section also indicate levels of ignorance about the disease. Lack of awareness and inadequate knowledge contribute to neglect of treatment leading to cardiac emergencies, irreversible adversities and even cardiovascular deaths (CVD). Though research data has pointed at this globally and locally, the health practices largely continue to be biomedical. Continuing the earlier biomedical method of management in the treatment of hypertension has not yielded satisfying results in curbing the condition as hypertension has already become an epidemic and as mentioned earlier, future projections of the condition and the associated cardiac emergencies leave the research community baffled. In this prevailing situation, the possible gaps in the health care system need to be effectively identified.

An examination of the healthcare practices in India in the context of hypertension reveals that when a patient consults a doctor, the doctor checks the Blood Pressure, investigates into the symptoms and prescribes medicine or changes the medications. This short process has high possibility of leaving an impression in the mind of the patient that the hypertension condition is treated by the medicine prescribed by the doctor. This typically is the outcome of biomedical model. However, the condition of Hypertension has a great deal of relationship with the lifestyle of the patient that includes the type of diet, physical activity, stress levels and their effective management, and the patient's knowledge about and response to alarm signals and emergency situations. Then, the approach of treatment for hypertension calls for a transcendence from biomedical to bio psychosocial model.

The patient who suffers from a disease and seeks treatment does so in a psychosocial context. It is essential to know if the patient is high on anxiety and depression (which impacts the cognition and thus the memory to be regular with medication), has a social support network of family and friends to aid in therapeutic adherence (that includes diet, exercise and other lifestyle factors) and the economic status to afford the medication and other treatment regimen prescribed. This emphasizes the necessity of not merely appreciating mind-body interdependency, but of also practicing mind-body medicine in which psychosocial support is integrated into treatment portfolio (Astin, Shapiro, Eisenberg, & Forys, 2003).Thus bio psychosocial approach is the need of the hour.

Research in Behavioural Cardiology already proved that knowledge of hypertension is strongly related to adherence behaviour which forms the foundation for effective pharmacotherapeutic outcome (Conthe et al., 2014).

Though the pharmacotherapy was effective in controlling the blood pressure in the patients with hypertension, the benefits of the medications are not realized as globally 50% of hypertensive patients are non-adherent to medication (Dennis et al., 2011; Sabate, 2003). The reasons for non-adherence could be many. One of them is ignorance about their condition. In India only 38% of diagnosed patients acknowledge being under treatment (Anchala et al., 2014) which is a testimony of adherence. The progressively increasing levels of prevalence itself could be a cause to create complacence. When a larger percentage of population is found to have an adverse health condition, the seriousness of it is likely to get diluted because of its frequency and familiarity. This leads to non-adherence to the prescribed medication and the lifestyle. Hypertension being chronic illness needs active participation of the individual. This lays emphasis on the need to focus on the biopsychosocial approach

to treatment rather than looking at hypertension through a reductionist biomedical model alone. According to Engel (1977) the biopsychosocial approach regards illness and health as functions of bio-physical parameters (e.g. pathology) in conjunction with psychosocial characteristics (e.g. self-efficacy and social support). Self-efficacy is very closely related to motivation. Motivation is effectively in operation only when cognition related to the desired behaviour is complete. The motivation to adhere to the medication and necessary lifestyle changes results from the health cognitions of the person. To explain logically, when the patient understands the significance of restricted diet, exercise and self-monitoring in terms of their contribution in regulating the blood pressure and the risks of not complying with it does he experience the drive to adhere to medication and prescribed life style. Thus, the first step towards a paradigm shift from biomedical to bio psychosocial approach is to create a strong knowledge base about hypertension in patients. Research evidence about the positive impact of knowledge on hypertension management is convincing.

Hypertension Knowledge and its Significance

Management of hypertension involves minimizing risk behaviours and optimizing health promoting behaviours. Any voluntary behavioural change in adult is desirable in view of probability of sustenance. Voluntary change in health risk and health promoting behaviour calls for a strong conviction. The conviction gains its origin and strength from a robust cognitive base. Cognitive base is created through appropriate knowledge inculcation. Learned resourcefulness model (Rosenbaum, 1990) theoretically proposed that cognitions impact the self-control of health behaviour of a patient thereby the blood pressure control. Several studies have indicated that the knowledge had significantly contributed to hypertension control

(Pandit et al., 2009; Xu et al., 2014; Bodenheimer, Wagner, & Grumbach, 2002; Coleman, Austin, Brach & Wagner, 2009).

There are a number of studies providing insight into several dimensions of knowledge related to hypertension. Research evidence in India and other countries have indicated that patients were unaware of the importance of medication (Ponnusankar, Surulivelrajan, Anandamoorthy, & Suresh, 2004) and exercise (Awotidebe et al., 2014) in the management of their disease. Studies also indicated inadequate knowledge about consequent complications of uncontrolled hypertension (Machado, Pires, & Lobao, 2012; Wexler, Elton, Taylor, Pleister, & Feldman, 2009). Studies also found people's lack of awareness about the normal blood pressure values (Wizner, Gryglewska, Gasowski, Kocemba, & Grodzicki, 2003) and their usual BP level (Zdrojewski, Pienkowski, Szynkiewicz, & Krupa-Wojciechowska, 2001). Notwithstanding all this, correct knowledge about the total adherence to medication is very important in view of the fact that being irregular with medication is very dangerous since it may lead to cerebral hemorrhage and paralytic stoke. A study conducted on 254 hypertensive patients in Nigeria found that 35.4% of the patients knew that hypertension should ideally be treated for life, while a majority of 58.3% held the misconception that antihypertensive drugs should be used only when there are symptoms. The remaining 6.3% believed that the treatment of hypertension should be for periods ranging from two weeks to five years but not for life (Familoni, Ogun, & Aina, 2004). These misconceptions held by the patients have a higher risk of impacting their clinical adherence and thereby on the outcome of management of blood pressure.

Another study from Cameroon that included 221 patients with hypertension assessed the hypertension knowledge through a 15 item scale and found that only

14% had adequate knowledge of hypertension, a 53.4% had average knowledge of hypertension while 32.6% of participants had poor knowledge of hypertension (Akoko, Fon, Ngu, & Ngu, 2017).

Medical science could not establish a definite cause for primary hypertension. Yet patients are found to attribute the condition to various causes and often wrongly so. Studies on knowledge levels related to hypertension also identified a number of myths and misconceptions related to hypertension. Kusuma (2009) identified several misconceptions among people that the condition of hypertension arises only when a person is under tension, the second myth is that hypertension was symptomatic and can be due to the urban living and daily stresses. Hariharan, Andrew, Kallevarapu, Rao, and Chivukula (2018) in their study found that 22% of the responses given by school children were misconceptions. The study reiterated that high school children held several misconceptions about hypertension such as hypertension means 'feeling high levels of tension', 'it makes a person vulnerable to get angry, shout at others and leads to aggressive behaviour' , 'a common disease that develops mostly in old age'. In view of the findings related to inadequate knowledge and myths and misconception related to hypertension whose prevalence is progressively in the rise, it is appropriate to think of cognitive intervention as an integral part of the treatment process so as to optimize the management of the disease.

Motivation through cognitive intervention

Cognitive intervention refers to an effort to create cognitive base in a specific area, which in this context is the area of primary hypertension. Past research referred to this in various expressions such as health information, patient education, psychoeducation, knowledge interventions and health education. Hence this section

refers to these terms as used in the respective studies. Compared to managing the repercussions of the uncontrolled blood pressure and its fiscal burden, it is cost effective to organize patient education as a preventive measure. Trogdon, Larsen, Larsen, Salas, & Snell (2012) had assessed the cost effectiveness of providing information that has phenomenally curbed the costs incurred in cardiac emergencies in the later part of disease progression. The study found out that by helping in controlling the blood pressure in the sample of 151 hypertensive patients, a future reduction of 0.3 % of cardiovascular emergencies in the form of stroke and heart attack was achieved. This predicted a saving of USD $767 per hypertensive patient.

Educating a patient of Hypertension is expected to create a cognitive base in the patients, which in turn impacts the affect states on one hand and motivation on the other. Once this is done, the patient is more likely to have higher levels of adherence. To explain in detail, when the information related to 'why' adherence is needed is understood by the patient, it will influence the motivation levels and attitude change. This theoretical model is rooted on the cognitive perspective of the patient education interventions (van et al., 2007). The cognitive intervention concentrates on changing patients' (dysfunctional) ideas and perceptions thereby enhance the motivation to change which translates to adherence behaviour. Several models emphasized the importance of cognitions in bringing about the desired behavioural change. The desired behavioural change as an outcome first begins by the dissemination of the adequate information as emphasized by the Information-Motivation-Strategy model (DiMatteo, Haskard-Zolnierek, & Martin, 2012), Information-motivation-behavioural skills model (Fisher, Fisher, & Harman, 2003), Informational social support (Cohen, 1988), and perceived behavioural control (PBC) model (Ajzen, 2002).These models highlight the need for clear communication of the necessary information regarding the

disease by the provider i.e. doctor to the patient in a clear language matching the level of patient's understanding. But the scenario of health care presents a grave picture as highlighted by the review of more than 300 studies. This review reiterated that many patients do not understand the health information shared to them (Kindig, Panzer, & Nielsen-Bohlman, 2004). A study by Thomas, Hariharan, Rana, Swain and Andrew (2014) revealed that 4% to 90% of the patients could not comprehend what the doctors spoke across 11 cardiac jargons during the process of consultation. Doctors who communicated effectively by talking to their patients and listening to them have left a better impact on the adherence levels of the patient. Significant correlations were found between communication and adherence. In a meta-analysis of more than 100 studies, Zolnierek & DiMatteo (2009) found that the patients whose doctors could not communicate effectively were 20% more likely to fail in their clinical adherence when compared to those who received information from effective communicators. The logic is simple. When there is ambiguity in information or communication, it fails to percolate down to comprehension. When there is no comprehension, there cannot be motivation. Thus the studies highlighted the immense need to the sharing of information as the key for behavioural outcomes. Motivational Interviewing and Cognitive Behaviour Therapy are increasingly used as communication techniques on patients with non-communicable diseases requiring major behavioural changes for better prognosis. They are based on the basic assumptions that resistance to change life style originates either due to lack of motivation or because of inadequacy, absence or faulty cognitions related to the disease. Behavioural change is an integral part of hypertension management which involves cessation of risk behaviour and initiation and sustenance of prescribed dietary and exercise pattern. The disease management in hypertension involving major behavioural changes in diet, exercise and self-

monitoring demands active participation of the patient in treatment process. This calls for self-accountability and sustained motivation levels. Motivational Interviewing includes information transfer through which a need to change is created in the patient. This helps in moving the individual from the pre-contemplation stage (no intention to elicit behaviour change) to action (making the behaviour change) and maintenance (sustaining the behaviour change for more than a 6 month period).Very often patients are found to exist in the pre-contemplation stage related to ignorance about the implications of their condition and their unhealthy dietary consumption on their blood pressure control outcomes(Witten, Vuuren, &Learmonth, 2013; Dennison, Peer, Steyn, Levitt, & Hill, 2007; Nkosi& Wright, 2010). Witten, Vuuren, &Learmonth (2013) found that motivational interviewing and cognitive behavioural therapy were successful in low income countries. Explaining the process in initiating and sustaining the behaviour change, researchers pointed out that motivational interviewing would increase awareness, and address ambivalence towards the dietary behaviour change and boost motivation to implement this change while Cognitive Behaviour Therapy would provide the necessary skills to maintain this change over long periods of time (White, 2001; William & Garland, 2002).

Forms of Cognitive Intervention

Information can be shared through different methods or forms such as direct communication, audio-visual mode, Print material (instructions and education), personalized health communication and story-telling or narratives. There is wide option of knowledge transaction that ranges from team communication to e-communication. The target of knowledge intervention can be individual patient, group of patients and population. In this review, the three major forms of knowledge

dissemination (Snyder-Ramos et al., 2005) are deliberated such as direct interaction form, audio-visual form and written form.

A) Direct Interaction form to create knowledge

Direct Communication between the health professional and the patient includes in its content clear explanations of the details of the disease, the role of medication in systemic/physiological correction, significance of diet and exercise, the alarm signals indicating cardiac emergency, medical consultation and the need for constant monitoring of the chronic condition. Thus it integrates authentic dissemination of information and creation of essential knowledge base in strengthening cognitive base ideally with equal participation from the patient by way of seeking additional information and clarifications. Thus direct interaction form assumes an advantage for the patient where only relevant information to his or her condition is filtered. Further, the physical presence of the doctor and the privacy factor adds to encourage the patient to form a strong knowledge base by interacting uninhibitedly. This enhanced quality of communication directly contributes to quality of knowledge.

Studies have shown the direct relationship between the quality in the communication between doctor and the patient and levels of adherence (Swain, Hariharan, Rana, Chivukula, & Thomas, 2015). Studies support that better adherence and hypertension control was seen in patients when the doctor-patient communication was collaborative, and when the patients actively participated in setting treatment goals and decision making (Naik et al., 2008). In fact, a review article (Bensing & Verheul, 2010) further explained the silent healing role of good doctor patient communication and suggested the placebo effect in three plausible mechanisms such

as expectancies, conditioning and affect manipulation. Providing patients with the space to ask questions (and have them answered) and allowing for clarification of the information they received, and to tell the story of their illness experience had actually enhanced the effective sharing of the information (Roter, Frankel, Hall, & Sluyter, 2006; Haidet & Paterniti, 2003). Provision of a platform for interaction between doctor and patient was found to be the key to enhance communication quality and further had a profound impact on patient outcomes (Wasson et al., 2008). In a multicenter quasi experimental study, a sample of 120 hypertensive patients were exposed to the educational intervention which consisted of doctor patient communication supported by a pamphlet containing information related to the knowledge of hypertension such as definition, causes, cardiovascular risk factors due to poor control and methods to enhance the blood pressure control. At the baseline assessments definition of hypertension was understood by only 48% of the sample. After the intervention, it increased to 99% of the sample. Knowledge related to consequences of poor hypertension control on kidneys and eyes at the baseline was seen in 54% and 58% of the sample respectively. This has increased to 100 % after the intervention. Improvements in knowledge related to medication were also observed from 51% of the sample at the baseline to 87% of the sample after the intervention (Ho et al., 2016). The study shows a positive impact of direct form of cognitive intervention on knowledge enhancements. Cognitive intervention in the form of oral information supplemented with written pamphlets had a positive impact on the elderly patients with hypertension in the domains of hypertension knowledge such as general information about hypertension, risk factors associated with the uncontrolled high blood pressure and medication management (Estrada, Pujol, Jiménez, & Salamero, 2012). Additionally, the Direct form of communication not

only enhanced the levels of knowledge about hypertension but also had a positive influence on the beliefs about medicines among the patients with hypertension (Magadza, Radloff, & Srinivas, 2009). In addition to modifying the health beliefs, several studies have also highlighted the importance of direct form of communication on the patient and hence behavioural outcome (Chen et al., 2007; Platt & Keating, 2007; Swain, Hariharan, Rana, Chivukula, & Thomas, 2015; Vermeire, Hearnshaw, Van Royen, & Denekens, 2001; Vik, Maxwell, & Hogan, 2004; Tongue, Epps, & Forese, 2005; Zolnierek, & DiMatteo, 2009).

Further, the quality of direct form of communication was found to follow a pathway through adherence behaviour and influenced the prognosis of the hypertension (Swain, Hariharan, Rana, Chivukula, & Thomas, 2015). Street, Makoul, Arora, & Epstein (2009) posited that active participation from both the doctor and patient's side enhanced the quality of communication and thereby had a therapeutic effect on the blood pressure control.

The important aspect of the information sharing hinges on '*who'* will play a key role in hypertension knowledge inculcation. The responsibility of creating an adequate cognitive base stands on the provider of the information i.e. primarily the physician. According to Lazare, Putnam, & Lipkin (1995) primary function of the doctor in the medical encounter is to educate the patient. In addition to the physician, the health information can be shared by other health professionals such as nurses, health psychologists, pharmacists, dieticians, nutritionists, physical therapists and social workers. Several studies present the key role of the specialist physician in dissemination of information (Beigi et al., 2014; Lu et al., 2015; Park et al., 2011). A quasi experimental study on 100 participants revealed that the short term educational program provided by a resident cardiologist was effective in bringing about

enhancement in knowledge, self-management and lifestyle modifications and also the blood pressure control (Beigi et al., 2014). The scarcity of doctors triggers the need for other health professionals in enhancing the information related to hypertension. Studies found that health professionals such as Nurses played a key role in educating the patient for risk management and providing information for facilitating the desired behavioural change (Glanville 2000; Yawn 2000). A Randomized controlled study in turkey (Hacihasanoğlu & Gözüm, 2011) allotted a sample of 120 hypertensive patients to three groups of 40 each. The first group was exposed to education regarding medication adherence, the second group was exposed to education about healthy lifestyle behaviours and medication adherence in addition. The Control Group was given only standard medical treatment. Intervention was provided in a structured and individualized format by trained nurses. Results showed increase in self-efficacy related to adherence to medication and Healthy lifestyle behaviours in first and the second group. Results also showed significant reduction in Systolic and diastolic blood pressures in both the groups. The second group had greater reduction in the blood pressure readings than the first group. The study throws light on the important role a nurse can play in the dissemination of information in the hypertension management. An Indian intervention study (Ramanath, Balaji, Nagakishore, Kumar, & Bhanuprakash, 2012) also highlighted the role of a clinical pharmacist in educating the hypertensive patient. The randomized trial in which intervention group was exposed to patient counseling by the clinical pharmacist, patient information leaflets and frequent telephonic reminders had enhanced adherence to medication and quality of life. While individual role of each health professional has a significant impact, it is interesting to see the combined effect of the provision of direct form of communication between the patient and the multidisciplinary team. A quasi

experimental study (Lauzière, Chevarie, Poirier, Utzschneider, & Bélanger, 2013) conducted on a sample of 40 patients also revealed that direct interaction by a team had better results. Structured educational program involving interdisciplinary team of educators such as physician, pharmacist, and dietician was associated with reduction in blood pressure and thereby contributed to risk reduction for cardiovascular emergencies. Thus the role of several health professionals answers the question of 'who' will disseminate the health information.

Very few studies provided the intervention at the individual level (Hacihasanoğlu, & Gözüm, 2011; Saleem et al., 2015). Some of the intervention studies exclusively provided one to many i.e group based interventions (Lauzière, Chevarie, Poirier, Utzschneider, & Bélanger, 2013; Ramanath, Balaji, Nagakishore, Kumar, & Bhanuprakash, 2012) while several other studies used the combination of individual and group based interventions (Beigi et al., 2014; Lu et al., 2015; Park et al., 2011). The last types of interventions were at the level of many to many i.e. multidisciplinary teams communicating to a group of hypertensive patients (Lauzière, Chevarie, Poirier, Utzschneider, & Bélanger, 2013). However the efficacy levels seemed to be same when compared to the interventions being provided at the individual or at the group level. However when human resources are scare, group interventions were swifter in reaching larger audiences and saved time and man power in achieving the desired objectives.

To enrich the direct interaction form of communication, supplementing the communication with the help of audio-visual aids such as animations enhanced the efficacy of the cognitive intervention. Direct interaction by the doctor if supported by the audio-visual aids in the form of animations and pictorial representations had better impact when compared with the mere didactic lecture (Mayer, Hegarty, Mayer, &

Campbell, 2005; Lu et al., 2015). However direct form of communication is not devoid of limitations. Doctor's use of complex medical language (Castro, Wilson, Wang, & Schillinger, 2007) may contribute to poor physician-patient communication thereby the knowledge of the patient. Considering the limitations from the patient's perspective, participation in the consultation process demands certain basic characteristics. Level of education and profound language skills seem to moderate the quality of communication. A study by Jolles, Clark, &Braum (2012) stresses that patients with less education and language barriers were found to have trouble in comprehending the health information and failed to connect with physicians thus resulting in non-adherence and poor hypertension control. Indian patients hold the physician in high esteem and ascribe high significance to the information from the doctor. However, unfortunately the quality of communication between the physician and the patient was found to be inadequate (Swain, Hariharan, Rana, Chivukula, & Thomas, 2015). The plausible reason may not be the lack of competence but can be attributed to the startling disproportion in the doctor patient ratio 1:2000 in India (Sharma, 2016) as against the WHO prescribed doctor-patient ratio 1:1000 (World Health Organization, 2017). This lays a serious constraint of time for the physician. The findings of Irving et al. (2017) reiterating the fact revealed an upsetting consultation time of mere two minutes a doctor spends with a patient in India. The time constraint compels the doctor to avoid engaging in elaborate explanations of the relevant issues related to the condition. Complicating the scenario, the study by Thomas, Hariharan, Rana, Swain, & Andrew (2014) revealed that patients could not comprehend the jargon used by the doctors in their communication. This contributes to lowering the quality of communication between the doctor and the patients. One

method of compensating the paucity of doctors' time is to provide the patients with virtual form of communication.

B) Knowledge Intervention in Virtual form

In virtual form, the knowledge transmission can occur through audiovisual mode by a health care professional even in their absence. The exclusive advantage of this method is if once doctors' information is recorded audio-visually, the physical presence of the doctor is not needed. This audio-visual method can also be presented in a group setting with delivery in multiple forms such as DVDs, internet based downloadable formats, watsapp, email and other video forwards. This form of patient education has its own set of advantages and disadvantages. The advantages of the virtual form of communication are that of wider scope of reaching the population in a short time. The phenomenal rise of internet usage and smart phone in the hands of almost majority of the population enables the faster and wider reach. It is less resource intensive and also a cost saving form of patient education (Sweat, O'donnell, & O'donnell, 2001).

According to the Mayer's multimedia learning theory the form or the medium through which any information is disseminated will dramatically affect the way the information is comprehended and stored (Mayer, 2003; Mayer & Moreno, 2003). Particularly, visual and auditory information is separately processed (Mayer, Heiser, & Lonn, 2001). When content is illustrated through pictures and words, the narration enhances the better coding of the verbal content than the written form. The superiority of the audio-visual over the written can be supported by the studies which suggest that when audio is used to convey the textual information, it frees the visual working memory to efficiently process related images, whereas the written form or

print based material forces the reader to split his/her visual working resource between the images and words (Mayer, 2003; Mayer & Moreno, 2003). Video gives an advantage for those who are challenged with reading difficulty. Video may be preferred when patient education material involves procedural information such as measurement of blood pressure or home B.P monitoring, understanding the physiology of the person, etc.

Several studies reported mixed and variable findings with regard to the efficacy of the health education programs. A systematic review (Tuong, Larsen, & Armstrong, 2014) of 28 controlled trial studies comprising of 12,703 subjects found that audio-visual interventions were variably effective for health behaviour modification depending on the target behaviours. The interventions were effective in enhancing the functional knowledge, treatment adherence, self-care in patient with congestive cardiac failure. For health behaviour change, the gain framing messages were more effective than the loss framing messages. In order to learn new behaviours, video modeling was found to be effective. The functional knowledge aspects such as measuring the blood pressure as a regular self-monitoring, understanding of the physiology of the circulatory system and complication of uncontrolled hypertension were effectively comprehended when visual messages are presented.

A systematic review (Abed, Himmel, Vormfelde and Koschack, 2014) found ten of the 20 reviewed studies reporting that audio-visual health education modules were successful in behavioural modification. Three different formats have been summarized for presenting the information in the audio-visual mode namely didactic presentation involving objective information as verbal instruction with or without figures, the second format was practice presentation where real people were filmed while they engaged in a specific practice and thirdly narrative presentation involving

real people being filmed while enacting scenes. Seven of the ten studies reporting a change in behaviours subscribed to practice presentation or a narrative presentation format. Researchers concluded that efficacy of patient education in audio-visual form is a matter of presentation format. Videos which provided only spoken or graphical presentation of health information were not appropriate for modifying faulty behaviours. Videos which showed real people such as patients practically demonstrating the skills were more effective. If the aim is to modify a more complex behaviour, the choice of narrative presentation format seems to promise ideal outcome.

The design of the audio visual patient education material is the important factor as it facilitates the cognitive factors that trigger the working memory facets in enhancing the careful retention and recall. Audio-Visual form of information dissemination through animations and videos were found to be effective in patients when procedural knowledge such as monitoring of the blood pressure, measurement of the blood pressure, anatomical and physiological intricacies of the body are better absorbed by the patient when information is presented visually (Wofford, Smith, & Miller, 2005; Leiner, Handal, & Williams, 2004).

The effect of audio visual patient education materials specific to hypertension has not been assessed separately. Several studies have clubbed the audiovisual intervention along with the written pamphlets. The study by Hamilton, Roberts, Johnson, & Tropp (1993) measured the effect of educational intervention on 34 patients with primary hypertension. The intervention has educated the patient of the adherence plan and the group was provided with pamphlets and audio-visual material. Intervention group testified a higher adherence to appointment keeping and drop in systolic blood pressure. Similarly Eckman et al.(2012) studied the impact of two

forms of educational interventions such as booklet alone and the booklet with video education through DVDs on the patients 'living with coronary artery disease' and found that knowledge and health behaviour scores improved in both the groups. The group receiving the booklet and video had greater improvements in test scores when compared to the booklet alone.

An intensive search of literature could not identify adequate studies related to cognitive intervention through audio-visual form.

C) Knowledge Intervention through Written form of communication

The practice of knowledge dissemination through written communication has been in vogue in hospitals. Many hospitals display booklets related to various health problems to be picked up by the patients. The purpose is to disseminate necessary information and thus enhance health literacy among public. A systematic review advocates that every physician's office should be stocked with a variety of pamphlets and brochures such that they provide the scope for self-education by the patients with hypertension (Fitzmaurice & Adams, 2000). A randomized controlled trial that measured the impact of a simple patient education booklet having written information was found to enhance the knowledge about hypertension (Dawes, Kaczorowski, Swanson, Hickey & Karwalajtys, 2010).

The advantage of the written information can be the feasibility of dissemination through internet and smart phone medium. Hunt, Siemienczuk, Touchette, & Payne (2004) found that the written information in the form of patient education booklet could be mailed to the patient and proved effective in enhancing the hypertension knowledge. In a survey Alshammari & Alshammari (2017) in Saudi Arabia found that the majority of participants used one of the social media for

gathering the health information. Among the social media Instagram, WhatsApp and SMS were most preferred.

Jones et al. (2011) developed and field tested hypertension patient education pamphlet that was exclusively tailored to fit the needs of at risk Indo-Asian community in Canada. The pamphlet was translated into Indo-Asian languages such as Gujarati and Punjabi. The main focus was to assess the culturally and language sensitive populations by administering the patient education pamphlets at the community level. They found an enhanced understanding of hypertension among the patients in the community. The study lays emphasis that patient education materials consider not only culture appropriateness, but also be written in language and literacy sensitive tone such that health education materials are highly acceptable to specific community.

When comparing the written pamphlets over an animated material Mayer, Hegarty, Mayer, & Campbell (2005) found that participants who studied material disseminated by print/ written information were able to understand and recalled better than the participants who viewed visuals containing the same information of the printed brochure. The static media hypothesis explains that the images that are stable or not in motion enables the readers to attend to specific information and this allowed them to review and control their pace. Hence print material was superior in this aspect. Application of this logic to the health communication implies that in certain medical contexts, it is conceivable that usage of written patient education material such as pamphlets or brochures would reduce extraneous working memory load which will profit patients better than the usage of video. For instance, in hypertension scenario, where there is an imminent need to identify the blood pressure readings such as systolic and diastolic numbers and to remember the material the print/ written form

of material will have an advantage as a tangible aid (e.g. daily monitoring of blood pressure readings and their interpretation).

Although the written form of cognitive intervention has its own specific advantages, the review concerning the use of the written material in hypertension management presents a different picture. The detailed guideline comprising of clear instructions to manage high BP or clear targets for BP control or educational material such as booklets have not produced clinically significant improvements in hypertension (McKinstry et al., 2006). Supplementing the finding, the study by Palumbo et al. (2001) observed that mere handing out of the patient booklet did not help the patients to understand their disease better but rather it proved counterproductive by inducing certain confusion. Thus, it is suggested that this mode may not be useful as a standalone method but may be good as a supplement to the above forms of knowledge inculcation. Review supports that several intervention studies have supplemented the written pamphlets to the direct form as part of the cognitive intervention. Coulter & Ellins (2007) recommended that written material are effective when they are supplemented or augmented with other forms of communication. The patient education material as a supplement to the oral patient education was found to be effective (Ho et al., 2016; Estrada, Pujol, Jiménez, & Salamero, 2012; Lu et al., 2015).

Regardless of perceptions brought forth by the ‘Mayer’s multimedia learning theory’ the empirical research evidence proving the relative efficacy of one medium over the other is inconclusive. For instance, presenting messages across multiple forms (i.e. aurally and visually) can enhance comprehension and also the recall of the information (Mayer, 2003; Mayer, Heiser, & Lonn, 2001).

The written form enjoyed the advantage of being economical from the angle of cost and feasibility. Further, possession of written material facilitated the patients to suit their pace in receiving information (Mayer, Hegarty, Mayer, & Campbell, 2005). The print form of material also reduces the distraction that is generally seen in the video format due to the motion thereby the focus on the primary information can be strengthened. In addition, written form of materials constitutes a ready source of reference.

Each form of cognitive intervention has its own advantages and the disadvantages; however, the literacy level, age and motivation of the patient are likely to predict the relative efficacy and usability with which different categories of patients choose the different forms based on their requirements. In many instances, combination of direct interaction with the virtual form, virtual form with the written form, or written form with the direct interaction form would be effective than delivering health messages in either of the forms exclusively. An effort to locate studies on relative efficacy of various forms of cognitive intervention did not meet with much success. Only one study had compared more than two types of education modules. Lu et al (2015) conducted a study to test the efficacy of three types of educational modules such as self-reading material i.e. written form (pamphlets and brochures), didactic lecture, and interactive educational workshop on 360 hypertensive patients over a span of two years period in china. They found that after the intervention blood pressure control significantly improved in 63.2% compared to the baseline of 41.2% among the didactic group. The efficient blood pressure management had phenomenally increased from 40.2% to 86.3% among the interactive workshop group. No improvements in blood pressure control were noticed in the group which was provided only self-reading material such as pamphlets and

brochures. The enhancements in knowledge, adherence to medication, salt control, and exercise were progressively greater from self-reading material to didactic group to interactive workshop group. Interactive workshop group also had the largest reductions in serum LDL cholesterol and body mass index.

It is difficult to assess the degree of positive contribution of cognitive intervention in management of hypertension. A critical analysis of 35 meta-analyses involving 65000 patients (Lagger, Pataky & Golay, 2010) observed that 50-80 percent of impact was seen in health outcomes due to therapeutic patient education modules. Out of the studies considered, 64% reported that efficacy on patient outcomes due to therapeutic patient education modules, while 30% of the studies reported no effect and unusually 6% of the analyzed reviews and meta-analyses reported even worsening of measured outcomes. However it is not appropriate to draw any inference based on it because of various factors such as sample size, research design, literacy level of participants, types of intervention, and methods of intervention and reporting. However higher efficacy rates were observed in the articles reporting multidisciplinary and multidimensional educational interventions and the articles that provided detailed descriptions of the educational intervention. For a positive result, it is not sufficient to administer cognitive intervention in the right form, but also in adequate frequency to suit the sample characteristics.

Frequency of Intervention

While patient education can be unequivocally advocated, attention needs to be given to the sustainability of the consequent adherence behaviour. One may question the adequacy of a single exposure to knowledge input through intervention. An investigation by Schillinger et al. (2003) revealed that only 50% of the information

that was discussed during a typical medical encounter between the doctor and the patient could be recalled. Other studies have reported retention and recall between 40-80 % (Kessels, 2003; Sherlock & Brownie, 2014). Ley's model of effective communication in health care emphasizes the role of recall to be pivotal in enhancing adherence (Ley, 1982). Message repetition enhances the memory recall (Cacioppo & Petty, 1979). This suggests the need for repeated exposures to the health information. Subsequent study by Watson & McKinstry (2009) found that increase in frequency of exposures enhanced the sustainability of impact of intervention. There is an evidence based neuropsychological explanation to this. A needs assessments survey on the predictors of knowledge enhancement due to patient education observed that there was a profound gap between the knowledge reception, absorption and retention of the information (Ni et al., 1999). The study suggested that exposing the patients at different time points such as several consultation points would be the possible solution to fill the identified gap. A neurobiological study found that during the first few practice trials in the learning of new functional knowledge different sets of regions of the brain displayed either an increasing or a decreasing activation profiles. This repetition of the information enabled in transfer of the acquired information in enhancing the behavioural outcomes. The first instruction phase of learning activated the lateral mid-prefrontal cortex and the practice phase activated the caudate nucleus and the repetition of the information activated the lateral premotor cortex bordering prefrontal cortex. This study provided the important insights into the brain systems that are involved in transformation of explicit information to effortless behavioural implementation (Ruge & Wolfensteller, 2009). Further, an fMRI study had also envisaged the above findings (Ischebeck, Zamarian, Schocke, & Delazer, 2009). These studies identified that the neuro-psychological foundation for repetition of the

health information strengthened the rapid formation of neural memory paths and reinforced the information enhancing the retention and retrieval of learned information. However an important aspect to be considered when planning the repetition of the information is the appropriate spacing between the exposures. Several studies highlighted the accurate spacing between the distributed trials to enhance the reinforcement and retrieval of learned material (Goedert, & Miller, 2008; Cepeda, Pashler, Vul, Wixted, & Rohrer, 2006).

Influence of Psychosocial Factors on Impact of Cognitive Intervention

While frequency of exposure may be one of the factors determining the sustainability of contents relevant for cognitive base and its subsequent adherence behaviours, there may be a number of psychosocial factors that could influence the retention level of knowledge. One obvious factor that determines the content receptivity is the baseline health literacy. Patients with low literacy were found to ask fewer medical questions and were less able to respond to physician's communication (Kim et al., 2011). In addition, factors like age, gender, and educational qualification are seen to affect the knowledge comprehension. Studies identified that patients' age is a major determinant of the quality of listening (Govender & Penn-Kekana, 2007). With regard to the gender, studies indicated an interaction between gender and income level posing a barrier to knowledge inculcation. A study conducted by Thorson and Johansson (2004) shows that woman patients of low income and status are described shy, hesitant and limited in their knowledge. They were found to verify with their husbands, family members and neighbours rather than adhering to the doctor's prescription. Patients with a higher educational level have more skills and confidence in talking to their doctors and tend to provide more information, ask more questions and speak longer than other patients. It was also found that highly educated

patients are more expressive and opinionated. They were found to receive more diagnostic and health information than less educated people (Willems, De Maesschalck, Deveugele, Derese, & De Maeseneer, 2005). It is found that hospitalized patients with limited health literacy reported poor communication in the domains of general clarity, responsiveness to patient concerns, and explanations of care compared with patients with higher health literacy (Kripalani et al., 2010; Katz, Jacobson, Veladar, & Kripalani, 2007).

While the above psychosocial factors describe the influence of demographic factors in receptivity, retention and translation of knowledge there are other significant psychological factors that get triggered by knowledge intervention. Systematic review highlighted the impact of enhanced cognitive base on patient outcomes such as reduced anxiety and depression, improved self-efficacy, increased adherence, increased functional capabilities (Michie, Miles, & Weinman, 2003; Mead & Bower, 2002). Street, Makoul, Arora, & Epstein (2009) have proposed that the adequate knowledge of the disease gathered through quality doctor patient communication has profound impact on proximal outcomes such as affective states namely reduced anxiety, fear and depression, emotional wellbeing, enhanced trust, patient satisfaction, self-efficacy (motivation) and intermediate outcomes such as quality medical decisions, self-management behaviours and functional ability. The effects of the cognitions i.e. knowledge enhancement on the affect (anxiety and depression), motivation (self-efficacy) and behaviours are deliberated here under.

Impact of Cognitive Intervention on Affect State

Knowledge and affect are closely linked. The two factor theory of emotion (Schachter & Singer, 1962) postulates that a person understands and labels his/her

feelings based on the cognitions that arise from the immediate situation. Thus cognitive factors play an important role in describing one's feeling with variety of emotional labels. Prominently affect states such as anxiety and depression are thus labeled based on the cognitions. Reiss (1997) found that the knowledge about the consequences of uncontrolled hypertension enhanced the anxiety levels among the patients. Information that one has hypertension during diagnosis enhanced their emotions such as anxiety for that moment (Irvine, Garner, Olmstead, & Logan, 1989). Evolutionarily this heightened anxiety levels were due to the autonomic arousal which maximized the survival (Bateson, Brilot, & Nettle, 2011). Thorough information on serious long term complications and consequences of uncontrolled disease may cause anxiety. However, it is essential for the patients to have proper understanding of the seriousness of their condition. De Jong, Moser, Chung, & Wu (2008) found that anxiety is associated with adherence to antihypertensive medication. Although the anxiety in this sense seems to be encouraging adherence, the literature also found that the long term heightened levels of anxiety had a detrimental effect on the lifestyle modification among hypertensive patients (Khatib et al., 2014) and also on the blood pressure control (Davies, Jackson, Potokar, & Nutt, 2004). Careful observation of the literature offers insight that the anxiety levels were ascribed to the nature and severity of the disease. Ogedegbe et al. (2008) observed that the emotional upheaval was high to the diagnosis of hypertension but over the years of illness, the levels of anxiety reduced. However, this reduction was not seen if the patients were kept in dark about the possible prognosis of the condition. A Dutch study by Ginty, Carroll, Roseboom, Phillips, and Rooij (2013) on a sample of 455 hypertensive patients found an association between symptoms of depression and anxiety with the diagnosis of hypertension several years down the lane. The study assessed those 5 years later from

the point of diagnosis and found the levels of anxiety and depression persistent in them. While, the study did not mention the mechanisms that explained those associations, it still throws light on the emotional state of the patient years after the diagnosis. Uncertainty in illness occurs when a patient has inadequate knowledge or lack of information of the condition thus leading to levels of anxiety (Babrow, 2001). Mere knowledge transmission does not address the issue of heightened anxiety levels. Video intervention providing knowledge of hypertension on 217 hypertensive patients had no effect on the anxiety levels of the patients (Montgomery, Fahey, & Peters, 2003). This leads to identification of gaps in doctor's role in transferring information. Studies found that the effective knowledge dissemination by a caring, compassionate physician who adequately clarifies the need for management in a reassuring manner alleviates the anxiety of the patient. As such knowledge dissemination through effective communication was found to reduce anxiety and depression in patients along with higher rate of symptom reduction (Fogarty, Curbow, Wingard, McDonnell, & Somerfield, 1999; Golin, Thorpe, & DiMatteo, 2008; Thomas, 2016).

The relationship between knowledge about the disease and the levels of anxiety has to be taken with a caveat as the findings have been contradictory. Detailed patient education about the risk information had no effect on the anxiety levels of the patients (Garrud, Wood, & Stainsby, 2001). For severe anxiety patients, educational intervention was found to be appropriate and effective. Montgomery, Fahey, & Peters (2003) in their knowledge intervention explained to the patients the importance of medicine and the role it plays in controlling the blood pressure and preventing future cardiac complications. This was found to reduce the anxiety levels of the hypertensive patients regarding the medication usage. This had a positive impact on the adherence to medication.

Another important affect state that comes into picture when explaining the role of knowledge is the Depression. Depression is a recurring concept in patients with chronic diseases. Depression is also common in hypertensive patients and is found to be associated with adverse health outcomes, poor quality of life, and excessive use of healthcare resources (Bogner et al., 2005; Ciechanowski, Katon, & Russo, 2005). But more often than not Depression among hypertensive patients is usually not diagnosed (Bane, Hughes, & McElnay, 2006). The reason could be that generally physician may not look into the aspect of the mental health issues unless reported in consultation. Hence, the patient may be denied the treatment and care of depression. Ironically it is the minor depression that is related to poor self-management than the major depression (Holzapfel et al., 2009). Depression in hypertensive patients was an important risk factor for myocardial infarctions (Krishnan, 2003). In order to address this issue, the role of knowledge on depression can be considered. Alm-Roijer, Fridlund, Stagmo, & Erhardt (2006) found that inadequate understanding about the disease may lead to enhanced depression and anxiety levels. On the contrary, when adequate knowledge was provided through quality doctor patient communication, it was found to reduce the levels of depressive symptoms (Williams, McGregor, King, Nelson, & Glasgow, 2005; Weingarten et al., 2002). This suggests that enhancement of cognitive base results in reduction of depressive symptoms as the clear and simple information provided by the doctor alleviates the uncertainty and thereby prevents the helplessness scenario which breeds depression (Salmon, 2006; Schofield et al., 2003). Loh et al. (2007) recommend that adequate sharing of information that enhances the knowledge acts as an antidote to depression. The knowledge dissemination enhances the sense of worth, confidence and hope which balms the patient to overcome depressive symptoms (Edmondson, Arndt, Alcántara, Chaplin, & Schwartz, 2015).

Another cross sectional study on 703 patients with chronic coronary disease found that the poor doctor patient communication which compromises the scope of effective knowledge transfer is the strong predictor for the levels of depression (Schenker, Stewart, Na, & Whooley, 2009).

Does knowledge intervention aimed at creating a strong cognitive base, alleviating depression and inducing anxiety in the appropriate level trigger motivation? Is there a direct relationship between knowledge level and motivation leading to a behavioural change? These aspects are addressed in the following paragraphs.

Knowledge Intervention and its Impact on Motivation

Information and a proper understanding of the medical regimen act as foundation for enhancing motivation. Patients can adhere to a treatment only if they believe in it. Unless patient has clear knowledge about hypertension, he/she will not have the urge to take proper care of the condition. This emphasizes the role of motivation as an important aspect of the psychosocial model of health care. Motivation is defined as a driving force responsible for initiation, persistence, direction and vigour of goal directed behaviour (Coleman, 2009). The goal directed behaviour in this context can be construed as adherence behaviour. Self-efficacy is a concept closely related to motivation. It refers to the individual's perception or belief about one's ability or competence to bring about intended results through actions. Self-efficacy assumes high significance in positive change in adherence behaviour and hypertension management. The Health belief model (Rosenstock, 1974) theorized that one's motivation to engage in health promoting or health risk behaviour depends on the interface of five factors such as perceptions of- severity of the disease,

susceptibility to the disease, benefits of health behaviour, barriers to management, and cues to action strategy. All the above factors can be manipulated effectively if the patient is provided a complete knowledge about the illness, consequences of uncontrolled hypertension and the management strategies. Thus knowledge plays an important role in enhancing motivation. According to theory of perceived control, self-efficacy is the facet of motivation which is the person's belief about their ability to execute a behaviour that predicted the behavioural outcomes of the management of the disease (Ajzen, & Fishbein, 2005, Fife-Schaw, Sheeran, & Norman, 2007). Self-efficacy as defined by Bandura (1997) refers to 'the conviction that one can successfully execute the behaviour required to produce the outcomes'. Self-efficacy of the patients hinges upon the availability of adequate information. Several studies have found the impact of knowledge of hypertension on the levels of self-efficacy among patients with hypertension (Yu & Cho, 2005; Lee, 2004). A longitudinal study by Rimal (2000) spanning over 14 years on a sample of 3429 participants in the project called Stanford five city project found that self-efficacy acted as a mediating factor between the knowledge and the behaviours in hypertension management. The Information-Motivation-Strategy model (DiMatteo, Haskard-Zolnierek, & Martin, 2012), Information-motivation-behavioural skills model (Fisher, Fisher, & Harman, 2003) and Health Belief model **(**Hochbaum, Rosenstock, & Kegels, 1952) emphasized the immediate impact of the information on self-efficacy.

A randomized controlled trial (Park et al., 2011) measured the effect of an integrated patient education intervention involving health education and exercise program over twelve weekly sessions. The study showed a clear decrease in the systolic blood pressure readings and also enhanced the self-efficacy for physical activity for the experimental group when compared with the control. This study

shows that the patient education has a positive impact on the self-efficacy levels of the patients with hypertension. However the study did not isolate the cause of enhanced self-efficacy due to health education from the exercise program.

When knowledge impacts the self-efficacy, it further enhances the behavioural aspects of hypertension care. Research evidence suggests a strong relationship between self-efficacy and adherence behaviour. Patients with low self-efficacy are less likely to follow treatment regimen, and are more likely to maximize the severity of obstacles to adherence and lead to inefficacious thinking, impaired level of functioning, and low treatment adherence (Schoenthaler, Ogedegbe & Allegrante, 2009). Warren-Findlow, Seymour, and Huber (2012) found that self-efficacy was strongly associated with the five self-care activities prescribed for hypertension such as higher levels of adherence to regular medication, reduction in salt intake, engaging in physical activity, quitting smoking , and engaging in weight reduction strategies. To this end it appears that the measurement of self-efficacy in the domain of self-care behaviours among hypertension patients would be crucial for controlling hypertension at individual or population level. Other studies also supported the findings that self-efficacy has been associated with several self-care behaviours, such as engaging in physical exercise (Lee, Arthur, & Avis, 2008) eating a healthy diet (Mishali, Omer, & Heymann, 2011), and adherence to medication (Wang, Chair, Thompson, & Twinn, 2009). Study conducted by Munger, Van, & LaFleur (2007) reported evidence for the argument that self-efficacy had a positive effect on adherence to medication. The lack of trust on the health care provider can impair the patient's adherence to medication, health related behaviours, and self-efficacy (Cooper et al., 2005). In patients with hypertension, self-efficacy has been associated with self-report and objective measures of adherence to medication regimens (Schoenthaler, Ogedegbe, &

Allegrante, 2009) as well as participation in physical activity (Martin, Friedman, & Schwartz, 2007). Self-efficacy has been demonstrated to be a predictor of participation in other healthy behaviours such as following a recommended diet (Pawlak & Colby, 2009) and weight loss. Moreover it has been reported that individuals with high self-efficacy are more likely to exhibit adherence to medication regimens, using low-salt diet techniques, engaging in physical activity, abstaining from smoking and utilizing common weight management strategies (Warren-Findlow, Seymour, & Huber, 2012). It is also found that self-efficacy influences patient's ability and skills to continue treatment (Schoenthaler, Ogedegbe, & Allegrante, 2009; Schofield, Saka, & Ashworth, 2011).

Impact of Knowledge Intervention on Adherence Behaviours

Knowledge is believed to play the initiating role of any behavioural outcome. As presented in the previous sections, several theories postulated the role of cognition in guiding the behaviours of the patient. Prominently the theory of planned behaviour postulated that the knowledge enhanced the patients' belief i.e. self-efficacy levels which predicted the health specific behaviours such as diet regulation (Gratton, Povey, & Clark-Carter, 2007) and regular exercise (Downs, & Hausenbas, 2005). A meta-analysis of 48 studies by Arbuthnott & Sharpe (2009) found a strong relationship between the enhanced knowledge through physician patient collaboration and patient adherence. A series of studies have supported strong evidence that knowledge related to hypertension is strongly related to hypertension specific adherence behaviour.

Cognition and the enhanced motivation together impacts behaviour and sustenance of it. Cooper et al. (2009) found that effective doctor patient

communication enhanced the knowledge of the patient and had profound impact on the patient adherence and blood pressure control. Findings in India also reflected the trend. The study conducted in south India by Ponnusankar, Surulivelrajan, Anandamoorthy, & Suresh (2004) found a positive impact of knowledge on behavioural facet i.e. clinical adherence. The study found that the knowledge regarding medication usage in the intervention group was significantly higher than the usual care group. This had an impact on the adherence scores such that intervention group's scores were significantly higher than the usual care group. In the similar lines, another Indian study conducted on rural population by Ramanath, Balaji, Nagakishore, Kumar, & Bhanuprakash (2012) also found that the patient education intervention had an impact on medication adherence and quality of life of the patients with hypertension. Other studies also cemented these findings (Saounatsou et al., 2001; Lu et al., 2015). However the pathway that can be traced between knowledge and behaviours was mediated by the role of self-efficacy (Street, Makoul, Arora, & Epstein, 2009). Based on research it may be inferred that the knowledge enhanced self-efficacy of the patients which had in turn influenced the behavioural aspects of the hypertension care.

Though medication is one of the essential components in adherence, other components—diet (Epstein et al., 2012; Kiblasan, Payagen, Dulnuan, Singson, & Uy, 2015), exercise (Jennings et al., 2009; US Department of Health and Human Services, 2006), and self-monitoring (Breaux-Shropshire, Brown, Pryor, & Maples, 2012)—also play pivotal role in managing hypertension. For prevention and treatment of hypertension, guidelines for health behaviour management include physical exercise, weight management, dietary recommendations, reduction in alcohol consumption, less intake of sodium, and stress management (Dasgupta et al., 2014). But the

scenario of hypertension adherence and non-adherence are discussed alongside as non-adherence is seen to be a common phenomenon across the globe (Hayes, ackloo, sahota, Mc Donald & Yao, 2008). Non adherence was estimated to be up to 50% in patients with chronic conditions (Nunes et al., 2009). Around 50% patients with chronic illness were not found to take their medications regularly (Laufs, Rettig-Ewen, & Böhm, 2010). When it comes to developing countries adherence rates to hypertension medication was only 50 % in India (Dennis et al., 2011) and 43% in china (Sabate, 2003). It is even more appalling to see the adherence in one of the south Indian state of Tamilnadu to be as low as 24.1 % (Venkatachalam, Abraham, Singh, Stalin, & Sathya, 2015). Pharmacological non-adherence is the principal problem in the hypertension management (Kabakci, 2006). Chronicity and asymptomatic nature of the disease has been the culprit for the poor adherence among patients with hypertension (Claxton, Cramer, & Pierce, 2001). This rings an alarm about the urgent need for educating patients with the asymptomatic nature of patients so that the patients would take no chances with their adherence. Patient's non adherence can be a pervasive threat to health and well-being and carry an appreciable economic burden as well. More than 40 percent of patients sustain significant risks because of the lack of knowledge about disease and poor doctor–patient communication that leads to misunderstanding, forgetting, or ignoring healthcare advice (Martin, Williams, Haskard, & DiMatte, 2005). Non adherence has been broadly classified as intentional and unintentional non adherence. Several reasons have been ascribed for non-adherence such as forgetfulness, low self-efficacy or lack of motivation due to the incurable nature of the disease and asymptomatic nature of hypertension (Akoko, Fon, Ngu, & Ngu, 2017).

A cross-sectional analysis (Kim et al., 2007) on 208 hypertensive patients using multivariate logistic regression revealed that about 53.8% of the subjects endorsed one or more types of non-adherent behaviours. After statistically controlling for demographic variables, the multivariate analysis highlighted two factors for intentional non adherence namely greater number of side effects from the medication and a lower level of hypertension knowledge. The study found a close relationship between hypertension knowledge and adherence levels. Study by Karaeren et al. (2009) found that non-adherence was closely related to knowledge deficits in the patients with hypertension. Knowledge dissemination could be the key to address the issue of non-adherence.

Wide range of studies showed strong associations between knowledge about disease and the clinical adherence (Chen et al., 2007; Gwadry-Sridhar et al., 2013; Karaeren et al., 2009; Platt & Keating, 2007; Ponnusankar, Surulivelrajan, Anandamoorthy, & Suresh, 2004; Tongue, Epps, & Forese, 2005; Zolnierek, & DiMatteo, 2009; Vermeire, Hearnshaw, Van Royen, & Denekens, 2001; Vik, Maxwell, & Hogan, 2004). However, two systematic reviews have presented conflicting findings stating that the patient education interventions have not been effective in enhancing the adherence levels in the patients with hypertension (Krousel-Wood, Hyre, Muntner, & Morisky, 2005; Chaves, Lúcio , Araújo, & Damasceno,2006). There could be several reasons to the inefficiency. Primarily the content of the knowledge in the modules play a pivotal role in predicting the adherence rates among the patient. When the patients were informed about the blood pressure readings through patient education modules, it facilitated them to engage in goal setting of target arterial pressure values which in turn enhanced their adherence levels (Brown, Bartholomew, & Naik, 2007). Further, the knowledge regarding

'causes of hypertension' enhanced the adherence levels. Patient education modules that emphasized the knowledge covering topics such as salt content in the food, sedentary lifestyle, alcohol consumption, intermittent taking of antihypertensive medicines had a strong impact on the clinical adherence of the hypertensive patients (Karaeren et al., 2009). The same study intriguingly observed that Knowledge of the consequences of uncontrolled hypertension had reduced the adherence level among the hypertensive patients. Although the theoretical premise of the perceived threat suggests an enhancement of the adherence levels, this finding contradicted the theory of planned behaviour. This could be because the dissemination of consequences of the uncontrolled hypertension might have enhanced the state anxiety levels momentarily as found in another study by Reiss (1997). Logically, the patient is generally interested in short term solutions rather than long term consequences, hence the short term enhanced state anxiety could not have translated into the adherence behaviour. Therefore the authors suggested the supremacy of sharing the positive knowledge of 'why to use medicines' being efficacious than explaining the consequences of uncontrolled hypertension which gave short term effects rather than long term impact. Knowledge regarding the side effects of medication had a detrimental effect on the adherence to medication (Benson & Britten, 2003) as hypertensive patients avoided the medicine usage when weighing the costs of the side effects of the medicines.

Strangely, a multicenter study in Spain on a sample of 996 participants randomized to intervention and Control groups found that the educational intervention had impact on knowledge enhancements but these knowledge enhancements had no impact on the adherence. Although knowledge enhancements were seen, the adherence to the medication was not enhanced and negatively impacted the blood pressure control. The providers of information in this study were trained nurses. The

impact depends on the emphasis laid during intervention involving verbal communication. Secondly the impact also is related to the duration of illness of the target group, which information is not provided. Higher duration of the hypertensive condition enhanced the risk of non-adherence (Ockene, Hayman, Pasternak, Schron, & Dunbar-Jacob, 2002). It may also be inferred that interventions aimed at increasing adherence must be motivation rousing rather than mere educational in approach (Palumbo et al., 2001).

Although at the outset, patient education interventions had a fairly positive impact on the adherence. Gwadry-Sridhar et al. (2013) suggest that proper care needs to be taken when measuring the adherence in the intervention studies. Several measurement tools have been broadly classified as direct and indirect methods. The direct methods have been measurement of level of medicine in blood. Although expensive it is more objective and accurate, whereas several economic measures such as pill counts, patient questionnaires, prescription refills, electronic medication monitors and patient diaries.

The end result of enhanced adherence is the effective management of primary hypertension. It may be of interest to review literature related to the impact of cognitive/ knowledge intervention on hypertension management that is finally reflected in the B.P reading.

Impact of Knowledge and Adherence on Management of primary Hypertension

In the research related to hypertension, the ultimate expected outcome of any adherence based study is the management of hypertension. Effective management of hypertension is indicated by the blood pressure control. Blood pressure is supposed to be under control when the blood pressure readings are less than systolic number of

140 and the diastolic number of 90 mm/Hg (Poulter, Prabhakaran & Caufield, 2015). In order to achieve this ideal level, the science advisory of the American Heart Association, the Centers for Disease Control and Prevention, and American College of Cardiology (Go et al ., 2014) primarily recommended three broad strategic areas such as, lifestyle modifications, pharmacotherapy and self-monitoring. These behavioural aspects of management are founded on the principle of adherence as the focal point (Krousel-Wood, Thomas, Muntner, & Morisky, 2004; Morris et al., 2006). As the previous sections emphasized, adherence is driven by the knowledge of the person. Systematic review highlighted some of the patient outcomes of enhanced cognitive base because of quality health communication such as improved self-efficacy, reduced blood pressure, increased adherence, increased functional capabilities and reduced expenditure in health care (Michie, Miles, & Weinman, 2003; Mead & Bower, 2002). There have been several studies which indicated the contribution of knowledge in hypertension control (Wang et al., 2003; Pandit et al., 2009; Xu et al., 2014; Bodenheimer, Wagner, & Grumbach, 2002; Coleman, Austin, Brach & Wagner, 2009). Several studies have demonstrated that cognitive intervention significantly enhanced medication adherence and improved healthy lifestyle behaviours and thereby significantly decreased blood pressure levels (Bosworth et al.,2005; Cakir & Pinar, 2006; Hennessy et al., 2006; Hunt, Siemienczuk, Touchette, & Payne, 2004; McKinstry, Hanley, Heaney, McCloughan, Elton, & Webb, 2006; Garcia-Peña, Thorogood, Armstrong, Reyes-Frausto, & Muñoz, 2001; Rudd et al.,2004; saleem et al ., 2013; Svetkey et al., 2005; Cooper et al.,2011). However few other studies did not find any impact of knowledge on hypertension control (Eckman et al., 2012; Ramanath, Balaji, Nagakishore, Kumar, &

Bhanuprakash, 2012; Abed, Himmel, Vormfelde, Koschack, 2014; Kilic & Uzunçakmak, & Ede, 2016; Prugger et al., 2011).

In terms of methodological control, several patient education interventions based studies have adopted randomized control trials. A Cochrane review by Glynn, Murphy, Smith, Schroeder, & Fahey (2010) on 20 randomized control trials ended up with inconclusive findings of the impact of knowledge on management of hypertension. Out of the 20 reviewed studies, eleven have reported the impact of intervention on the systolic blood pressure readings (SBP). The reduction in SBP readings reported in mean difference values ranged between -15.7 mmHg and +1.3 mmHg. Thirteen studies have mentioned the effect of the intervention on diastolic blood pressure (DBP) readings. The reduction in DBP readings reported in mean difference values ranged between -8.7 mmHg and +7.1 mmHg. Out of the 20 randomized control trials, seven of them reported the impact on blood pressure control. However three of them have not reported the impact on blood pressure readings but they however reported increase in knowledge levels.

The mixed findings imply several gaps in the intervention studies. The follow up duration has been widely varying across the studies from 12 weeks (park et al., 2011) to two years (Lu et al., 2015). In a classic randomized controlled trial, a peculiar observation was found. Reduction in systolic blood pressure was observed but only after six months of follow up. This study provided an insight that the knowledge interventions to show their reflections on management may take longer time and needs longer follow ups (Hamilton, Roberts, Johnson, & Tropp, 1993).

A cluster randomized trial by Hennessy et al. (2006) on a huge sample of 10,696 hypertensive patients measured the efficacy of a multifaceted education

intervention which included education as well as motivational content as part of the intervention. It was found that intervention had a moderate effect on the blood pressure control. The authors felt that introduction of concurrent Control Group comparison is a must for assessing the efficacy of education interventions. The study also throws light on the importance of Control Group comparison for any intervention study, the lack of which in many intervention studies might have led to flawed generalizations. The study also proposed that future intervention studies should recruit hypertensive patients whose blood pressure is uncontrolled at baseline rather than focus on all hypertensive patients.

Moreover the content of the knowledge intervention has not been clearly mentioned across the studies (Ramanath, Balaji, Nagakishore, Kumar, & Bhanuprakash, 2012; Abed, Himmel, Vormfelde, Koschack, 2014). The content plays a pivotal role has also been widely varying across the studies. The intervention study by Cakir & Pinar (2006) found that education interventions that provide information about lifestyle modifications in addition to information about the disease can enhance the efficacy on not only the blood pressure control but also on several biological outcomes such as reduced body mass index, waist circumference, body weight after a six months follow up.

The contradictory findings could be attributed to unexplored factors in knowledge transmission such as medium of communication(Abed, Himmel, Vormfelde, Koschack, 2014), frequency of exposures for sustainability (wilson et al., 2010), Quality of communication (Swain, Hariharan, Rana, Chivukula, & Thomas, 2015) quantity of health information (Eckman et al., 2012) health literacy of patients (Williams, Baker, Parker, &Nurss, 1998) and language use in communication (Thomas, Hariharan, Rana, Swain, & Andrew, 2014). While each factor impacts

translation of knowledge into hypertension management behaviour, the medium of information and frequency of exposure assume significance for optimizing comprehensibility of information and sustainability of behaviour. Review glaringly presents that knowledge has an impact on adherence.

For the present study based on the review of literature the following research questions have been set down. Based on these research questions, hypotheses were outlined.

Research questions

1. Does Cognitive Intervention enhance knowledge of primary hypertension?
2. Does Cognitive Intervention enhance clinical adherence in patients with primary hypertension?
3. Does Cognitive Intervention result in efficient management of primary hypertension?
4. Does Cognitive Intervention through Direct Interaction form result in higher level of knowledge compared to audio visual form?
5. Does Cognitive Intervention through Direct Interaction form result in higher level of adherence compared to audio visual form?
6. Does Cognitive Intervention through Direct Interaction form result in higher level of management of hypertension compared to audio visual form?
7. Does repeated exposure to Cognitive Intervention results in higher level of knowledge of hypertension compared to single exposure?
8. Does repeated exposure to Cognitive Intervention result in higher level of adherence of hypertension compared to single exposure?
9. Does repeated exposure to Cognitive Intervention result in higher level of management of hypertension compared to single exposure?

10. Does Cognitive Intervention reduce anxiety and depression levels in patients with primary hypertension?

11. Does Cognitive Intervention enhance self-efficacy levels in patients with primary hypertension?

12. Does the impact of Cognitive Intervention on management of primary hypertension follow a pathway?

Hypotheses

Set 1 (Knowledge)

1. The intervention groups will differ from the Control Group in post-intervention knowledge levels.

2. The groups exposed to intervention in Direct Interaction form will differ from the groups exposed to the intervention through Audio-Visual form in their post-intervention hypertension knowledge levels.

3. The groups that received repeated intervention will differ in hypertension knowledge compared to those which received the interventions only once.

Set 2 (Adherence)

4. The intervention groups will differ from the Control Group in post-intervention clinical adherence.

5. There will be differences in levels of adherence between the groups receiving intervention through Direct Interaction and Audio Visual from.

6. There will be differences in adherence behaviour in groups that received repeated intervention compared to the groups that received single exposure to intervention.

Set 3 (Management)

7. The intervention groups will differ from Control Group in management of primary hypertension.

8. There will be differences between the group receiving Direct Intervention and the groups receiving intervention through Audio Visual form in management of hypertension.

9. There will be differences in hypertension management between the groups that received a single exposure to intervention and the groups that received repeated exposure.

Set 4

10. Intervention groups will differ from the Control Group in anxiety and depression levels.

11. Intervention groups will differ from the Control Group in self-efficacy levels.

12. The impact of cognitive intervention on hypertension management will follow a pathway.

Objectives

1. To assess the differential impact of Cognitive Intervention through Direct and Audio-Visual form on Knowledge level, adherence and management of primary hypertension.

2. To assess the differential impact of Cognitive Intervention through single and double exposures on Knowledge level, adherence and management of primary hypertension.

3. To identify the factors contributing to knowledge, self-efficacy, adherence and disease management in patients with primary hypertension.

4. To trace the pathways between Cognitive Interventions and management of hypertension.

CHAPTER III

METHOD

Chapter III

METHOD

The purpose of the study was to examine the effect of form and frequency of cognitive intervention on adherence behaviour as well as hypertension management among patients diagnosed with primary hypertension. The design included two forms of Cognitive Intervention (Direct Interaction and Audio Visual) and two frequencies of exposure to Cognitive Intervention (Single and Double Exposure).

Plan and Design

The study adopted a quasi-experimental design, by employing the pre-test post-test non-equivalent group design. The design consisted of a total of five groups.

Group 1 and Group 2 received cognitive intervention through Direct Interaction (DI) mode, where a qualified doctor through a session exposed them to the knowledge on primary hypertension. Group 3 and Group 4 received cognitive intervention through video recording. While Groups1 and 3 were exposed to the Cognitive intervention only once, Groups 2 and 4 were exposed to repeated inputs (twice) through the same mode in a gap of 15 days after the first exposure. The fifth Group is Control Group that had no cognitive intervention but received only standard medical care. Group 1 is called 'Direct Interaction Single Exposure Group' (DIS), Group 2 is called 'Direct Interaction Double Exposure (DID)', Group 3 is referred to as 'Audio Visual Single Exposure Group (AVS), Group 4 is referred as Audio Visual Double Exposure Group (AVD) while Group 5 is called Control Group (C).

In order to obtain the baseline data on their clinical adherence, hypertension management, cognitive base with regard to hypertension, and other psychosocial

parameters such as Anxiety, Depression, Perceived social support, Personal Stress level and Self efficacy, all the participants were administered tests on the said parameters. In order to examine their hypertension management, three Blood Pressure (B.P) readings were taken at the rate of once in a week. The cognitive intervention is planned the day after the third B.P reading. Similarly thirty days after first exposure to intervention, the first post-intervention B.P was checked and recorded. Thereafter the B.P readings were taken two more times at the rate of once a week. The participants were given a post test on all the parameters 30 days after first exposure and 15 days after second exposure. Practically Group 1 and Group 3 comprehensively had the post-test 30 days after their cognitive intervention while Group 2 and Group 4 had the posttest 15 days after their repeated exposure to cognitive intervention.

The design of the study is comprehensively presented in Table 3.1

Table 3.1 *Design of the study*

	Groups	Baseline assessments			Exposures		Post-test assessments		
		Pretest-I (1^{st} day)	Pretest-II (8^{th} day)	Pretest-III (15^{th} day)	Expo-I (day after Pretest-III)	Expo-II (15^{th} day from Expo-I)	Posttest-I (30^{th} day from Expo-I and 15^{th} day from expo-II)	Posttest -II (38^{th} day from Expo-I and 23rd day from expo-II)	Posttest- III (46^{th} day from Expo-I and 31^{st} day from expo-II)
1	**Direct Interaction Single(D.I.S)** (n_5=*50)*	B.P reading-1	B.P reading-2	B.P reading-3	✓	----	B.P reading-1	B.P reading-2	B.P reading-3
2	**Direct Interaction Double (D.I.D)** (n_5=*51)*	Hypertension Knowledge	Anxiety	Personal stress	✓	✓	Hypertension Knowledge	Anxiety Depression	Personal stress
3	**Audio-Visual Single (A.V.S)** (n_5=*51)*	Adherence	Depression Perceived social support	Self-efficacy	✓	----	Adherence	Perceived social support	Self-efficacy
4	**Audio-Visual Double (A.V.D)** (n_5=*51)*				✓	✓			
5	**Control** (n_5=*53)*				----------				

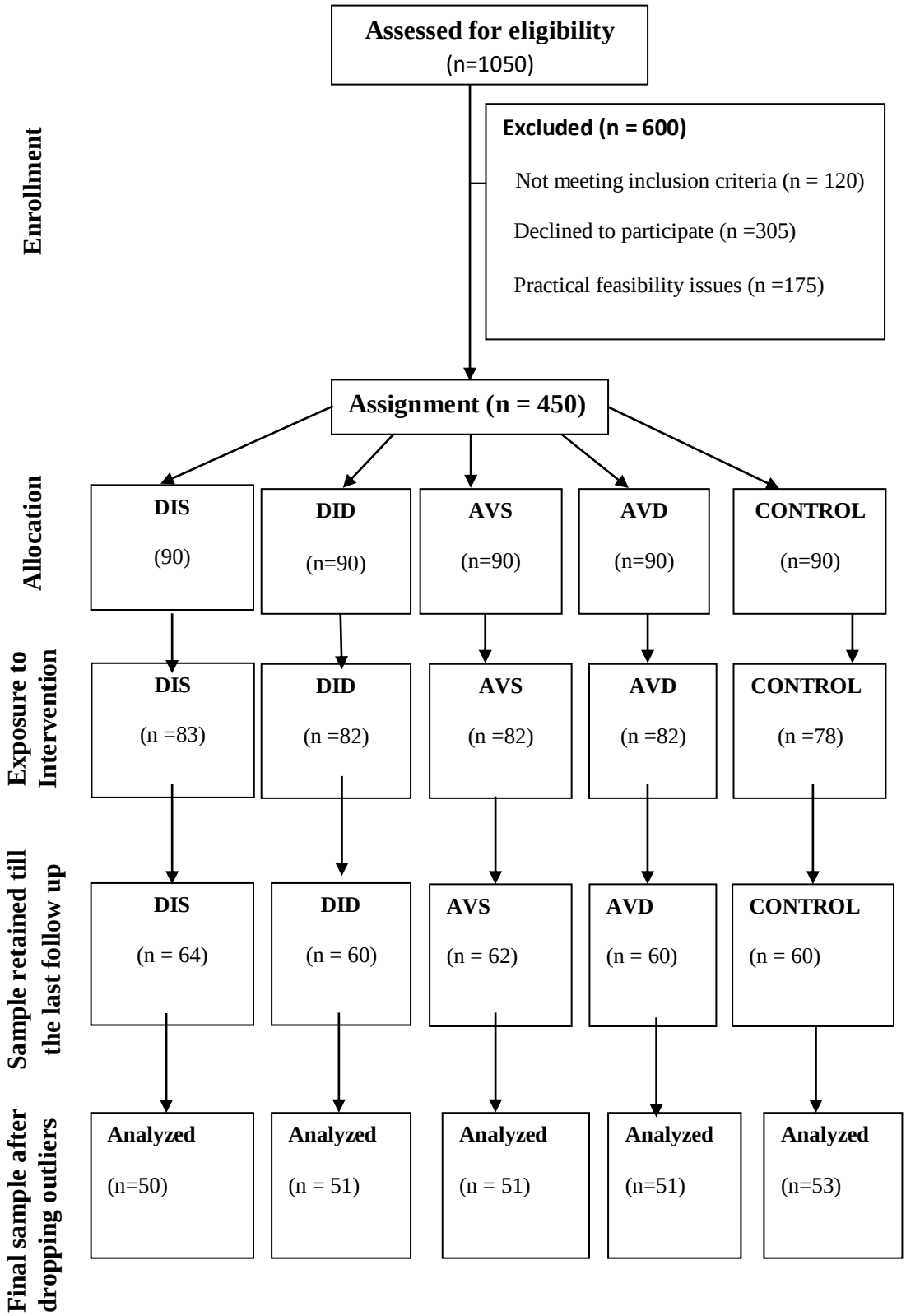


Figure 3.1 Flow chart of the participants at each stage of the study

The sample was drawn from the patients diagnosed with hypertension who visited the church health centres in and around the city of Hyderabad for regular health checkups. The inclusion and exclusion criteria for recruitment of participants for the study are presented as under

Inclusion criteria (i) Patients aged from 30 to 65 years diagnosed with primary hypertension for at least a year (ii) Participants who expressed willingness by signing the informed consent form.

Exclusion criteria (i) Patients with any associated illness such as Diabetes Mellitus, thyroid, arthritis etc are excluded (ii) Patients with secondary hypertension (iii) Patients who were suffering from secondary complications of hypertension (iv) Patients identified by physicians as incapable in comprehending the instructions because of diagnosed psychiatric illness, physical or cognitive disability (v) Patients who were illiterate (Who could not read at least one language).

Taking into consideration various important factors like nature of the research, nature of the analysis, sample size used in similar studies, and resource constraints, a total of 250 participants were planned. Anticipating huge sample attrition as seen across phases of an interventional study and also based on the experiences in the pilot study, more number of participants was screened. Initially a total of 1050 participants were screened for recruitment. Out of this, a total of 600 participants were excluded for various reasons such as not meeting the inclusion/exclusion criteria (n=120), unwillingness to participate (n=305), inability to participate due to logistics (n=175). The remaining 450 participants were equally assigned to the five groups following the method of serial assignment, i.e 1st participant was assigned to Group 1, second participant to Group 2, third participant to Group 3, fourth participant to Group 4,

fifth participant to Group 5 and sixth participant to Group 1 again and so on and so forth, until all the 450 were assigned to the five Groups in equal number. After excluding the participants who failed to comply with attending the intervention session and follow up visits, a total sample consisted of 306 participants. The data of the 306 participants were entered into the computer. During the process of cleaning the data (by removing the outliers and missing data), the final sample accounted to a total of 256 participants. The final sample belonged to Group 1- DIS (n=50), Group 2–DID (n=51), Group 3-AVS (n=51), Group 4- AVD (n=51) and Group 5-Control (n=53). The details of recruitment and attrition of sample at various stages are depicted as a flow chart in Figure 3.1.

Demographic characteristics of the sample

Out of the 256 participants, men constituted 53.3% of the sample and women accounted for 46.7 %. The age of participants ranged from 30 to 65 years while the mean age was 52.2 years (*SD= 8.31)* and the duration of illness was 5.42 years (*SD*= 5.07*).* In terms of educational qualification, 18.8 % had primary education, 17.6 % had high School education, 27.3 % had Intermediate education, 24.2% were graduate degree holders, and 12.1% were Post graduates/ Professionals. They belonged to low economic background as judged by their possession of white ration card status (49.6 %) and higher economic background as judged by their possession of pink ration card (50.4%).

The pretest-posttest design of the study demands to ensure the homogeneity of the five Groups to strengthen the attribution of the results to the intervention. For this purpose the Groups were subjected to homogeneity tests.

Homogeneity of the groups: Separate chi squares were computed to verify if the five groups differed significantly on each of the demographic variables. Results of the chi square analysis (Table 3.2) showed that there were no significant association between the Groups and the gender (p>.05), between the groups and the educational qualification (p>.05), and between the groups and the economic status (p>.05). With regard to the age, one way ANOVA was carried out to find out if the five groups differed on the mean age. Results revealed no significant difference in the mean age of the five groups. This indicated that the five groups were homogenous on the demographic variables.

In addition to the demographic variables, homogeneity of the groups had to be tested with regard to a number of other parameters like duration of illness, knowledge in hypertension, clinical adherence, BP management, anxiety, depression, hypertension self-efficacy, perceived social support and personal stress. The reason for this is to ascertain that any group difference on these in post-intervention testing is attributed to the intervention. One-way between groups analysis of variance or ANOVA was carried out for each of these parameters. Results as seen in Table 3.3, revealed that the five groups did not significantly differ (p>.05) in terms of mean duration of illness, hypertension knowledge, clinical adherence, B.P management, anxiety, depression, perceived social support, hypertension self-efficacy and personal stress. The results clearly indicated that the distribution of participants across the five groups maintained homogeneity.

Table 3.2

Results showing homogeneity of groups in demographic variables

	Observed (Expected)					χ^2
	D.I.S	D.I.D	A.V.S	A.V.D	CNTRL	
Gender						
Male	30	25	25	31	21	6.45
	(25.8)	(26.3)	(26.3)	(26.3)	(27.3)	(p>.05)
Female	20	26	26	20	32	
	(24.2)	(24.7)	(24.7)	(24.7)	(25.7)	
Educational qualification						
Literate School drop out	14	10	11	8	5	
	(9.4)	(9.6)	(9.6)	(9.6)	(9.9)	
High School	13	8	6	9	9	18.25
	(8.8)	(9.0)	(9.0)	(9.0)	(9.3)	(p>.05)
Intermediate	8	13	17	17	15	
	(13.7)	(13.9)	(13.9)	(13.9)	(14.5)	
Graduate	10	15	8	13	16	
	(12.1)	(12.4)	(12.4)	(12.4)	(12.8)	
Post Graduate/	5	5	9	4	8	
Professional	(6.1)	(6.2)	(6.2)	(6.2)	(6.2)	
Economic category						
White card	24	27	27	20	29	3.26
	(24.8)	(25.3)	(25.3)	(25.3)	(26.3)	(p>.05)
Pink card	26	24	24	31	24	
	(25.2)	(25.7)	(25.7)	(25.7)	(26.7)	
			(Mean) (*SD*)			
	DIS	DID	AVS	AVD	Control	*F*(4,250)
Age	50.38	52.20	53.71	52.53	52.15	1.03
	(7.82)	(9.65)	(7.89)	(7.31)	(8.67)	(*p*>.05)

Table 3.3

Results of one-way ANOVA showing homogeneity of groups on measured parameters

	Mean *(SD)*					***F*(4,250)**
	D.I.S	D.I.D	A.V.S	A.V.D	Control	
Duration of illness (in months)	49.26 (41.88)	56.75 (66.83)	75.88 (59.47)	64.47 (66.59)	78.34 (62.82)	2.15 (p>.05)
Hypertension Knowledge	12.74 (4.55)	12.12 (3.48)	12.65 (3.49)	11.92 (3.35)	12.74 (4.26)	0.50 (p>.05)
Adherence	37.76 (10.74)	37.86 (8.75)	37.90 (9.74)	38.27 (9.27)	38.92 (9.14)	0.13 (p>.05)
Blood Pressure Management	103.61 (5.43)	103.92 (5.85)	104.71 (5.35)	104.93 (5.73)	103.20 (5.79)	.86 (p>.05)
Anxiety	9.00 (4.14)	9.39 (4.61)	8.78 (4.95)	8.49 (2.83)	8.94 (4.21)	.31 (p>.05)
Depression	8.30 (3.17)	8.90 (3.41)	8.06 (3.71)	8.65 (3.10)	8.30 (3.50)	.48 (p>.05)
Hypertension Self-Efficacy	5.99 (1.68)	6.23 (1.95)	6.62 (1.85)	6.09 (1.86)	6.79 (1.59)	1.90 (p>.05)
Perceived Social Support	63.44 (11.83)	64.01 (13.44)	63.76 (16.33)	64.09 (13.84)	65.73 (13.81)	.21 (p>.05)
Personal Stress	109 (13.51)	112 (18.11)	103 (22.55)	105 (18.56)	104 (18.66)	2.02 (p>.05)

Tools

The baseline and follow up assessments were carried out by using seven tools—Hypertension Knowledge Test (HKT), Hypertension Compliance Scale (HyComps), Hospital Anxiety and Depression Scale (HADS), Multidimensional Scale of Perceived Social Support (MSPSS), Personal Stress inventory (PSI) and Hypertension Self Efficacy Scale (HSES). All these are self-report paper pencil tools. The psychometric properties, administration, scoring, content and development (Where applicable) of the tools are discussed below. In addition to these, Blood Pressure apparatus (mercury sphygmomanometer) was used to measure the blood pressure.

Hypertension Knowledge Test (HKT): This test was developed by Asher and Hariharan (2017). It is a multiple choice test of knowledge having 22 items. The 22 items are in the form of statements. Under each statement were five options out of which only one is the correct answer. The respondents are required to read each statement and choose one out of the five options as the answer. The 22 items were distributed under the following four domains, viz General awareness of hypertension (five items) (e.g., hypertension is called as silent killer because), lifestyle factors (five items) (e.g., Dietary changes that are useful to control hypertension are), Causes, Care and Casualty awareness of hypertension (6 items) (e.g., warning signal during a heart attack), and Medication Management (6 items) (e.g., commonly used drugs to treat hypertension). The test –retest reliability of the test was found to be high (r=.92 p<.001). The HKT also had construct validity, based on significant negative correlations with systolic (r = -.28) and diastolic (r = -.22) blood pressure readings. HKT was translated into Telugu using standard translation and back translation procedures.

Scoring: Every correct answer was given a score of 1 and wrong answer a score of zero. The subscale score was calculated by summing the items on each subscale. The subscale of knowledge about General Awareness in Hypertension consisted of five items (Items 1, 2, 4, 9, and 17) and the score ranged from 0 to 5. The subscale of knowledge about Lifestyle Factors included five items (Items 5, 6, 7, 10, and 16) and the score ranged from 0 to 5. The subscale of knowledge about Causes, Care and Casualty consisted of six items (Items 3, 8, 19, 20, 21, and 22) thus the score ranged from 0 to 6. Six items (Items 11, 12,13,14,15, and 18) came under the subscale of Management of Medications where the score ranged from 0 to 6. The total score was the summation of the four subscale scores put together. Thus the total score ranged from 0 to 22. The higher scores were indicative of higher levels of knowledge about hypertension. A copy of the scale is appended (Appendix A1).

Hypertension Compliance Scale (HyCompS): HyCompS (Swain, Hariharan, Rana, Chivukula, & Thomas, 2015) is a 5-point scale used to measure the compliance to diet, exercise, lifestyle and self-monitoring facets of clinical adherence in hypertensive patients. It consisted of 15 (both positive and negative) statements related to adherence with the clinical prescription. Each item was measured on a 4 point Likert scale (1= not a single day in a week, 4=almost every day) in addition, an option of not applicable/Do not know was given a score of zero. It had four domains, namely Adherence to medication (e.g. How often do you forget to take your medicine for high blood pressure?), Adherence to diet (e.g. How often do you eat salty food?), Adherence to exercise (e.g. How often do you do the prescribed exercises e.g. morning walk?), and Adherence to self-monitoring (e.g. How often do you check blood pressure level?). The validity of the scale was established on Indian sample and

the Cronbach's α was found to be .67 (Swain, 2013). A copy of the scale is appended (Appendix A2).

Scoring: The number of items varied across four domains of HyComps—Adherence to medication (Items 1, 2, 7, 8, 9, 10, and 11), Adherence to diet (Item 3, 4, and 5), Adherence to exercise (Item 13, 14, and 15), and Adherence to self-monitoring (Item 6 and 12). For the dimension of Adherence to medication, the scores ranged from 0 to 28, for both the domains of Adherence to diet and Adherence to exercise, the scores ranged between 0 to12, and as there were two items under the dimension of Adherence to self-monitoring, its scores ranged from 0 to 8. The total scores of adherence ranged from 0 to 60. The items 6, 12, and 13 were scored reversely. Higher the score better was the adherence.

Hospital Anxiety and Depression Scale (HADS): This is a standardized scale (Zigmond and Snaith, 1983). It has 14 items. The items in the scale are simple self- statements measured on a 4 point scale that ranged from 0 to 3 (descriptions of the response varied for each item). The participants are required to respond by choosing the option that is closest to their feelings during the past week. The scale consisted of two sub scales each consisting of seven items. The anxiety subscale measures anxiety levels (e.g., I get a sort of frightened feeling as if something aweful is about to happen) and depression subscale measured depression (e.g., I have lost interest in my appearance). Together the two sub scales (14 items) constituted assessment of overall distress. Although, the term 'Hospital' in the title suggested that it was valid in such setting, many studies conducted worldwide confirmed its validity on medical, psychiatric and normal populations in primary care medical practice, in community settings and also in general population (Chivukula, Swain, Rana & Hariharan, 2013; Thomas, Hariharan & Rana, 2016 ; Snaith, 2003; Bjelland, Dahl,

Haug, & Neckelmann, 2002). The psychometric properties of the HADS had been well established. In a review of 747 papers which have used HADS, reliability as represented by Cronbach's alpha reported for anxiety subscale ranged between .68 and .93 (*M*=.83) and for depression subscale ranged between .67 and .90 (*M=.82).* On Indian population (Thomas, Hariharan & Rana, 2016) the internal consistency was found to be .75 and .65 respectively for the anxiety and depression subscales. The scores of the HADS subscale demonstrated large correlations (greater than.60) with scores on other tools that measured anxiety and depression such as General Health Questionnaire, Beck Depression Inventory, and State and Trait Anxiety Inventory suggesting the validity of the scale (Bjelland, Dahl, Haug, & Neckelmann, 2002). The licenses for the English and Telugu forms of HADS were purchased from GL Assesments and Mapi Research Trust. Copy of the scale is enclosed in appendix (A3).

Scoring: Every item had a score ranging from 0 to 3 depending upon the rating given by the respondent. The subscale measuring anxiety consisted of items 1,3,5,7,9,11 and 13 while the subscale measuring depression included the items 2, 4, 6, 8, 10, and 14. The sum of scores of the items in each sub scale was calculated to obtain the sub-scale scores that ranged between 0 and 21. In accordance with the clinical norms, a total score on a subscale between 0 and 7 suggested normal level of anxiety or depression, a score between 8 and 10 indicated a likely case of anxiety or/and depression, while a score of 11 or above specified a definite case of anxiety and depression (Snaith, 2003). In the present study, the scores of each sub scale were taken in terms of unit such that the higher scores in a sub scale symbolized the higher level of anxiety or depression.

Multidimensional Scale of Perceived Social Support (MSPSS): This is a 12 item self-report instrument developed by Zimet, Dahlem, Zimet & Farley (1988). It

measures the individual's perception of the support received from several social support agents. The items are in the form of statements. The respondent is required to rate each item on a 7-point scale, ranging in the level of agreement (1= Very strongly Disagree, 7= Very Strongly Agree). The tool has three sub-scales each comprising 4 items. The subscales are so structured to indicate the source of the social support, such as family (e.g., I get the emotional help and support I need from my family), Friends (e.g. I can count on my friends when things go wrong), and significant others (There is a special person with whom I can share my joys and sorrows). In terms of psychometric properties (Zimet, Dahlem, Zimet & Farley, 1988), the internal consistency indicated by Cronbach's alpha for the whole test was .88. For the subscales of friends, family and significant others Cronbach's coefficient alpha was .85, .87 and .91 respectively. The authors deduced the construct validity by correlating the depression scores obtained from the Hopkins Symptom Checklist (HSCL) with the scores on MSPSS. Significant negative correlation (r= -.25, p< .01) found between the MSPSS and depression scores of HSCL aided the authors to deduce the MSPSS to be a valid scale. Copy of the scale is enclosed in appendix (A4).

Scoring: Every item is scored based on the rating ranging from 1 to 7. The score for subscale is calculated by summing up the scores on each subscale. The subscale of family consisted of items 3, 4, 8, and 11. The subscale of friends included items 6, 7, 9, and 12 while items 1, 2, 5, and 10 came under the subscale of significant others. The scores on the subscales range from 4 to 28. The overall perceived social support score is derived by adding the scores of the sub-scales. The overall scores range between 12 and 84. The higher scores are indicative of higher levels of respondent's perceived social support.

Hypertension Self Efficacy Scale: is constructed specifically for this study. The scale is structured based on Chronic Disease Self Efficacy Scale (Lorig et al, 2010). Hypertension Self Efficacy Scale is structured to measure the individual's self-efficacy in managing hypertension. It consists of 31 items to be rated on a ten point scale measuring the level of confidence of the respondent. The 31 items measure self-efficacy in nine dimensions, viz, Exercise regularly (Items 1,2,and 3 items) (e.g., How confident are you that you can exercise without making your B.P symptoms worse?), 'Get information about disease' (items 4 and 5) (e.g., How confident are you that you can get information about your blood pressure from community resources) , 'Obtain help from community, family, friends' (Items 6,7,8, and 9) (e.g., How confident are you that you can get emotional support from friends and family such as listening or talking over your problems?) , Communication with physician' (items 10,11, and 12) (e.g., How confident are you that you can ask your doctor things about your B.P that concerns you?), 'Manage disease in general' (items 13,14,15,16,and 17) (e.g., How confident are you in controlling your B.P. through methods other than just taking medicines?) 'Do chores' (items 18 and 19) (e.g., How confident are you that you can complete your household chores, despite your health problems?) 'Social/Recreational activities' (items20 and 21) (e.g., How confident are that you can continue to do your hobbies and recreation?), Manage symptoms' (items 22,23,24,25,and 26) (e.g., How confident are you that you can keep the fatigue caused by your B.P from interfering with the things you want to do?), and Lastly 'Control/mange depression' (items 27,28,29,30,and 31) (e.g., How confident are you that you can keep yourself from feeling lonely?). The internal consistency in terms of chronbach alpha for the nine dimensions is .76, .62, .71, .89, .88, .85, .79, .93, and .91 respectively and the internal consistency reliability for the 31 items (putting together the items of all the nine

scales) measured by cronbach's alpha was .88. The construct validity was deduced by correlating clinical adherence scores obtained from the Hypertension Complaince Scale (HyCompS) with the total score on HSES. Significant positive correlations (r=.25) found between the clinical adherence and Hypertension specific self-efficacy confirmed the HSES to be a valid scale. Several studies supported the association between compliance and self-efficacy (Wu, Song & Moser, 2015; Schoenthaler, Ogedegbe & Allegrante, 2009; Scherer & Bruce, 2001). Copy of the scale is enclosed in appendix (A5).

Scoring: Every item had a score ranging from 1 to 10 depending upon the degree of confidence rated by the respondent. The total composite score of self-efficacy was the mean of the scores of the 31 items together from nine scales. Higher number indicates higher self-efficacy. Score of each sub-scale is the mean of the scores of items in the dimension. The sub-scale HSES- 'Exercise regularly' consisted of items 1, 2, and 3 and the subscale HSES-'Get information about disease' consisted of items 4, 5. The subscale HSES-'Obtain help from community, family, and friends' consisted of 6, 7, 8, and 9 items while the subscale HSES-'Communicate with physician' consisted of items 10, 11, and 12. The subscale HSES-'Manage disease in general' consisted of items 13,14,15,16 and 17 while the subscale HSES-'Do chores' consisted of items 18 and 19. The subscale HSES-'Social/Recreational activities' consisted of items 20 and 21 while the subscale HSES-Manage symptoms' consisted of items 22,23,24,25 and 26. Lastly the HSES-'Control/mange depression' consisted of items 27, 28, 29, 30, and 31.

Blood pressure recording: The patients' blood pressure reading was measured by a standard mercury sphygmomanometer (Elko Company, India). The calibrations and the measurements validated were verified. The B.P readings were measured and

recorded. The readings are then converted to the mean arterial pressure readings with the help of the following formula.

$$\text{Mean Arterial Pressure (MAP)} = \frac{\text{Systolic Blood Pressure} + 2\,(\text{Diastolic Blood Pressure})}{3}$$

Mean Arterial Pressure is defined as the average pressure in a patient's arteries during one cardiac cycle. It is considered a stronger indicator of perfusion to vital organs than systolic and diastolic blood pressure (Henry, Miller, Kelly, & Champney, 2002).

Personal Details Form: A separate Personal details form was used to record details of socio-demographic, contact and medical information that were relevant for the analysis. This was a one time record so as to avoid repetition of the same in every tool. Once recorded every participant was assigned an ID number. Thereafter every tool that was administered carried the unique ID number of the participant. A copy of this form is enclosed in appendix (A6).

Interventions

The cognitive intervention was designed with a purpose of creating a strong cognitive base with inputs of knowledge about primary hypertension. Functional knowledge is defined as the essential information about primary hypertension with a focus on essential behavioural aspects for efficient management of hypertension. Thus, the intervention design comprised of essential information about primary hypertension with logical explanations about the normal physiology of circulatory system, the obstacle to this normal functioning, the role of medication, diet and exercise in sustaining normal blood pressure, the need for regular self-monitoring, symptoms of raised blood pressure, alarm signals demanding emergency consultation

with the physician. Adequate emphasis was also given in logically explaining the repercussions of non-adherence and low adherence and the irreversibility of the same.

The content explained above remained the same for the entire intervention group while the groups varied in the form and frequency of exposure to intervention.

Intervention for Direct Interaction Groups

In this module, a qualified physician prepared a power point presentation of the contents of cognitive intervention. The power point presentation consisted of visuals that included figures, pictures, flowcharts and animations wherever necessary. The module was prepared with 15 slides for 30 minute presentation by the physician who addressed the participants in the groups of 30 per batch. At the end of the 30 minutes presentation the physician invited the participants for open interaction.

The groups exposed to this module also varied in frequency of exposure, the group that had a single exposure (DIS) were exposed to this module only once while the group of double exposure (DID) was exposed to this module twice with a gap of 15 days.

Audio-Visual Mode

While the contents and the slides in the power point presentation and the physician remained the same, the module in this mode was through a video presentation. The presentation of the physician was video recorded and the group was exposed to this video presentation in batches of 30 participants.

The groups exposed to this module differed in frequency of exposure. One group was exposed to this only once called as Audio-Visual Single Exposure (AVS) Group, while the other group received one repeated exposure with a gap of 15 days

and designated as Audio-Visual Double Exposure (AVD) Group. The audiovisual intervention is appended in the form of CD.

Booklet

In addition the modules, participants of all the four groups received a booklet on primary hypertension containing the above information on primary hypertension. The booklet consisted of all the information of the cognitive intervention written in English and Telugu (The participants could choose the booklets of their preferred language) with illustrations in colours. The booklet in English (Appendix B1) and in Telugu (Appendix B2) are appended.

Procedure

The procedure followed various stages of obtaining the ethical clearance, permissions from the health centres, designing of cognitive intervention, modules and conduction of the study.

Ethical clearance: The study design was presented in institutional ethics committee of the University of Hyderabad, and obtained its approval (Appendix C1). Permissions were obtained from the governing body of the church administration where the data collection was planned. The mandatory license for the required number of administrations to use HADS was purchased (Appendices C2). Patient Information form (Appendix C3) explaining the purpose, procedure and outcomes of the study were given to all the patients. For those who cannot read English, the form was translated into Telugu (Appendix C4). Those willing to sign the Informed Consent Form (Appendix C5) were recruited into the study.

Designing the Cognitive Intervention Module: An extensive literature search preceded the designing of cognitive intervention module. This module was developed in two modes namely direct interaction mode and audio-visual mode.

Articles related to causes, consequences of uncontrolled hypertension, management of hypertension, lifestyle modification, medications and symptoms of hypertension were reviewed. In addition to research articles, the Joint National Committee's panel (JNC-8) guidelines for management of Hypertension in adults (James *et al*., 2014), patient education reports on high blood pressure by the University of Maryland Medical Center (2017) were critically reviewed.

Inputs were taken from three physicians on the essential information for a patient of primary hypertension so as to effectively manage the condition by keeping the blood pressure under control. Draft content was prepared using non-technical terms to suit the comprehension of a lay patient. Two sessions of discussions were held with the physician who consented to provide the intervention. In these two sessions the content was organized in the suitable form of presentation. Three more sessions of discussion with the physician finalized the visuals and their forms, and power point presentation. The content was pruned further to fit into a 30 minute session after two sessions of rehearsal by the physician. The physician carried the cues in a slip for the direct presentation. The presentation was recorded in English in the studio for audio-visual module. The audio-visual module was finalized after proper editing that took three sittings so as to fit into a 30 minute session. The script was translated to Telugu and back translated. The final script was voiced over in Telugu language. Thus the A.V mode was available in English and Telugu languages.

Booklet: The booklet was finalized after four drafts and was given for printing after a thorough proof reading. The script was translated into Telugu and back

translated to ensure equivalence. The final draft was colorfully printed on A4 size cards.

Pilot study*:* A pilot study was conducted on a sample of 614 patients in the age group of 30 to 65 years diagnosed with primary hypertension to test the feasibility of the new tool and establish the psychometric properties. The new tool of Hypertension Knowledge Test originally consisted of 30 items. After content validation by experts, based on the absolute agreement on the essentiality of the items, six Items were dropped. The test consisting of 24 items was administered to 614 patients with primary hypertension as part of pilot testing of the tools. The other tools such as HyComps, Hypertension Anxiety and Depression Scale (HADS), Hypertension Self Efficacy Scale, Multidimensional Scale of Perceived Social Support (MSPSS) were administering to check the feasibility. Based on the pilot study, the validation of 24 item Hypertension Knowledge Test was carried out on in order to evaluate the item characteristics of the test. Two types of item analysis such as Item difficulty and item discrimination were carried out. Item difficulty was carried out to drop those items correctly answered by all the respondents and the items wrongly answered by all respondents. Discrimination index measured the ability of each item to discriminate between those who scored high on the total test score and those who scored low. This index showed the extent to which overall knowledge of the hypertension is related to the response of an item and also to ascertain whether the test taker got an item correct due to their level of knowledge of hypertension and not due to chance or bias. Based on these two analyses, a final set of 22 item test named as 'Hypertension Knowledge Test' was developed and validated. The publication related to the pilot is appended (Appendix D).

The Main study:

***Recruitment of participants*:** After obtaining administrative permission from the governing body of the church, daily visits were made to the health centers. The physician identified the patients diagnosed with primary hypertension. The identified patients were approached. Those fulfilling the inclusion and exclusion criteria were invited to join as volunteers in the study. The eligible persons fulfilling the criteria were sought their consent to participate in the study. Those willing to sign the informed consent were given the informed consent form after verbal explanation. The participants were recruited after signing the informed consent form. While in the process of recruitment they were sequentially assigned to the five groups. For example, the first recruit was assigned to Group 1, second to Group 2 and so on until every group had 90 participants.

A schedule was prepared for cognitive intervention with the dates and times. The schedule was prepared in a manner to accommodate a group of 30 participants in a session. The participants were informed about their due visit for intervention.

Pre-intervention assessments: The pre-intervention assessment process was initiated 15 days prior to the scheduled date of intervention for the batch. The pretest was carried out in three sessions of predetermined dates i.e. on day 1, day 8 and day 15. The blood pressure reading (B.P reading) was taken on all the three sessions while the other tests were staggered over the three sessions. The B.P reading was taken following the standard procedure. The participant was asked to relax in the seating position for 30 minutes. Appropriately sized cuffs were used and the three readings recorded in mm/hg were taken with a gap of 10 minutes each and the average of the three readings is taken as the final blood pressure reading. The average of these three readings was considered as one B.P reading for the participant.

On day 1 of the pre-intervention assessment, along with B.P reading the persona data sheet was filled, and an ID number was assigned to each participant. Thereafter the Hypertension Knowledge Test (HKT) and Hypertension Compliance Scale (HyCompS) were administered to the participants in the batch of 30. On day 8 after taking the individual B.P reading the group of 30 participants was administered Hospital Anxiety and Depression Scale (HADS) and Multidimensional Perceived Social Support Scale (MSPSS). Similarly on day 15 after taking the individual B.P reading, the participants in a group were administered Hypertension Self Efficacy Scale (HSES) and Personal Stress scale. The administration of psychological tests in each session took about 45 minutes.

As mentioned earlier, there was attrition of recruited participants during the three assessment sessions. At the time of the third pre-intervention assessment, the number of participants in the Group 1,2,3,4, and 5 were n_1=83, n_2=82, n_3=82, n_4=82 and n_5==78 respectively.

Interventions: The schedule was organized in such a way that the participants would have their exposure to cognitive intervention the day after their pre-intervention assessments. The participants were exposed to the intervention module of direct interaction or audio-visual module as per their group assignment.

The Participants in the first experimental condition, namely 'Direct Interaction single exposure Group' were exposed to the direct interaction module of the cognitive intervention. In this session the physician presented the content using power point presentation that lasted for a duration of 30 minutes. Each batch of 30 participants was exposed to the presentation in a congenial environment of air conditioned room that had the facility of LCD projector, screen and a public address system. After the presentation, the investigator announced that the session was open for any questions

or doubts or clarification on the presentation. The questions were entertained one at a time giving scope for supplementary questions either from the same participant or from the others. The interaction time has concluded at the end of 45 minutes. At the end the participants were handed over the booklet to strengthen their understanding about hypertension.

The Participants in the second experimental condition, namely 'Direct Interaction double exposure Group' were exposed to the same intervention as above. In addition, the same exposure was given second time on the 15th day from first exposure. Thus Direct Interaction Double exposure group was exposed twice to the same intervention in a gap of 15 days. The interaction time in each session was restricted to 45 minutes. The participants were handed over the booklets and instructed to read it to strengthen their understanding about hypertension.

The participants in the third experimental condition, namely Audio-Visual single exposure Group were exposed to the A.V module of the cognitive intervention for duration of 30 minutes in a congenial environment of air conditioned room that had the facility of computer, LCD projector, screen and a public address. After the 30 minute exposure to the video, the participants were handed over the booklets and instructed to read it to strengthen their understanding of hypertension.

The Participants in the fourth experimental condition, namely 'Audio Visual Double exposure Group' were exposed to the same intervention as above. However, the group was given the same exposure for a second time on the 15th day from first exposure. On the completion of second exposure of the Audio-Visual presentation, the participants were handed over the booklet and instructed to read the same to strengthen their understanding of hypertension.

The Control Group was administered all the pre-intervention assessment but did not receive any cognitive intervention however these participants received the standard medical treatment.

Post-intervention assessments: The post-intervention assessment for every group was initiated on the 31st day of the last pre-intervention assessment. There were three post-intervention assessments. The second was on the 8th day of the first post-intervention assessment and the third was on the 15th day of first post-intervention assessment. The staggering of psychological tests were followed similar to pre-intervention assessment and the B.P readings. The Control Group participants were presented with the 30 minute AV presentation in order to satisfy the ethical obligation.

CHAPTER IV

RESULTS

Chapter IV

RESULTS

The main objective of this study was to find out the effect of cognitive intervention on adherence and disease management of patients with primary hypertension. Knowledge interventions were given in two varying modes and in two varying frequencies. In order to find out the relative effectiveness of these four intervention modules the four groups were compared with a Control Group (that received no additional intervention but only standard medical care) applying Analysis of Covariance (ANCOVA) using the software package SPSS version 20. Further an attempt was made to identify the factors contributing to clinical adherence and hypertension management after exposure to cognitive intervention. Multiple Regression Analyses were carried out to identify the predictors of enhanced knowledge, clinical adherence and hypertension management. A pathway was tracked between the predictors and the criterion. The results are discussed in four sections. In section-I, the four intervention groups and the Control Group were compared on the level of hypertension knowledge, clinical adherence and hypertension management. In section-II, the four intervention groups and the Control Group were compared on psychosocial variables such as the level of anxiety, depression, perceived social support and self-efficacy. In section-III, correlates to knowledge, self-efficacy, adherence and hypertension management were identified independently and the multiple regression analyses were carried out separately for each of the criterion. Once this is done, in section-IV the pathway was tracked by carrying out further Multiple Regression Analysis.

Section-I: Differences among the Intervention and the Control Groups

Differential Impact of Four Modules of Cognitive Intervention in Knowledge Enhancement

The participants in four groups, viz., Direct Interaction Single Exposure (DIS), Direct Interaction Double Exposure (DID), Audio-Visual Single Exposure (AVS) and Audio-Visual Double Exposure (AVD) received four different modules of Cognitive intervention while those in the control did not receive any cognitive intervention. The cognitive intervention consisted of knowledge inputs related to various aspects of hypertension. The four modules of intervention were taken as independent variables, while the hypertension related variables such as knowledge, adherence, hypertension management, and psychosocial variables such as anxiety, depression, perceived social support and self-efficacy with their dimensions are dependent variables. The four groups receiving intervention through different modules were compared with the Control Group. The pre-intervention scores are considered as the covariates in each of the separate analysis accordingly. The pre-intervention scores are represented by the Roman number I and the post-intervention scores are represented by the Roman number II. Subsidiary post hoc analyses were computed to substantiate the results of ANCOVA. It is pertinent to mention here that the five groups were found to be homogenous on the dependent variable as found from the pre-intervention scores. The groups were also found to be homogenous on demographic variables such as age, gender, education, economic status and duration of illness. In addition normality checks and Levene's test were carried out and the assumptions of Analysis of Covariance were met.

An attempt was made to find out if the four modules of intervention had differential impact in creating a cognitive base that was sustained over four weeks. For this purpose the four groups and the Control Group were compared by applying separate Analyses of Covariance (ANCOVA) for differences in post-intervention overall knowledge and its dimensions such as General awareness, Lifestyle factors in hypertension care, Knowledge related to Causes, Care and Casualty and Knowledge related to medication management.

For the purpose of controlling the effect of pre-intervention scores on the post-intervention scores, the corresponding pre-intervention score of the variable was considered as the covariate in each ANCOVA. The pre-intervention overall knowledge score was significantly related to the post-intervention overall knowledge $F(1,250) = 157.81$, $p<.001$, $\eta^2=.38$. The ANCOVA controlled and evaluated the pre-intervention knowledge at a mean score of 12.43. The pre-intervention general awareness score was significantly related to the post-intervention general awareness $F(1,250) = 75.23$, $p<.001$, $\eta^2=.23$. ANCOVA controlled and evaluated the pre-intervention general awareness at a mean score of 2.79. The pre-intervention score of lifestyle aspects was significantly related to the post-intervention score of lifestyle aspects, $F(1,250) = 68.46$, $p<.001$, $\eta^2=.21$. ANCOVA controlled and evaluated the pre-intervention knowledge of lifestyle factors at a mean score of 3.08. The pre-intervention score of knowledge about causes, care and casualty awareness was significantly related to the post-intervention score of knowledge about causes, care and casualty awareness $F(1,250) = 85.92$, $p<.001$, $\eta^2 =.25$. ANCOVA controlled and evaluated the pre-intervention knowledge about causes, care and casualty awareness at a mean score of 3.15. The pre-intervention knowledge about medication management was significantly related to the post-intervention knowledge about

medication management F (1,250) = 61.08, p<.001, η^2=.19. ANCOVA controlled and evaluated the pre-intervention knowledge about medication management at a mean score of 3.41. Since there was an effect of the covariate, it necessitated to compute the ANCOVA to partial out the effect of pretest scores.

Five ANCOVAs were carried out to find the differences among the five groups (DIS, DID, AVS, AVD and Control). Results are presented in table 4.1. The table presents the adjusted means of the post-intervention knowledge scores (after controlling for pre-intervention knowledge scores), Standard Errors, F values and effect sizes. A cursory look at the table reveals significant differences among the five groups on overall knowledge, $F(4, 250) = 56.69$, $p < .001$, General awareness F (4, 250) = 73.54, p< .001, Lifestyle factors $F(4, 250) = 14.63$, $p < .001$, Causes, Care and Casualty awareness $F(4, 250) = 29.43$, $p < .001$, Medication Management $F(4, 250) = 4.35$, $p < .05$. As a logical step forward, post hoc tests of multiple group comparison based on Bonferroni adjustments was applied to compare the post-intervention knowledge enhancement of each group with every other group based on estimated marginal means. The results are presented in table 4.2. The table reveals that the Control Group significantly differed from all the other groups on overall knowledge as well as on General awareness, Lifestyle factors, Causes, care and Casualty and Medication management dimensions. Further it is also observed that the DID Group significantly differed from the AVS on overall knowledge and the dimensions of General awareness and Lifestyle factors. Further it is also observed that the DID Group significantly differed from the AVD on overall knowledge and all the dimensions except medication management.

No significant differences were observed between the two Direct Intervention Groups and the two Audio-Visual Groups. The Control Group was found to have

significantly lower Overall Knowledge base (*M*=13.18, *SE*=0.30) compared to DIS (*M*=18.18, *SE*=0.30), DID *(M*=19.20, *SE*=0.30), AVS *(M*=17.17, *SE*=0.30), and AVD *(M*=17.19, *SE*=0.30). The effect size was moderate ($ή^2$ = .47). Control Group was also found to have scored lower on the dimension of General awareness (*M*=2.80, *SE*=0.10), compared to DIS (*M*=4.74, *SE*=0.10), DID (*M*=4.97, *SE*=0.10), AVS (*M*=4.55, *SE*=0.10), and AVD (*M*=4.55, *SE*=0.10). The effect size was moderate ($ή^2$ = .54). On the dimension of Lifestyle aspects the Control Group was found to have significantly lower level of knowledge base (*M*=2.86, *SE*=0.09) compared to DIS (*M*=3.58, *SE*=0.09), DID (*M*=3.82, *SE*=0.09), AVS (*M*=3.37, *SE*=0.09), and AVD (*M*=3.39, *SE*=0.09) with the effect size being small ($ή^2$ = .19). Same was found in the case of knowledge base on the dimension of Causes, Care and Casualty where the Control Group scored significantly lower (*M*=3.18, *SE*=0.14) compared to DIS (*M*=4.18, *SE*=0.14), DID (*M*=5.21, *SE=0.*14), and AVS (*M*=4.90, *SE*=0.14). The effect size was small ($ή^2$ = .32). Finally it is observed from table 4.1 and 4.2 that the Control Group scored significantly low on knowledge dimension of medication management (*M*=4.40, *SE*=0.13) as compared to DIS (*M*=5.08, *SE*=0.14), and DID (*M*=5.09, *SE*=0.14), but not with AVS and AVD although the effect size was small ($ή^2$ = .06).

Table 4.2 also broadly revealed that the Direct Interaction Groups that received two exposures (DID) significantly differed from the two Groups that received cognitive intervention through audio-visual mode irrespective of number of exposures (AVS and AVD). A scrutiny into Table 4.1 reveals that the DID Group scored higher on overall knowledge (*M* = 19.20, *SE* = 0.30) compared to AVS (*M*=17.17, *SE*=0.30) and AVD (*M*=17.19, *SE*=0.30). DID also significantly differed from AVS on overall knowledge and its dimensions such as General awareness and

Lifestyle aspects but not in the dimensions of 'Causes, Care and Casualty' and medication management. DID also significantly differed from AVD on overall knowledge and its dimensions such as General Awareness, Lifestyle aspects, 'Causes, Care and Casualty' except for the dimensions of medication management. Table 4.1 reveals that DID showed higher knowledge base on General Awareness (*M*=4.97, *SE*=0.10) compared to AVS (*M*=4.55, *SE*=0.10) and AVD (*M*=4.55, *SE*=0.10). The effect size was found to be moderate ($ή^2$ = .54). On the dimension of Life Style aspects, the DID Group scored significantly higher on knowledge (*M*=3.82, *SE*=0.09) compared to AVS (*M*=3.37, *SE*=0.09) and AVD (*M*=3.38, *SE*=0.09). The effect size was found to be small ($ή^2$ = .19). The DID Group showed higher level of knowledge base in the dimension of Causes, Care and Casualty (*M*=5.21, *SE*=0.14) in contrast to AVD (*M*=4.47, *SE*=0.14). The group effect size was small ($ή^2$ = .32).

The results are also given a visual representation in the form of graphs from figure 4.1 to 4.5 for the overall knowledge and its dimensions respectively. The bars represent the five groups while the lines cutting across the bars represent the controlled means of the pre-intervention knowledge and its dimensions respectively. It can be clearly perceived in case of Control Group that the height of the bars did not significantly shoot up beyond the pre-intervention knowledge level indicating that the knowledge base of the Control Group showed no significant change in the post-intervention scores (Except in medication management dimension) as in the case of other groups that received cognitive intervention.

Table 4.1

Results of one way ANCOVA with estimated marginal means, standard errors, effect sizes ($\acute{\eta}^2$) for post-intervention hypertension Knowledge score and its variables

	Means (Standard error)					***F*(4,250)**	**$\acute{\eta}^2$**
Groups ⟶	DIS	DID	AVS	AVD	Control		
Overall HTN Knowledge	18.18 (.31)	19.20 (.30)	17.17 (.30)	17.19 (.30)	13.18 (.30)	56.69***	.47
General Awareness	4.74 (.10)	4.97 (.10)	4.55 (.10)	4.55 (.10)	2.80 (.10)	73.54***	.54
Lifestyle Aspects	3.58 (.09)	3.82 (.09)	3.37 (.09)	3.38 (.09)	2.86 (.09)	14.63***	.19
Causes, Care & Casualty Awareness	4.81 (.14)	5.21 (.14)	4.90 (.14)	4.47 (.14)	3.18 (.14)	29.43***	.32
Medication Management	5.08 (.14)	5.09 (.14)	4.89 (.14)	4.72 (.14)	4.40 (.13)	4.35**	.06

Note. 1. DIS = Direct Interaction Single, DID = Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double

2. *= $p<.05$, **= $p<.01$, ***= $p<.001$.

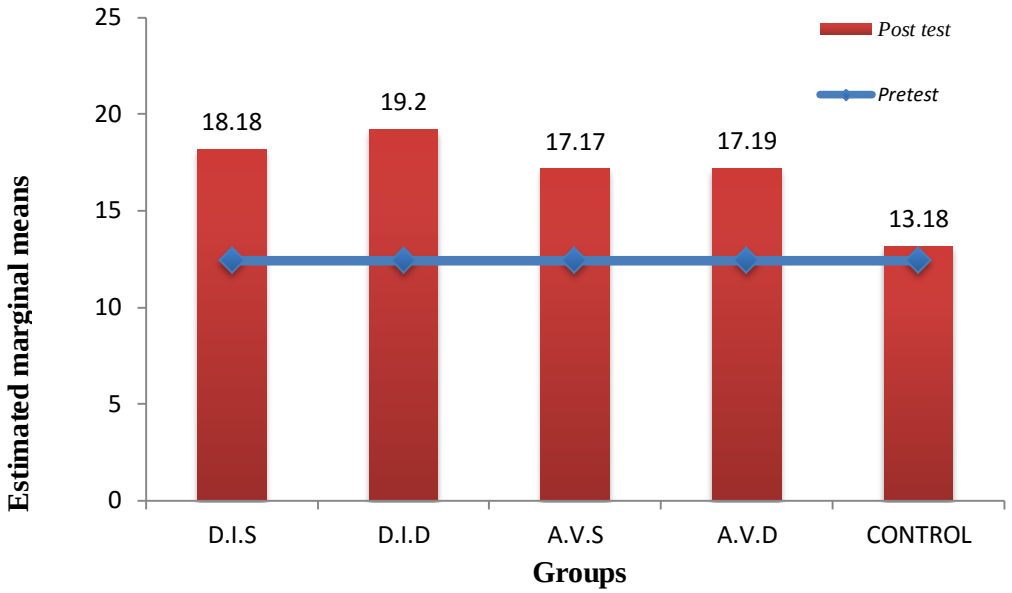
Table 4.2

Results of Bonferroni multiple group comparisons on knowledge and its dimensions

Multiple comparisons	Overall HTN Knowledge	General Awareness	Lifestyle Aspects	Causes, Care & Casualty awareness	Medication Management
DIS ~DID	-1.01	-.22	-.23	-.40	-.01
DIS ~AVS	1.00	.19	.21	-.09	.18
DIS ~AVD	.99	.19	.20	.33	.36
DIS ~Control	4.99***	1.94***	.72***	1.62***	.68**
DID~AVS	2.02***	.41*	.45**	.30	.20
DID ~AVD	2.01***	.41*	.43*	.73**	.37
DID ~Control	6.01***	2.16***	.95***	2.02***	.69**
AVS ~AVD	-.01	.01	-.01	.43	.17
AVS ~Control	3.99***	1.75***	.50**	1.72***	.49
AVD ~Control	4.00***	1.75***	.52**	1.28***	.32

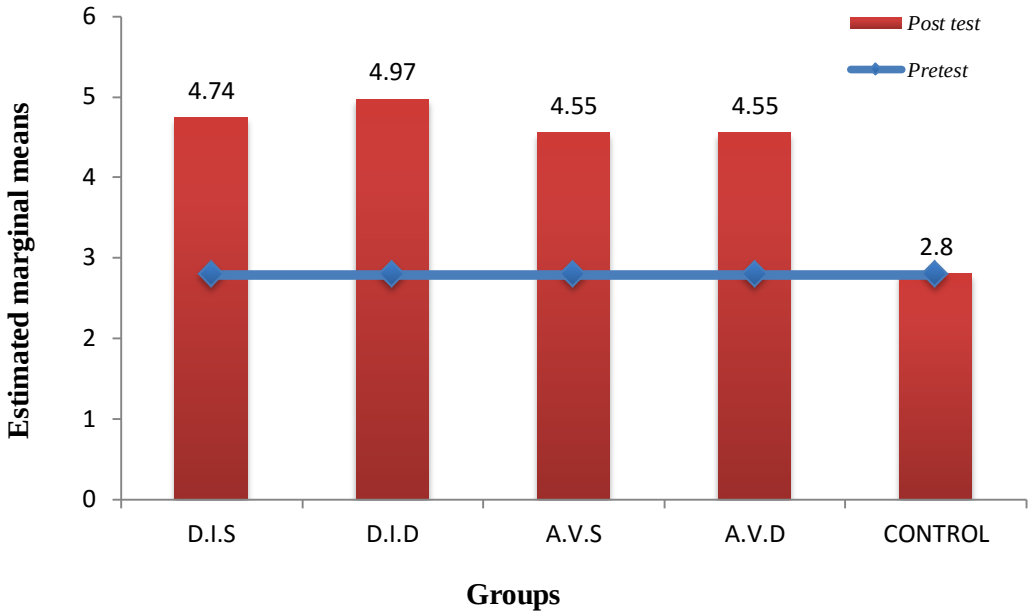
Note. 1. DIS = Direct Interaction Single, DID = Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double

2. *= $p<.05$, **= $p<.01$, ***= $p<.001$.



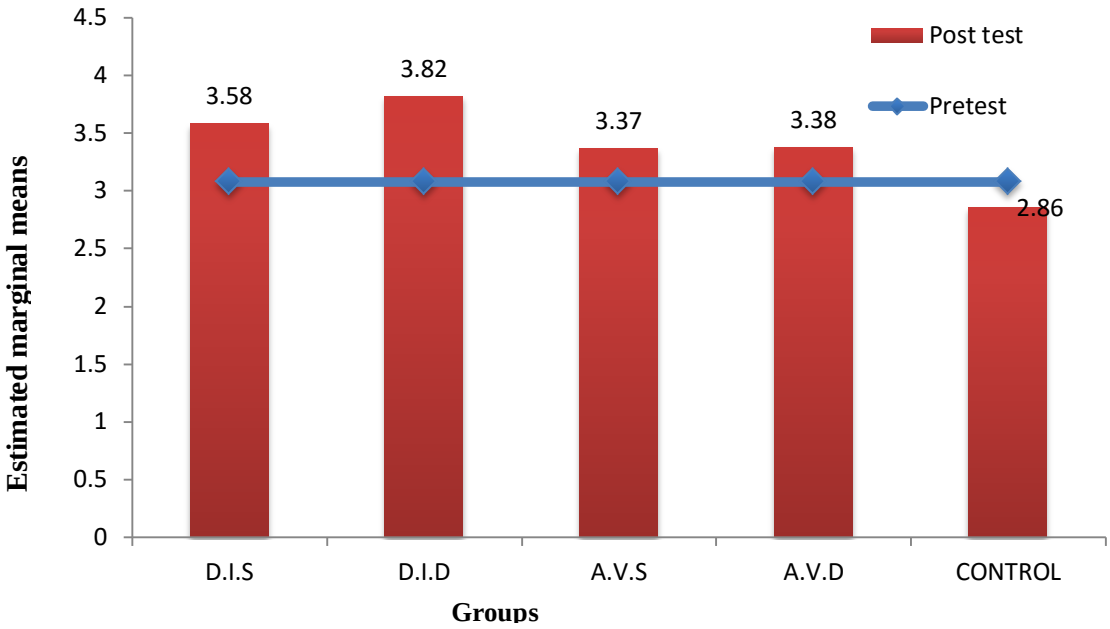
Note: Covariate was evaluated at pretest controlled mean value of 12.43.

Figure 4.1 Graph showing the group differences in the post-intervention Overall Knowledge



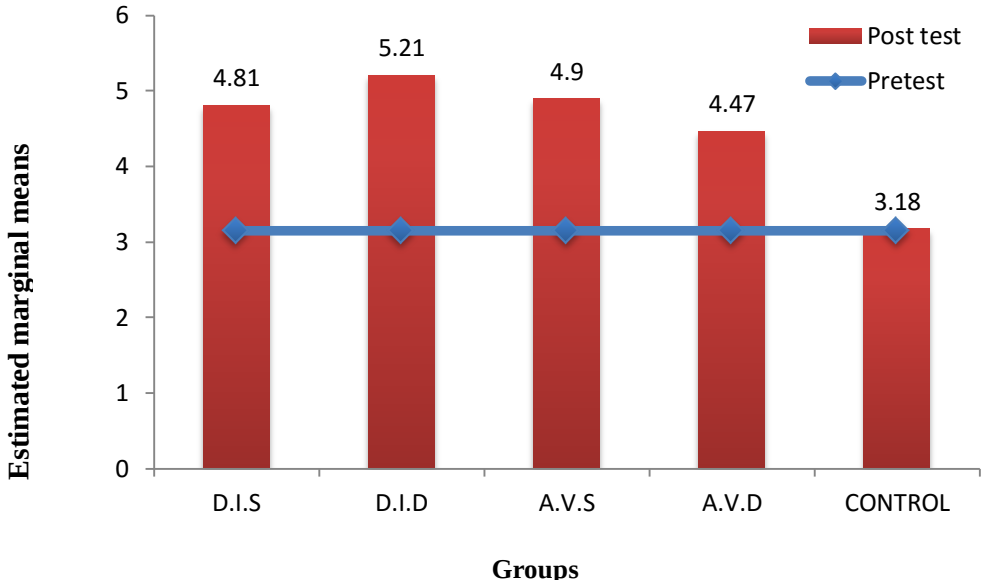
Note: Covariate was evaluated at pretest controlled mean value of 2.79

Figure 4.2 Graph showing the group differences in the post-intervention 'General Awareness' about hypertension



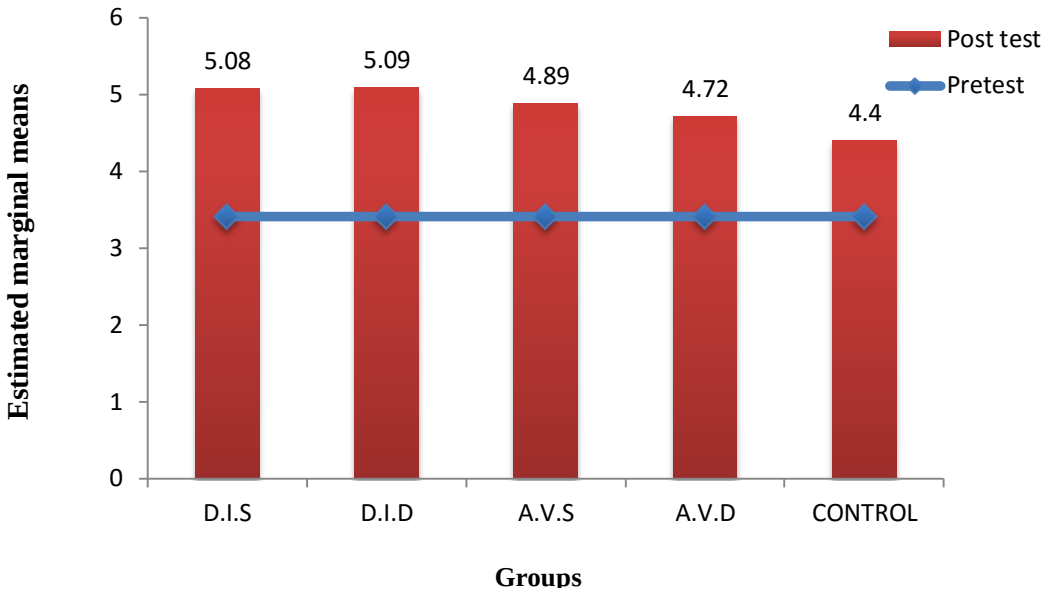
Note: Covariate was evaluated at pretest controlled mean value of 3.08

Figure 4.3 Graph showing the group differences in the post-intervention knowledge about Lifestyle Factors



Note: Covariate was evaluated at pretest controlled mean value 3.15

Figure 4.4 Graph showing the group differences in the post-intervention knowledge about Causes, Care and Casualty Awareness



Note: Covariate was evaluated at pretest controlled mean value 3.41

Figure 4.5 Graph showing the group differences in the post-intervention knowledge about Medication Management

Differential Impact of four modules of Cognitive Intervention on Adherence

From the preceding section, it was found that the cognitive interventions had a positive impact on the knowledge related to hypertension and its four dimensions. This knowledge inculcation is expected to create a cognitive base which in turn is expected to be translated to behaviour that gets reflected in enhancement of the clinical adherence. Thus the enhanced adherence behaviour is expected to be the outcome of cognitive intervention. High clinical adherence is an essential pre-requisite for efficient hypertension management.

Clinical adherence is measured by Hypertension Compliance Scale (HyCompS) in its totality as well as the four dimensions of adherence viz, adherence to medication, diet, exercise and self-monitoring.

Logically, if the four modules of cognitive intervention created differential cognitive base as has been discussed in preceding paragraphs, it is expected that there will be differences in translating the cognition into adherence behaviour. In order to examine this, separate one way ANCOVA and Bonferroni Multiple Group Comparison tests were carried out for the overall adherence and its dimensions.

For the purpose of controlling the effect of pre-intervention scores on the post-intervention scores, pre-intervention score of the corresponding variable was considered as the covariate in the respective ANCOVA. The pre-intervention overall adherence score was significantly related to the post-intervention overall adherence, $F(1,250) = 49.46$, $p<.001$, $\eta^2=.16$. The ANCOVA controlled and evaluated the pre-intervention overall adherence at a mean score of 38.15. The pre-intervention adherence to medication was significantly related to the post-intervention adherence to medication, $F(1,250) = 71.29$, $p<.001$, $\eta^2=.22$. The ANCOVA controlled and

evaluated the pre-intervention adherence to medication at a mean score of 19.49. The pre-intervention score of adherence to diet was significantly related to the post-intervention adherence to diet, F (1,250) = 59.16, p<.001, η^2=.19. The ANCOVA controlled and evaluated the pre-intervention adherence to diet at a mean score of 8.53.The pre-intervention score of adherence to exercise was significantly related to the post -intervention score of adherence to exercise, F (1,250) = 21.38, p<.001, η^2=.07. The ANCOVA controlled and evaluated the pre-intervention adherence to exercise at a mean score of 6.55. However the pre-intervention adherence to self-monitoring was not significantly related to the post-intervention adherence to self-monitoring. The ANCOVA controlled and evaluated the pre-intervention adherence to self-monitoring at a mean score of 3.58. Since there was an effect of the covariate on overall adherence and its three dimensions, it necessitated to compute the ANCOVA to partial out the effect of pre-intervention scores on the post-intervention scores. The results of the one way ANCOVA are presented in table 4.3 while that of Bonferroni Multiple Group Post Hoc Comparisons are presented in table 4.4.

Table 4.3 presents the estimated marginal means of post-intervention scores, standard errors, ANCOVA scores and effect sizes, while table 4.4 presents the mean differences and levels of probability (*p*) on the overall and dimension scores for each pair of the five groups, It may be observed from table 4.3 that the five groups significantly differed on Overall Adherence, F(4,250)= 41.36, *p*<.001, Adherence to Medication, F(4,250)= 26.23, *p*<.001, Adherence to Diet, F(4,250)= 36.22, *p*<.001, Adherence to Exercise, F(4,250)= 7.11, *p*<.001, and Self-Monitoring, F(4,250)= 16.58, *p*<.001. In order to examine further details on the differences between different pairs of the five groups, Bonferroni Multiple Group Comparisons were carried out. The results are presented in table 4.4. It may be observed from table 4.4 that the

Control Group significantly differed from all the intervention groups namely DIS, DID, AVS, AVD on overall adherence as well as on the dimensions of Adherence to Medication, Diet and Exercise. Further both the direct interaction groups significantly differed from the audio-visual groups on the dimensions of self-monitoring.

To explain in detail, table 4.3 and 4.4 reveals that the Control Group scored significantly lower (*M*= 37.97, *SE*=.81) in Overall Adherence compared to DIS (*M*= 49.72, *SE*=.84, *p* <.001), DID (*M*= 51.68, *SE*=.83, *p* <.001), AVS (*M*= 47.75, *SE*=.83, *p* <.001) and AVD (*M*= 47.57, *SE*=.83, *p* <.001). The effect size is found to be small ($\acute{\eta}^2$ = .39).

The Control Group (*M*= 20.07, *SE*=.52) was also found to score the lowest in Adherence to Medication in the post-intervention test compared to DIS (*M*= 26.23, *SE*=.53, *p* <.001), DID (*M*= 26.67, *SE*=.53, *p* <.001), AVS (*M*= 25.85, *SE*=.53, *p* <.001), and AVD (*M* = 25.16, *SE*=.52, *p* <.001). The group effect size was small ($\acute{\eta}^2$ = .29).

Adherence to Diet is one of the important components of clinical adherence. The Control Group was found to score the lowest (*M*= 8.25, *SE*=.23) compared to DIS (*M* = 11.45, *SE* =.09, *p* <.001), DID (*M* = 11.78, *SE*=.09, *p* <.001), AVS (*M* = 10.94, *SE*=.23, *p* <.001), and AVD (*M*= 11.08, *SE*=.23, *p* <.001). The Group effect size was small ($\acute{\eta}^2$ = .36).

The Control Group was consistent in scoring the lowest in Adherence to Exercise (*M* = 6.32, *SE* =.25) compared to DIS (*M* = 7.36, *SE* =.25, *p* <.05), DID (*M*= 8.03, *SE*=.25, *p* <.001), AVS (*M*= 7.57, *SE*=.25, *p* <.01), and AVD (*M*= 7.87, *SE*=.25, *p* <.001). The Group effect size was small ($\acute{\eta}^2$ = .10).

A slightly different trend was observed in Adherence to Self-Monitoring where the Control Group scored lower (*M*= 3.32, *SE*=.20) compared to DIS (*M*= 4.65, *SE*=.21, *p* <.001), DID (*M*= 5.20, *SE*=.21, *p* <.001). However the Control Group did not differ significantly from AVS and AVD Groups.

A scrutiny of the mean scores from table 4.3 broadly gives an impression that the DID Group had a higher level of Overall Adherence and its dimensions. A further examination of this through application of Multiple Group Comparison revealed that DID Group in fact did not significantly differ from DIS Group on Overall Adherence as well as the four dimensions. However DID Group scored significantly higher on Overall Adherence (*M*= 51.68, *SE*=0.83) compared to AVS (*M*= 47.75, *SE*=.83, *p* <.05) and AVD (*M*= 47.75, *SE*=.83, *p* <.01).Similarly DID Group was found to have higher level of Adherence (*M*= 5.20, *SE*=.21) compared to AVS (*M*= 3.40, *SE*=.21, *p* <.001) and AVD (*M*= 3.45, *SE*=.21, *p* <.001) on Adherence to self-monitoring.

It may be observed from table 4.3 and 4.4 that DIS Group scored significantly higher on self-monitoring (*M*= 4.65, *SE*=.21) compared to AVS Group (*M*= 3.40, *SE*=.21, *p* <.01) and AVD Group (*M*= 3.45, *SE*=.21, *p* <.001).

The two tables clearly indicate that two direct interaction modules were efficient compared to the two Audio-Visual modules in enhancing the Adherence to Self-Monitoring. This is irrespective of the number of exposures in the modules. It is also evident from the results that cognitive intervention in any form and frequency was successful in enhancing Overall Adherence, Adherence to Medication, Diet and Exercise when compared to Control Group where intervention was limited only to standard medical care with no cognitive intervention.

Graphic representation of the results is provided from figure 4.6 to 4.10. The bars represent the post-intervention scores of five groups while the lines cutting across the bars represent the pretest controlled mean scores of the variable concerned.

It may be observed from the graph that the adherence scores improved significantly for the four intervention groups whereas it did not show any significant change for the Control Group on Overall Adherence as well as its dimensions except in the dimension of Self-Monitoring. In this dimension the two groups exposed to the modules of direct interaction showed significant improvement in adherence and were found to be significantly higher on adherence compared to their counterpart in Audio Visual module and control.

Table 4.3

Results of one way ANCOVA with estimated marginal means, standard errors, effect sizes ($ή^2$) for post-intervention adherence and its variables

	Means (Standard Errors)					$F(4,250)$	$ή^2$
Groups ⟶	**DIS**	**DID**	**AVS**	**AVD**	**Control**		
Adherence Overall	49.72 (.84)	51.68 (.83)	47.75 (.83)	47.57 (.83)	37.97 (.81)	41.36***	.39
Medication	26.23 (.53)	26.67 (.53)	25.85 (.53)	25.16 (.53)	20.07 (.52)	26.23***	.29
Diet	11.45 (.09)	11.78 (.09)	10.94 (.23)	11.08 (.23)	8.25 (.23)	36.22***	.36
Exercise	7.36 (.25)	8.03 (.25)	7.57 (.25)	7.87 (.25)	6.32 (.25)	7.11***	.10
Self – monitoring	4.65 (.21)	5.20 (.21)	3.40 (.21)	3.45 (.21)	3.32 (.20)	16.58***	.21

Note. 1. DIS = Direct Interaction Single, DID = Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double

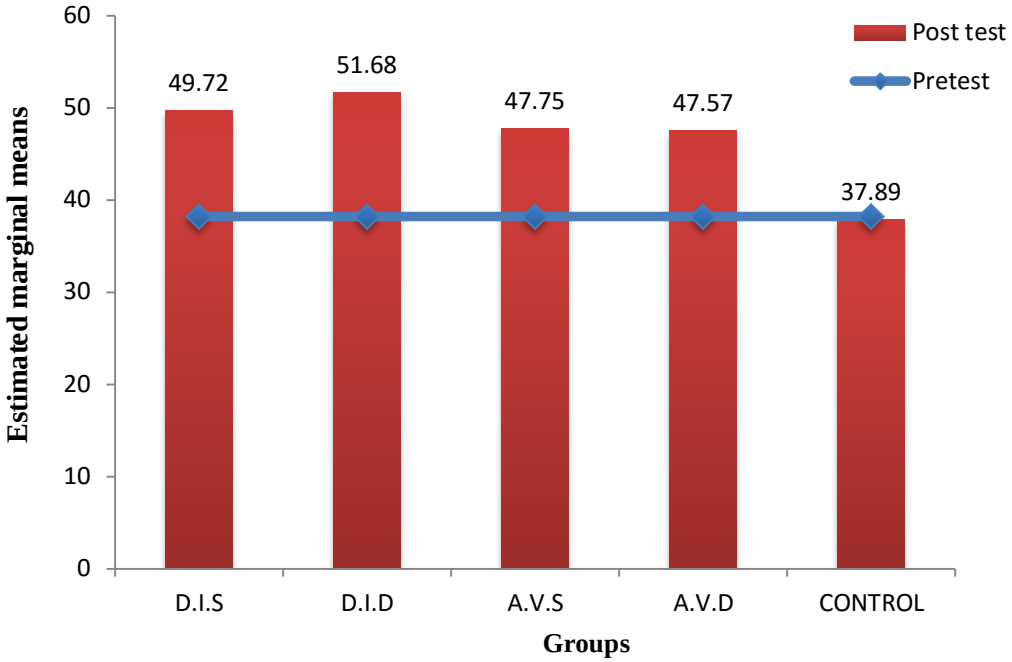
2. *= $p<.05$, **= $p<.01$, ***= $p<.001$.

Table 4.4

Results of Bonferroni multiple Group comparisons on adherence and its dimensions

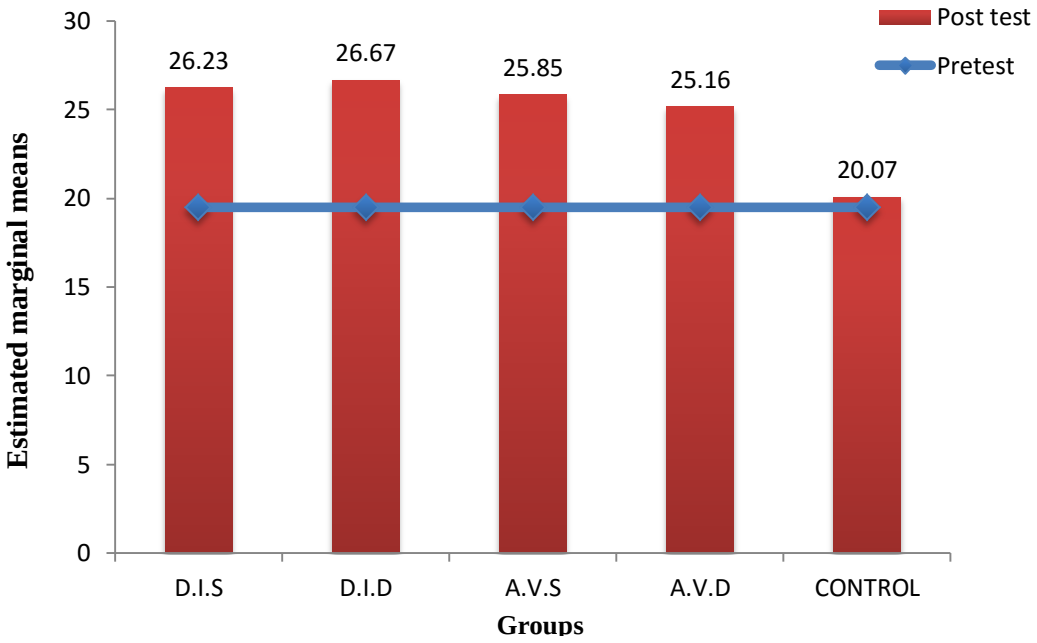
Multiple comparisons	**Hycomps Overall**	**Hycomps-Medication**	**Hycomps-Diet**	**Hycomps-Exercise**	**Hycomps-Self Monitoring**
DIS ~DID	-1.95	-.44	-.32	-.66	-.54
DIS ~AVS	1.97	.37	.51	-.21	1.25***
DIS ~AVD	2.15	1.06	.36	-.51	1.19**
DIS ~Control	11.75***	6.15***	3.20***	1.04*	1.33***
DID~AVS	3.93*	.81	.84	.45	1.80***
DID ~AVD	4.11**	1.50	.69	.15	1.74***
DID ~Control	13.71***	6.60***	3.53***	1.70***	1.87***
AVS ~AVD	.18	.69	-.14	-.29	-.05
AVS ~Control	9.78***	5.78***	2.69***	1.25**	.07
AVD ~Control	9.59***	5.09***	2.83***	1.55***	.13

Note. * = $p<.05$, **= $p<.01$, ***= $p<.001$



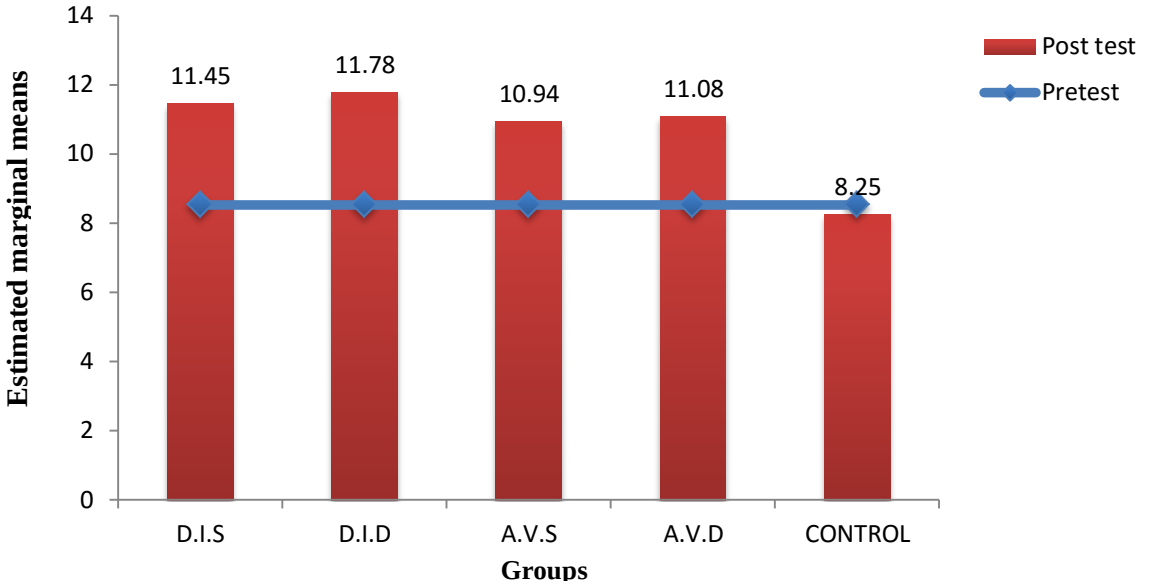
Note: Covariate was evaluated at pretest controlled mean value 38.15

Figure 4.6 Graph showing the group differences in the post-intervention overall adherence



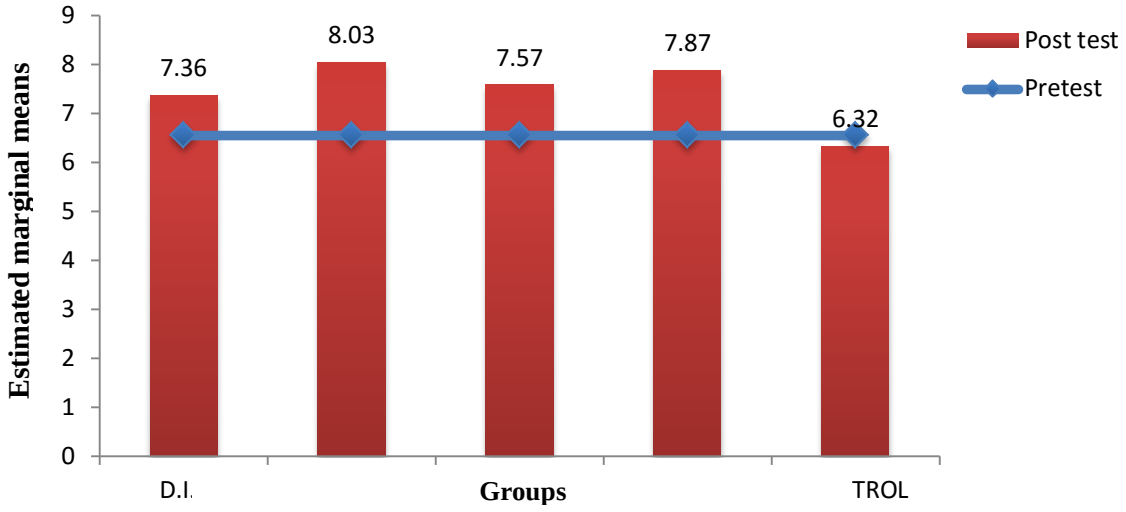
Note: Covariate was evaluated at pretest controlled mean value of19.49

Figure 4.7 Graph showing the group differences in the post-intervention adherence to Medication



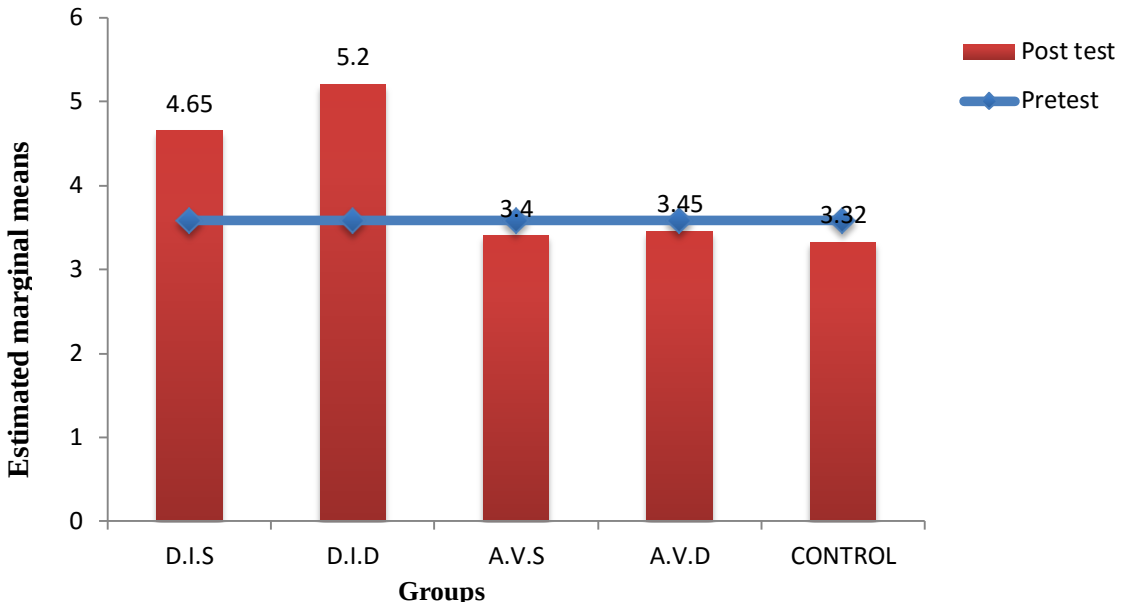
Note: Covariate was evaluated at pretest controlled mean value of 8.53

Figure 4.8 Graph showing the group differences in the post-intervention adherence to Diet



Note: Covariate was evaluated at pretest controlled mean value of 6.55

Figure 4.9 Graph showing the group differences in the post-intervention adherence to Exercise



Note: Covariate was evaluated at pretest controlled mean value 3.58

Figure 4.10 Graph showing the group differences in the post-intervention adherence to Self-Monitoring

Differential Impact of Four Modules of Cognitive Intervention on Management of Hypertension

The third objective of the study was to find out the differential impact of the four modules of cognitive intervention on management of hypertension. The best index of hypertension management is the blood pressure (B.P) reading of systolic and diastolic measures. The B.P readings were obtained thrice prior to the intervention and thrice following the intervention with a gap of one week between the readings. The mean scores of the three pre- intervention readings and three post-intervention readings were converted to the Mean Arterial Pressure (MAP) scores for the purpose of statistical analysis. The normal B.P in terms of Systolic and Diastolic id expected to be 120/80 to 140/90 mm/Hg. The formula for conversion of B.P into Mean Arterial Pressure (MAP) is explained in the method chapter. The normal blood pressure in terms of MAP is 70 to 100 mm Hg.

A one way ANCOVA was carried out on the post-intervention B.P readings after controlling for the effect of their pre-intervention B.P readings. The corresponding pre- intervention score of the blood pressure reading was considered as the covariate in the ANCOVA. The pre-intervention B.P reading was significantly related to the post-intervention B.P reading, F (1,250) = 288.12, p<.001, η 2=.53. The ANCOVA controlled and evaluated the pre-intervention B.P reading at a mean score of 104.07. Since there was an effect of the covariate, it is necessary to compute ANCOVA to partial out the effect of Pre-intervention B.P reading. The results of one way ANCOVA are presented in table 4.5. The table presents the estimated marginal means, F values, *p* levels and $\acute{\eta}^2$ values. It may be observed from the table that there is a significant difference between the five groups in post-intervention B.P level, F (4, 250) = 15.31, p < .001. The effect size was small ($\acute{\eta}^2$ = .19). In order to find out the

significant post hoc differences, Multiple Group Comparison tests were carried out using Bonferroni procedure. Covariate appearing in the model was evaluated at Pre-intervention MAP of 104.07.

The results are presented in table 4.6. It may be observed from table 4.6 that the Control Group significantly differed from all except AVD Group in managing the blood pressure. Further it is also observed that the group exposed to DID module significantly differed from the two Audio-Visual modules in managing the Blood Pressure.

To elaborate further, the Control Group was found to have significantly higher levels of B.P as expressed in terms of Mean Arterial Pressure (M= 102.36, SE=.51) compared to DIS (M= 98.42, SE=.53, p <.001), DID (M= 96.94, SE=.52, p <.001) and AVS (M= 99.83, SE=.52, p <.01). Interestingly no significant differences were found in management of B.P between AVD and Control Group.

The group exposed to the module of DID was found to have significant lower level of B.P (M= 98.42, SE=.53) in post-intervention readings compared to the group exposed to AVS (M= 99.83, SE=.52, p <.01) and AVD (M= 100.28, SE=.52, p <.001). It is evident from the results that the Direct Interaction modules of the intervention were found to be effective in translating the cognitive base of knowledge about Hypertension to effective management in Hypertension. So was the case for Audio-Visual module with single exposure. However it is intriguing to note that the audio-visual double exposure module was not effective in translating the cognitive base to effective management of hypertension.

The results are given graphical representation in figure 4.11. The bars represent the groups while the lines represent the pre-intervention controlled mean

arterial pressure score. It may be pointed out that Mean Arterial Pressure scores are inversely related to efficient hypertension management. Higher values indicate lower efficiency in managing hypertension. The graph clearly indicates better management of hypertension as per the post-intervention readings.

This part of the results section clearly suggests the impact of any module of cognitive intervention in creating cognitive base as evidenced in terms of enhanced knowledge levels. The results also suggested relative efficacy of Direct Interaction Double exposure module in enhancing knowledge, adherence and effectiveness of B.P control.

Table 4.5

Results of one way ANCOVA with estimated marginal means, standard errors, effect sizes ($\acute{\eta}^2$) for post-intervention hypertension management

Groups	Means	Standard Errors	F(4,250)	$\acute{\eta}^2$
DIS	98.42	.53	15.31***	.19
DID	96.94	.52		
AVS	99.83	.52		
AVD	100.28	.52		
Control	102.36	.51		

Note: 1. Covariate was evaluated at pretest controlled mean value of 104.07

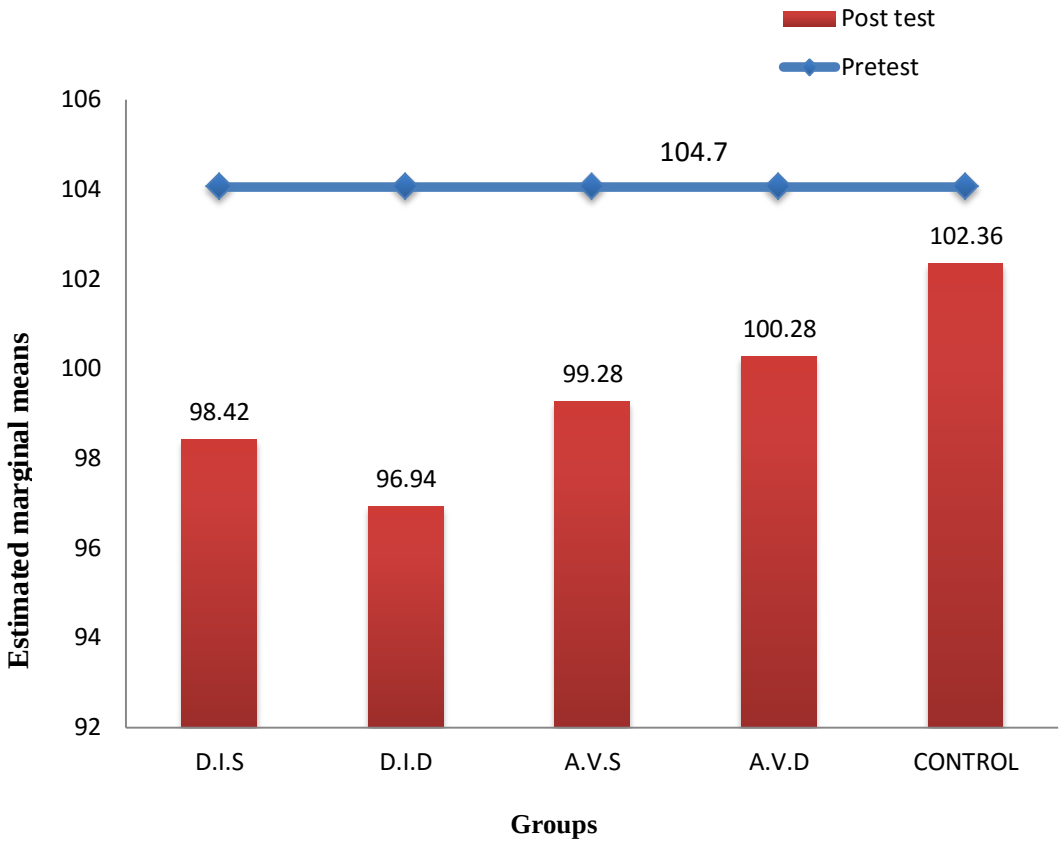
2. ***p<.001

Table 4.6

Results of Bonferroni Multiple Group Comparisons on Blood Pressure Readings

Multiple comparisons	**Hypertension Management (Blood Pressure Readings)**
DIS ~Control	3.94***
DID ~Control	5.42***
AVS ~Control	2.53**
AVD ~Control	2.08
DID~AVS	2.88**
DID ~AVD	3.34***
AVS ~AVD	.45
DIS ~DID	1.48
DIS ~AVS	1.40
DIS ~AVD	1.85

Note. 1. DIS = Direct Interaction Single, DID =Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double
*2. **= p<.01 ***p<.001,*



Note: 1. Covariate was evaluated at pretest controlled mean value of 104.07
2. Lower the Mean Arterial Pressure indicates better management.

Figure 4.11 Graph showing the group differences in post-intervention B.P readings

Section-II Differential Impact of the Cognitive Interventions on Psychosocial Variables

Section-II of this chapter presents the results related to the impact of cognitive interventions on psychosocial variables viz anxiety, depression, social support and self-efficacy. Cognitive Intervention with knowledge base is expected to form a cognitive base related to hypertension. This Cognitive base is assumed to have its influence on the affect and thereby trigger motivation for positive action in managing hypertension more effectively. The purpose of this analysis is to find out the differential impact of the four modules of intervention on variables related to affect state (anxiety and depression), motivation (Self efficacy) and identification of social resources (perceived social support).

Towards this purpose separate ANCOVAS were carried out for each of these parameters and their respective dimensions. The results are presented from table 4.7 to 4.12 and the graphical representations are presented from figure 4.13 to figure 4.27.

Impact of cognitive intervention on Anxiety and Depression

In order to find out if the four intervention modules had differential impact on post-intervention anxiety and depression levels, two separate one way Analysis of Covariance were carried out. For the purpose of controlling the effect of pre-intervention scores on the post-intervention scores, the corresponding pre-intervention score of the variable was considered as the covariate in each ANCOVA. The pre-intervention anxiety was significantly related to the post-intervention anxiety, F (1,250) = 323.69, p<.001, η 2=.56. The ANCOVA controlled and evaluated the pre-intervention anxiety at a mean score of 8.92. The pre-intervention depression was significantly related to the post-intervention depression, F (1,250) = 267.10, p<.001,

η^2=.51. The ANCOVA controlled and evaluated the pre-intervention depression at a mean score of 8.44.

Table 4.7 presents the results of ANCOVA with the values of estimated marginal means, standard errors, and effect sizes ($ή^{2)}$ for anxiety and depression. The results reveal a significant group differences for anxiety, F (4,250) =2.97, p<.05 and depression F (4,250) =8.19, p<.001. The effect size was small for anxiety ($ή^2$= 0.04) and depression ($ή^2$= 0.11).

Table 4.8 presenting the results of Bonferroni Multiple Group Comparison reveals that significant difference in anxiety was found only between DID and AVD Groups wherein DID scored significantly lower in Anxiety (M= 7.75, SE=.35) compared to AVD Group (M= 9.29, SE=.35, p <.001).

Figure 4.12 represents the significant group differences in post-intervention anxiety. The bars represent the groups while the line represents the controlled mean of pre-intervention anxiety. It may be clearly observed from the figure that the post-intervention anxiety levels are significantly lower for DID Group while it overshot the controlled pre-intervention anxiety levels in case of AVD.

A cursory look at the table 4.8 also reveals that DID Group significantly differed from rest of the groups on depression scores, scoring significantly lower on depression (M= 6.40, SE=.30) compared to all the other groups i.e. DIS (M= 8.25, SE =.30, p <.001), AVS (M = 7.85, SE = .30, p <. 05), AVD (M = 8.08, SE =.30, p <.001), and Control (M= 8.67, SE=.29, p <.001).

Figure 4.13 represents the controlled pre-intervention scores and the adjusted post-intervention scores for all groups. The bars represent the post-intervention scores

of the groups while the line depicts pre-intervention controlled mean scores of depression. The lower level of depression for DID Group is evident from the figure.

Table 4.7

Results of one way ANCOVA with estimated marginal means, standard errors, effect sizes (ή²) for Anxiety and Depression.

	Means (Standard Errors)					F(4,250)	ή²
Groups ⟶	**DIS**	**DID**	**AVS**	**AVD**	**Control**		
Anxiety							
	9.08	7.75	8.40	9.29	8.91	2.97*	.04
	(.36)	(.35)	(.35)	(.35)	(.35)		
Depression							
	8.25	6.40	7.85	8.08	8.67	8.19***	.11
	(.30)	(.30)	(.30)	(.30)	(.29)		

Note. 1. DIS = Direct Interaction Single, DID = Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double

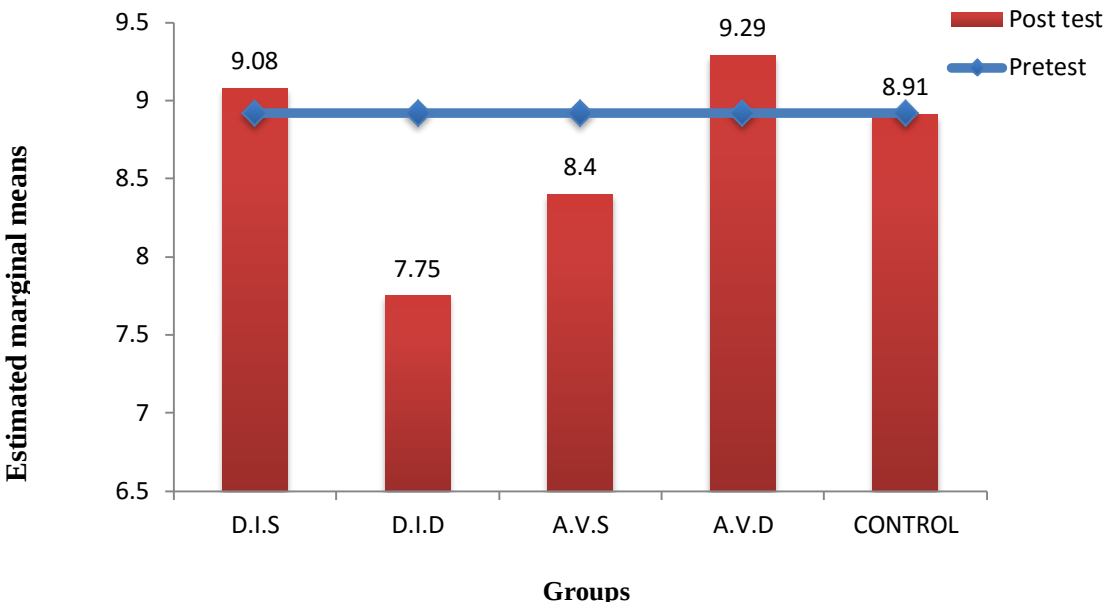
2. *= p<.05, **= p<.01, ***= p<.001.

Table 4.8

Results of Bonferroni multiple group comparisons on Anxiety and Depression

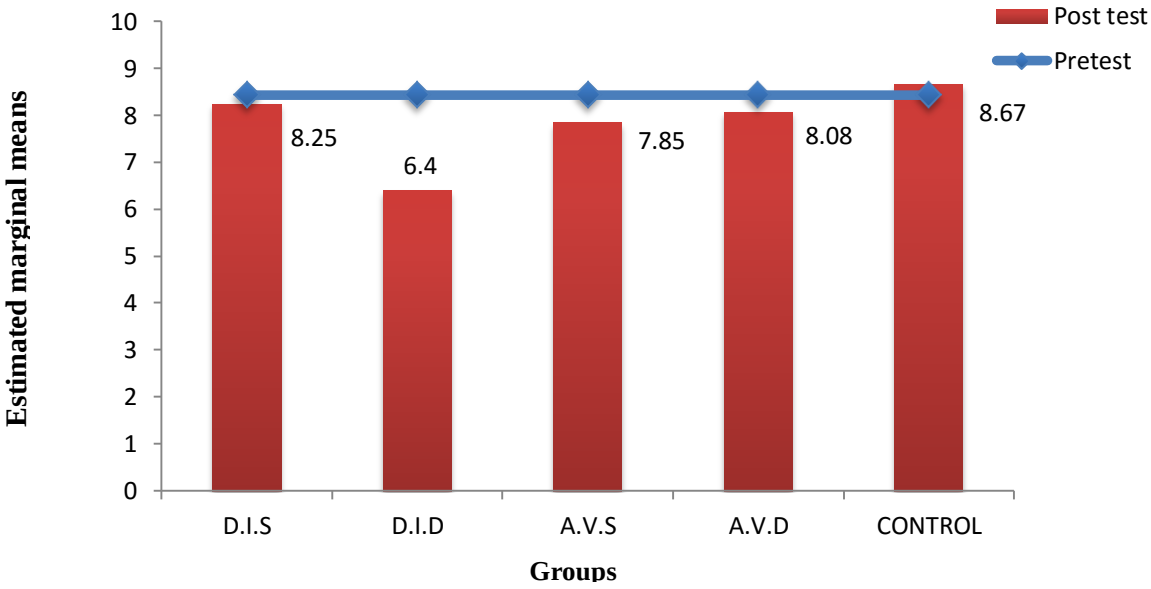
Multiple Comparisons	**Anxiety**	**Depression**
DIS ~DID	1.33	1.85***
DIS ~AVS	.67	.39
DIS ~AVD	-.21	.17
DIS ~Control	.17	-.42
DID~AVS	-.65	-1.45*
DID ~AVD	-1.54*	-1.67***
DID ~Control	-1.15	-2.27***
AVS ~AVD	-.88	-.22
AVS ~Control	.50	-.81
AVD ~Control	.38	-.59

Note. *p <.05, ***p<.001



Note: Covariate was evaluated at pretest controlled mean value of 8.92.

Figure 4.12 Graph showing the group differences in Anxiety



Note: Covariate was evaluated at pretest controlled mean value of 8.44.

Figure 4.13 Graph showing the group differences in Depression

Differential Impact of Four Modules of Cognitive Intervention on Social Support

The intervention modules included the need for seeking support in the form of formal medical intervention on perceiving alarm signals and regular monitoring of B.P by a qualified nurse or doctor. Further, the module also emphasized the need for restriction in diet and regulating exercise. This calls for family support. The participants exposed to the intervention are expected to identify the social support resources for enhancing adherence and management if hypertension. An attempt was made to compare the four groups on Multidimensional Perceived Social Support Overall score and its dimensions. Separate one way ANCOVAs were carried out for the overall scores of Perceived Social Support and its dimensions.

For the purpose of controlling the effect of pre-intervention scores on the post-intervention scores, the corresponding pre-intervention score of the variable was considered as the covariate in each separate ANCOVA. The pre-intervention Overall Social Support was significantly related to the post-intervention Overall Social Support, $F(1,250) = 261.68$, $p<.001$, $\eta^2=.51$. The ANCOVA controlled and evaluated the pre-intervention Overall Social Support at a mean score of 64.22.The pre-intervention Social Support from Family was significantly related to the post-intervention social support from family, $F(1,250) = 175.05$, $p<.001$, $\eta^2=.41$. The ANCOVA controlled and evaluated the pre-intervention Social Support from Family at a mean score of 22.15. The pre-intervention score of Social Support from Friends was significantly related to the post - intervention Social Support from Friends, $F(1,250) = 186.67$, $p<.001$, $\eta^2=.42$. The ANCOVA controlled and evaluated the pre-intervention Social Support from Friends at a mean score of 20.66. The pre-intervention score of Social Support from Significant Others was significantly related

to the post - intervention score of Social Support from Significant Others, $F(1,250) = 350.33$, $p<.001$, $\eta^2=.58$. The ANCOVA controlled and evaluated the pre-intervention social support from significant others at a mean score of 21.41. Since there was an effect of the covariate on post-intervention scores, it necessitated the need to compute the ANCOVA to partial out the effect of pre-intervention scores on the post-intervention scores. Table 4.9 presents the results of ANCOVA with the values of estimated marginal means, standard errors, and effect sizes ($ή^2$) for perceived social support and its dimensions. The results reveal a significant group differences for Overall Social Support, $F (4,250) =14.22$, $p<.001$ and its dimensions such as Family, $F(4,250) =8.12$, $p<.001$, Friends, $F (4,250) =12$, $p<.001$ and Significant Others, $F(4,250) =10.09$, $p<.001$. The effect sizes were small for Overall Social Support ($ή^2=.18$) and its dimensions, Family ($ή^2= 0.11$), Friends ($ή^2= 0.16$) and Significant Others ($ή^2= 0.13$).

In order to find out the differences between various combinations of the four intervention groups and the control on the Overall Social Support and its dimensions, four Bonferroni Multiple Group Comparisons were carried out. The results are presented in the table 4.10.

A cursory look at the table 4.9 and 4.10 reveal that there was significant differences between DID and Control Group, DID and AVD Groups, and DIS and Control Groups on the Overall Perceived Social Support and all its dimensions of Family, Friends and Significant Others. It can also be noticed that there were significant differences between DIS and AVS, DIS and AVD, and DID and AVS Groups in the Perceived Social Support Overall score and also in the dimensions of Social Support from Friends. In addition, AVS and Control Group differed significantly only in the Overall Perceived Social Support score. To explain it in

detail, a careful observation of the scores on Overall Perceived Social Support, the DID Group scored significantly higher (*M*= 75.01, *SE*=1.06) when compared to Control Group (*M*= 65.83, *SE*=1.04, *p* <.001), AVD Group (*M* = 68.15, *SE*=1.06, *p*<.001), and AVS Group (*M*= 70.31, *SE*=1.06, *p* <.05). Further the DIS Group scored significantly higher (*M*= 74.61, *SE*=1.07) when compared to AVS Group (*M*= 70.31, *SE*=1.06, *p* <.05), AVD Group (*M*= 68.15, *SE*=1.06, *p* <.001), and Control Group (*M*= 65.83, *SE*=1.04, *p* <.001). In addition, AVS Group scored significantly higher (*M*= 70.31, *SE*=1.06, *p* <.001) when compared to Control Group (*M*= 65.83, *SE*=1.04, *p* <.001).

Observing the scores in the dimension of Perceived Social Support from the Family, DID Group scored significantly higher (*M*= 25.17, *SE*=.39) when compared to Control Group (*M*= 22.82, *SE*=.39, *p* <.001), and AVD Group (*M*= 23.33, *SE*=.39, *p* <.05). Further the DIS Group scored significantly higher (*M*= 25.17, *SE*=.39) when compared to Control Group (*M*= 22.82, *SE*=.39, *p* <.05).

Scrutiny of the results of Perceived Social Support from the Friends reveal that the DID Group scored significantly higher (*M*= 24.75, *SE*=.45) when compared to Control Group (*M* = 21.15, *SE* = .44, *p* <.001), AVD Group (*M* = 22.15, *SE*=.45, *p* <.001), and AVS Group (*M*= 22.90, *SE*=.45, *p* <.05). Further the DIS Group scored significantly higher (*M* = 24.80, *SE*=.46) when compared to AVS Group (*M*= 22.90, *SE*=.45, *p* <.05), AVD Group (*M*= 22.15, *SE*=.45, *p* <.001), and Control Group (*M*= 21.15, *SE*=.44, *p* <.001).

Observing the scores in the dimension of Perceived Social Support from the Significant Others, DID Group scored significantly higher (*M*= 24.57, *SE*=.39) when compared to Control Group (*M* = 21.87, *SE* = .39, *p* <.001) and AVD Group

(*M*= 22.63, *SE*=.39, *p* <.05). Further the DIS Group scored significantly higher (*M*= 24.57, *SE*=.39) when compared to Control Group (*M*=21.87, *SE*=.39, *p* <.05) and AVD Group (*M*= 22.63, *SE*=.39, *p* <.05).

Graphic representation of the results is provided in figure 4.14 to 4.17. The bars represent the post-intervention scores of the five Groups while the lines cutting across the bars represent the pre-intervention controlled mean scores of the variable concerned.

It may be observed from the graph that the Perceived Social Support scores improved significantly for the direct interaction Groups such as DIS and DID on Overall Perceived Social Support and all its dimensions whereas it did not show any significant change for the audio visual modules such as AVS and AVD when compared with Control Group in Overall or the dimensions of social support except between AVS and Control Group scores in the Overall Perceived Social Support.

Table 4.9

Results of one way ANCOVA with estimated marginal means, standard errors, effect sizes ($ń^2$) for Perceived Social Support and its variables

	Means (Standard Errors)					F(4,250)	$ń^2$
Groups ⟶	DIS	DID	AVS	AVD	CNTL		
Perceived Social Support-Overall	74.61 (1.07)	75.01 (1.06)	70.31 (1.06)	68.15 (1.06)	65.83 (1.04)	14.22***	.18
Family	25.17 (.39)	25.40 (.39)	24.05 (.39)	23.33 (.39)	22.82 (.39)	8.12***	.11
Friends	24.80 (.46)	24.75 (.45)	22.90 (.45)	22.15 (.45)	21.15 (.44)	12.00***	.16
Significant Others	24.57 (.39)	24.78 (.39)	23.38 (.39)	22.63 (.39)	21.87 (.39)	10.09***	.13

Note. 1. DIS = Direct Interaction Single, DID = Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double

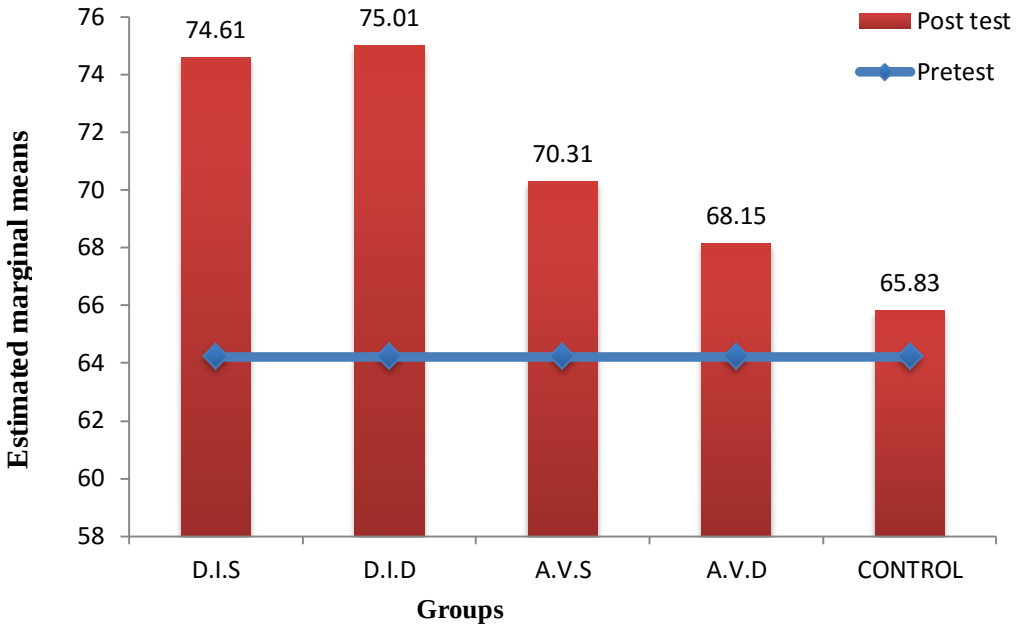
2. ***= p<.001.

Table 4.10

Results of Bonferroni multiple group comparisons on perceived social support and its dimensions

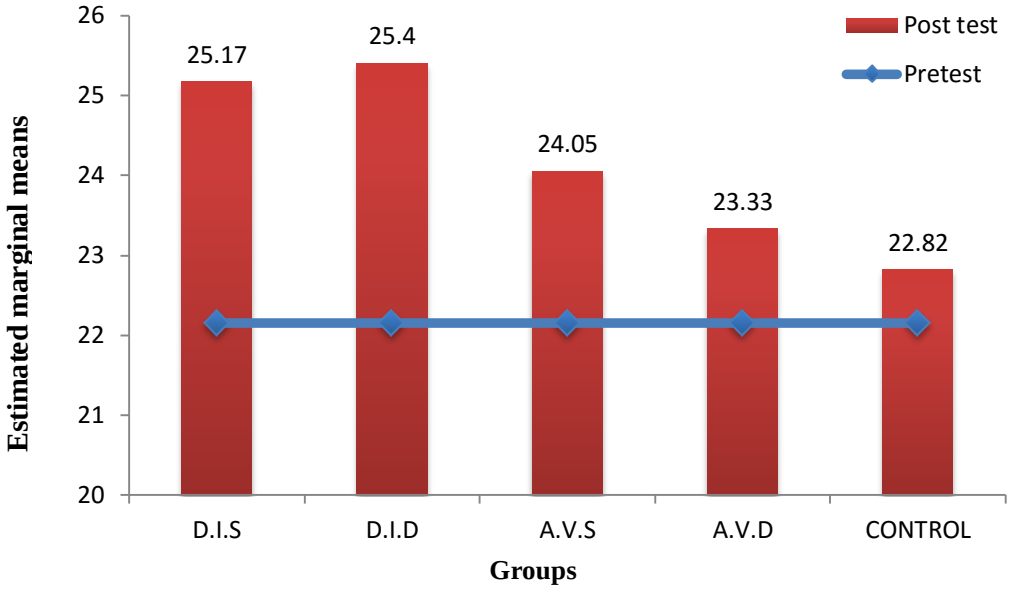
Multiple comparisons	**Perceived Social support-Total**	**Family**	**Friends**	**Significant Others**
DIS ~DID	-.39	-.23	.05	-.21
DIS ~AVS	4.30*	1.11	1.90*	1.19
DIS ~AVD	6.46***	1.84	2.65***	1.93*
DIS ~Control	8.78***	2.35***	3.54***	2.69***
DID~AVS	4.70*	1.34	1.84*	1.40
DID ~AVD	6.86***	2.07*	2.6***	2.14***
DID ~Control	9.18***	2.58***	3.48***	2.90***
AVS ~AVD	2.16	.72	.75	.74
AVS ~Control	4.48*	1.23	1.63	1.50
AVD ~Control	2.31	.50	.88	.75

Note. *p= <.05, ***=p<.001



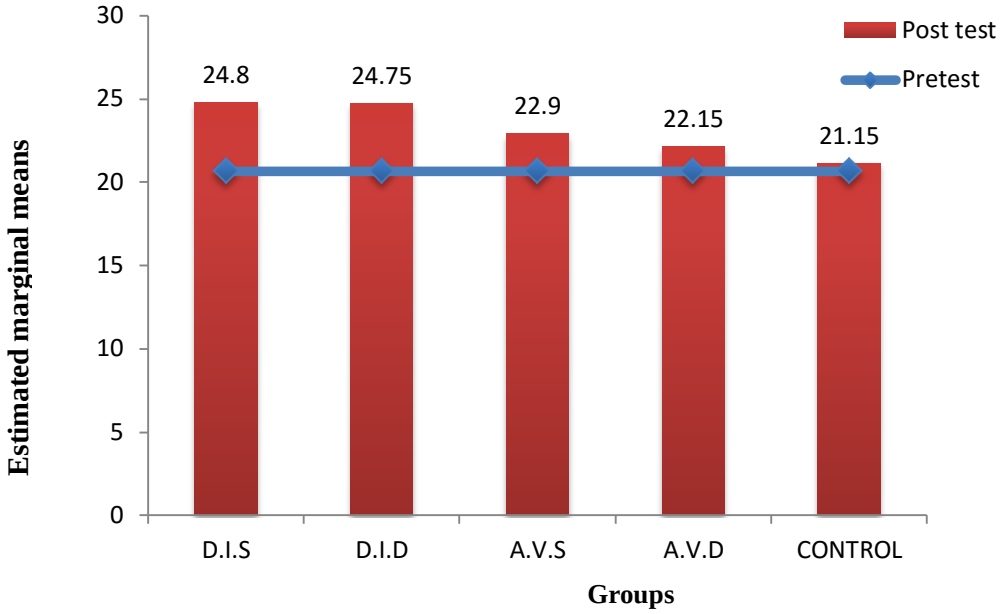
Note: Covariate was evaluated at pretest controlled mean value of 64.22

Figure 4.14 Graph showing the group differences in total scores of social support



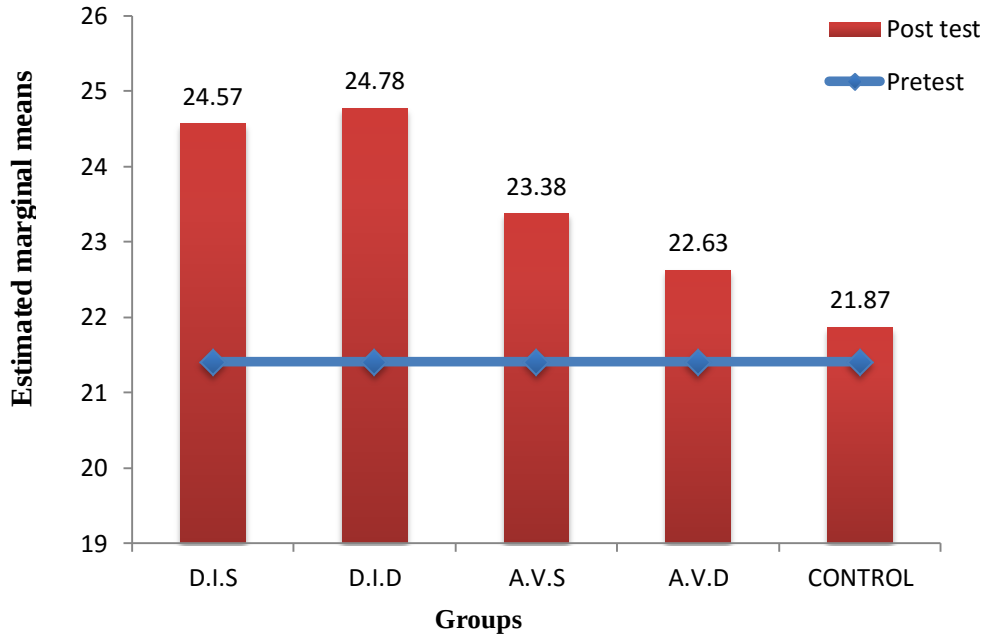
Note: Covariate was evaluated at pretest controlled mean value of 22.15

Figure 4.15 Graph showing the group differences in the social support from Family



Note: Covariate was evaluated at pretest controlled mean value of 20.66.

Figure 4.16 Graph showing the group differences in social support from Friends



Note: Covariate was evaluated at pretest controlled mean value of 21.41

Figure 4.17 Graph showing the group differences in the social support from 'Significant Others'

Differential Impact of Four Modules of Cognitive Intervention on Self-Efficacy

The intervention module included strong message on the role of the participants in managing hypertension. They disseminated information on the things the participant could practice with some effort to reap a positive outcome of better management of hypertension. The cognitive base formed with this message was expected to trigger motivation for the participant to feel what all s/he could possibly do in managing hypertension. Thus self-efficacy of the participant is expected to have enhanced following intervention. It was relevant to see if the four modules had a differential impact in creating self-efficacy.

An attempt was made to compare the four Groups on self-efficacy and its dimensions. Separate one way ANCOVAS were carried out. For the overall scores of self-efficacy as well as its nine dimensions.

For the purpose of controlling the effect of pre-intervention scores on the post-intervention scores, the corresponding pre-intervention score of the variable was considered as the covariate in each separate ANCOVA. The covariate pre-intervention Overall Self-Efficacy was significantly related to the post-intervention Overall Self-Efficacy, F (1,250) = 204.88, $p<.001$, $\eta^2=.45$. The ANCOVA controlled and evaluated the pre-intervention Overall Self-Efficacy at a mean score of 6.35. The covariate pre-intervention Regular Exercise was significantly related to the post-intervention Regular Exercise, F (1,250) = 305.65, $p<.001$, $\eta^2=.55$. The ANCOVA controlled and evaluated the pre-intervention Self-Efficacy (Regular Exercise) at a mean score of 6.05. The pre-intervention Getting Information was significantly related to the post-intervention Getting Information, F (1,250) = 97.52, $p<.001$, $\eta^2=.28$. The ANCOVA controlled and evaluated the pre-intervention Self-Efficacy (Getting Information) at a mean score of 5.81. The pre-intervention ‘Obtain Help’

was significantly related to the post-intervention 'Obtain Help', F(1,250) = 172.70, $p<.001$, $\eta^2=.40$. The ANCOVA controlled and evaluated the pre-intervention Self-Efficacy (Obtaining Help) at a mean score of 5.81.The pre-intervention Communication with Physician was significantly related to the post-intervention Communication with Physician, F (1,250) = 110.80, $p<.001$, $\eta^2=.30$. The ANCOVA controlled and evaluated the pre-intervention Self-Efficacy (Communication with Physician) dimension at a mean score of 6.83. The pre-intervention Disease Management was significantly related to the post-intervention Disease Management, F (1,250) = 147.27, $p<.001$, $\eta^2=.37$. The ANCOVA controlled and evaluated the pre-intervention Self-Efficacy (Disease Management dimension) at a mean score of 6.62.The pre-intervention Doing Chores was significantly related to the post-intervention Doing Chores, F(1,250) = 174.53, $p<.001$, $\eta^2=.41$. The ANCOVA controlled and evaluated the pre-intervention Self-Efficacy (Doing Chores dimension) at a mean score of 6.03. The pre-intervention Social Activities was significantly related to the post -intervention Social Activities, F (1,250) = 133.75, $p<.001$, $\eta^2=.34$. The ANCOVA controlled and evaluated the pre-intervention Self-Efficacy (Social Activities dimension) at a mean score of 6.45. The pre-intervention Symptom Management was significantly related to the post-intervention Symptom Management, F (1,250) = 152.31, $p<.001$, $\eta^2=.37$. The ANCOVA controlled and evaluated the pre-intervention Self-Efficacy (Symptom Management) at a mean score of 6.46.The pre-intervention Controlling Depression was significantly related to the post-intervention Controlling Depression, F (1,250) = 134.50, $p<.001$, $\eta^2=.35$. The ANCOVA controlled and evaluated the pre-intervention Self-Efficacy (Controlling Depression) at a mean score of 6.46. It can also be mentioned that in overall and in dimension wise Self-Efficacy, a small effect size was observed throughout. Since

there was an effect of the covariate on post-intervention scores, it necessitated to compute the ANCOVA to partial out the effect of pre-intervention scores on the post-intervention scores by controlling pre-intervention scores.

The results of ANCOVA are presented in the table 4.11. It was found that the five groups significantly differed on Overall Self-Efficacy, F (4,250) =32.77, $p<.001$, and its dimensions such as Regular Exercise, F(4,250)=22.22, $p<.001$, Getting Information about disease, F(4,250)=32.35, $p<.001$, Obtaining Help from Community, Friends, and Family, F(4,250) =25.48, $p<.001$, Communication with Physician, F(4,250)=22.08, $p<.001$, Disease Management, F (4,250) =21.36, $p<.001$, Doing Chores, F(4,250) =15.90, $p<.001$, Social Activities, F (4,250) =14.83, $p<.001$, Symptom Management, F (4,250) =12.89, $p<.001$ and Controlling Depression, F (4,250) =10.03, $p<.001$.

In order to find out the differences between various combinations of the four intervention Groups and Control Group on the self-efficacy and its nine dimensions, ten Bonferroni Multiple Group Comparisons were carried out. The results are presented in the table 4.12.

A cursory look at the table 4.11 and 4.12 reveals that the four intervention Groups significantly differed when compared to Control Group in Overall Self-Efficacy scores and its dimensions except the dimensions of Doing Chores, Disease Management and Controlling Depression. To elucidate further, DID Group had better post-intervention Self-Efficacy scores when compared to Control Group in overall Self-Efficacy and all its nine dimensions. DIS Group also has better post-intervention Self-Efficacy scores when compared to Control Group in Overall Self-Efficacy and its seven dimensions except in the dimensions of Disease Management in General and

Controlling Depression. Both the Audio-Visual Groups had better post-intervention Self-Efficacy scores when compared with Control Group in Overall Self-Efficacy and its seven dimensions except in the dimensions of Doing Chores and Controlling Depression. In addition the post-intervention self-efficacy scores of Direct Interaction Double (DID) exposure Group were higher than the Audio Visual Single exposure Group (AVS) in Overall Self-Efficacy and its eight dimensions except in the dimension of Getting Information about the disease. Further the post-intervention Self-Efficacy scores of Direct Interaction Double (DID) exposure Group were higher than the Audio Visual Double exposure Group (AVD) in Overall Self-Efficacy and its six dimensions except in the dimension of 'Getting Information about the disease', 'Communication with Physician' and 'Disease Management in General'.

To explain in detail, it can be observed from the table 4.11 and 4.12 that in case of Overall Self-Efficacy, the Control Group scored lower than all the intervention Groups. To elucidate further, the Control Group (M = 6.58, SE =.14, p <.001) scored lower than DIS Group (M = 8.22, SE =.14, p <.001), DID Group (M= 8.80, SE=.43), AVS Group (M= 7.7, SE=.14, p <.05) and AVD Group (M= 7.78, SE=.14, p <.001). Additionally, DID Group significantly differed from AVS, AVD and Control Groups. To explain in detail DID scored higher (M= 8.80, SE=.43) compared to AVS Group (M= 7.7, SE=.14, p <.05), AVD Group (M= 7.78, SE=.14, p <.001), and Control Group (M= 6.58, SE=.14, p <.001).

For the dimension on Regular Exercise, a scrutiny of table 4.11 and 4.12 revealed that DID scored higher (M= 8.44, SE=.18) compared to AVS (M= 7.08, SE =.18, p <.01), AVD(M = 7.34, SE =.18, p <.01), and Control (M = 6.14, SE =.17, p <.001). Apart from this, the Control Group scored significantly lower

(*M*= 6.14, *SE*=.45), than DIS (*M*= 8.10, *SE*=.18, *p* <.001), AVS (*M*= 7.08, *SE*=.18, *p* <.001), and AVD (*M*= 7.34, *SE*=.18, *p* <.001) Groups.

For the dimension on Getting Information about Disease, a scrutiny of table 4.11 and 4.12 revealed that the Control Group scored significantly lower (*M*= 5.79, *SE*=.22) than DIS Group (*M*= 8.85, *SE*=.23, *p* <.001), DID Group (*M*= 8.77, *SE*=.22, *p* <.001), AVS Group (*M*= 8.39, *SE*=.22, *p* <.001) and AVD Group (*M*= 8.52, *SE*=.22, *p* <.001).

For the dimension of Obtaining Help from Community, Family and Friends, a scrutiny of table 4.11 and 4.12 revealed that the Control Group scored significantly lower (*M*= 7.44, *SE=2*.55), than DIS Group (*M*= 9.12, *SE*=1.34, *p* <.001), DID Group (*M*= 9.42, *SE*=1.35, *p* <.001), AVS Group (*M*= 8.71, *SE*=2.04, *p* <.001) and AVD Group (*M*= 9.31, *SE*=1.18, *p* <.001). Apart from this DID Group scored significantly higher (*M*= 9.42, *SE*=1.35) than AVS Group (*M*= 8.71, *SE*=2.04, *p* <.001) and AVD Group (*M*= 9.31, *SE*=1.18, *p* <.01).

In the dimension of Communication with the Physician, Control Group scored significantly lower (*M*= 7.21, *SE*=.20), than DIS Group (*M*= 9.29, *SE*=.21, *p* <.001), DID Group (*M*= 9.57, *SE*=.20, *p* <.001), AVS Group (*M*= 8.50, *SE*=.20, *p* <.001) and AVD Group (*M*= 9.44, *SE*=.20, *p* <.001). In addition AVS Group scored significantly lower (*M*= 8.50, *SE*=.20), than DID Group (*M*= 9.57, *SE*=.20, *p* <.01) and AVD Group (*M*= 9.44, *SE*=.20, *p* <.05).

For the dimension of Disease Management in General, Control Group scored significantly lower (*M*= 6.93, *SE*=.19) than DID Group (*M*= 9.19, *SE*=.19, *p* <.001), AVS Group (*M*= 8.01, *SE*=.19, *p* <.01) and AVD Group (*M*= 8.43, *SE*=.19, *p* <.001).

Apart from this, DID Group scored higher (*M*= 9.19, *SE*=.19) than AVD Group (*M*= 8.43, *SE*=.19, *p* <.001).

For the dimension of Doing Chores, table 4.11 and 4.12 revealed that the DIS Group scored significantly higher (*M*= 7.89, *SE*=.20), than AVS Group (*M*= 6.77, *SE*=.20, *p* <.01), AVD Group (*M* = 6.63, *SE* =.20, *p* <.001), and Control Group (*M*= 6.41, *SE*=.20, *p* <.001). Apart from this DID Group also scored significantly higher (*M*= 8.24, *SE*=.20) than AVS Group (*M*= 6.77, *SE*=.20, *p* <.001), AVD Group (*M*= 6.63, *SE*=.20, *p* <.001), and Control Group (*M*= 6.41, *SE*=.20, *p* <.001).

In the dimension of Social/Recreational Activities, Examining the tables 4.11 and 4.12 shows that Control Group had scored significantly lower (*M*= 6.60, *SE*=.21, *p* <.001) than all the intervention Groups such as DIS Group (*M*= 8.30, *SE*=.22, *p* <.001), DID Group (*M* = 8.44, *SE*=.21), AVS Group (*M*= 7.70, *SE*=.21, *p*<.01) and AVD Group (*M*= 7.59, *SE*=.22, *p* <.05). Additionally, DID Group significantly differed from both the audio visual Groups such as AVS and AVD Groups. To explain in detail DID scored higher (*M*= 8.44, *SE*=.22) compared to AVS Group (*M*= 7.70, *SE*=.21, *p* <.05) and AVD Group (*M*= 7.59, *SE*=.22, *p* <.001).

For the eighth dimension of self-efficacy i.e. Symptom Management, Control Group scored significantly lower (*M*= 6.71, *SE*=.20), than DIS Group (*M*= 8.14, *SE*=.20, *p* <.001), DID Group (*M*= 8.66, *SE*=.20, *p* <.001) and AVS Group (*M*= 7.57, *SE*=.20, *p* <.05). Apart from this, DID Group scored higher (*M*= 8.66, *SE*=.20) than AVD Group (*M*= 7.50, *SE*=.20, *p* <.01).

In the last dimension i.e. Controlling Depression, a scrutiny of table 4.11 and 4.12 revealed that DID scored higher (*M*= 8.64, *SE*=.23) than rest other Groups such as DIS Group (*M*= 7.03, *SE*=.24, *p* <.001), AVS Group (*M*= 7.60, *SE*=.23, *p* <.001),

AVD Group (M= 6.93, SE=.23, p <.001), and Control Group (M = 6.81, SE=.23, p<.001).

A careful scrutiny of the estimated marginal means in the table 4.11revealed that DID Group scored the highest followed by DIS, AVD, AVS and Control Group respectively in the Overall Self-Efficacy, Self-Efficacy related to Regular Exercise, Disease Management in general, Doing Chores, Social/Recreational Activities and Symptom Management. Whereas DIS Group scored highest followed by DID, AVD, AVS and Control in the dimension of 'Getting Information about the disease'. In the dimensions of Obtaining Help and Communication with the Physician, DID Group scored highest followed by AVD, DIS, AVS and Control Group respectively. In Controlling Depression, DID Group scored highest followed by AVS, DIS, AVD and Control Group respectively in the rank order of means.

Graphic representation of the results is provided from figure 4.18 to 4.27. The bars represent the post-intervention scores of the five groups while the lines cutting across the bars represent the pre-intervention controlled mean score of the variables concerned.

It may be observed from the graphs that Self-Efficacy has enhanced prominently in the DID Group when compared to the other groups. Further the DID Group scored the highest in the post-intervention Overall Self-Efficacy score and its dimensions

Table 4.11

Results of one way ANCOVA with estimated marginal means, standard errors, effect sizes ($ή^2$) for self-efficacy and its dimensions

	Means (Standard Errors)					**F(4,250)**	**$ή^2$**
Groups ⟶	DIS	DID	AVS	AVD	CONTROL		
Overall Self Efficacy	8.22 (.14)	8.80 (.14)	7.70 (.14)	7.78 (.14)	6.58 (.14)	32.77***	.34
Regular exercise	8.10 (.18)	8.44 (.18)	7.08 (.18)	7.34 (.18)	6.14 (.17)	22.22***	.26
Getting info about disease	8.85 (.23)	8.77 (.22)	8.39 (.22)	8.52 (.22)	5.79 (.22)	32.35***	.34
Obtaining help - community, family, friends	9.12 (1.34)	9.42 (1.35)	8.71 (2.04)	9.31 (1.18)	7.44 (2.55)	25.48***	.29
Communication with physician	9.29 (.21)	9.57 (.20)	8.50 (.20)	9.44 (.20)	7.21 (.20)	22.08***	.26
Disease management in general	8.98 (.19)	9.19 (.19)	8.01 (.19)	8.43 (.19)	6.93 (.19)	21.36***	.25
Doing chores	7.89 (.20)	8.24 (.20)	6.77 (.20)	6.63 (.20)	6.41 (.20)	15.90***	.20
Social/Recreational activities	8.30 (.22)	8.44 (.21)	7.70 (.21)	7.59 (.22)	6.60 (.21)	14.83***	.19
Symptom management	8.14 (.20)	8.66 (.20)	7.57 (.20)	7.50 (.20)	6.71 (.20)	12.89***	.17
Controlling Depression	7.03 (.24)	8.64 (.23)	7.60 (.23)	6.93 (.23)	6.81 (.23)	10.03***	.13

Note. 1. DIS = Direct Interaction Single, DID = Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double

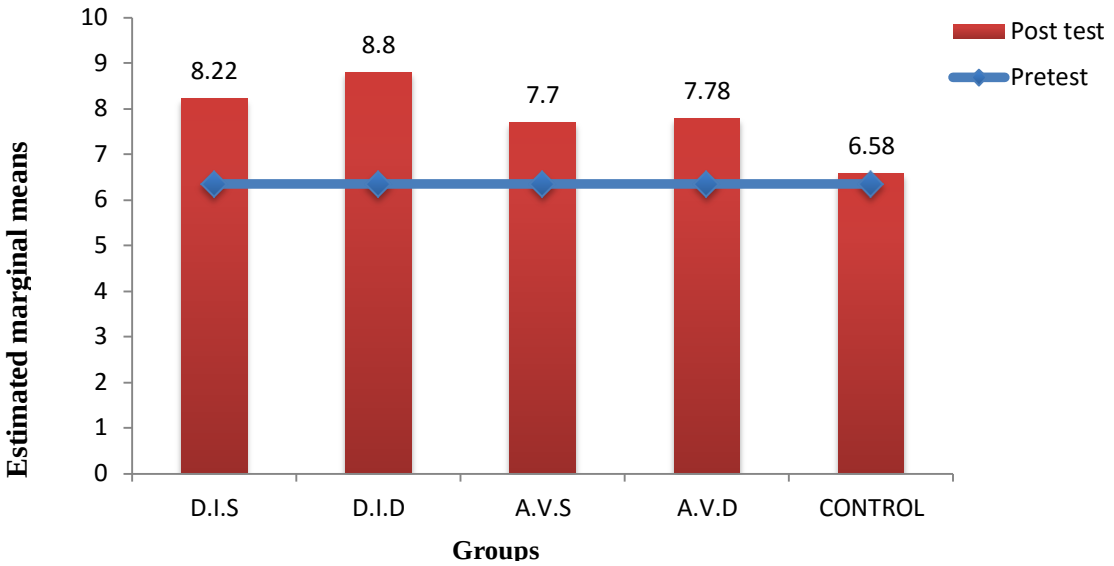
2. ***= $p<.001$.

Table 4.12

Results of Bonferroni multiple group comparisons on self-efficacy and its dimensions

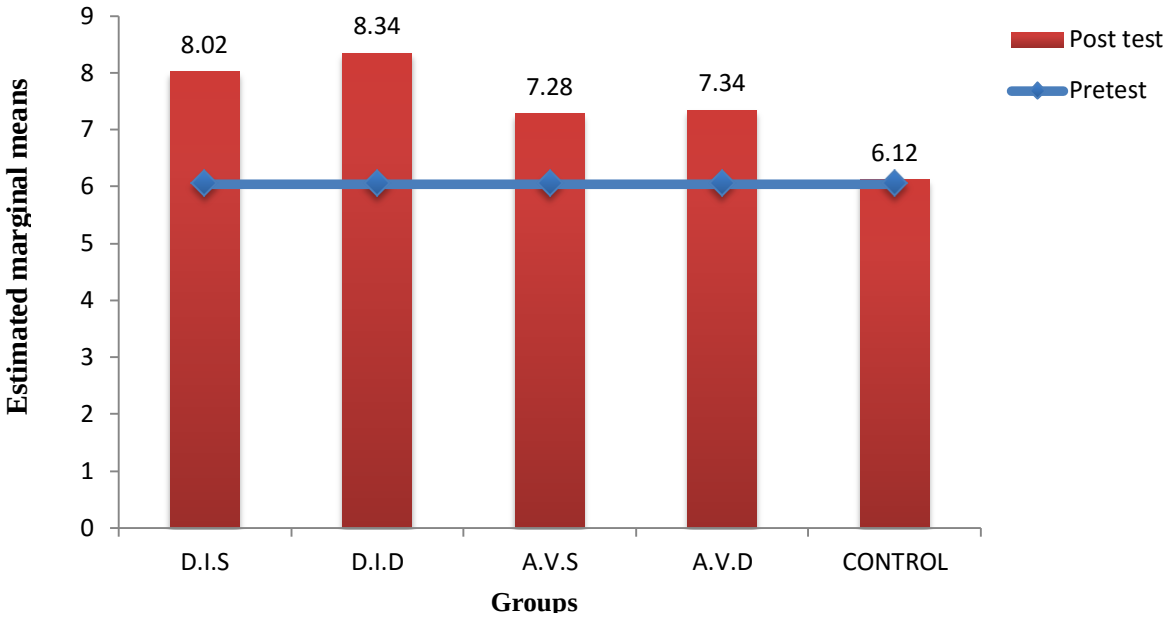
Multiple comparisons	DIS ~DID	DIS~ AVS	DIS ~AVD	DIS ~ Control	DID~ AVS	DID~ AVD	DID ~ Control	AVS~ AVD	AVS~ Control	AVD~ Control
HSES Total	-.57	.52	.44	1.64***	1.09***	1.01***	2.22***	-.07	1.12***	1.20***
Exercising Regularly	.32	.73	.67	1.89***	1.05**	1.00**	2.22***	.057	1.16***	1.22***
Getting info about disease	.08	.46	.33	3.06***	.37	.24	2.97***	.13	2.59***	2.72**
Obtaining help	.73	.41	.20	1.85***	1.15***	.94**	2.59***	.20	1.44***	1.65***
Communication with physician	.28	.78	.14	2.07***	1.07**	.13	2.35***	.93*	1.28***	2.22***
Disease management in general	.20	.97	.55	2.04	1.18***	.75	2.25***	.42	1.07**	1.49***
Doing chores	.34	1.12**	1.26***	1.48***	1.46***	1.60***	1.82***	.13	.35	.22
Social/ Recreational activities	.54	.59	.71	1.69***	1.13**	1.25**	2.23**	.11	1.09**	.98*
Symptom management	.51	.57	.64	1.43***	1.08**	1.16**	1.94***	.07	.86*	.78
Controlling Depression	1.60***	.57	.10	.21	1.03**	1.70***	1.82***	.67	.78	.11

Note. *p <.05, ***p<.001



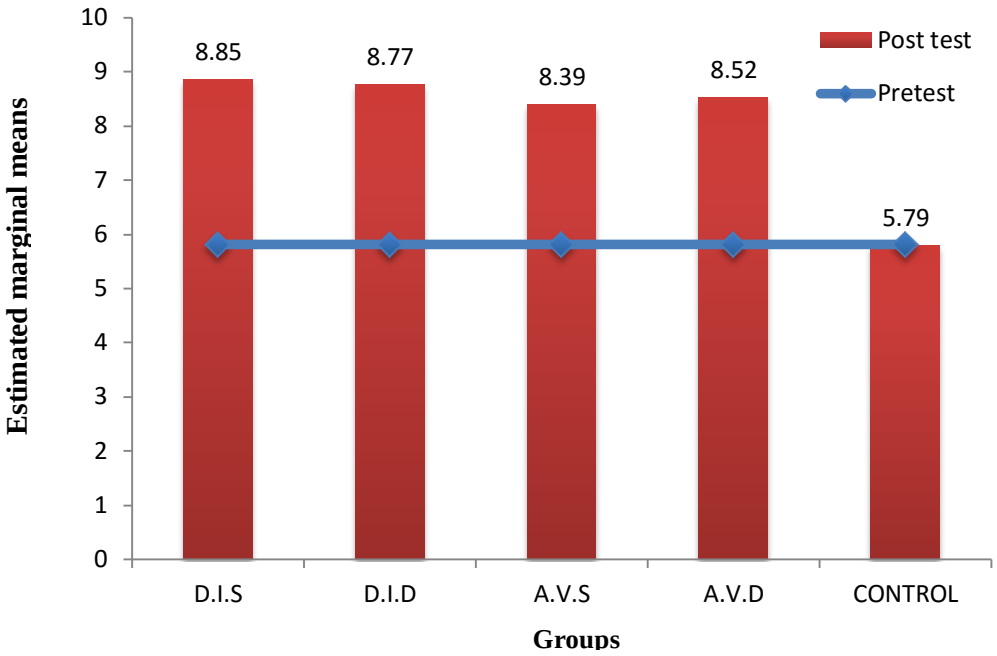
Note: Covariate was evaluated at pretest controlled mean value of 6.35

Figure 4.18 Graph showing the group differences in the total scores of Hypertension Self-Efficacy



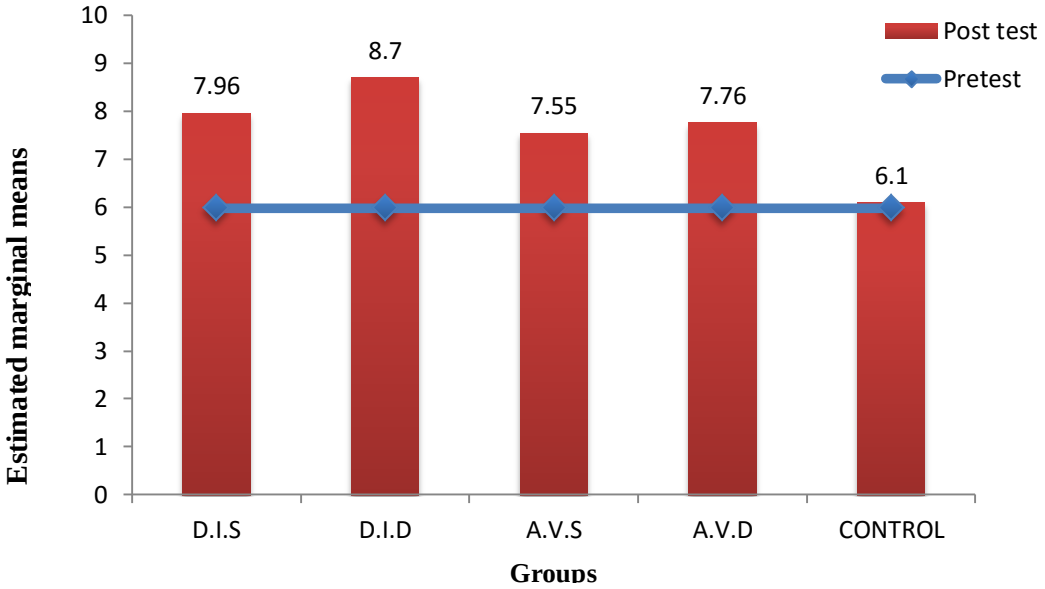
Note: Covariate was evaluated at pretest controlled mean value of 6.05

Figure 4.19 Graph showing the group differences in the HTN Self-Efficacy about 'Regular Exercise'



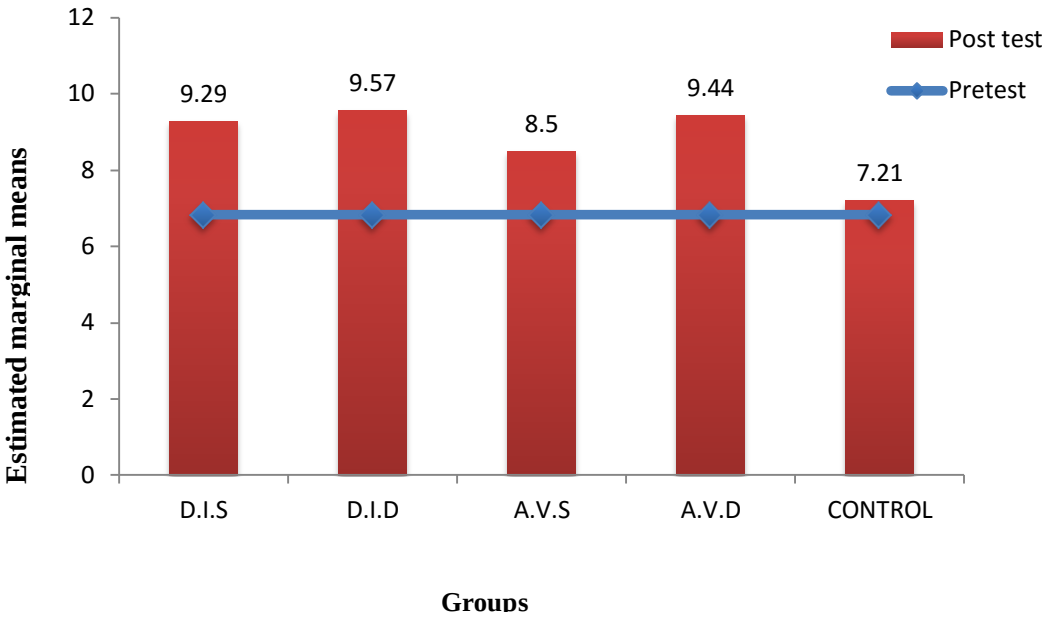
Note: Covariate was evaluated at pretest controlled mean value of 5.81.

Figure 4.20 Graph showing the group differences in the HTN Self-Efficacy dimension of 'Getting Information about Disease'



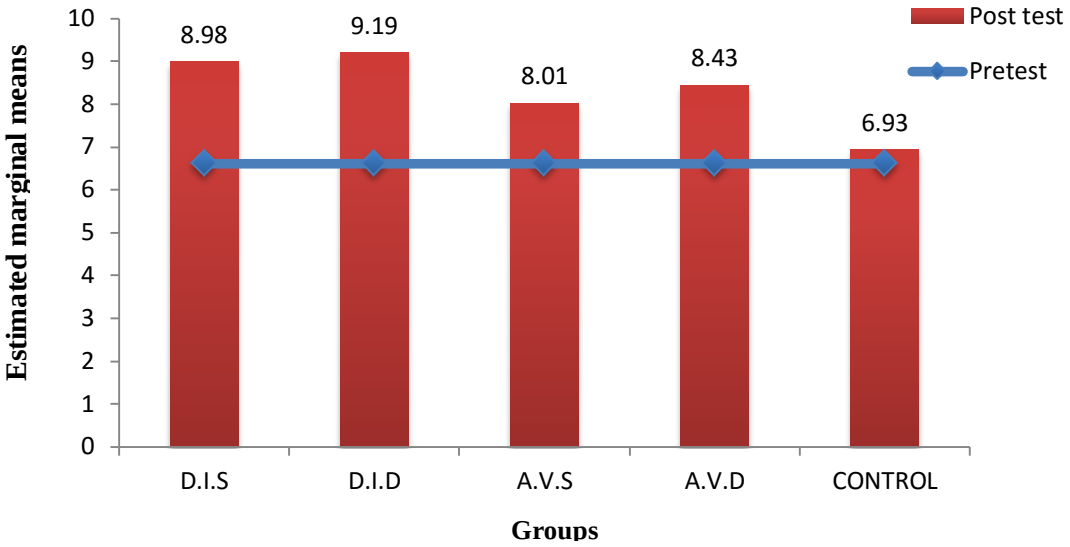
Note: Covariate was evaluated pretest controlled mean value of 5.98.

Figure 4.21 Graph showing the group differences in the HTN Self-Efficacy dimension of 'Obtaining Help'



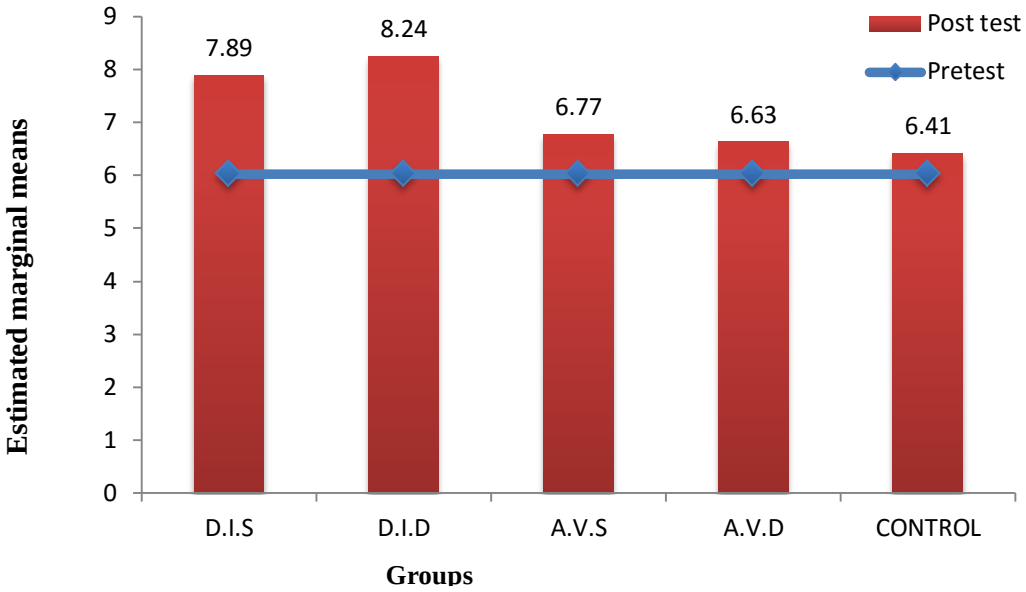
Note: Covariate was evaluated at pretest controlled mean value of 6.83

Figure 4.22 Graph showing the group differences in the HTN Self-Efficacy dimension of 'Communication with Physician'



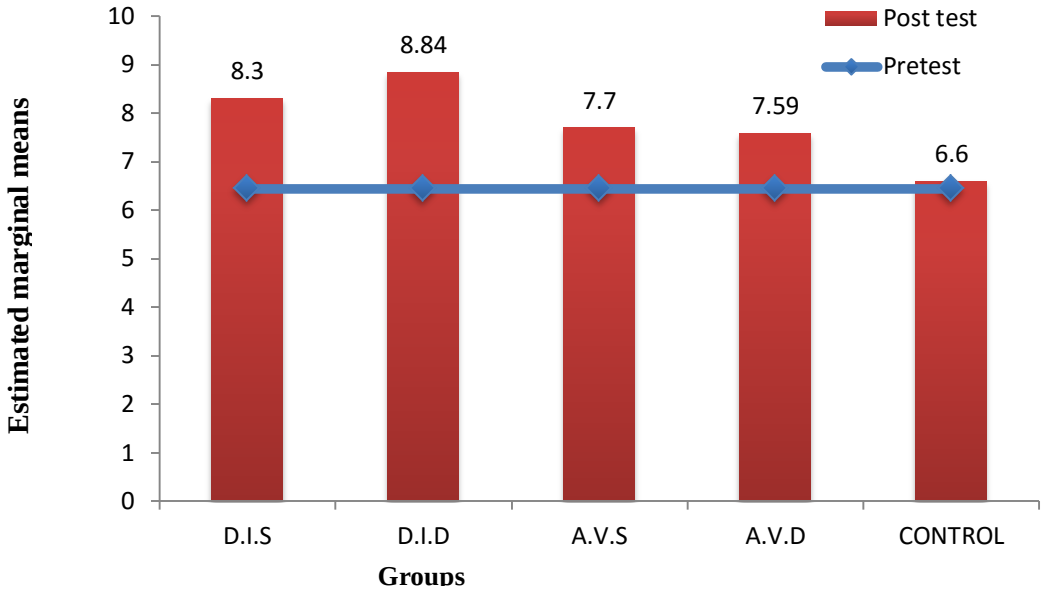
Note: Covariate was evaluated at pretest controlled mean value of 6.62.

Figure 4.23 Graph showing the group differences in the Hypertension Self-Efficacy dimension of 'Disease Management in General'



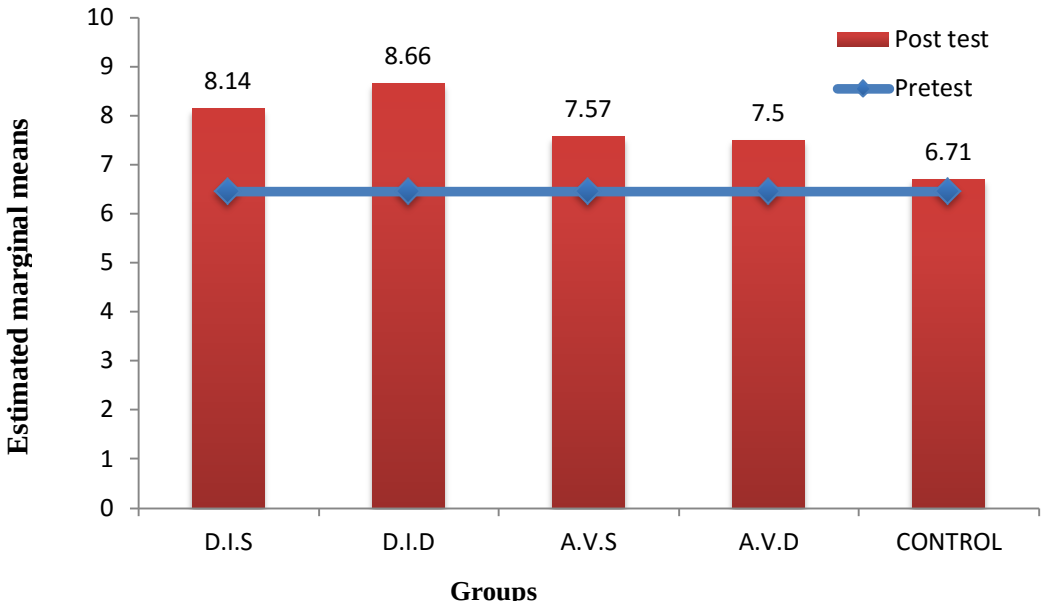
Note: Covariate was evaluated at pretest controlled mean value of 6.03.

Figure 4.24 Graph showing the group differences in the HTN Self-Efficacy dimension of 'Doing Chores'



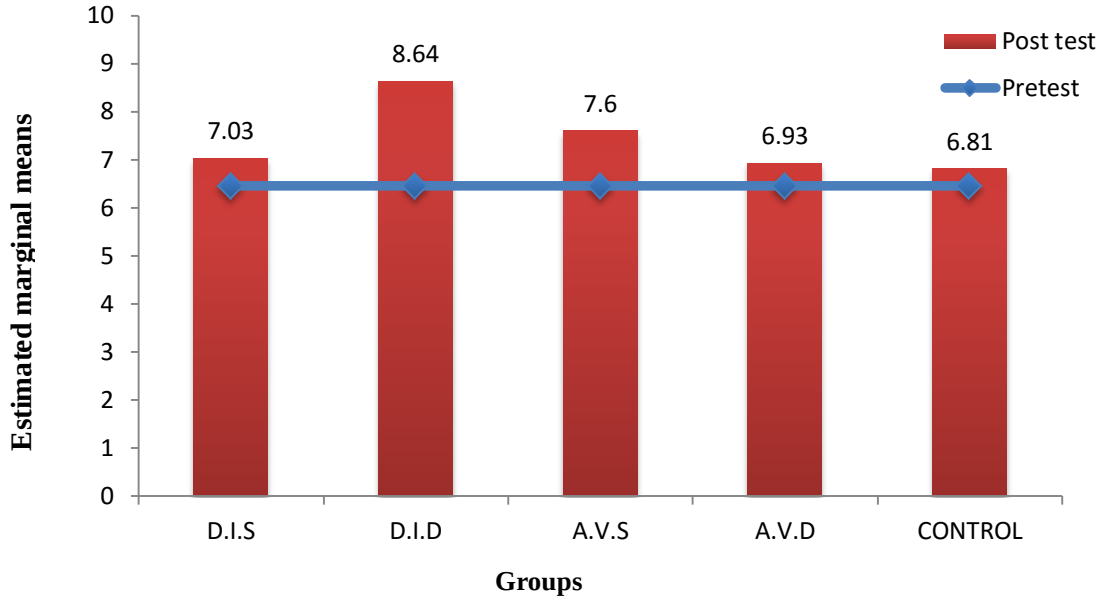
Note: Covariate was evaluated at pretest controlled mean value of 6.45.

Figure 4.25 Graph showing the group differences in the HTN Self-Efficacy dimension of 'Social Recreational Activities'



Note: Covariate was evaluated at pretest controlled mean value of 6.46

Figure 4.26 Graph showing the group differences in the HTN Self-Efficacy dimension of 'Symptom Management'



Note: Covariate was evaluated at pretest controlled mean value of 6.46.

Figure 4.27 Graph showing the group differences in the HTN Self-Efficacy dimension of 'Controlling Depression'

Section III: Psychosocial predictors of post-intervention Knowledge, Self-Efficacy, Adherence, and Management related to Hypertension

The preceding sections of this chapter confirmed the significant impact of cognitive intervention on the level of knowledge, self-efficacy, adherence and hypertension management. The results indicated that hypertension related knowledge was relatively high in the post-intervention scenario compared to the level of knowledge before intervention. A number of factors in addition to intervention per say might have contributed to enhance the knowledge levels. Similarly a significant improvement was observed in case of self-efficacy, adherence and management related to hypertension. It may be of relevance to identify the factors contributing to the enhanced levels of these parameters in addition to the intervention provided to them.

In order to gain an insight into the above, four separate Multiple Regression Analyses were planned to identify the variables that contributed to post-intervention knowledge (knowledge-II), post-intervention self-efficacy (self-efficacy-II), post-intervention adherence (adherence-II) and post-intervention hypertension management (Hypertension management-II). For the subsequent regression analysis, the categorical variables namely gender, economic category, group affiliation such as DIS, DID, AVS, AVD, and control were coded for analysis. Under gender, men were coded as 0 while women were coded as 1.Under Economic category, White card was coded as 0 and pink card was coded as 1. Group affiliation DIS, DID, AVS, AVD, and control were dummy coded into five variables.

The results of Multiple Regression Analysis are explained under the following four separate headings.

a) Psychosocial factors predicting post-intervention knowledge

Knowledge enhancement following the intervention could have been an outcome of a number of demographic and psychosocial factors in addition to intervention modules. In order to identify the contribution of various factors in predicting post-intervention knowledge about hypertension, the Group affiliation (DIS,DID,AVS,AVD and Control), all demographic factors (age, gender, education, economic category, duration of illness), and all psychosocial factors (pre-intervention levels of knowledge, anxiety, depression, self-efficacy, perceived social support) were taken into consideration. As a prerequisite to Multiple Regression Analysis, Pearson product moment correlation was computed between these variables and knowledge-II.

The result of correlation are presented in the table 4.13

Table 4.13 *Pearson's product-moment correlation coefficients between predictor and criterion variable (Knowledge-II)*

	M(SD)	Knowledge-II
Age	52.20(8.31)	-.06
Gender	-	-.02
Years of Education	12.23 (6.02)	.08
Economic Category	-	.15*
Duration of illness(M)	61.11 (60.85)	-.04
Knowledge I	12.43	.48***
Anxiety I	8.92	-.13*
Depression I	8.44	-.07
Self-Efficacy I	6.35	.04
Social support-I	64.22	.12*
Adherence I	38.15	.03
DIS	-	.19**
DID	-	.30***
AVS	-	.05
AVD	-	.01
CONTROL	-	-.54***

Note.1. Gender was coded as a binary categorical variable (0=Male patient, 1 = Female patient), Economic category (0= white card, 1=Pink card) DIS,DID,AVS,AVD, and Control were coded as dummy variables (0= not in group, 1= present in group), I= Pre-intervention scores,

2. *= p<.05, **= p<.01, ***= p<.001.

It may be observed from the table 4.13 that out of 17 variables, 7 variables significantly correlated with knowledge-II. These seven variables were affiliation to Control Group (r=-.54, p<.001), pre-intervention Knowledge (r=.48, p<.001), affiliation to DID (r=.30, p<.001) affiliation to DIS (r=.19, p<.01) Economic Category (r=0.15, p<.05), and existing level of Anxiety or Anxiety I (r= -.13, p<.05).

Taking the above seven variables such as affiliation to Control Group, pre-intervention Knowledge, affiliation to DID, affiliation to DIS, Economic Category, and existing level of Anxiety (Anxiety-I) were entered as predictors and Multiple Regression Analysis was carried out. The resulted significant model is thus presented in table 4.14.

Table 4.14

Multiple Regression Analysis for variables predicting overall knowledge-II

	B	***SEB***	***B***	***T***
Economic category	.48	.27	.07	1.74
DIS	1.01	.38	.11	2.68**
DID	2.05	.38	.24	5.46***
Control	-3.95	.37	-.46	-10.61***
Knowledge-I	.43	.03	.49	11.45***
Anxiety-I	-.01	.03	-.01	-.29
Social Support-I	.01	.01	.01	.06
SE			2.18	
R^2			.60	
C			11.52	
F			53.71***	

Note. 1. B=Unstandardized beta coefficient, SEB=Standard Error of Beta, β= Standardized beta coefficient, t=t-test, SE= Standard Error of the estimate, R2= Variance, C=Constant, F=F-statistic
*2. **= p<.01, ***= p<.001.*

It may be observed from the table 4.14, affiliation to Control Group, pre-intervention Knowledge, affiliation to DID, affiliation to DIS, Economic Category, and existing level of Anxiety considered as contributors. This model had explained a variance of 60% in post-intervention knowledge, R^2=.60, F (7,248) = 53.71, p<.001. To elaborate further, the result of Multiple Regression Analysis clearly indicated that apart from preexisting knowledge (β = .49, p <.001), the intervention module of DID (β = .24, p <.001) and DIS (β = .11, p <.01) positively predicted knowledge-II, while not receiving intervention (Control Group) (β = -.46, p <.001) negatively predicted post-intervention knowledge. Having identified the predictors for knowledge-II, it may be of relevance to identify the predictors for Self-Efficacy in the post-intervention scenario (self-efficacy-II)

b) Psychosocial factors predicting post-intervention self-efficacy (Self-Efficacy-II)

The self-efficacy is closely related to the motivational aspects. The intervention modules comprised of simple methods that motivate enhancing adherence and hypertension management. However the receptivity and assimilation of this knowledge and translating the same to adherence behaviour may be a function of several other psychosocial factors. In order to identify the psychosocial factors and modules of intervention contributing to the post-intervention self-efficacy level, Multiple Regression Analysis was planned. It included the type of intervention module exposed to (DIS, DID, AVS, AVD) & Control Group, the demographic variables (age, gender, education, economic status, duration of illness) and post-intervention psychosocial variables (knowledge-II, anxiety-II, depression-II, social support-II).

As a pre requisite, a correlational analysis was carried out between the variables and Self-Efficacy-II. The results are presented in the table 4.15.

Table 4.15

Pearson's product-moment correlation coefficients between predictor and criterion variable (Self Efficacy-II)

	M(SD)	Self-Efficacy-II
Age	52.20(8.31)	-.01
Gender	-	-.06
Years of Education	12.23 (6.02)	-.06
Economic Category		-.02
Duration of illness(M)	65.11 (60.85)	.01
Knowledge II	16.95(3.42)	.44***
Anxiety II	8.69(3.85)	-.22***
Depression II	7.86 (3.14)	-.25***
Self-Efficacy II	7.81(1.50)	1
Social support II	70.73(11.28)	.41***
Adherence II	46.86 (7.95)	-
DIS	-	.07
DID	-	.31***
AVS	-	.01
AVD	-	-.05
Control	-	-.34***

Note. 1. Gender was coded as a binary categorical variable (0=Male patient, 1 = Female patient), Economic Category (0= white card, 1=Pink card) DIS, DID, AVS, AVD, and Control were coded as dummy variables (0= not in Group, 1= present in Group), II=Post-intervention score,

2. ***p<.001

It may be observed from the table that out of 14 variables, 6 variables significantly correlated with self-efficacy-II. These variables referred to knowledge-II (r=.44, p<.001), perceived social support-II (r=.41, p<.001) affiliation to Control Group (r=-.34, p<.001), affiliation to DID (r=.31, p<.001), depression-II (r=-.25, p<.001) and anxiety-II (r=-.22, p<.001). A Multiple Regression Analysis following simultaneous method was carried out taking these six variables together as predictors for self-efficacy-II. The resultant model of multiple regressions analysis is presented in the table 4.16.

Table 4.16

Multiple Regression Analysis for variables predicting post-intervention self-efficacy (self-efficacy-II)

	B	***SEB***	***B***	***T***
Knowledge-II	.09	.02	.22	3.30**
DID	.53	.21	.14	2.56**
Control	-.46	.23	-.12	-1.99*
Anxiety-II	-.01	.02	-.05	-.76
Depression-II	-.04	.03	-.09	-1.40
Social Support-II	.03	.01	.25	4.38***
SE			1.25	
R^2			.323	
C			4.28	
F			19.76***	

Note.1. B=Unstandardized beta coefficient, SEB=Standard Error of Beta, β= Standardised beta coefficient, t=t- test, SE= Standard Error of the estimate, R2= Variance, C=Constant, F=F-statistic

*2. *= p<.05, **= p<.01, ***= p<.001.*

It may be observed from the table that this model had explained a variance of 32.3 % in post-intervention Self-Efficacy, R^2=.323, F (6,249) = 19.76, p<.001. To elaborate further, the results of Multiple Regression Analysis evidently indicated that Social Support-II (β = .25, p <.001), Knowledge-II (β = .22, p <.01), affiliation to DID intervention module (β = .14, p <.01) were the significant positive and independent predictors of post-intervention Self-Efficacy while affiliation to no intervention (Control Group) negatively predicted post-intervention Self-Efficacy (β = -.12, p <.05). After identifying predictors of Self-Efficacy, a logical follow up is to identify the prediction of adherence behaviour in the post-intervention scenario.

c) Psychosocial predictors of post-intervention adherence (adherence-II)

Adherence behaviour refers to compliance with medication, diet, exercise and self-monitoring. The purpose of the intervention was to bring about the positive change in adherence behaviour. While the intervention modules aimed at this, a number of other psychosocial variables might have contributed in determining the level of adherence following the intervention besides the modules themselves. In order to examine this factor, a Multiple Regression Analysis was planned taking into consideration the various intervention modules (DID, DIS, AVS, AVD and Control), demographic variables (age, gender, education, economic status, duration of illness) and psychosocial variables (knowledge-II, anxiety-II, depression-II, self-efficacy-II, social support-II).

As a prerequisite, correlation analysis was run to find out the relationship between the variables and post-intervention adherence. The results are presented in the table 4.17.

Table 4.17

Pearson's product-moment correlation coefficients between predictors and criterion variable (Adherence-II)

	M(SD)	Adherence II
Age	52.20(8.31)	-.03
Gender	-	-.11
Years of Education	12.23 (6.02)	-.02
Economic Category		.03
Duration of illness(M)	65.11 (60.85)	-.22***
Knowledge II	16.95(3.42)	.52***
Anxiety II	8.69(3.85)	-.13*
Depression II	7.86 (3.14)	-.24***
Self-Efficacy II	7.81(1.50)	.43***
Social support II	70.73(11.28)	.27***
Adherence II	46.86 (7.95)	1
DIS	-	.17**
DID	-	.30***
AVS	-	.05*
AVD	-	-.15*
Control	-	-.55***

Note. 1. Gender was coded as a binary categorical variable (0=Male patient, 1 = Female patient), Economic category (0= white card, 1=Pink card) DIS,DID,AVS,AVD, and Control were coded as dummy variables (0= not in Group, 1= present in Group), II=Post-intervention score.

2. *p<.05 **= *p*<.01, ***= *p*<.001.

It may be observed from the table that, eleven variables significantly correlated with Adherence-II. They are 'not having exposure to intervention/affiliation to Control Group(*r*=-.55, *p*<.001), Knowledge-II (*r*=.52, *p*<.001), Self-Efficacy-II (*r*=.43, *p*<.001), affiliation to DID module (*r*=.30, *p*<.001), Social Support (*r*=.27, *p*<.001), Depression-II (*r*= -.24, *p*<.001), Duration of Illness (*r*= -.22, *p*<.001), affiliation to DIS (*r*=.17, *p*<.07), affiliation to AVD(*r*=-.15, *p*<.05), Anxiety -II (*r*=-.13,*p*<.05) and affiliation to AVS (*r*=-.13, *p*<.05).

Multiple Regression Analysis was computed following simultaneous methods taking together the above significant variables into the regression model as predictors of Adherence-II. The results are presented in the table 4.18.

Table 4.18

Multiple regression analysis for variables predicting overall adherence

	B	***SEB***	***B***	***T***
Knowledge-II	.46	.14	.20	3.23**
Self-efficacy-II	.83	.30	.15	2.75**
Duration of illness	-.02	.01	-.17	-3.60***
DIS	.54	1.06	.02	.51
DID	1.45	1.08	.07	1.33
Control	-6.50	1.14	-.33	-5.68***
Anxiety-II	-.03	.12	-.01	-.29
Depression-II	-.17	.14	.07	-1.20
Social Support II	.04	.03	.06	1.05
SE			5.96	
R^2			.458	
C			33.78	
F			23.12***	

Note. 1. B=Unstandardized beta coefficient, SEB=Standard Error of Beta, β= Standardized beta coefficient, t=t-test, SE= Standard Error of the estimate, R2= Variance, C=Constant, F=F-statistic

*2. *p<.05, **p<.01, ***p<.001*

It may be observed from the table that the model together explained a variance of 45.8 % in post-intervention adherence, R^2=.458, F (9,246) = 23.12, p<.001. To elaborate further, 'not receiving intervention' (being in Control Group) (β = -.33, p <.001), and suffering from hypertension for a longer duration i.e. duration of illness (β = -.17, p <.001) negatively contributed to adherence while enhanced Knowledge (β = .20, p <.01), and Self-Efficacy in post-intervention scenario (β = .15, p <.01) positively contributed to Adherence-II.

The final aim of providing cognitive intervention was to help the participant manage their hypertension more effectively by bringing down their B.P readings. Cognitive intervention alone may not be a sufficient condition to bring this result.

Hence an attempt was made to identify the other psychosocial factors apart from the intervention module that contribute to effective management of HTN.

d) Psychosocial factors predicting post-intervention hypertension management (Hypertension management-II)

In order to identify the possible prediction of hypertension management, the regression model included the contributors such as the four intervention modules and the absence of it (DIS, DID, AVS, AVD and Control), the demographic variable (Age, Gender, Economic Status, Duration of Illness) and the psychosocial variables (Knowledge-II, Anxiety-II, Depression-II, Self-Efficacy-II, Adherence-II) were considered. As a pre-requisite to Multiple Regression Analysis, a correlation analysis was carried out between these variables and the Hypertension Management-II. The results are presented in the table 4.19.

Table 4.19

Pearson's product-moment correlation coefficients between predictors and criterion variable (Hypertension Management)

	M(SD)	**Hypertension Management (B.P Reading)**
Age	52.20(8.31)	.14*
Gender	-	.10
Years of Education	12.23 (6.02)	-.14*
Economic Category	-	-.17**
Duration of illness(M)	65.11(60.85)	.01
Knowledge II	16.95(3.42)	-.36***
Anxiety II	8.69(3.85)	.09
Depression II	7.86 (3.14)	.13*
Self-Efficacy II	7.81(1.50)	-.30***
Social support II	70.73(11.28)	-.25***
Adherence II	46.86 (7.95)	-.33***
DIS	-	-.12*
DID	-	-.24***
AVS	-	.06
AVD	-	.20
Control	-	.19**

Note 1. Gender was coded as a binary categorical variable (0=Male patient, 1 = Female patient), Economic category (0= white card, 1=Pink card) DIS,DID,AVS,AVD, and Control were coded as dummy variables (0= not in Group, 1= present in Group), II=Post-intervention score.
2. *= p<.05, **= p<.01, ***= p<.001
3. Negative correlation in blood pressure readings indicates better management i.e. Lower readings of blood pressure indicate better management.

It may be observed from the table that Knowledge-II (r=-.36, p<.001), Adherence-II (r=.33, p<.001), Self-Efficacy-II (r=-.30, p<.001), Social Support (r=-.25, p<.001), exposure to DID module (r=-.24, p<.001), not receiving any intervention (Control Group) (r=-.19, p<.01), Economic Status (r=-.17, p<.001), Age (r=.14, p<.05), Education(r=-.14, p<.05), Depression (r=.13, p<.05), affiliation to DIS module (r=-.12, p<.05) significantly correlated with Hypertension Management-II. It may be necessary to mention here that the scores of hypertension management are

measured in terms of Mean Arterial Pressure (MAP). Lower scores indicate better management of hypertension. Thus the negative correlation in fact indicates a positive relationship between the variable and hypertension management.

Taking the above variables as predictors, a Multiple Regression Analysis was computed following simultaneous method. The result of the Multiple Regression Analysis is presented in table 4.20.

Table 4.20

Multiple regression analysis for variables predicting management-II of primary hypertension

	B	***SEB***	***B***	***T***
Knowledge-II	-.25	.12	-.15	-2.00*
Self-Efficacy-II	-.46	.26	-.12	-1.76
Adherence-II	-.11	.05	-.15	-2.12*
Age	.07	.04	.10	1.90
Years of education	-.10	.05	-.11	-1.81
Economic category	-1.32	.68	-.11	-1.92
DIS	-1.72	.92	-.12	-1.86
DID	-2.29	.93	-.15	-2.44*
Control	-1.35	1.05	-.09	-1.29
Depression-II	-.01	.10	-.01	-.02
Social Support-II	-.03	.03	-.06	-1.05
SE			5.09	
R^2			.248	
C			114.47	
F			7.30***	

Note. 1. *B*=Unstandardised beta coefficient, *SEB*=Standard Error of Beta,β= Standardised beta coefficient,*t*=t-test, *SE*= Standard Error of the estimate, R^2= Variance, *C*=Constant, *F*=F-statistic

2. *p<.05, ***p<.001

3. Negative correlation in blood pressure readings indicates better management i.e. Lower readings of blood pressure indicate better management.

It may be noted from the table that the model together explained a 24.8% of variance in management of hypertension, R^2=.248, F (11,244) = 7.30, p<.001. To elaborate further, getting exposure to intervention through DID module (β = -.15, p <.05), the changed adherence in post-intervention scenario (Adherence II) (β = -.15, p <.05), and the changed knowledge in post-intervention scenario (Knowledge-II) (β = -.15, p <.05), significantly and independently contributed to effective management of hypertension following the intervention.

Section IV: Tracking the path between hypertension knowledge and management

The results of the Multiple Regression Analyses identified independent set of predictors for post-intervention Knowledge, Self-Efficacy, Adherence and Hypertension management. Taking these predictors into consideration, Multiple Regression Analysis was carried out again to filter out the most significant set of predictors for the four variables identified as criteria namely Knowledge, Self-Efficacy, Adherence and Management of Hypertension in post-intervention scenario. The purpose of this was to trace a path if any from the point of enhanced knowledge (as targeted by cognitive intervention), to self-efficacy (the expected byproduct of cognitive intervention), adherence (behaviour translation of cognitive base created by intervention) and hypertension management reflected in controlled B.P levels (the final outcome of cognitive intervention). In order to attain the goals of tracking the path, four separate Multiple Regression Analyses were carried out as explained below.

A Multiple Regression Analysis was carried out taking those four significant independent predictors that have emerged as distinct individual predictors contributing to knowledge after the intervention (refer table 4.14 from the previous section). Thus pre-existing knowledge, the intervention module of DID, DIS and not receiving intervention (Control Group) was considered as contributors in the model for predicting post-intervention knowledge.

The results are presented in the table 4.21.

Table 4.21

Pathway Tracking: Multiple Regression Analyses for significant variables predicting Knowledge-II

	B	***SEB***	***B***	***T***
DIS	.99	.37	.11	2.63**
DID	2.01	.37	.23	5.37***
Control	-4.00	.37	-.47	-10.78***
Knowledge-I	.45	.03	.50	12.60***
SE			2.18	
R^2			.597	
C			11.58	
F			93.11***	

Note. 1. *B=Unstandardised beta coefficient, SEB=Standard Error of Beta, β= Standardised beta coefficient, t=t-test, SE= Standard Error of the estimate, R2= Variance, C=Constant, F=F-statistic*

2. **= p<.01, ***= p<.001.

It may be observed from the table that the model that including pre-intervention knowledge level, affiliation to Control Group, DIS module and DID module together explained 59.7% of variance in post-intervention knowledge, R^2=.597, F (4,251) = 93.11, p<.001. To elaborate further, getting exposure to intervention through DID module (β = .23, p <.001), through DIS module (β = .11, p <.01), the pre-intervention knowledge (β = .50, p <.001), significantly and positively contributed to effective management of hypertension following the intervention whereas not being exposed to any intervention (Control Group) (β = -.47, p <.001) significantly and negatively contributed to effective management of hypertension following the intervention.

The enhanced knowledge included through intervention module is expected to impart the self-efficacy levels in the post-intervention scenario. In order to examine this, a Multiple Regression Analysis was carried out taking the four variables emerged as significant predictors of self-efficacy in the earlier analysis (refer table 4.16). The significant variables were post-intervention Knowledge, affiliation to DID module, Control Group, and post-intervention Perceived Social Support. The above variables were considered as contributors in the next Multiple Regression Model. The results are presented in the table 4.22.

Table 4.22

Pathway Tracking: Multiple regression analyses for significant variables self-efficacy

	B	***SEB***	***B***	***T***
Knowledge-II	.10	.02	.23	3.57***
DID	.58	.20	.16	2.78**
Control	-.44	.23	-.12	-1.90
Social support-II	.03	.001	.27	4.94***
SE			1.26	
R^2			.308	
C			3.39	
F			27.99***	

Note. 1. *B=Unstandardised beta coefficient, SEB=Standard Error of Beta, β= Standardised beta coefficient, t=t-test, SE= Standard Error of the estimate, R2= Variance, C=Constant, F=F-statistic*

2. *=*p*<.05, **=*p*<.01, ***=*p*<.00

It may be observed from the table that the model together explained a variance of 30.8% in post-intervention self-efficacy, R^2=.308, F (4,251) = 27.99, p<.001. To ornate further, post-intervention perceived social support (β = .27, p <.001), the post-intervention knowledge (β = .23, p <.001), getting exposure to intervention through DID module (β = .16, p <.01), significantly and positively contributed to Self-Efficacy following intervention. However affiliation to Control Group was dropped.

As expected, the post-intervention knowledge constituted as one of the significant predictors of self-efficacy. Now, it is of interest to find out if self-efficacy continues to constitute one of the significant variables in the set predicting adherence. In order to attain this goal, the four variables emerged as significant predictors of adherence in the earlier Multiple Regression Analysis (refer table 4.18) are taken as predictors of adherence in this model. The identified variables are post-intervention Knowledge, Self-Efficacy, Duration of Illness and affiliated to Control Group. The results are presented in table 4.23.

Table 4.23

Pathway Tracking: Multiple Regression Analysis for significant variables predicting Adherence

	B	***SEB***	***B***	***T***
Knowledge-II	.56	.13	.24	4.01***
Self-efficacy-II	1.10	.28	.20	3.91***
Duration of illness	-.02	.01	-.18	-3.81***
Control	-6.61	1.11	-.34	-5.93***
SE			5.98	
R^2			.444	
C			31.76	
F			50.03**	

Note. 1. *B=Unstandardised beta coefficient, SEB=Standard Error of Beta, β= Standardised beta coefficient, t=t-test, SE= Standard Error of the estimate, R2= Variance, C=Constant, F=F-statistic*
2. **= p<.01, ***= p<.001.

It may be observed from the table that the model together explained a variance of 44.4 % of variance in post-intervention adherence, R^2=.444, F (4,251) = 50.03, p<.001. To explain further, 'not receiving intervention' (being in Control Group) (β = -.34, p <.001) and suffering from hypertension for a longer duration (Duration of illness) (β = -.18, p <.001) negatively contributed to adherence while enhanced knowledge (Knowledge-II) (β = .24, p <.001), and Self-Efficacy in post-intervention scenario (Self Efficacy-II) (β = .20, p <.001) positively contributed to Adherence-II.

When the adherence is enhanced due to knowledge input and Self-Efficacy improved due to exposure to intervention, it is expected to reflect in better management of hypertension manifested on controlled B.P levels. In order to find out if the enhanced knowledge, adherence and exposure to DID module of intervention continued to predict hypertension management in post-intervention scenario, Multiple Regression Analysis is carried out taking those three significant variables as emerged from earlier analysis (refer to table 4.20) as predictors of hypertension management. Results are presented in the table 4.24.

Table 4.24

Pathway Tracking: Multiple regression analysis for significant variables predicting HTN management

	B	***SEB***	***B***	***T***
Knowledge-II	-.41	.11	-.24	-3.57***
Adherence II	-.12	.04	-.16	-2.40**
DID	-1.66	.87	-.12	-1.89
SE			5.26	
R^2			.171	
C			112.46	
F			17.33***	

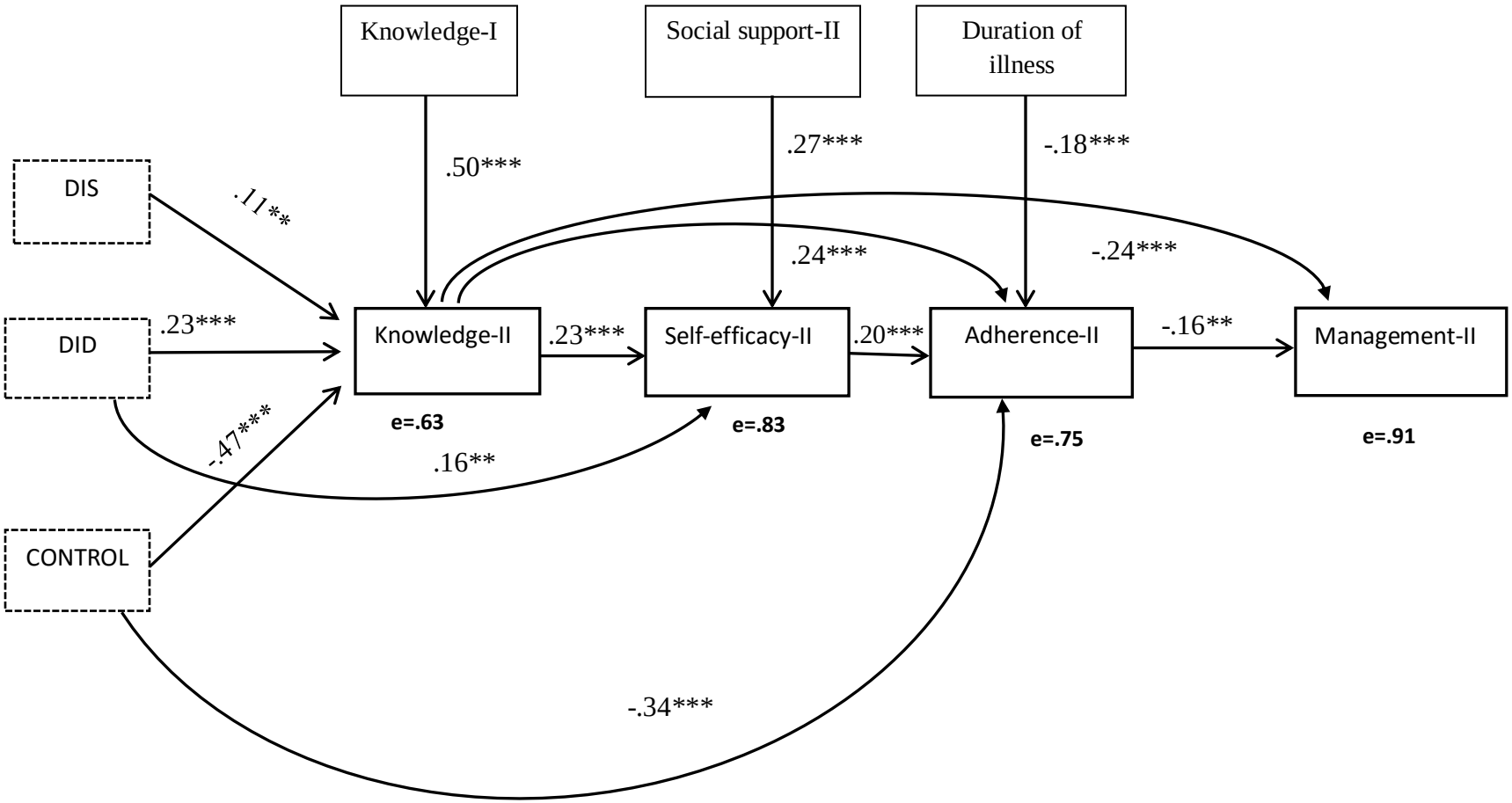
Note. 1. *B=Unstandardized beta coefficient, SEB=Standard Error of Beta, β= Standardized beta coefficient=t-test, SE= Standard Error of the estimate, R2= Variance, C=Constant, F=F-statistic*

2. **= p<.01, ***= p<.001.

3. Negative correlation indicates better management i.e. Lower the Mean Arterial Pressure indicates better management.

It may be noted from the table that the model together explained a 17.1 % of variance in Management of Hypertension, R^2=.171, F (3,252) = 17.33, p<.001. It may be observed from the table that only two variables namely changed adherence in post-intervention scenario (Adherence-II) (β = -.16, p <.01), and the changed knowledge in post-intervention scenario (Knowledge-II) (β = -.24, p <.001) significantly and independently contributed to effective Management of Hypertension while getting exposure to intervention through DID module was dropped.

The above findings are graphically represented to explore the path between knowledge, self-efficacy, and adherence and management of hypertension.



Note. → Significant paths with β coefficients (*= p<.05, **= p<.01, ***= p<.001), E denotes error

Negative β values in case of HTN management indicates positive contributions of the predictors

Figure 4.28 Significant psychosocial correlates (with β coefficients) of knowledge, self-efficacy, adherence and hypertension management in patients with primary hypertension

Figure 4.28 represents the criteria and their predictors. It may be observed from the figure that knowledge-II has contribution from knowledge-I (β = .50, p <.001), DIS (β = .11, p <.01), DID (β = .23, p <.001), and Control Group (β = -.47, p <.001). This indicates the pre-intervention knowledge, affiliation to DIS, DID modules positively contributed to knowledge-II while affiliation to Control Groups negatively contributed to post-intervention knowledge. Self-Efficacy-II is contributed by Knowledge-II (β = .23, p <.001), DID (β = .16, p <.01), and Social Support-II (β = .27, p <.001), Adherence-II has contributions from Self-Efficacy-II (β = .20, p <.001), Knowledge -II (β = .24, p <.001), Duration of Illness (β = -.18, p <.001), affiliation to Control Group (β = -.34, p <.001). However, while post-intervention Self-Efficacy and Knowledge positively contributed to Adherence, affiliation to Control Group and duration of illness negatively contributed to it. To explain in a simple way longer the duration of illness and not being exposed to cognitive intervention module because of affiliation to Control Group lowered the adherence levels in post-intervention.

The figure showing negative beta values in prediction of management in fact indicates a positive contribution because lower the B.P readings better is the management of hypertension. The figure shows a positive contribution of Adherence-II (β = -.16, p <.01), and Knowledge-II (β = -.24, p <.05) in predicting Hypertension Management.

After giving a visual representation of various factors contributing to the path between knowledge and management, a further attempt was made to track the pathway between each intervention module and Hypertension Management. The rationale behind this is the intervention module provided essential knowledge input to create a cognitive base expected to be translated into adherence to have an outcome of controlled blood pressure. The results of the ANCOVA showed differential impact of each module in creating cognitive base reflected in knowledge

scores, motivation levels measured by Self-Efficacy, Adherence behaviour as well as the Hypertension Management as indicated by B.P readings.

The Multiple Regression Analyses identified two out of the four intervention modules (DIS and DID) and Control Group as constituents of significant set of predictors for the four criteria. Owing to the results of ANCOVA indicating differential impact of the four modules, it is of interest to trace separate pathways for the two intervention modules.

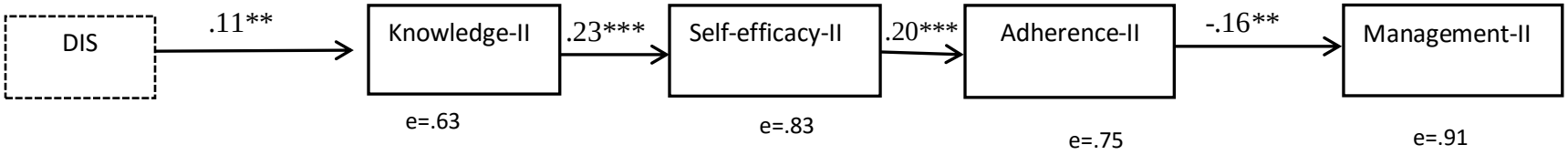


Figure 4.29 Pathway between the DIS module and hypertension management

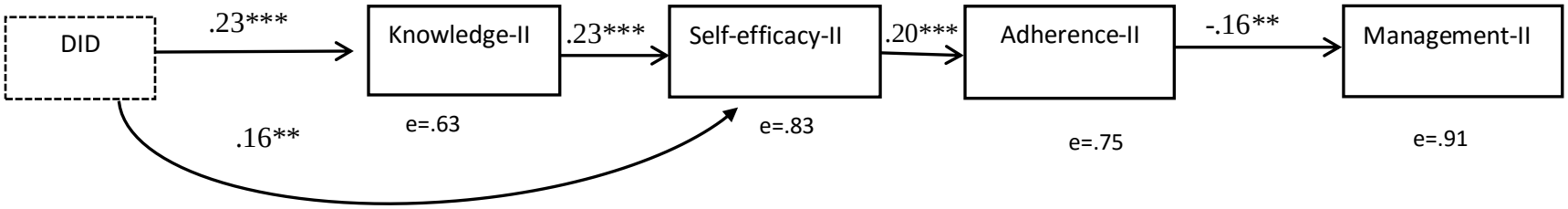


Figure 4.30 Pathway between the DID module and hypertension management

Note. e denotes error, Negative β values in case of HTN management indicates positive contributions of the predictors.

→ Significant independent path with β coefficient (**= $p<.01$, ***= $p<.001$)

Figure 4.29 depicts the pathway from DIS intervention module to Hypertension Management. As depicted in the figure, an absolutely clear pathway was tracked. It is observed from the figure that the intervention module DIS significantly predicted the post-intervention knowledge (β = .11, p <.01), post-intervention Knowledge significantly predicted Self-Efficacy (β = .23, p <.001); Self-Efficacy predicted Adherence significantly (β = .20, p <.001), while Adherence significantly predicted Hypertension Management (β = -.16, p <.001), Thus, we could draw a clear track. It indicates that DIS module significantly and independently contributed to knowledge, which independently contributed to enhanced self-efficacy and so on. None of the predictors crossed the path to contribute directly to any of the criterion.

Figure 4.30 represents the pathway between DID module and Hypertension Management. It may be observed from the figure that DID module directly contributed to post-intervention Knowledge (β = .23, p <.001); post-intervention Knowledge significantly and independently predicted Self-Efficacy (β = .23, p <.001). Self-efficacy was also directly predicted by DID module (β = .16, p <.01). Self-efficacy was found to predict Adherence (β = .20, p <.001), and Adherence significantly and independently predicted Hypertension Management (β=.16, p <.001). This indicates that while there is path between DID module and hypertension management passing through post-intervention knowledge, Self-Efficacy and Adherence in that order, DID module also directly contributed to enhanced Self-Efficacy. This indicates that the DID module of cognitive intervention contributed to knowledge level on one hand while directly contributing to self-efficacy on the other. Further a comparison of the two figures clearly indicates the

differences of the two modules in their contribution to knowledge levels. The β value of DIS predicting the knowledge is 0.11(p<.01) while the β value of DID predicting the knowledge is 0.23 (p<.001). This indicates a relatively superior efficacy of DID module. In addition to this, the contribution of DID module to Self-Efficacy also indicates the function of DID module extending beyond knowledge inculcation. Thus, it is clear from the pathway analysis that a clear path is traceable from intervention modules to Knowledge, Self-efficacy, Adherence and Hypertension Management. Further the pathway analysis also identified the dual function of DID module in creating not only a cognitive base but also enhancing the self-efficacy.

CHAPTER V

DISCUSSION

Chapter V

DISCUSSION

The study started with the objectives of finding the differential impact of cognitive intervention through Direct and Audio Visual form, one time and repeated exposure in enhancing knowledge related to hypertension, level of adherence and efficiency in hypertension management among the patients of primary hypertension. Further it also aimed at identifying the factors contributing to knowledge enhancement, adherence and hypertension management. Yet another objective of the study was to track the path between cognitive intervention and hypertension management. Related to the above objectives, twelve specific hypotheses were tested by comparing four modules of cognitive intervention varying in form and frequency with that of Control Group which had no cognitive intervention but was on the standard medical care. The findings of the study clearly indicated the positive impact of cognitive interventions not only in enhancing knowledge levels related to hypertension but also in improving adherence behaviour culminating in effective management of hypertension reflected in lowered blood pressure readings. For this purpose of discussion, the twelve hypotheses are grouped under four broad themes. The first set of hypotheses relate to the impact of cognitive intervention in enhancing the knowledge base related to hypertension. The three hypotheses are

Hypothesis 1: The intervention groups will differ from the Control Group in post-intervention knowledge levels.

Hypothesis 2: The groups exposed to intervention in direct interaction form will differ from the groups exposed to the intervention through audio-visual form in their post-intervention hypertension knowledge levels and its components.

Hypothesis 3: The groups that received repeated intervention will differ in hypertension knowledge compared to those which received the interventions only once.

Hypothesis I conjectured that the Control Group will differ from the intervention groups in their level of knowledge in post-intervention testing. The results of ANCOVA revealed a significant difference between Control Group and intervention groups in overall knowledge level and the three domains of hypertension knowledge viz General Awareness, Lifestyle factors, Causes , Care and Casualty awareness. This indicates that only when targeted efforts are made to create awareness about the nature, causes, alarm signals, need for adherence to prescribed lifestyle will there be a registration of the same in the memory of the patients. This subsequently is expected to create a cognitive base on the relevant knowledge about hypertension. It is essential that the patients of primary hypertension have this basic knowledge that needs to be nurtured and used constantly in managing their hypertensive condition. Research evidence has been adequately emphasizing on cognition as a prerequisite to behaviour change in the desirable direction (DiMatteo, Haskard-Zolnierek, & Martin, 2012; DiMatteo & DiNicola, 1982; Fisher, Fisher, & Harman, 2003).

The results of the Bonferroni multiple Group comparison interestingly reveled that with respect to the knowledge domain of medication management, the controlled Group was found to be on par with the two groups where the cognitive intervention followed audio visual form. In other words, the groups exposed to direct form of cognitive intervention were found to be on a higher level of knowledge with respect to medication management compared to their audio visual counterparts and Control Group. It may be relevant to mention here a few observations of the investigator. It

was observed that the participants had the opportunity of getting feedback from the physician specifically on the medication prescribed to them and its functioning and relevance to their hypertensive condition. For example, they could have an additional knowledge whether the medicines prescribed to them was a beta blocker, or diuretic or a vasodilator. The audio visual groups were deprived of this facility. Naturally the group exposed to direct interaction form had the advantage of relating the knowledge to their personal context. The studies in the past have proved that the personal relevance of knowledge significantly contributes to having strong cognitive base (Atreja, Bellam, & Levy, 2005; Burgoon et al., 1987; Jolles, Clark, & Braam, 2012; Kandula et al., 2009; Thankappan, Sivasankaran, Mini, Daivadanam,Sarma, & Khader, 2013).

The second hypothesis postulates that the post-intervention knowledge levels of the groups exposed to knowledge in two different forms will be different. Results of ANCOVA and Bonferroni Multiple Group Comparison revealed that the direct form of cognitive intervention only when there was repeated exposure, resulted in higher levels of overall knowledge, general awareness, and lifestyle factors compared to the groups exposed to the intervention through audio visual form. With regard to awareness about causes, care, and casualty, the groups that received intervention through repeated direct intervention differed from the one which had repeated audio visual interaction but not with the one which had single audio visual exposure.

These results suggest relatively higher level of efficacy of intervention through direct interaction in general and particularly when the intervention is repeated. This may be attributed to the advantage of physical presence of the physician and his approachability in strengthening the cognitive base through stimulating supplementary questions related to the presented knowledge. The physical

presence of the person transmitting knowledge has all the advantage of face to face teaching vis-à-vis distance made (Hara, 2000). The mutuality in communication process extends beyond verbal communication as both the initiator and the receiver of communication have a scope to respond to the several non-verbal cues, such as facial expressions, gestures, and postures. A number of studies in the past have proved the efficacy of direct communication compared to others (Beigi et al., 2014; Lu et al., 2015; Haidet & Paterniti, 2003; Roter, Frankel, Hall, & Sluyter, 2006).

The third hypothesis propounds higher level of impact of repeated exposure to an intervention compared to a single exposure irrespective of its form. It is interesting to note that repetition of intervention per se was not effective in enhancing knowledge. A combination of form and frequency of intervention was found to have a positive influence. The repeated form of exposure through audio visual mode was found to be counterproductive with respect to causes, care and causality awareness. Repeated exposure to audio visual intervention resulted in less gain in knowledge compared to repeated intervention in direct form. The reasons for this could be loss of information value through audio visual form when repeated because the recipients assume a passive role with no scope for clarification of any doubt arising out of information. This was found to be true in case of intensive campaigns through media resulting in a saturation point of information. For example, the campaign related to protecting oneself from HIV AIDS titled as ‘Puliraja campaign’ (Kannan, 2003) through monotonous messages did not bring cost effective outcome in reproductive health practices among Indian population as evidenced by increasing incidence of cases (Jha et al., 2010). In this context the domain related to causes care and casualty disseminates information about the serious adverse impact of untreated hypertension. There is a possibility that this information creates certain amount of anxiety when it is

repeated to the recipient who has no scope to dissipate the fears and apprehensions thus generated (Irvine, Garner, Olmstead, & Logan, 1989). Under such circumstances, the natural defense mechanism would be to push the information into oblivion. Based on the findings, the first hypothesis that there will be difference in post-intervention knowledge levels between the intervention groups and the Control Group is accepted with respect to overall knowledge level, and its domain such as general awareness, lifestyle, causes, care and casualty awareness but not in the domain of medication management.

The second hypothesis that conjectured a difference in post-intervention knowledge levels between the two forms of intervention i.e. direct interaction form and audio visual form is not accepted.

The third hypothesis that repeated exposure to intervention will be effective compared to single exposure is not accepted. The above discussion suggests that neither the form nor the frequency of intervention in isolation contributes to higher level of knowledge.

The second set of hypotheses (Hypotheses 4 to 6) relate to the impact of cognitive intervention in enhancing clinical adherence. The three hypotheses are

Hypothesis 4: The intervention groups will differ from the Control Group in post-intervention clinical adherence.

Hypothesis 5: There will be differences in levels of adherence between the groups receiving intervention through direct intervention and audiovisual from.

Hypothesis 6: There will be differences in adherence behaviour in groups that received repeated intervention compared to the groups that received single exposure to intervention.

The second set of hypotheses relate to the impact of cognitive intervention in bringing about a behavioural change in terms of clinical adherence, that includes adherence to medication, diet, exercise and self-monitoring. The findings by and large indicate a positive impact of cognitive intervention on overall adherence and its components.

The fourth hypothesis postulates that group receiving cognitive intervention will have higher levels of overall adherence and its components such as medication, diet, exercise and self-monitoring. The results clearly indicated that groups that received intervention showed higher level of adherence in general as well as adherence to medication, diet and exercise compared to the Control Group. This clearly suggests that cognitive base created by exposure to hypertension related knowledge translated into strengthening positive behaviour related to clinical adherence. A number of studies have established a positive relationship between communication and adherence (Swain, Hariharan, Rana, Chivukula, & Thomas, 2015; Schoenthaler, Knafl, Fiscella, & Ogedegbe, 2017; Steigerwalt, Makos, Saunders, Jackson, & Scisney-Matlock, 2002), information exposure and adherence (McKinstry et al., 2006), group orientation and adherence (Lauzière, Chevarie, Poirier, Utzschneider, & Bélanger, 2013). It may be relevant to state here that only when the communication packed in intervention suits the target groups in its content, medium (language) and form will it have an effective outcome that is intense enough to translate from cognition to behaviour (Giuse, Koonce, Storrow, Kusnoor, & Ye, 2012; Glasgow et al., 2013). Based on this, it may be inferred that the intervention

developed in this study worked effectively and established its suitability to its target group.

The fifth hypothesis posited that the form of intervention will have an effect on adherence levels. However the findings were contradictory, except in adherence to self-monitoring. In case of self-monitoring the groups that received intervention through direct interaction were found to have higher levels of adherence compared to their counterparts who received intervention through audio visual form. Self-monitoring is a behaviour demanding sustenance. Unless the message about the significance of self-monitoring is strong in content, form and frequency, it is difficult to persevere after initiating the same.

Sixth hypothesis conjectures that repeated exposure to intervention would bring about an enhanced level of adherence compared to a single expose to intervention. The results clearly proved that the frequency of exposure to intervention per se had no role in enhancing the adherence levels. The study design had provision to compare single exposure with that of double exposure. There may be only a marginal benefit meted out by the second exposure. Hence it is difficult to conclude that repeated exposure with higher frequency and larger spacing will have the same impact. Further studies in this area should compare a single exposure with repeated exposures in higher frequencies so as to infer the impact of frequency of intervention on adherence.

Based on the above discussion, hypothesis 4 is accepted with reference to overall adherence, adherence to medication, diet, and exercise only but not with reference to self-monitoring. The fifth hypothesis that there will be difference in adherence in the groups receiving intervention through direct and audio visual form is

not accepted. The sixth hypothesis that there would be a difference in adherence in the group receiving single intervention and repeated intervention is not accepted.

The third set of hypothesis related to the impact of cognitive intervention on management of hypertension. Hypertension management was measured in terms of systolic and diastolic blood pressure converted to a single unit measure of Mean Arterial Pressure (MAP).

Following are the three hypotheses related to impact of cognitive intervention on hypertension management

Hypothesis 7: The intervention groups will differ from Control Group in management of primary hypertension.

Hypothesis 8: There will be differences between the group receiving direct intervention and the groups receiving intervention through audiovisual form.

Hypothesis 9: There will be differences in hypertension management between the groups that received a single exposure to intervention and the groups that received repeated exposure.

The seventh hypothesis postulated that there will be significant difference in blood pressure readings between the intervention groups and the Control Group following their exposure to intervention. The results broadly indicated an effective blood pressure management reflected in MAP values in the intervention groups compared to the Control Group.

The results found significant control over the blood pressure levels in all the intervention groups except the one which had repeated exposure to audio visual form of cognitive intervention. Though this group was found to have a lower level of blood

pressure compared to the pre-intervention readings, the readings were more comparable to the Control Group thus reflecting in no significant difference in the B.P levels. One of the reasons for this could be the fact that repeated exposure to audio visual intervention as passive recipients of information might have enhanced their levels of anxiety in response to the information related to repercussion of uncontrolled B.P. There are a number of studies relating heightened levels of blood pressure to state anxiety (Saboya, Zimmerman, & Bodanese, 2010; Grimsrud, Stein, Seedat, Williams, & Myer, 2009; Pan et al., 2015).

The other reason could be the resultant desensitization of information and denial as a consequence of repeated exposure. The study by Van't Riet and Ruiter (2013) supports this finding that repeated exposure to health promoting information may result in disregard, denial, or dismissal of the very information. Such reactions may lead to a casual attitude towards the core message thereby rendering the intervention futile. In fact there are reports that while majority of interventions culminate in benefitting the target group, in about 6% of studies it was counterproductive by worsening the conditions (Lagger, pataky, and Golay, 2010). It may be reiterated here that the effectiveness of cognitive intervention depends upon its suitability to the target group in form, content and frequency.

The eighth hypothesis postulates that there will be difference in effective management of hypertension depending upon the form of intervention. The findings revealed that neither of the two forms of intervention per se was found to be relatively effective in bringing down the levels of blood pressure readings.

The ninth hypothesis propounded that there would be a difference in the level of blood pressure readings between the single intervention and repeated

intervention groups. The findings did not support this. It was found that neither the form nor the frequency of exposure per se contributed to effective control of blood pressure. However the combination of direct interaction form and repeated exposure significantly brought down the B.P readings suggesting an effective hypertension management. The reasons for this could be that the very physical presence of the physician on two occasions might have had a reassuring effect on the participants. Further it was observed by the investigator that repeated interaction with the physician in a group setting enhanced the possibility of wider arena of personal experiences of hypertensive patients and the physician's responses to the same, broadening the scope of understanding in controlling the blood pressure in different contexts. It was observed that the participants were more uninhibited in the second interaction with the physician. Further when one participant was discussing his/her problem, the others could relate the situations to them and posed supplementary questions to the physician. This certainly facilitated in acquiring knowledge on specific methods in alleviating a situation from shoot up in their B.P levels.

The findings clearly indicated a positive impact of cognitive intervention on effective management of primary hypertension. It may be relevant to mention here that the condition of primary hypertension is closely related to affect state in general and psychological distress in particular. Anxiety and depression are found to be significant constituents of psychological distress. The relationship between hypertension, anxiety and depression are well established in research (Saboya, Zimmerman, & Bodanese, 2010; Tlili et al., 2015, Vetere, Ripaldi, Ais, Korob, Kes, & Villamil, 2007) though it is difficult to establish antecedent consequence relationship. In this context, it was relevant to test the hypothesis which conjectured that there would be an impact of intervention on psychological distress as well as the

psychological states indicating motivational level. Broad hypothesis was that the cognitive intervention would culminate in effective hypertension management by successfully influencing the affect state, motivational levels and adherence behaviour. Following this conjecture, the fourth set of hypothesis were formulated as

Hypothesis 10: Intervention groups will differ from the Control Group in anxiety and depression levels.

Hypothesis 11: Intervention groups will differ from the Control Group in self-efficacy levels.

Hypothesis 12: The impact of cognitive intervention on hypertension management will follow a pathway.

Hypothesis 10 posited that the groups that received cognitive intervention will differ from the Control Group in anxiety and depression levels. The results indicated a significant difference in post-intervention anxiety level only between the two groups that received intervention twice. Very interestingly while the group that received direct intervention with repeated exposure was found to score the lowest in anxiety level the group that was exposed to intervention twice through audio visual form scored not only highest among the groups but the mean scores were higher than the pre-intervention anxiety level. This suggests that repeated intervention through audio visual form was counterproductive so far as addressing the anxiety state in participants. one could infer that repeated exposure to cognitive intervention where the knowledge component elaborated on the physiology of cardio vascular system emphasizing on the norm and deviation (in case of hypertension) highlighting the adversities caused by non-adherence can create anxiety in the target group. When the intervention creates a scope for ventilation of this anxiety or apprehension and for

clarification of anxiety creating doubts, it provided the scope for directly addressing this anxiety leading towards a better equilibrium. This is the possible explanation for significantly lowered anxiety levels in case of the group which had direct form of interaction and had repeated opportunity to express their fears and find preventive and remedial actions specific to their condition. Contrarily the group which was repeatedly exposed to the same information twice, emphasizing on the possible serious adverse effects has the potential to enhance levels of anxiety by relating the information to their specific condition. When the exposure is repeated with no opportunity to address the fears and apprehensions related to their personal symptoms and condition, it is natural that the anxiety level shoots up rather than subside. This phenomenon of unaddressed fears enhancing the anxiety was found in past research (Reiss, 1997; Ginty, Carroll, Roseboom, Phillips, and Rooij, 2013; Ogedegbe et al. 2008).

In order to explore further into the above finding, a quasi-experiment was designed with a neutral sample comprising of post graduate students of Psychology. The purpose of this experiment was to identify the core 'carry home message' of the intervention content. A group of 46 post graduate students of Health Psychology were divided into two groups. The first group consisted of 24 students while the second group consisted of 22 students. The first group was exposed to audio visual form of intervention twice with a gap of 15 days. The second group was exposed to the same only once. The participants in both the groups were asked to write down the core message of the video clipping. It was found that 80% of the participants in the group that had repeated exposure mentioned about the seriousness of the disease as the core theme. When they were asked to rate the anxiety they experienced about hypertension, the mean anxiety level was 8.2 on a 10 point rating

scale, contrarily the group that had a single exposure to the video clipping varied widely in their response related to the carry home message of the video. The mean ratings of the anxiety levels related to hypertension was found to be 4.8.

Non communicable diseases that are chronic in nature are found to be closely associated with depressive states (Stein, Cox, Afifi, Belik, & Sareen, 2006; Katon & Ciechanowski, 2002) with no cause effect relationship established. Very often ignorance, inadequate knowledge, ambiguity about the nature, symptoms, seriousness and possible adversities related to one's health condition contributed to depression state (Babrow, 2001; Wyer & Srull, 2014). Cognitive intervention works towards clearing ignorance and providing better insight into the nature, characteristics, causes, consequences, and care of the chronic disease. Logically, this must result in lowering if not dissipating depression.

Hypothesis 10 conjectured that exposure to intervention helps in lowering the depression. The results revealed that this was true only in case of the group that received repeated cognitive intervention in direct form. Once again the same explanation given for the difference in anxiety may hold good in terms of opportunity for clearing ignorance, confusion and ambiguity by interacting with the physician who was physically present. The perceived approachability of the physician for the participants might have increased with the second exposure. Hence the difference between the group that had only one exposure though the physical presence of the physician was the same.

Fear and anxiety in adequate measures may function as propellers that drive the individual towards action. Thus they may contribute to motivate the person towards initiation and sustenance of action. Thus the cognitive intervention may be

construed as invoking motivation for adherence behaviour by exposing the participants to knowledge that generated mild fear and anxiety regarding consequences of uncontrolled hypertension, non-adherence behaviour. Further the cognitive intervention through its emphasis on the significance of the patient's role and the simple ways of patient participation in adherence to life style has the potential in enhancing the self-efficacy in the target group.

Hypothesis 11 conjectured that the groups exposed to intervention would have higher levels of self-efficacy compared to the Control Group. The results clearly indicated that intervention in both the forms and frequencies was successful in enhancing self-efficacy. However the result further clearly suggested higher levels of efficacy in case of direct form repeated frequencies of intervention compared to both frequencies of audio visual form in overall self-efficacy and its six dimensions except in the dimensions of 'getting information about disease', 'communication with physician' and 'disease management in general'. This suggests that the direct form of cognitive intervention with higher frequency helps in enhancing the motivation levels of the patients in managing their life with hypertension condition. This perhaps was possible with the physician's reiteration about the condition of hypertension continuing lifelong yet the possibility of retaining it within limits by taking prescribed lifestyle measures. This contributes to enhancing the self-efficacy in disease management. The emphasis on the patient's role and participation in the treatment process in the interactions in the direct form of intervention evolved predominantly in the second exposure as per the observation. Thus the repeated exposure that opened an opportunity for one to one interaction also must have functioned as re-assurance of controllability of hypertension with higher levels of involvement and participation from the patients. Thus self-efficacy plays a significant role in creating a health belief

which is crucial in effectively overcoming the hurdles to reap the optimum outcome of disease management.

The above findings related to anxiety, depression and self-efficacy leads to formulate a hypothesis emphasizing on their role in connecting cognitive intervention to effective disease management.

The hypothesis 12 conjectured that the impact of cognitive intervention on hypertension management will follow a pathway.

The results revealed clear pathway between cognitive intervention and hypertension management only when direct face-to-face intervention was given. It was found that the cognitive intervention influenced the knowledge level which enhanced self-efficacy which in turn contributed to enhanced levels of adherence. A higher level of adherence finally was found to result in better control of blood pressure. Thus in case of intervention through direct interaction with single as well as double exposure the pathway was found to be the same except for one unique feature in case of repeated exposure. In this case it was found that the cognitive intervention while directly contributing to enhanced knowledge level, also directly contributed to enhancing the self-efficacy. This is understandable because the direct intervention with the physician in a group was observed to have several of the participants posing questions specific to their conditions eliciting responses from the physician emphasizing on their role involvement and participation in treatment process through changes in lifestyle such as following the diet pattern, exercise schedule and religious monitoring of blood pressure and regular consultation with the physician. Further in case of repeated direct interaction form, the interaction also elicited specific tips of handling procrastination, complacence and stimulus control for complying with diet,

habit formation for compliance with medication etc. Thus every bit of the interaction was observed to be sending a message of 'I can control my blood pressure' to the patient. It is not surprising to observe the direct contribution of such intervention in enhancing self-efficacy of the participants.

The hypothesis 10 that postulated lower level of anxiety in intervention groups compared to Control Group is not accepted. In case of depression the hypothesis that the intervention groups will differ from Control Group in the levels of depression is not accepted with respect to the audio visual groups and the direct interaction Group with a single exposure while it may be accepted with respect to the direct interaction group with double exposure. Hypothesis 11 that postulated difference between the intervention group and the Control Group in self-efficacy is accepted. Hypothesis 12 that conjectured a pathway between the cognitive intervention and hypertension management is accepted with respect to the intervention in direct form irrespective of the frequency of exposure.

The overall results gave an insight that cognitive intervention definitely contributed to knowledge enhancement, higher self-efficacy, better adherence behaviour and thereby efficient management of primary hypertension compared to mere standard medical treatment. Thus biopsychosocial approach to management of primary hypertension through effective communication process was glaringly found superior in optimizing disease management compared to biomedical approach (Adler, 2009; Borrell-Carrió, Suchman, & Epstein, 2004; Fava, & Sonino, 2008; Lindau, Laumann, Levinson, & Waite, 2003).

Limitations

This quasi experimental study inherits the natural limitation of comparing the groups without following pure randomization. Though the homogeneity of the groups were ascertained, pure randomization would have been more scientific. It was not followed because of feasibility factors. Second limitation is that follow up period was only limited to six weeks. Hence the sustainability of hypertension management over a longer period cannot be claimed. Further studies may take this into consideration.

Implications

The findings clearly implied the urgent need for a paradigm shift in treatment of primary hypertension. An investment of one hour of cognitive intervention split into two sessions could successfully sustain the near normal blood pressure levels in the participants for six weeks. If this is viewed from the perspective of health economics, it talks about prevention of the possible cardiac events, paralytic strokes and premature cardio vascular deaths at least in 1/3rd of population (Sacco et al., 2016). In view of the cost effectiveness, cognitive intervention may be made an integral part of treatment process of primary hypertension.

Considering the dismal state of doctor patient ratio in India, it may not be possible to advocate the expansion of time for patient consultation. However it calls for innovative ideas in forming peer support groups of patients and professionals addressing their groups at regular intervals. The professionals may include not only the physician but also Health Psychologists, Dietician, Yoga Experts, Physiotherapists and Community level Paramedical Professionals. A group interaction held with a frequency of once in a month for duration of 30 minutes to 60 minutes may not be a

high demand on time of these professionals. Further it may not be difficult for the hospitals to organize the same. The patients may find it very helpful even if such sessions are organized for a nominal fee.

Apart from the direct group intervention suggested above, it may be highly cost effective to use the media such as television and social media like mobile and internet apps where the patients are reminded about their adherence to medication, diet and exercise at regular frequencies. The contents to be aired through audio visual modes needs to be field tested carefully particularly examining the influence of each bit of information on the anxiety levels. Further the audio visual contents should be so designed and tested for their positive role in enhancing the self-efficacy of the patients in managing their primary hypertension.

The biopsychosocial model in treating primary hypertension must be implemented in every hospital or clinic. This is possible only if it gets into the system through appropriate changes in health policy. National Heart Associations should recommend the need of Behaviour Cardiologists in diagnosis and management of hypertension.

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APPENDICES

HYPERTENSION KNOWLEDGE TEST

PATIENT ID

INSTRUCTIONS: PLEASE READ THE FOLLOWING QUSTIONS REGARDING HIGH B.P CAREFULLY AND SELECT THE CORRECT ANSWER AND ASSESS HOW MUCH YOU KNOW ABOUT YOUR DISEASE

ఈ క్రింది భాగంలో హై బీ.పీ గురించి కొన్ని ప్రశ్న లు ఉన్నా య్ వాటి క్రింద ఇవ్వబడిన సమాధానాలలో సరైన సమాధానాన్ని టిక్ చేయండి. దీని ద్వారా హై బీ.పీ పట్ల మీకున్న అవగాహనా మీరు తెలుసుకోవచ్చు.మీకు జవాబు తెలియనిచో 'నాకు తెలియదు' అని టిక్ చేయండి .

1. If someone's blood pressure is 120/80, it is
   a. High
   b. Low
   c. Normal
   d. Pre-Hypertension
   e. Do not know

1 .ఒకరి బి.పి 120/80 ఉంటె ఆది ?

ఏ. ఎక్కువ

బి.తక్కువ

సి. సరైనది

డీ. ప్రీ హైపర్ టెన్షన్

ఈ. నాకు తెలియదు

2. Dietary Changes that are useful to control hypertension
   a. Consuming more fruits and whole grains
   b. Red meat, egg, milk, cheese
   c. Go on Fasting
   d. Intermittently
   e. Do not Know

2 . హై బి.పి ని నియంత్రించడానికి ఎలాంటి ఆహార పదార్థాలు తీసుకోవాలి ?

ఏ. ఎక్కువగా పండ్లు కూరగాయలు,పొత్తుతో ఉన్న ధాన్యం తీసుకోవాలి

బి. ఎవరు మాంసం,గుడ్లు,పాలు,నెయ్యి

సి. ద్రవ ఆహారం మాత్రమే తీసుకోవడం

ఈ. నాకు తెలియదు

3. For patients with high B.P reducing salt intake
   a. Helps in bringing down the B.P
   b. Increases the B.P
   c. Does not have any impact
   d. Is dangerous
   e. Do not know

3 హై బి.పి ఉన్న రోగి ఉప్పు తగ్గించడం వల్ల

ఏ . హై బి.పి తగ్గుతుంది

బి. హై బి.పి పెరుగుతుంది

సి. ఎటువంటి ప్రభావం ఉండదు

డి.ప్రమాదకరమైన పరిస్థితులకు దారితీస్తుంది

ఈ. నాకు తెలియదు

4. Once someone has high blood pressure, it usually lasts for
   a. Two Years
   b. 5-10 years
   c. 10-15 years
   d. Rest of their life.
   e. Do not know

4 ఎవరికైనా హై బీ.పీ వస్తే, ఇది ఎంత కాలం ఉంటుంది

ఏ. రెండు సంవత్సరాలు

బి. 5 నుండి 10 సంవత్సరాలు

సి. జీవితాంతం

ఏ. నాకు తెలియదు

5. People with high blood pressure should take their medicine
   a. Every day and lifelong without break.
   b. A course for one week.
   c. Only when the B.P is high.
   d. Until the B.P gives normal reading.
   e. Do not know.

5 బి.పి ఉన్న వ్యక్తులు ఎంతకాలం మందులు వాడాలి ?

ఏ. ప్రతిరోజు, జీవితాంతం మానక తీసుకోవాలి

బి. వారంరోజుల పాటు

సి. బి.పి ఎక్కువగా ఉన్నపుడే

డి. బి.పి సాధారణ స్థితికి కొచ్చేనంతవరకు

ఈ. నాకు తెలియదు

6. What happens when B.P shoots very high crossing its limits?
   a. Leads to paralysis
   b. Leads to holes in the heart
   c. Damages the bones
   d. Both a& b
   e. Do not Know

6 బి. పీ అదుపు తప్పి చాలా ఎక్కువైతే

ఏ. పక్షవాతం వస్తుంది

బి. గుండెలో రంద్రం పడుతుంది

సి. శరీరం లో ఎముకలకు ప్రమాదం కలిగిస్తుంది

డ్. (ఏ మరియు బి)

ఈ. నాకు తెలియదు

7. Doctor needs to be informed about the medicines that a B.P patient is using
   a. When undergoing surgical procedures
   b. When going for X Ray
   c. When consulting doctor for uncontrolled fever
   d. When one has severe throat infection
   e. Do not know

7 . హై బి.పి ఉన్న వ్యక్తి తాను వాడుతున్న మందులేవో డాక్టర్కు ఎప్పుడు తెలియపర్చాలి ?

ఏ.శాస్త్ర చికిత్స వెళ్ళకమునుపు

బి. ఎక్స్ రేకు వెళ్ళాక మునుపు

సి .నయం కానీ జ్వరముకి డాక్టర్ ని కలసినప్పుడు

డి. గొంతు ఇన్ఫెక్షన్ ఉన్నపుడు

ఈ. నాకు తెలియదు

8. Which of the following is not a cause of high B.P.?
   a. Obesity
   b. Excessive anger
   c. Smoking
   d. Hereditary
   e. Do not Know

8. ఈ క్రింది వాటిలో హై బీ.పీ కి కారణం ఏది ?
ఏ. స్థూలకాయం
బి. కోపం ఎక్కువగా ఉంటుంది
సి. పొగ త్రాగటం
డి.వంశపారంపర్యం
ఇ. నాకు తెలియదు

9. The fact about High blood pressure is that
   a. It is Normal phenomenon problems if left untreated
   b. It causes serious health problems if left untreated
   c. It is seen only in old people.
   d. It is seen in people who are short tempered.
   e. Do not know

9. హై బీ.పీ కి సంబందించిన ఈ క్రింది వాటిలో ఇది వాస్తవం ? ఏ .ఈ వ్యాధి ప్రతి వ్యతికి ఉంటుంది
బి. దీని వైద్యంలో నిర్లక్ష్యం ప్రమాదకరమైన పరిమాణానికి దారి తీసే అవకాశం ఉంటుంది
సి. వృదుల్లో మాత్రమే ఉంటుంది
డి. ముక్కోపము ఉన్నవారికే ఉంటుంది
ఇ. నాకు తెలియదు

10. Risk of hypertension can be reduced by
   a. Smoking occasionally
   b. Consuming limited quantity of alcohol everyday
   c. Avoiding physical activity
   d. Reducing the weight
   e. Do not know

10 హై బి. పీ వచ్చే ప్రమాదాన్ని ఎలా నివారించవచ్చు ?
ఏ. అప్పుడప్పుడు పొగ త్రాగడం వాళ్ళ
బి. ప్రతి రోజు కొద్దిగా మద్యం త్రాగటం వల్ల
సి. శారీరక శ్రమకు దూరంగా ఉండటం వల్ల
డీ. బరువు తగ్గించడం వల్ల
ఈ. నాకు తెలియదు

11. Medicines for hypertension
   a. Can be suggested by a relative who has been taking medicines for high B>P for prolonged period
   b. Cannot deviate from the prescribed medication under any circumstance
   c. For any reason, if the prescribed medicine is unavailable, the medicines used by other hypertensive patients can be taken temporarily.
   d. When one forgets to carry the medicine while going out , it can be skipped
   e. Do not know

11 . హై బి.పి.కి మందులు వాడాల్సిన విధానమేమి ?
ఏ. చాలా కాలంగా బి.ప్.కి మందులు వాడే బంధువుల సలహా పై మందులు తీసుకోవచ్చు
బి. ఎట్టి పరిస్థితులలోను వైద్యుడు వ్రాసిన మందులు తప్ప ,వేరేవి వాడకూడదు
సి. మనం తీసుకునే మందు ఏ కారణం వల్లనైనా అందుబాటులో లేకపోతే ,వేరే వాలు హై.బి.పి.కి వాడే మందులు తాత్కాలికంగా తీసుకోవచ్చు

డీ. బయటికి ఎప్పుడైనా వెళ్ళినప్పుడు మందులు తీసుకెళ్లడం మర్చిపోతే ,మందులు వేసుకోవడం మానేయవచ్చు

ఈ. నాకు తెలియదు

12. In a patient of Hypertension, if suddenly on side of face starts drooping, speech becomes difficult, arm becomes weak then its possibly
    a. Brain stroke
    b. Heart attack
    c. Heart failure
    d. Kidney Failure
    e. Do not know

12 .హై బి.పి ఉన్న వ్యక్తిలో, అకస్మాత్తుగ ఒకవైపు ముఖ్యభాగము, చేతులు, కాలు,బలహీనమైనప్పుడు,మాట్లాడుటలో ఇబ్బంది ఉన్నట్లైతే అవి

ఏ. మెదడు స్ట్రోక్ సంకేతాలు

బి. గుండెపోటు సంకేతాలు

సి. గుండె వైఫల్యం సంకేతాలు

డి. మూత్రపిండాల వైఫల్యం

ఈ. నాకు తెలియదు

13. Commonly used drugs to treat hypertension
    a. Beta blockers and diuretics
    b. Diuretics and hormones
    c. Vasodilators and steroids
    d. Sodium bicarbide and calcium carbonate
    e. Do not know.

13 .హై బి.పి.కి మాములుగా ఉపయోగించే మందు ?

ఏ. బీటా బ్లాకర్స్ & డాయురి టిక్స్

బి. డాయురి టిక్స్ & హార్మోన్

సి. వాసోడైలెటర్స్ & స్టెరాయిడ్స్

డీ. సోడియం బై కార్బైడ్

ఈ. నాకు తెలియదు

14. Which one of the following is wrong?
    a. Medications should be taken on time every day.
    b. When the B.P is normal, medications can be stopped.
    c. Take the medicine irrespective of other problems like fever or cold.
    d. Doctor should know all the medications being taken.
    e. Do not know.

14 .క్రింద తెలుపబడిన వాటిలో ఏది తప్పు

ఏ. ప్రతి దినం మందులు నిర్ణిత సమయంలోనే తీసుకోవాలి

బి. బి.పి .మాములుగా ఉన్నపుడు మందులు మానేయాలి

సి. జ్వరం,జలుబు, ఉన్న మందులు వాడాలి

డీ. ఏ ఏ మందులు వాడుతున్నది వ్యిధునికి తెలియజీయాలి

ఈ. నాకు తెలియదు

15. What should be done if a person misses a dose of medication?
    a. It is good to take skipped dose along with the next dose together
    b. Skip the next dose also and start fresh from next day morning
    c. Take the dose as early as possible
    d. It is good to skip routinely to avoid over dose
    e. Do not know

15. ఒకసారి బి.పీ మాత్రా(గోలి) వేసుకోవడం మర్చిపోతే ఏమి చేయాలి.
ఏ) మరచిన మోతాదును తరువాత మోతాదులో కలిపి ఒకేసారి తీసుకోవాలి
బి.తరువాత మోతాదు కూడా మానేసి,మరుసటి రోజు తిరిగి ప్రారంభించాలి
సి. సాధ్యమైనంత త్వరలో ఆ మోతాదు మాత్ర తీసుకోవాలి
డి.అప్పుడప్పుడు మందు మానేసి అతి మోతాదును నివారించుకోవచ్చు
ఈ. నాకు తెలియదు

16. Warning signal during a heart attack
    A. Person suffers from fever & chills
    B. Person experiences headache
    C. Person suffers from dizziness, pain in the chest and shortness of breath.
    D. Person suffers from swelling of feet
    E. Do not know

16. గుండెపోటుకు క్వచ్చే సంకేతాలు ఏవి ?
ఏ. జ్వరము ,చలి ఉండటం
బి. తలనొప్పి ఉండటం
సి. చాటి నొప్పి ,కళ్ళు తిరగడం ,ఊపిరి అంధక పోవడం
డి కాలు వాపు ఉండటం
ఈ. నాకు తెలియదు

17. Which of the following is correct
    a. Decrease medication dosage when the symptoms disappear
    b. Medication can be skipped once in a way
    c. Have a routine for taking medication
    d. Increase the dosage when the symptoms are severe
    e. Do not Know

17 .క్రింద వాటిలో ఏది సైరినది
ఏ. రోగ లక్షణాలు కనిపించకపోతే మందు మోతాదు తగ్గించాలి .
బి.ఎప్పుడోఒక్కపుడు మందు వేసుకోకపోయినా పర్వాలేదు
సి. మడులు క్రమబద్ధంగా తీసుకోవాలి
డీ. వ్యాధి లక్షణాలు ఎక్కువగా ఉంటె మందు మోతాదు పెంచాలి
ఈ. నాకు తెలియదు

18. Hypertension is blood pressure recording more than
    a. 100/80
    b. 110/70
    c. 120/80
    d. 140/90
    e. Do not know

18. ఈ క్రింది కొలతలలో దేనికంటే ఎక్కువున్నప్పుడు హై.బి పి అంటారు ?
ఏ. 100/80
బి.110/70

సి. 120/80

డీ. 140/90

ఈ. నాకు తెలియదు

19. Life style modification for treating Hypertension include
a. Resting a lot
b. Regulating diet and exercise
c. Living in quit locality
d. Controlling anger
e. Do not know

19 .హై బి.పి ఉన్న వ్యక్తి చికత్సలో భాగంగా ఈ క్రింది జీవన శైలి పాటించాలి ?

ఏ. ఆర్థిక విశ్రాతి తీసుకోవడం

బి. ఆహార వ్యాయామాలు క్రమబద్దీకరించడం

సి. ప్రశాంతమైన స్థలం లో నివసించడం

డి. కోపాన్ని నియంత్రించుకోవడం

ఈ. నాకు తెలియదు

20. Which of the following statement is wrong
   a. Eat less red meat and sweets
   b. Eat foods that are high in magnesium, potassium, and calcium.
   c. Eat foods with more sodium.
   d. Eat more whole grain products and fish.
   e. Do not Know

20 .క్రింద ఇవ్వబడిన వివరణలో ఏది తప్పు?

ఏ. మాంసం,తీపి పదార్థాలు తినడం తగ్గించాలి

బి.మెగ్నీషియం ,పొటాషియం ,కాల్షియమ్ ఎక్కువగా ఉండే పదార్థాలు తినాలి

సి. ఉప్పు ఎక్కువగా ఉండే పదార్థాలు తినాలి

డీ. పోతూ ధాన్యాలు ,చేపలు ఎక్కువగా తినాలి

ఈ. నాకు తెలియదు

21. Damage caused by high blood pressure to body
   a. Heart attack, heart failure, brain stroke.
   b. Damage of blood vessels, eyes, kidneys.
   c. Gaining lot of weight
   d. Both A and B are true
   e. Do not know

21 . హై బి.పి వల్ల శరీరానికి జరిగే నష్టమేమి ?

ఏ. గుండె పోతూ, గుండె వైఫల్యం

బి. రక్త నాళాలు, కళ్ళు ,మూత్రపిండాలు చెడిపోవడం

సి. శరీరం బరువెక్కుతుంది

డి. (ఏ)మరియు (బి) రెండు వాస్తవమే

ఈ. నాకు తెలియదు

22. All are true statements about Hypertension Expect?
    a. Genes, Obesity, Stress are some of risk factors
    b. Walking long distances is harmful for patients with high B.P
    c. Headaches, chest, pain breathing difficulty can be symptoms when B.P is High
    d. It Can Sometimes be a “Silent Killer” with very little symptoms
    e. Do not know

22. హై బీ.పీ కి సంబందించిన ఈ క్రింది వ్యాక్యలలో ఒక్కటి తప్పు, దానిని గుర్తించండి.?

ఏ. హై బీ.పీ కి ముఖ్య కారణాలు జన్యుపరమైనవి స్థూలకాయం,ఒత్తిడి మొదలైనవి

బి. హై బీ.పీ గల రోగి చాలా దూరం నడవడం ప్రమాదకరం

సి. బి.ప్ ఎక్కువగా ఉన్నపుడు తల నొప్పి,ఛాతి నొప్పి, శ్వాస పీల్చడం కష్టమౌతుంది

డి. ఒక్కోసారి ఈలాంటి లక్షణాలు బయటపడకుండా నిశ్శబదంగా ఇది మనిషి చావుకు దారితీస్తుంది

ఈ. నాకు తెలియదు

Appendix A2

Patient ID

HYPERTENSION COMPLIANCE SCALE (HYCOMPS)

The following section aims to measure the extent to which you follow your treatment regimen in the management of High B.P (B.P). Each question has six options on the right side. Choose the option related to your frequency of that behavior over a period of ONE MONTH and circle the appropriate number that suits you.

ఈ క్రింది బాగంలో అధిక రక్తపోటు నియంత్రణ మరియు చికిత్స నియమములను తెలుపుచు కొన్ని వాక్యములు ఉన్నాయి. కుడివైపున **నెలకు (౩౦ రోజులలో)** మీరు ఎన్ని సార్లు వాటిని పాటిస్తూన్నారో తెలుపుచున్న సంఖ్య చుట్టూ సున్నా/ వృతం చుట్టండి.

STATEMENT వాక్యము	**నెల లో/ఒక్క రోజు కూడా వర్తించదు NOT A SINGLE DAY IN A MONTH**	**అప్పుడప్పుడు SOMETIMES**	**చాల సార్లు MOST OF THE TIMES**	**దాదాపుగా ప్రతిరోజు ALMOST EVERYDAY**	**నాకు వర్తించదు /నాకు తెలియదు NOT APPLICABLE/DO NOT KNOW**
1. ఎంత తరచుగా మీరు మీ అధిక రక్తపోటు(BP) మందులు తీసుకోవడం మర్చిపోతారు? 1. How often do you forget to take your medicine for high blood pressure (BP)?	0	1	2	3	4
2. మీరు ఎంత తరచుగా మీ బి.పి మందులు తీసుకొకుడదని నిర్ణయిస్తారు? 2. How often do you decide not to take your medicine?	0	1	2	3	4
3. మీరు ఎంత తరచుగా కొంచెము ఉప్పు ఎక్కువగా ఉన్న ఆహారము తింటారు? 3. How often do you eat salty food?	0	1	2	3	4

4. మీరు ఎంత తరచుగా ఫాస్ట్ ఫుడ్ (చిరు తిండి) తింటారు ? 4. How often do you eat fast food?	0	1	2	3	4
5. మీరు ఎంత తరచుగా మీ ఆహారములో అదనముగా ఉప్పు వేసుకుంటారు ? 5. How often do you add extra salt to your food?	0	1	2	3	4
6. మీరు క్లినిక్ వదిలి వెళ్లె ముందు మీరు ఎంత తరచుగా తదుపరి అపాయింట్మెంట్ తిసుకుంటారు? 6. How often do you get the next appointment before you leave the clinic?	0	1	2	3	4
7. మీకు ఎంత తరచుగా బి.పి మందులు తక్కువ అవుతాయి? 7. How often do you run out of BP medicines?	0	1	2	3	4
8. మీరు ఆరోగ్యముగా ఉన్నారు అని భావించి, ఎంత తరచుగా మందులు వేసుకోవడం మానేస్తారు ? 8. How often do you miss taking your medicine because you feel better?	0	1	2	3	4
9. మీరు అనారోగ్యముగా ఉన్నప్పుడు, ఎంత తరచుగా బి.పి మందులు మానేస్తారు? 9. How often do you miss taking your medicine because you feel sick?	0	1	2	3	4
10. ఎంత తరచుగా మీరు వేరొకరి బి.పి మందులు తిసుకుంటారు? 10. How often do you take someone else's	0	1	2	3	4

BP medicine?					
11. ఎంత తరచుగా మీరు మీ బి.పి మందులు తీసుకోవడంలో అశ్రద్ధ చూపుతారు? 11. How often you just don't bother about taking your BP medicine?	0	1	2	3	4
12. మీరు ఎంత తరచుగా రక్తపోటు స్థాయిని పరీక్షించుకుంటారు? 12. How often do you check blood pressure level?	0	1	2	3	4
13. మీరు ఎంత తరచుగా సూచించిన వ్యాయామాలు చేస్తారు ఉదా: ఉదయం నడక ? 13. How often do you do the prescribed exercises e.g. morning walk?	0	1	2	3	4
14. ఎంత తరచుగా మీ వ్యాయామంకు ప్రత్యామ్నాయంగా/ బదులు ఇంటి పనులు చెస్తారు ? 14. How often do you substitute your exercise with household chores/ running errands?	0	1	2	3	4
15. ఎంత తరచుగా మీరు మీ వ్యాయామం వ్యవధిని/ సమయాన్ని తగ్గిస్తారు ? 15. How often do you cut short the duration of your exercise?	0	1	2	3	4

PATIENT ID:

Appendix-A3

Hospital Anxiety and Depression Scale (HADS)

Instructions: Clinicians are aware that emotions play an important part in most illnesses. If your clinician knows about these feelings s/he will be able to help you more. This questionnaire is designed to help your clinician to know how you feel. Read each item below and tick the reply which comes closest to how you have been feeling in the past week. Don't take too long over your replies, your immediate reactions to each item will probably be more accurate than a long, thought-out response.

చాలా రకాల జబ్బుల్లో మానసిక భావనలు ముఖ్యపాత్ర వహిస్తాయని వైద్యులకు తెలుసు.మీ వైద్యునికి ఈ మానసిక భావనలు తెలిస్తే అతడు లేదా ఆమె మీకు మరింత బాగా సహాయ పడగలరు. మీరు ఎలాంటి మానసిక భావనలు కలిగి ఉన్నారో వాటిని మీ వైద్యుడు తెలుసుకునేందుకు సహాయపడే విధంగా ఈ ప్రశ్నావళి రూపొందించబడినది. క్రింది ప్రతి అంశాన్నీ చదివి, గడిచిన 7 రోజుల్లో మీరు లోనైన భావనలకు అతి దగ్గరగా అనిపించే జవాబు ప్రక్కన టిక్ చేయండి. జవాబులిచ్చేందుకు మరీ ఎక్కువ సమయం తీసుకోవద్దు, బాగా ఆలోచించి, ఎక్కువ సమయం తీసుకునే జవాబు కంటే, వెను వెంటనే ఇచ్చే జవాబు మరింత ఖచ్చితంగా ఉండవచ్చు.

1. I feel tense or 'wound up'

- ☐ Most of the time
- ☐ A lot of the time
- ☐ From time to time, occasionally
- ☐ Not at all

1. నాకు ఆందోళనగా లేదా ఒత్తిడిగా అనిపిస్తుంది .

- ☐ అత్యధిక సమయం
- ☐ ఎక్కువ సమయం
- ☐ తరుచుగా / ఎప్పటికప్పుడు
- ☐ అసలు లేదు

2. I still enjoy the things I used to enjoy:

- ☐ Definitely as much
- ☐ Not quite so much
- ☐ Only a little
- ☐ Hardly at all

2. నేను ఇంతకి ముందు / మునుపు ఆనందించే / ఆస్వాదించే విషయాలను ఇప్పటికి/ ఇప్పుడు కూడా ఆనందిస్తున్నాను/ ఆస్వాదిస్తున్నాను.

- ☐ అన్ని విషయాలను
- ☐ చాలా విషయాలను
- ☐ కొన్ని విషయాలను
- ☐ అసలు ఏ విషయాలను ఆస్వదిన్చాట్లేదు

3. I get a sort of frightened feeling as if something awful is about to happen:

- ☐ Very definitely and quite badly
- ☐ Yes, but not too badly
- ☐ A little, but it doesn't worry me

3.ఏదో ఘోరం జరబోతున్నట్లు భయపడిన భావనలు నాకు కలుగుతున్నాయి.

- ☐ ఖచ్చితముగా మరియు తీవ్రముగా
- ☐ అవును, కాని అంత తీవ్రముగా కాదు

☐ Not at all

☐ కొంతవరకు కాని ఆందోళన కలిగించదు

☐ అసలు ఎమీ లేదు

4. I can laugh and see the funny side of things:

☐ As much as I always could

☐ Not quite so much now

☐ Definitely not so much now

☐ Not at all

4. నేను నవ్వగలను మరియు అన్నింటిని తమాషా కోణంలో చూడగలను

☐ ప్రతిసారి లాగే సాధ్యమైనంత వరకు

☐ ఇంతకు మునుపు / ముందు ఉన్నంత లేదు

☐ మరీ అంత లేదు

☐ అసలు లేదు

5. Worrying thoughts go through my mind:

☐ A great deal of the time

☐ A lot of the time

☐ From time to time, but not too often

☐ Only occasionally

5. చింతించే / ఆందోళన కలిగించే విషయాలను గురించి ఆలోచిస్తుంటాను.

☐ అత్యధిక సమయం

☐ ఎక్కువ సమయం

☐ అప్పుడప్పుడు కానీ పదేపదే కాదు

☐ ఎప్పుడో ఒకసారి/ అడపాదడపా

6. I feel cheerful:

☐ Not at all

☐ Not often

☐ Sometimes

☐ Most of the time

6. నాకు ఉల్లాసంగా / ఉత్సాహముగా అనిపిస్తుంటుంది.

☐ అసలు అనిపించదు

☐ తరచుగా కాదు

☐ కొన్నిసార్లు అప్పుడప్పుడు కొన్ని సందర్భాలలో

☐ ఎక్కువ/ బహు సందర్భాలలో

7. I can sit at ease and feel relaxed:

☐ Definitely

☐ Usually

☐ Not Often

☐ Not at all

7. నేను నిమ్మళముగా/ ప్రశాంతముగా ఉండగలను.

☐ ఖచ్చితముగా

☐ సాధారణముగా/ సామాన్యముగా

☐ తరుచుగా కాదు

☐ అసలే కాదు

8. I feel as if I am slowed down:

☐ Nearly all the time

8. పనులు చేయడంలో నేను మందగించినట్లు అనిపిస్తుంది

- [ ] Very often
- [ ] Sometimes
- [ ] Not at all

- [ ] అత్యధిక సమయం
- [ ] తరచుగా
- [ ] కొన్నిసార్లు
- [ ] అసలు లేదు / కాదు

9. I get a sort of frightened feeling like 'butterflies' in the stomach:

- [ ] Not at all
- [ ] Occasionally
- [ ] Quite Often
- [ ] Very Often

9. నాకు గుండె దడగా ఉండి అసౌకర్యముగా అనిపిస్తుంటుంది.

- [ ] అసలే కాదు / అసలు అనిపించదు
- [ ] అడపదడప అనిపిస్తుంది
- [ ] తరచుగా అనిపిస్తుంది
- [ ] చాలా తరచుగా

10. I have lost interest in my appearance:

- [ ] Definitely
- [ ] I don't take as much care as I should
- [ ] I may not take quite as much care
- [ ] I take just as much care as ever

10. నాకు రూపము / ఆకృతి/ ఆకారం మీద నాకు ఆసక్తి తగ్గింది

- [ ] నిజంగానే తగ్గింది
- [ ] కొంతవరకు తగ్గింది
- [ ] అంతగా లేదు
- [ ] అసలు తగ్గలేదు

11. I feel restless as I have to be on the move:

- [ ] Very much indeed
- [ ] Quite a lot
- [ ] Not very much
- [ ] Not at all

11. నెమ్మది లేకుండా నేను ఒకచోటు ఉండలేని భావన నాకు కలుగుతుంది.

- [ ] నిజంగానే అనిపిస్తుంది
- [ ] కొంతవరకు అనిపిస్తుంది
- [ ] అంతగా లేదు
- [ ] అసలు లేదు

12. I look forward with enjoyment to things:

- [ ] As much as I ever did
- [ ] Rather less than I used to
- [ ] Definitely less than I used to

12. నేను చేయ తలచిన విషయాలను అనందించగలను అనే నమ్మకంతో ఉంటాను

- [ ] ప్రతిసారి లాగే

☐ Hardly at all

☐ ఇంతకు ముందు కంటే కొంచం తక్కువగా

☐ ఖచ్చితముగా తక్కువ

☐ అసలు లేదు

13. I get sudden feelings of panic:

☐ Very often indeed

☐ Quite often

☐ Not very often

☐ Not at all

13. నాకు ఆకస్మికముగా తీవ్ర, భయాందోళన కలుగుతుంది.

☐ నిజంగా చాలా తరచుగా

☐ తరచుగా

☐ తక్కువగా

☐ అసలు లేదు

14. I can enjoy a good book or radio or TV program:

☐ Often

☐ Sometimes

☐ Not often

☐ Very seldom

14. నేను మంచి పుస్తకం చదవడం / రేడియో వినడం / టి. వి కార్యక్రమాన్ని చూడటాన్ని నేను ఆస్వాదించగలను

☐ తరచుగా

☐ కొన్నిసార్లు మాత్రమే

☐ తరచుగా కాదు

☐ చాలా అరుదుగా

PATIENT ID

APPENDIX A4

MULTIDIMENSIONAL SCALE OF PERCEIVED SOCIAL SUPPORT (MSPSS)

Circle the "1" if you Very Strongly Disagree
Circle the "2" if you Strongly Disagree
Circle the "3" if you Mildly Disagree
Circle the "4" if you are Neutral
Circle the "5" if you Mildly Agree
Circle the "6" if you Strongly Agree
Circle the "7" if you Very Strongly Agree

ఈ క్రింది భాగంలో ఇచ్చిన వాక్యములు జాగ్రత్తగా చదివి, వాటి కుడివైపున మీరు ఎంత వ్యతిరేకిస్తున్నారు లేదా ఎంత అంగీకరిస్తున్నారో సూచిస్తున్న అంకె చుట్టూ సున్నా / వృతం చుట్టండి

	STATEMENT వాక్యం	*VERY STRONGLY DISAGREE (1)* చాలా దృఢంగా వ్యతిరేకిస్తాను	*STRONGLY DISAGREE(2)* దృఢంగా వ్యతిరేకిస్తాను	*MILDLY DISAGREE (3)* స్వల్పంగా వ్యతిరేకిస్తాను	*NEUTAL (4)* తటస్థం	*MILDLY AGREE (5)* స్వల్పంగా అంగీకరిస్తాను	*STRONGLY AGREE (6)* దృఢంగా అంగీకరిస్తాను	*VERY STRONGLY AGREE (7)* చాలా దృఢంగా అంగీకరిస్తాను
1	There is a special person who is around when I am in need. నాకు ఏదైనా అవసరమైతే నాకంటూ ఒక ప్రత్యేక వ్యక్తి నాకు అందుబాటులో ఉన్నారు	1	*2*	*3*	*4*	*5*	*6*	*7*
2	There is a special person with whom I can share my joys and sorrows. నా సంతోషాలను, బాధలను పంచుకోవడానికి నాకొక ప్రత్యేకమైన వ్యక్తి ఉన్నారు	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3		*1*	*2*	*3*	*4*	*5*	*6*	*7*

	My family really tries to help me. నా కుటుంబం నాకు నిజంగా సహాయం చేయడానికి ప్రయత్నిస్తుంది							
4	I get the emotional help and support I need from my family నా భావోద్వేగపరమైన అవసరాలకు న కుటుంబము నుంచి సహాయం దొరుకుతుంది	*1*	*2*	*3*	*4*	*5*	*6*	*7*
5	I have a special person who is a real source of comfort to me. నన్ను నిజంగా ఆదరించే ఒక ప్రత్యేకమైన వ్యక్తి నాకు ఉన్నారు	*1*	*2*	*3*	*4*	*5*	*6*	*7*
6	My friends really try to help me నా స్నేహితులు నాకు నిజంగా సహాయపడే ప్రయత్నం చేస్తారు	*1*	*2*	*3*	*4*	*5*	*6*	*7*
7	I can count on my friends when things go wrong. పనులు సక్రమంగా జరగనప్పుడు నేను నా స్నేహితుల మీద ఆధారపడగలను	*1*	*2*	*3*	*4*	*5*	*6*	*7*
8	I can talk about my problems wit my family. నా సమస్యల గురించి నా కుటుంబంల మాట్లాడగలను	*1*	*2*	*3*	*4*	*5*	*6*	*7*
9	I have friends with whom I can share my joys and sorrows. నా సంతోషాలను బాధలను పంచుకోవడానికి నాకు స్నేహితులు ఉన్నారు	*1*	*2*	*3*	*4*	*5*	*6*	*7*

10	There is a special person in my life who cares about my feelings నా భావాలను పట్టించుకోడానికి నా జీవితంలో నాకొక ప్రత్యేకమైన వ్యక్తి ఉన్నారు	*1*	*2*	*3*	*4*	*5*	*6*	*7*
11	My family is willing to help m□ make decisions నిర్ణయాలు తీసుకోవడంలో నా కుటుంబం నాకు సహాయం చేయడాని సిద్ధంగా ఉంది	*1*	*2*	*3*	*4*	*5*	*6*	*7*
12	I can talk about my problems wit my friends. నా సమస్యల గురించి నా మిత్రులతో నేను మాట్లాడగలను	*1*	*2*	*3*	*4*	*5*	*6*	*7*

----------THANK YOU----------

PATIENT ID

Appendix A5

HYPERTENSION SELF EFFICACY SCALE

Instructions: You are aware that you have the condition called High Blood Pressure (H.B.P), We would like to know how confident you are in doing certain activities related to hypertension/ high blood pressure (H.B.P).For each of the following questions, please choose the number that corresponds to your confidence that you can do the tasks regularly at the present time.

Not at all confident | | | | | | | | | | totally confident
1----2-----3--- - 4----5----6----7-----8----9-----10

Example: Every day, I can jog for 5 kilometers.

After reading the above statement, if you are totally confident to jog 5 k.m/ day then circle 10. If you feel that it is impossible (Which means that you are not at all confident)to jog 5 k.m/day then circle 1.

సూచనలు : మీకు అధిక రక్తపోటు (బి.పి) ఉందని మీకు తెలుసు. మీ బి.పి / అధిక రక్తపోటు కి సంభందించి చేసే కొన్ని పనులు ఈ క్రింది వాక్యాలలో సుచించబడ్డాయి. అవి మీరెంత ఆత్మ విశ్వాసం తో చేస్తారో తెలుసుకోవాలని మేము అనుకుంటున్నాము. ప్రతి వాక్యాన్ని జాగ్రత్తగా చదవండి. ఆ పనులను చేయడములో మీరు ఎంత ఆత్మ విశ్వాసం కలిగున్నారో దాన్ని సూచించే తగిన అంకెను ఎన్నుకోవడం ద్వారా ప్రతి వాక్యము ఎదురుగ 1 నుండి 10 అంకెలు సూచించబడ్డాయి. ఇందులో

ఏమాత్రం ఆత్మ విశ్వాసం లేదు| | | | | | | | | | పూర్తి ఆత్మ విశ్వాసం ఉంది

1---- 2----- 3--- 4-----5----6----7-----8---- 9-----10

ఉదా: "ప్రతి రోజు 5కీ. మీ పరుగెత్త గలను "

పై వాక్యాన్ని చదివిన తర్వాత మీరు 5కీ.మీ ప్రతిరోజు సునాయాసంగా పరుగేత్తగలరు అనుకుంటే, '10' అంకె చుట్టూ సున్నా/ వృతం చుట్టండి . అలాకాకుండా ప్రతిరోజు 5 కీ. మీ పరుగెత్తడం అసంభవం అనుకుంటే '1' అంకె చుట్టూ సున్నా/ వృతం చుట్టండి

Sl.no	Statement/వాక్యం	Circle the response
1	How confident are you that you can do gentle exercises for muscle strength and flexibility three to four times per week కండరాల పట్టుత్వం, తగిన కదలిక , పరిరక్షణ కోసం వారానికి 3-4 సార్లు తేలికపాటి వ్యాయామం చేయగలను	1-2-3-4-5-6-7-8-9-10

2	How confident are you that you can do aerobic exercise such as walking, swimming, or bicycling three to four times each week? వారానికి 3-4 సార్లు వాకింగ్, ఈతకొట్టడం, సైకిల్ తొక్కడం వంటి ఏరోబిక్ ఎక్సర్ సైజ్ చేయగలను	1-2-3-4-5-6-7-8-9-10
3	How confident are you that you can exercise without making B.P symptoms worse?బి.పి లక్షణాలు పెరుగకుండ వ్యాయామాలు చేయగలను	1-2-3-4-5-6-7-8-9-10
4	How confident are you that you can get information about B.P from community resources? బి.పి కి సంభందించిన వివరాలను పరిసర సమాజం నుండి తెలుసుకోగలను	1-2-3-4-5-6-7-8-9-10
5	How confident are you that you can get information about B.P from internet source? బి.పి కి సంభందించిన వివరాలను ఇంటర్నెట్ ద్వారా తెలుసుకోగలను	1-2-3-4-5-6-7-8-9-10
6	How confident are you that you can get family and friends to help you with the things you need (such as household chores like shopping, cooking, or transport)? నా అవసరాలకు కుటుంబం, బందుమిత్రుల నుండి సహాయం పొందగలను (ఉదా: ఇంటి పనులు, బజారు పనులు, తిరగడానికి,వంట మొదలగు పనులలో సహాయం)	1-2-3-4-5-6-7-8-9-10
7	How confident are you that you can get emotional support from friends and family (such as listening or talking over your problems)? కుటుంబసబ్యులు, మిత్రుల నుండి మానసిక ఆసరా/ (భాధలని వినడం, పంచుకోవడం)	1-2-3-4-5-6-7-8-9-10
8	How confident are you that you can get emotional support from resources other than friends or family, if needed? అవసరమైతే కుటుంబసబ్యులు, మిత్రులే కాక ఇతరులు కుడా మానసికంగా ఆసరా ఇవ్వగలరు	1-2-3-4-5-6-7-8-9-10
9	How confident are you that you can get help with your daily tasks (such as housecleaning, yard work, meals, or personal hygiene) from resources other than friends or family, if needed?	1-2-3-4-5-6-7-8-9-10

	అవసరమైతే రోజువారి పనులకు (ఉదా: ఇల్లు, పరిసరాలు శుబ్రం చేసుకోవటం , వంట, వ్యక్తిగత శుబ్రత) కుటుంబ సభ్యులు, మిత్రులు కాక ఇతరుల నుండి సహాయం పొందగలను	
10	How confident are you that you can ask your doctor things about your B.P that concerns you? నా బి.పి కి సంభందించిన విషయాలని నా డాక్టర్ ని అడిగి తెలుసుకోగలను	1-2-3-4-5-6-7-8-9-10
11	How confident are you that you can discuss openly with your doctor any personal problems that may be related to your B.P? నా బి.పి కి సంభందించిన వ్యక్తిగత విషయాల గురించి డాక్టర్ తో మొహమాటం లేకుండా చర్చించగలను	1-2-3-4-5-6-7-8-9-10
12	How confident are you that you can work out differences with your doctor when they arise? నా డాక్టర్ తో అభిప్రాయ భేదాలు వస్తే వాటిని సామరస్యంగా పరిష్కరించుకోగలను	1-2-3-4-5-6-7-8-9-10
13	Having an illness often means doing different tasks and activities to manage your condition. How confident are you that you can do all the things necessary to manage your condition on a regular basis? బి.పి ని నియంత్రిన్చుకోవడానికి ఎన్నో పనులు, జాగ్రత్తలు పాటించాల్సివస్తుంది. క్రమం తప్పకుండా అవసరమైన జాగ్రత్తలు పాటిస్తూ నా బి.పి ని ఎప్పటికప్పుడు నియంత్రించగలను	1-2-3-4-5-6-7-8-9-10
14	How confident are you that you can judge when the changes in your B.P mean you should visit a doctor? నా బి.పి లో వచ్చిన మార్పులు గుర్తించి , ఇది డాక్టర్ ని సంప్రదించాల్సిన సమయం అని గుర్తించగలను.	1-2-3-4-5-6-7-8-9-10
15	How confident are you that you can do the different tasks and activities needed to manage your B.P so as to reduce your need to see a doctor? డాక్టర్ ని సంప్రదించే అవసరం తగ్గించే విధంగా బి.పి నియంత్రణకి తగిన చర్యలు తేసుకోగలను	1-2-3-4-5-6-7-8-9-10

16	How confident are you that you can reduce the emotional distress caused by your health condition so that it does not affect your everyday life అనారోగ్యం వలన కలిగిన మానసికమైన కలత ప్రభావం దైనందిన జీవితంపై పడకుండా దాన్ని తగ్గించుకోగలను.	1-2-3-4-5-6-7-8-9-10
17	How confident are you in controlling your B.P through methods other than just taking medicines? కేవలం మందుల ద్వారానే కాకుండా ఇతర మార్గాల ద్వారా నా బి.పి ని నియంత్రించుకోగలను	1-2-3-4-5-6-7-8-9-10
18	How confident are you that you can complete your household chores despite your health problems? అనారోగ్యంగా ఉన్నప్పటికీ నా దైనందిన చర్యలను నిర్వర్తించగలను	1-2-3-4-5-6-7-8-9-10
19	How confident are you that you can get your shopping done despite your health problem? అనారోగ్యంగా ఉన్నప్పటికీ బయట పనులు (ఉదా: బజారులో కొనుగోలు) చేసుకోగలను	1-2-3-4-5-6-7-8-9-10
20	How confident are you that you can continue to do your hobbies and recreation? నేను ఇష్టపడే పనులను (హాబీలను) మనసికోల్లాసం కలిగించే పనులను / సరదాలను కొనసాగించగలను	1-2-3-4-5-6-7-8-9-10
21	How confident are you that you can continue to do the things you like to do with friends and family (such as social visits and recreation)? నా కుటుంబసబ్యులు, మిత్రులతో సరదాగా చేసే పనులు కొనసాగించుకోగలను (ఉదా : ఇతరులను సందర్శించడం, సరదాలు వంటివి)	1-2-3-4-5-6-7-8-9-10
22	How confident are you that you can reduce your physical discomfort or pain? శారిరకమైన భాధ, నొప్పి తగ్గించుకోగలను	1-2-3-4-5-6-7-8-9-10
23	How confident are you that you can keep the fatigue caused by your B.P from interfering with the things you want to do?	1-2-3-4-5-6-7-8-9-10

	బి.పి వలన కలిగే అలసట నేను చేయాల్సిన పనులని అడ్డుకోకుండా చూడగలను	
24	How confident are you that you can keep the physical discomfort or pain of your B.P from interfering with the things you want to do? బి.పి వలన కలిగే శారీరక భాధ/నొప్పి నేను చేయాలని అనుకొన్న పనులకి అడ్డం రాకుండా చూడగలను	1-2-3-4-5-6-7-8-9-10
25	How confident are you that you can keep any other symptoms or health problems you have from interfering with the things you want to do? నాకున్న ఇతర అనారోగ్యసమస్యలు లేదా లక్షణాలు నేను చేయాలని అనుకొన్న పనులకు అడ్డురాకుండా చూడగలను	1-2-3-4-5-6-7-8-9-10
26	How confident are you that you can control any symptoms or health problems you have so that they don't interfere with the things you want to do నాకున్న అనారోగ్యసమస్యలను , లక్షణాలు నేను చేయాల్సిన పనులకు అడ్డంరాకుండా చూడగలను	1-2-3-4-5-6-7-8-9-10
27	How confident are you that you can keep from getting discouraged when nothing you do seems to make any difference నేను ఎంతచేసిన దాని ఫలితం లేనప్పుడు నిరుత్సాహపడను	1-2-3-4-5-6-7-8-9-10
28	How confident are you that you can keep from feeling sad or down in the dumps? బాధపడకుండా, క్రుంగిపోకుండ నన్ను నేను కపాడుకోగలను	1-2-3-4-5-6-7-8-9-10
29	How confident are you that you can keep yourself from feeling lonely? ఒంటరితనం ఫిలవకుండా నన్ను నేను కాపాడుకోగలను	1-2-3-4-5-6-7-8-9-10
30	How confident are you that you can do something to make yourself feel better when you are feeling lonely? ఒంటరితనం అనుభవించినప్పుడు ఏదోఒకటి చేసి దానినుండి బయటపడగలను	1-2-3-4-5-6-7-8-9-10
31	How confident are you that you can do something to make yourself feel better when you feel sad or down in the dumps? బాధతో క్రుంగిపోతున్నట్లు అనిపించిన్నప్పుడు ఏదోఒకటి చేసి దానినుండి బయటపడగలను	1-2-3-4-5-6-7-8-9-10

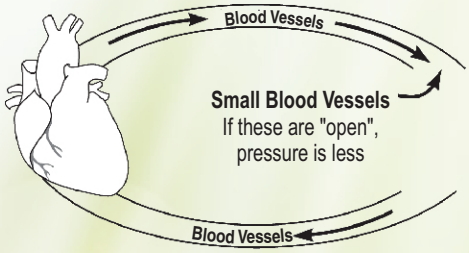
APPENDIX-A6

HYPERTENSIVE PATIENT'S PERSONAL DETAILS FORM

	Patient ID Number	
1	**Name /** పేరు	
2	**Gender/**లింగము	Male పురుషుడు /Female మహిళ
3	**Age /** వయస్సు	
4	**Phone number/**ఫోన్ నంబర్	
5	**Education/**చదువు	**A.**Illiterate/ నిరక్షరాస్యులు **B**. High School ఉన్నత పాటశాల **C.**Undergraduate డిగ్రీ **D.** Postgraduate /Professional ఆపై చదువులు
6	**Occupation** / వృత్తి	
7	**Economic Status /** ఆర్థిక గుర్తింపు	**A**. White Card Holder తెల్ల రేషన్ **B.** Pink Card Holder. గులాబీ రేషన్ కార్డు
8	**Duration of illness/** అధిక రక్త పోటు ఎన్ని సంవత్సరాలనుండి ఉన్నది	
9	**Any other associated illness** ఇతర రుగ్మతలు	
10	**Personal History** అలవాట్లు	**A.** Smoking పొగ త్రాగటం **B.** Alcohol మద్యం **C.** Drugs మాదక ద్రవ్యం
11	**Family History of Hypertension:** మీ కుటుంబంలో అధిక రక్త పోటు ఇంకెవరికైనా ఉన్నదా	a) Father /తండ్రికి b) Mother /తల్లికి c) Siblings (Brothers/ Sisters) తోటుట్టువులు (సహోదరి/ సహోదరులకు)

HIGH BLOOD PRESSURE BOOKLET

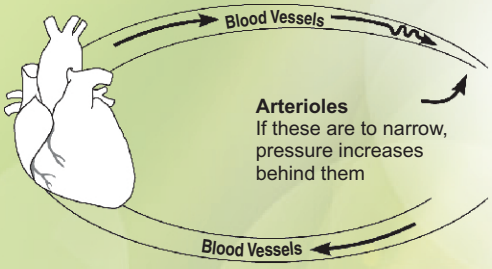
Blood pressure is the force exerted by the circulating liquid called blood against the walls of blood vessels. Everyone needs this blood pressure to send oxygen and nutrition for body functioning. Hypertension is just the medical term for high blood pressure (HBP).



What is the normal blood circulation?

The heart pumps and pushes blood into the whole body. Each time the heart contracts to push the blood, we have a heartbeat. Thus in a normal person the heart beats around 60 to 80 times in a minute. When the blood is pushed into the blood vessels, they can open wide or close thus pumping the blood forward.

What is high B.P.? What actually happens in the body?



If the small blood vessels remain open as the heart beats, blood pressure in the blood vessels remains normal. If they narrow, the blood has to be pushed harder and this Leads to higher blood pressure. Thus pressure of blood on the walls of the blood vessels goes high. This results in high B.P.

High B.P. results from four common conditions

1. When the heart pushes more blood every minute
2. When the total amount of blood in the body increases.
3. When the thickness of blood increases requiring the heart to push harder.
4. When the blood vessels become narrow

How will I know that I have high B.P. ?

Doctor checks for B.P. reading. Two measurements are given in each reading of the blood pressure. The upper (systolic) measure is the force required to pump the blood to the different organs of the body by the heart, which is always high.

The lower (diastolic) measure is the pressure of the blood on the vessels in resting state to prevent its collapse. A person is said to be hypertensive if three consecutive readings are ≥140/90 mm Hg.

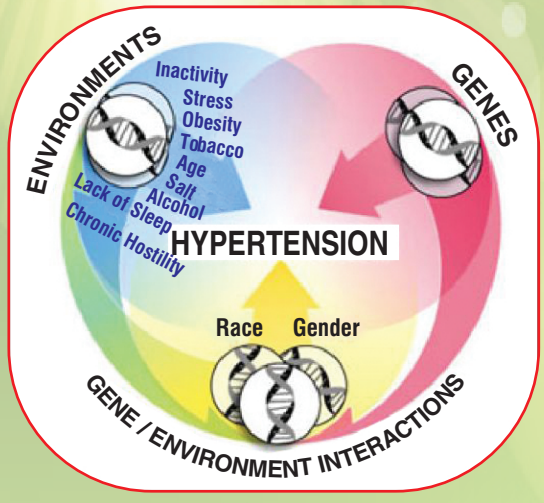
Blood Pressure Measures (for Adults ≥ 18 years age)

Diagnosis	*Systolic Pressure (Upper #) mm Hg.*		*Diastolic Pressure (Lower #) mm Hg.*
Normal	Less than 120	AND	Less than 80
Pre-hypertension	Between 120-139	OR	Between 80-89
Hypertension	140 and above	OR	90 and above

*This chart reflects blood pressure categories defined by the American Heart Association

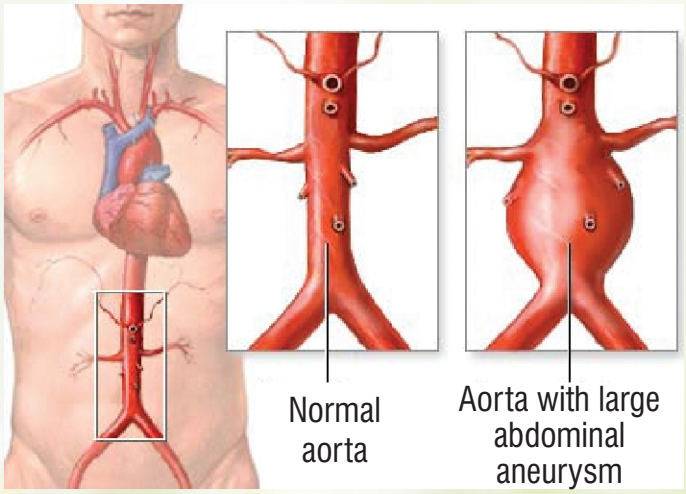
Why did I get it?

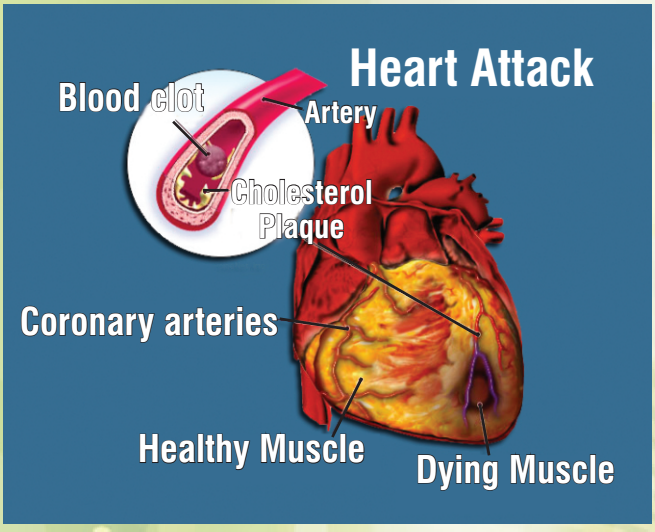
It is difficult to exactly pin point the actual cause of high B.P. It is caused due to the presence of one/more of these mentioned reasons.



What happens if the high blood pressure is not treated?

1. **Ballooning of the blood vessels because of the weakness (Aneurysm) :** High BP will damage the walls of artery which may already be weak . This is called aneurysm. The wall may burst and bleed into the surrounding tissue.





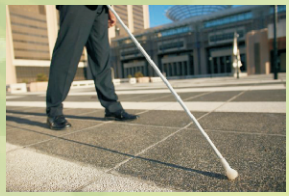
2. **Heart Attack:** Fat and calcium accumulate in the walls of the artery to form a buildup. This is called a plaque like salt in a water pipe. This decreases the Blood flow through the blood vessels. When the plaque is large it completely blocks the blood flow. This leads to heart attack. Technically it is called Myocardial Infarction (MI).

3. **Heart Failure:** Due to narrowing down of arteries the heart has to pump forcefully. Repeated forceful pumping reduces the elasticity of heart muscles. This results in increasing the size of heart. Eventually heart begins to weaken till it can no longer pump leading to accumulation of fluid in different parts of the body. This is called congestive heart failure (CHF).

4. **Brain Stroke :** High B.P. is a major cause of stroke (paralysis) and bleeding in the brain. The paralytic strokes may or may not be cured completely.

5. **Damage of the Kidneys:** Kidneys filter the blood and remove the wastes by urination. When the blood vessels supplying blood to the kidneys are damaged, kidney tissues won't get the blood they need and kidneys themselves gradually lose ability to function. This can lead to kidney failure. When the kidneys fail, there is a failure in purification of blood. As a result, toxic wastes accumulate in the

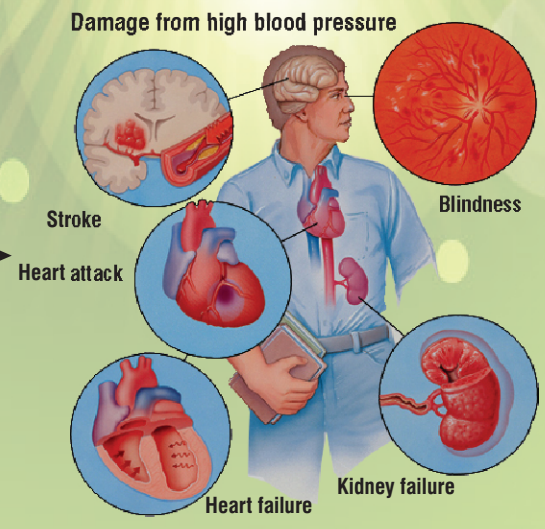
6. **Damage of Eyes:** High BP can narrow the blood vessels in the eye. They may rupture and bleed. These changes can cause impaired vision and over time may lead to blindness.



Untreated High B.P. is a silent killer:

The harmful effects on blood vessels, heart, brain, eyes and kidneys happen very gradually over a period of time. The damage is slow and steady. Thus it comes to the notice only after the damage occurs.

Hence high B.P. is known as silent killer.



What can be done to control High B.P. ?

DO THE FOLLOWING:

Medicines:

1. Take the prescribed medicine without fail. It should form a part of your daily routine as brushing, bathing, eating and sleeping.
2. If you miss a dose of drug, take it as soon as you remember or continue with the next dose whichever is earliest.
3. **You must take the medicines lifelong.** If you are irregular with medicines then the blood pressure fluctuates. The pressure changes on the walls of the blood vessels increase the risk of their bursting.

Regular self-monitoring: Since High B.P. is a silent condition, it is recommended to check your B.P. regularly.

Lifestyle changes:

Exercise: Relaxes the muscle, releases the stress. It improves the blood circulation. Thus blood pressure comes down. A 30-45 minutes walking, gardening, jogging or swimming; 3-4 times a week helps to lower blood pressure.

Weight reduction: Even a small amount of weight reduction can help in lowering the B.P.

Diet : Take low salt, low fat, low starch, high fibre diet.

Quit Smoking: It causes the blood vessels to constrict thereby raising the B.P.

Adequate sleep: On an average, an adult should have a sleep of 6-8 hours a day.

Relaxation: Meditation can put your body into a state of deep rest, which lowers the blood pressure. Bio-feedback, Yoga and deep breathing also help.

DO NOT DO THE FOLLOWING

1. Never take the medicine prescribed for another person: The doctor prescribes different medicines for different patients. Such as
   - **Diuretics:** This is to drain more water and salt through urine in order to reduce the blood volume and pressure
   - **Beta blockers:** Some patients take this to reduce the workload on heart by decreasing both the rate of heart beat and the strength of heart's contraction.
   - **Vasodilators:** Some others take medicines to increase the diameter of the blood vessels.

You do not know what type of the above three medicines are prescribed for you and what type for the other person. Hence it is dangerous to take the medicines prescribed for the other person.

What diet should I take?

Diet:

- Take **more** of fruits and vegetables, oats, millets, fibers, pulses, nuts, whole grain foods, fish & poultry.
- **Reduce** salt, red meat, saturated fats, sugar, oil and starch in your food.
- Drinking too much alcohol can increase your blood pressure.
- **Salt** can raise BP by causing the body to retain fluid, which leads to a greater burden on the heart. Intake Limit should be less than 5gm/day from all food sources combined together.

*A tea spoon contains 5gms of salt.

Food items to be reduced by hypertensives

A

- **Table salt**
- **Ajinomoto (tasting salt)**
- **Cool drinks (sodium benzoate) like aerated soda water**
- **Baking powder, Cooking soda**
- **Fried foods, Snack foods**

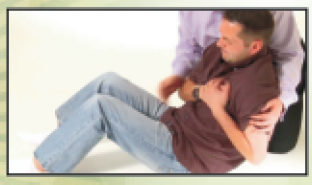
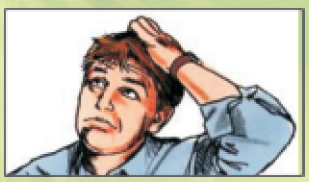
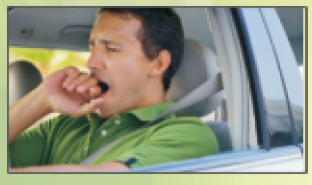
B

Salt preserved foods
- Pickles and canned foods
- Dry fish, ketchups and sauces
- Prepared mixes and ready to eat foods

Highly salted foods
Cheese, Papads, Peanut Butter, Potato Chips, Salted Biscuits, Salted Butter

Bakery Products
Biscuits, cakes, breads and pastries

What are the warning signals when you need to rush to a doctor?

Blurring of vision		**Heaviness in the chest / Breathlessness**	
Dizziness / Light headedness		**Nausea / vomiting**	
Fatigue		**Confusion**	
Headache (throbbing)		**Drowsiness**	

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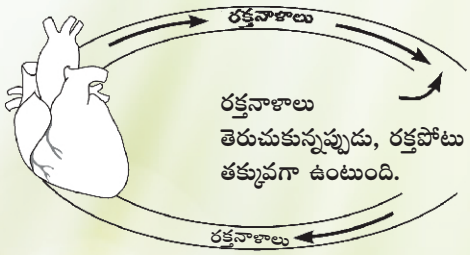
అధిక రక్తపోటు / హై బి.పి.

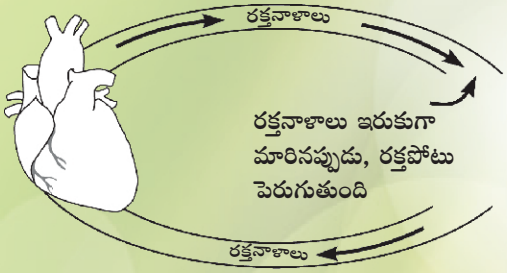
గుండె రక్తాన్ని పంపు చేయడం వల్ల రక్తనాళాలపై కొంత ఒత్తిడి ఉంటుంది. దీనినే రక్తపోటు అంటారు. ప్రతి ఒక్కరికి కొంత రక్తపోటు ఉంటుంది. అధిక రక్తపోటును వైద్యపరిబాషలో హైపర్ టెన్షన్ లేదా హై బి.పి అని అంటారు.



ఆరోగ్యకరమైన రక్తప్రసరణ ఎలా జరుగుతుంది?

ఒక నిమిషానికి సాధారణంగా గుండె 60 నుండి 80 సార్లు కొట్టుకుంటుంది. ఇలా గుండె కొట్టుకునే ప్రతిసారి రక్త నాళాలు తెరచుకోవడం, మూసుకోవడం వలన రక్తం రక్తనాళాలలో ప్రవహిస్తూవుంటుంది.

అధిక రక్తపోటు అంటే ఏంటి? ఎందువలన హై బి.పి. వస్తుంది ?



గుండె రక్తాన్ని పంపు చేసినప్పుడు, చిన్న రక్తనాళాలు తెరచుకునే ఉంటే, రక్తనాళాల్లో రక్తపోటు ఆరోగ్యకరంగా ఉంటుంది. ఒకవేళ రక్త నాళాలు ఇరుకుగా మారినట్లైయితే రక్త నాళాలపై ఒత్తిడి ఎక్కువైపోతుంది. దీనివలన హై బి.పి. కలుగుతుంది.

హై బి.పి. సాధారణంగా నాలుగు కారణాలవల్ల కలుగుతుంది.

1. ఒక నిమిషంలో గుండె ఎక్కువ రక్తాన్ని పంపు చేసినప్పుడు
2. శరీరంలో రక్తపు పరిమాణం ఎక్కువైనప్పుడు
3. రక్తము చిక్కగా మారడం వలన గుండె బలంగా కొట్టుకునే పరిస్థితి ఏర్పడినప్పుడు
4. రక్త నాళాలు ఇరుకుగా మారినప్పుడు

అధిక రక్తపోటు ఉందని తెలుసుకొనేది ఎలా ?

వైద్యులు రక్తపోటు పరిక్ష చేసినప్పుడు, ఆరోగ్యంగా ఉన్న వ్యక్తికి సాధారణంగా ఉండే బి.పి. 120/80 mm Hg.

రక్తపోటు కొలతలు (≥ 18 సం॥లు వయస్సు వున్నవారికి)

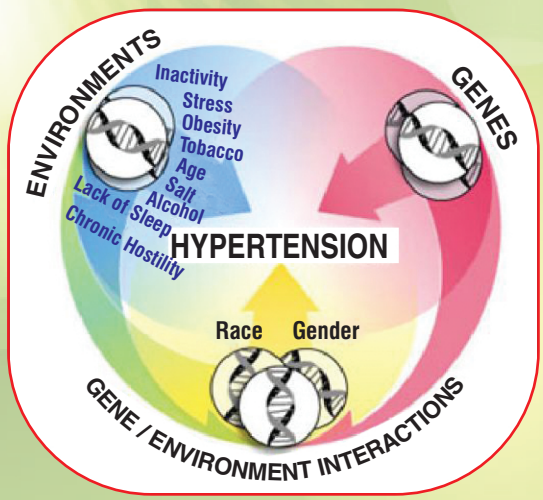
రక్తపోటు నిర్ధారణ	సిస్టాలిక్ బ్లడ్ ప్రెషర్ (పై సంఖ్య)	డయస్టాలిక్ బ్లడ్ ప్రెషర్ (కింది సంఖ్య
ఆరోగ్యకరమైన బి.పి.	120 కంటే తక్కువ	80 కంటే తక్కువ
ప్రీ-హైపర్ టెన్షన్	120 నుండి 139	80 నుండి 89
హై బి.పి	140, అంతకంటే ఎక్కువ	90, అంతకంటే ఎక్కువ

ఇందులో 120 (పై సంఖ్యను సిస్టాలిక్ బ్లడ్ ప్రెషర్ అనగా గుండె ముడుచుకున్నప్పుడు ఉండే రక్తపోటు) కాగా 80 డయస్టాలిక్ బ్లడ్ ప్రెషర్ (గుండె యదాతథ స్థితికి వచ్చినప్పుడు ఉండే రక్తపోటు) గా గుర్తిస్తారు, అయితే బి.పి.ని నిర్ధారించేముందు మూడు సార్లు బి.పి. కొలతలు సరాసరి 140/90 గాని అంతకు ఎక్కువగాని ఉన్నట్లయితే మీకు హై బి.పి. ఉందని వైద్యులు నిర్ధారిస్తారు.

అస్సలు నాకు బి.పి. ఎందుకు వచ్చింది?

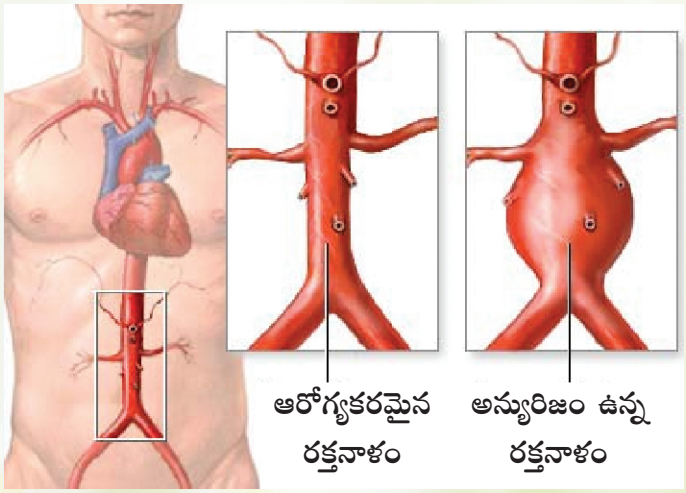
ఈ క్రింది ఇవ్వబడిన ఏ కారణం వల్లనైన హై బి.పి. రావచ్చు, ఒక్క కారణం అని కచ్చితంగా చెప్పలేం.

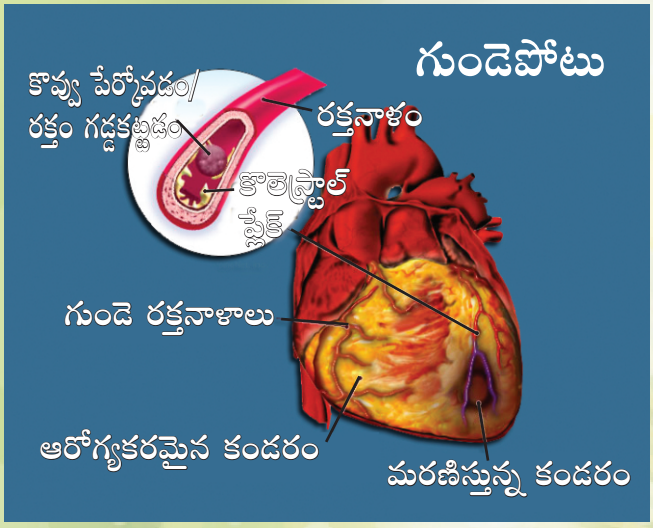
అధిక బరువు, వయస్సు, నిద్రలేమి, శరీరానికి వ్యాయామం తగ్గనప్పుడు స్థూలకాయం, షుగర్ వ్యాధి ఉండటం, విపరీతమైన దీర్ఘకాల ఒత్తిడి, ఉప్పు, పొగాకు ఉత్పత్తులు, మద్యపానం ఎక్కువ తీసికోవడం. వంశపారంపర్యమైన, జన్యుపరమైన మొదలైన ఏ కారణం వలనైన రావచ్చు.



హై బి.పి.ని నియంత్రించుకోకపోతే ఏమవుతుంది?

రక్తనాళాలు బలహీనత వలన ఉబ్బడం (అన్యురిజమ్) : కాలక్రమేణా అధిక బిపి రక్తనాళాల గోడలను పాడుచేస్తుంది. అలాంటి చోట చిన్న కణుతులు ఏర్పడతాయి. వాటినే అన్యురిజమ్స్ అంటారు. అవి చిట్లి రక్తస్రావానికి దారితీస్తాయి.





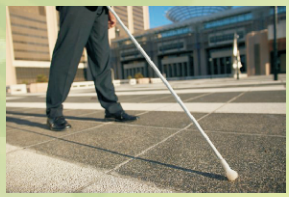
గుండెపోటు : కొవ్వు, కాల్షియం పెరిగి రక్తనాళాల గోడలో పేరుకుంటాయి. దీనినే ప్లాక్ అంటారు, దీనిద్వారా రక్త ప్రవాహం తగ్గుతుంది. రక్తప్రవాహం పూర్తిగా అగిపోయినప్పుడు గుండెపోటుకు దారితీస్తుంది. దీనినే హార్ట్ ఎటాక్ లేదా మయోకార్డియల్ ఇన్ఫార్క్షన్ అంటారు.

హార్ట్‌ఫెయిల్యూర్/గుండె వైఫల్యం : చాలా కాలంగా హై బి.పితో బాధపడే వారిలో గుండె ఎక్కువ రక్తాన్ని పంపు చెయ్యడంవల్ల క్రమంగా గుండె సైజు పెరిగిపోతుంది. దీన్నే హార్ట్ ఎన్‌లార్జ్‌మెంట్ అంటాం. ఇది అలా కొనసాగితే కొన్నాళ్లకి గుండె కండరాలు నీరసించిపోతాయి. అప్పుడు రక్తాన్ని నరాల్లోకి గట్టిగా తోసే శక్తిని గుండె కోల్పోతుంది. ఈ స్థితిలో రక్తం ఎక్కడిదక్కడ ఉండిపోతుంది. శరీరంలోని భాగాల్లో నిలిచిపోతుంది. ఇది కాలేయాన్ని, మూత్రపిండాలను ఇలా ఏ భాగాన్నైనా పనిచేయకుండా చేస్తుంది. ఈ పరిస్థితినే డాక్టర్ల బాషలో కంజెస్టివ్ కార్డియాక్ ఫెయిల్యూర్ అంటారు.

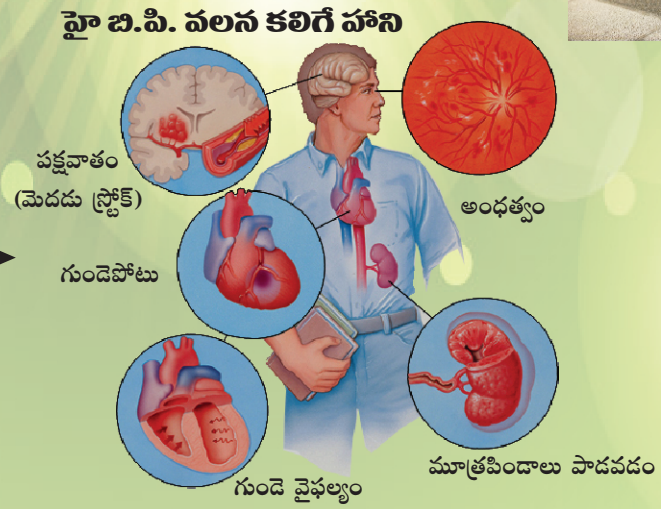
పక్షవాతం : హై బి.పి. వల్ల మెదడు లో స్ట్రోక్ వచ్చి పక్షవాతం కలిగే అవకాశాలు ఎక్కువ, పక్షవాతం వస్తే బాగవ్వడం కష్టం.

మూత్రపిండాలను పాడుచేస్తుంది : కిడ్నీలు రక్తాన్ని శుద్ధి చేసి వ్యర్ధ పదార్థాలను మూత్రం ద్వారా వదిలేస్తాయి. అధిక రక్తపోటు వలన మూత్రపిండాలకు రక్త సరఫరా చేసే రక్త నాళాలు పాడైపోతాయి. ఇలా మూత్రపిండాలు పనిచేయడం మానేస్తాయి. దీనినే కిడ్నీ ఫెయిల్యూర్ అంటారు. కిడ్నీ పనిచేయకపోతే శరీరంలో విష పదార్థాలు పేరుకు పోతాయి.

కళ్ళను పాడుచేస్తుంది : హై బి.పి. కంటిలోని రక్తనాళాలను ఇరుకుగా చేయటం వల్ల అవి చిట్లి రక్తస్రావానికి దారితీస్తుంది. ఇది దృష్టి లోపానికి, కొన్ని సార్లు చూపు కోల్పోయే ప్రమాదానికి దారితీస్తుంది.



అధిక రక్తపోటు నిశబ్ధంగా చంపుతుంది : అధిక రక్తపోటు వల్ల రక్త నాళాలు, గుండె, మెదడు, మూత్రపిండాలు మరియు కళ్ళపై హానికరమైన ప్రభావం క్రమంగా, నిదానంగా, దీర్ఘకాలంగా జరుగుతుంది. ఈ సమయంలో ఎటువంటి గుర్తులు బయటికి కనిపించకపోవడం ఈ వ్యాధి విశేషం. ఇది తెలుసుకొనే లోపే కబళిస్తుంది. అందుకే ఈ వ్యాధిని సైలెంట్ కిల్లర్ లేక నిశబ్ధంగా చంపే రోగం అంటారు.



రక్తపోటును నియంత్రించడం ఎలా ?

చెయాల్సినవి :

మందుల వాడకం :

1. వైద్యులు సూచించిన బి.పి. మందులను మరిచిపోకుండా, తప్పక వేసుకోవాలి. దినచర్యలో ఆహారం, స్నానం, నిద్ర ఎలా ఒక బాగంగా అలవాటు అయ్యాయో అదేవిధంగా మందులు క్రమంగా వేసుకోవడం దినచర్యలో ఒక భాగంగా మారిపోవాలి.
2. ఒకవేళ మందు (మాత్ర) వేసుకోడం మరిచిపోతే, గుర్తొచిన వెంటనే వేసుకోవాలి లేదా ఆ తర్వాత వేసుకోవాల్సిన సమయానికి మాత్ర వేసుకోవాలి.
3. చికిత్స మొదలు పెట్టాక జీవితాంతం మందులు వాడటానికి సిద్ధమైయుండాలి. మందులు మొదలుపెట్టిన తర్వాత వేసుకోవడం మానేస్తే బి.పి. హఠాత్తుగా పెరిగి రక్తనాళాలు చిట్లే సమస్య ఎక్కువైతుంది.

క్రమ పద్ధతిలో బి.పి. ఎంతుందో చూసుకుంటూ వుండాలి : హై బి.పి. నిశబ్ద వ్యాధి గనుక, తరుచుగా బి.పి.ని చెక్ చేసుకోవడం మంచిది.

జీవనశైలి మార్పులు :

వ్యాయామం : వ్యాయామం కండరాలపై ఒత్తిడిని తగ్గించి, రక్తనాళాలలో రక్తప్రసరణను పెంచుతుంది. దాని వలన రక్తపోటు తగ్గుతుంది. 30-45 నిముషాలు నడవటం, జాగింగ్, ఈతకొట్టడం, తోటపని చేయడం లాంటివి వారానికి 3-4 సార్లు చేస్తే బి.పి. తగ్గుతంది.

బరువు తగ్గటం : కొద్దిగా బరువు తగ్గటం కూడా బి.పి.ని తగ్గిస్తుంది.

ఆహార నియమం : ఉప్పు, కొవ్వు పదార్థాలు, పిండి పదార్థాలు తగ్గించాలి, పీచు పదార్థాలు, పండ్లు, కూరగాయలు మంచివి.

పొగాకు : పొగాకు ఉత్పత్తులు రక్తనాళాలను ఇరుకుచేస్తాయి. పొగాకు, సిగరెట్, గుట్కా లాంటివి మానేయాలి.

సరిపడే నిద్రపోవాలి : సుమారు 6-8 గంటల చక్కటి నిద్ర అవసరం

రిలాక్సేషన్ : యోగ, ధ్యానం, బయోఫీడ్ బాక్ మొదలైనవి ఒత్తిడిని తగ్గించడమే గాక రక్తప్రసరణను పెంచుతాయి.

చేయకూడనివి :

1. **ఒకరు వాడే బి.పి. మందులు ఇంకొకరు వాడకూడదు :** అయితే హై బి.పి.ని నియంత్రించే మందులు చాలా రకాలున్నాయి.
   - **దయూరెటిక్ :** ఈ మందులు మూత్రవిసర్జన పెంచి, దాని ద్వారా నీరు, ఉప్పును, రక్త పరిమాణాన్ని తగ్గించి రక్తపోటును నియంత్రిస్తాయి.
   - **బీటా బ్లాకర్స్ :** ఈ మందులు గుండెపై ఒత్తిడిని తగ్గించి రక్త సరఫరా పరిమాణాన్ని తగ్గిస్తాయి.
   - **వాసోడైలేటర్స్ :** ఇవి రక్త నాళాలు వ్యాసం పెంచి రక్త సరఫరాను పెంచుతాయి.

మీ శరీర తత్వాన్ని బట్టి, మీకు హై బి.పి. కారణాలని బట్టి డాక్టర్లు మందులు ఇస్తారు. కాబట్టి ఎవరి మందు వారిదే. ఇంకొకరి మందు వాడడం హానికరం.

ఎటువంటి ఆహారం తీసుకోవాలి ?

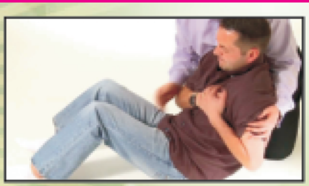
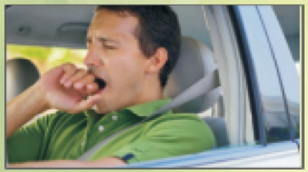
- పీచు పదార్థములు ఉన్న పండ్లు, కూరగాయలు, అలాగే రాగులు, సజ్జలు, కొర్రలు, ధాన్యపు ఆహారాలు, పప్పులు, కాయలు, కోడి మరియు చేపలు మంచివి.
- **తగ్గించాల్సినవి :** ఉప్పు, మాంసం, కొవ్వు పదార్థాలు, చక్కర, ఆహారంలో నూనె మరియు పిండి పదార్థాలు.
- ఎక్కువ మద్యం సేవించటం రక్తపోటును పెంచుతుంది.
- **ఉప్పు విషతుల్యం :** ఉప్పు నీటిని పీల్చుకోవటం వల్ల శరీరంలో నీటి శాతాన్ని పెంచి రక్తపోటును పెంచుతుంది. ఒక రోజు తినే అన్ని భోజన పదార్థాలలో ఉప్పు పరిమాణం కలిపి ఒక రోజుకు 5 గ్రాములు మించకూడదు.

మనం వాడే ఒక్క చెంచా కొలతలో 5 గ్రాములు ఉప్పు ఉంటుంది.

తగ్గించాల్సిన భోజన పదార్థాలు	
A	**B**
ఉప్పు, అజినోమోటో (టేస్టింగ్ సాల్ట్), బేకింగ్ పౌడర్, కుకింగ్ సోడా, నూనెలో వేయించిన పదార్థాలు, చిరుతిండ్లు, శీతల పానీయాలలో సోడియం బెంజోయేట్ ఉంటుంది, ఉప్పు కలిపిన చిరుతిండ్లు 	**ఉప్పు నిల్వ ఉంచిన పదార్థాలు :** పచ్చళ్ళు, ఊరగాయలు, చట్నీలు, ఎండుచేపలు, వడియాలు, సాస్, సూప్, కెచప్. **ఎక్కువ ఉప్పు ఉన్న పదార్థాలు** ఉప్పు బిస్కెట్లు, చిప్స్, చీస్, ఉప్పు కలిపిన వెన్నె, అప్పడాలు, వడియాలు. **బేకరీ పదార్థాలు** కేకులు, బ్రెడ్ లేక ఇతర బేకరీ పదార్థాలు

ఈ క్రింది హెచ్చరిక సంకేతాలు కనిపిస్తే వెంటనే వైద్యులని సంప్రదించండి.

హై బిపి హెచ్చరిక సంకేతాలు :

కళ్లు మసకబారడం		గుండె బరువుగా పట్టేసినట్టు ఉండడం, కొంచెం దూరం నడిచినా ఊపిరి అందకపోవడం	
తల తిరగడం		హటాత్తుగా వాంతులు	
విపరీతమైన నీరసం		అయోమయంగా అనిపించి ఎక్కడున్నామో కూడా తెలుసుకోలేకపోవడం	
విపరీతమైన తలనొప్పి		నిద్ర మత్తుగా అనిపించడం	

ASHER ANDREW

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APPENDIX C1

Institute Ethics Committee
University of Hyderabad

Decision Letter of Institute Ethics Committee
University of Hyderabad

IEC No Application No:	UH/IEC/2014/22	Date of review	21.4.2014
Project Title:	Impact of cognitive mediation on the management of primary hypertension		
Principal Investigator/ Co-PI:	Prof. Meena Hariharan Asher Andrew		
Participating Institutes if any	N/A	Approval from Participating Institute	N/A
Documents received and reviewed	Protocol, ICF, Questionnaire		
In case of renewal, submission of update	--		
Decision of the IEC:	Approved [√] Reject [ ] Resubmit [ ] Conditional Approval [ ] Duration of Approval: One year from date of approval		
Any other Comments Requirements for conditional Approval	Initial study would be done at UoH campus only. If number is not sufficient, other institutions would be considered with prior approval		

Please note:

a. Any amendments in the protocol must be informed to the Ethics committee and fresh approval taken.
b. Any serious adverse event must be reported to the Ethics Committee within 48 hours in writing (mentioning the protocol No. or the study ID)
c. Any advertisement placed in the newspapers, magazines must be submitted for approval.
d. The results of the study should be presented in any of the academic forums of the hospital annually.
e. If the conduct of the study is to be continued beyond the approved period, an application for the same must be forwarded to the Ethics Committee.
f. It is hereby confirmed that neither you nor any of the members of the study team participated in the decision making/voting procedures.

Chairperson

(Justice Rangarajan)

Member Secretary

(Prof. Geeta K. Vemuganti)

Address: School of Medical Sciences, University of Hyderabad, C.R. Rao Road, Gachibowli, Hyderabad – 500 046.
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APPENDIX C2

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APPENDIX C3

PATIENT INFORMATION SHEET

Project title: **Form and Frequency of Cognitive Intervention: Impact on Adherence and Management of Primary Hypertension**

We warmly invite you to participate in this research study for a period of three months. Your participation is completely voluntary. The study is being undertaken to fulfill the requirements of PhD by Asher Andrew under the guidance of Prof. Meena Hariharan. In order to decide whether to participate or not please go through the following information that explains the details of the study. Anything regarding the study or your participation, you are welcome to clarify with the researcher.

1. **What is the purpose of the study?**

   The study aims to find out the way complete knowledge about hypertension can help in managing the disease better.

2. **Why are you requested to participate?**

   You are requested to participate because you have high blood pressure. Your age has also been considered to determine your suitability to participate in this study.

3. **How to participate in the study?**

   You can participate in the study only after you give your consent to participate. Then you will be assigned to one of the five groups in the study that are described below, by the method of random selection. Therefore the chance of being included in any of the five groups is 20%. Random selection helps to reduce bias in research findings. Your participation will not affect your medical treatment in any way.

   In case you are included in Group 1**,** you will be exposed to a 'Cognitive Intervention' which includes an orientation session by a medical professional. The

   sessions will provide you clear explanation of what hypertension is, the risks involved the deviation from normal physiological process, how medicines help, the potential damages of irregular medication, and the alarm signals that warrant

immediate medical consultation etc. The explanation will be with the help of audio visual aids. Explanation by the doctor is followed by free interaction between the doctor and the patient where you are free to ask questions and get all your doubts clarified by the doctor. For this, you are needed to be present at the Centre for 7 days in the span of two months,

In addition a booklet which consists of all the do's and don'ts for a patient with hypertension shall be provided for your ready reference at any point. You will not have to pay any money for the booklet nor for the above intervention.

The content explained above remained the same for all the four intervention groups. However in '**Intervention group** 2', the exposure to intervention is repeated the second time. For the entire process, you are needed to be present at the Centre for 8 days in the span of two months. In case you are included in '**Intervention Group 3',** the video recorded version of the above intervention module is presented once. There will not be physical presence of the doctor. For this, you are needed to be present at the Centre for 7 days in the span of two months. If you are included in '**Intervention Group 4',** the video recorded version of the above intervention module is presented twice. For this, you are needed to be present at the Centre for 8 days in the span of two months.

In addition a booklet which consists of all the do's and don'ts for a patient with hypertension shall be provided for your ready reference at any point. You will not have to pay any money for the booklet nor for the above intervention.

Group 5 is called as a '**Control group'.** In case you are assigned to this group, you will only receive medical treatment like any other patient who is not participating in the study. Both the groups will continue with the standard treatment as per your doctor's advice. However you are requested to be present at the Centre for 6 days in the span of two months. Irrespective of the group you are assigned to, we will request you to answer few questions by responding to the questionnaires.

4. **What are the questionnaires I have to respond to?**

You will be given five questionnaires. The items in the questionnaire relate to, your knowledge about hypertension, the extent to which you comply with medical prescription, your level of anxiety and depression, hypertension related self-efficacy and extent of perceived social support you receive.

5. **When do I have to respond to questionnaires?**

   You will be requested to fill questionnaires once you consent to join the study and the second time at the time of termination.

6. **Are there any benefits or risks attached to my participation?**

   There are **no direct benefits or payments** for your participation. Nevertheless, if you are assigned to group 1, there is a possibility of increasing your adherence behavior which will help you to effectively manage your hypertension thereby to reduce your complications of unmanaged hypertension

7. **Will my taking part in the study be kept confidential?**

   Information collected from you during the course of this study will be known only to the research team. The information will have your name and address removed, and would be identified by an identity number so that your details remain confidential. All personal details will be confidential within legal limits.

8. **Can I discontinue from the study?**

   You can discontinue your participation from the study at any point of time without citing any reason.

9. **How will the results of the research study be used?**

   The results obtained through analysis based on the data collected from you and other participants will form a part of the research at the Centre for Health Psychology, University of Hyderabad, and may be published later in a scientific journal where your identity will not be revealed.

If you have any queries or doubts or for any further information related to this study, feel free to contact the researcher Mr. Asher Andrew on this phone number 9848814259 or email address ashi.andrew@gmail.com. **Immense thanks for your valuable time in reading this pamphlet. If you are willing to participate, kindly sign the *Consent form* given on the following page.**

APPENDIX C4

సమాచార పత్రం

ప్రాజెక్టు : అధిక రక్తపోటు చికిత్సాపాటింపు మరియు నియంత్రణ సమాచార మాధ్యమము యొక్క ప్రభావం

రెండు నెలలుగా సాగే ఈ పరిశోధనలో పాల్గొనడానికి మిమల్ని ఆహ్వానిస్తునాము. ఈ పరిశోధన ప్రొఫెసర్ మీనా హరిహరన్ గారి మార్గదర్శకత్వంలో అషేర్ ఆంధ్రూ పి .హెచ్ .డి పట్టా కోసం చేయబడుతున్నది. మీరు ఇందులో స్వచంధంగా పాల్గొనవలసి ఉంటుంది. ఈ పరిశోధనలో పల్గోనాలో వద్దో నిర్ణయించుకోవడానికి ముందుగా ఈ పరిశోధన ఉద్దేశం ఏంటో, అందులో ఏమి ఉంటుందో , ఎందుకోసం చేయబడుతున్నదో ఈ క్రింది సమాచారం జాగ్రత్తగా చదవడం ద్వార తెలుసుకోవచ్చు. ఈ పరిశోధన గురించి కాని అందులో మీ పాత్ర గురించి కాని ఇంకేమైనా సందేహాలుంటే మీరు పరిచోధకుని అడిగి తెలుసుకొనవచ్చు.

1. **ఈ పరిశోధన ఉద్దేశం ఏంటి?**

   అధికరక్త పోటు ఉన్న వారికి, రోగము గురించిన సంపూర్ణ మానసిక సమాచారము తెలుసుకోవడం వలన, అధిక రక్తపోటు నియంత్రణపై ఎంత ప్రభావం ఉంటుందో తెలుసుకోవడం ఈ పరిశోధన లక్ష్యం.

2. **నన్ను పాల్గొనమని ఎందుకు అడుగుతున్నారు ?**

   మీ వయస్సు, అధిక రక్త పోటు ఉన్నందువలన మిమల్ని ఈ పరిశోధనలో పాల్గొనేందుకు అర్హులనుగా భావించి పాల్గొనమని అడుగుచున్నాము.

3. **ఈ పరిశోధనలో ఎలా పాల్గొనవచ్చు?**

   మీరు పాల్గొనేందుకు పూర్తిగా స్వచంధంగా నిర్ణయం తేసుకోవలెను. ఈ పరిశోధనలో ఐదు గ్రుపులుంటాయి. వీటిలో ఎదో ఒక దానిలో యాద్రుచిక ఎంపిక ద్వార కేటాయించబడుతారు. అంటే ఎ ఒక్క గ్రూపులో కేటాయించబడటానికి అవకాశం 1/5గా ఉంటుంది. ఇలా చేయటం ద్వార పరిశోధనలో ఎటువంటి పక్షపాతం జరగకుండా కాపాడుతుంది. ఇందులో పలుపంపులు మీ చికిత్స క్రమముపై ఎటువంటి ప్రభావం చుపించదు.

   ఒకవేళ గ్రూప్ 1 లో ఎంపికైతే , 'ఆరోగ్య సమాచారము' అనే తరగతులలో ఒక వైద్య నిపుణుడు అధిక రక్తపోటు గుర్చిన సంపూర్ణ సమాచారమును అర్థమయ్యే రీతిలో భోధిస్తారు. ఈ బోధనలో రక్తపోటు

ఎందుకు వచ్చింది? రక్తప్రసరణలో మార్పులు ఎలా జర్గుతాయి, వీటిని ఎలా న్నియంత్రించాలి , మందులు ఎలా వాడుకోవాలి, వాడకపోవడం వలన శరీరము పై వచ్చే దుష్ప్రభావాలు. అత్యవసర అనారోగ్య పరిస్థితిని ఎలా ఎదుర్కోవాలి అనే సమాచారమును అర్థమయ్యే సరళ రీతిలో వీడియో మరియు దృశ్య రూపములలో బోధిస్తారు. ఆ తర్వాత మీ సందేహములు మరియు ప్రశ్నలను డాక్టర్ గారిని అడుగవచు. దీనికొరకు, రెండు నెలల వ్యవధిలో 7రోజులు రావలసివస్తుంది. ధీనితోపాటు అధిక రక్తపోటు నియంత్రణలో ఏది చేయకూడదో మరియు ఏది ఎలా చేయాలో సూచించే సమాచారము ముద్రించబడిన పుస్తకము ఉచితంగా ఇవబడును. ఈ పైనవాటి కోరకు మీరు ఏమి డబ్బు కట్టనవసరము లేదు.

పైన సూచించిన సమచారమునే 4 గ్రూపులకు ఇవ్వబడును. కాని ఇచ్చే విధానములో మార్పులు ఉంటాయి. రెండో గ్రూపులో ఎంపికైన చొ పైవిధమైన సమాచారమును రెండుసార్లు ఇవ్వబడును. దీనికొరకు, రెండు నెలల వ్యవధిలో 8రోజులు రావలసివస్తుంది. మూడో గ్రూపులో ఎంపికైన చొ పైవిధమైన సమాచారమును రికార్డు చేసి వీడియో ద్వార ఇవ్వబడును. దీనికొరకు, రెండు నెలల వ్యవధిలో 8రోజులు రావలసివస్తుంది .భౌతికముగా వైధుడు ఈ గ్రూప్ లో ఉండదు. దీనికొరకు, రెండు నెలల వ్యవధిలో 7 రోజులు రావలసివస్తుంది. ఒకవేళ నాల్గవ గ్రూపులో ఎంపిక చేయబడితే పైపధతిలోనే రెండుసార్లు భోదించడం జరుగుతుంది.

ఒకవేళ ఐదో గ్రూపులో (నియంత్రిత గ్రూప్) ఎంపికైతే, పరిశోధనలో లేనివారిలాగ యధావిధి రోగ నియంత్రణలో కొనసాగవచ్చు కాని , రెండు నెలల వ్యవధిలో 6 రోజులు రావలసివస్తుంది. ఏ గ్రూపులో ఉన్నప్పటికీ , మీ శారీరక, మానసిక, సామాజిక కొలతలకు సంభందించిన అనేక అంశాలను గ్రహించడానికి మేము మిమ్మల్ని కొన్ని ప్రశ్నవలులను నింపమని కోరుతాము.

4. ఎటువంటి ప్రశ్నావలు ఇవ్వబడును? ఎప్పుడు నింపాలి?

క్రింద వివరింపబడిన విధముగా ఐదు పశ్నావలులు ఇవ్వబడును. రక్తపోటు గుర్చిన అవగాహన, రోగ నియంత్రణలో అనగా మందులు, వ్యాయమం, ఆహారం, స్వీయ పర్యవేక్షణలో కట్టుబడియుండుట, మనసికస్తితి, రోగానియంత్రణలో మీమీద మీకున్న నమ్మకం, మీ అప్తులనుండి మీరు పొందుతున్న ఆసరా, వంటివి నిర్ణయించే ఐదు ప్రశ్నవలులను తరగతులకు ముందు మరియు తర్వాత అనగా రెండు సార్లు ఇవ్వబడును.

5. నేను పాల్గొనడం వలన లాభాలు కానీ నష్టాలు కాని ఉంటాయి ?

మీరు పాల్గొనడం వలన ప్రత్యక్షంగా లాభాలు కాని డబ్బు కాని లబ్యం కావు. కాని మొదటి నలుగు గ్రూపులలో ఎంపికైతే రక్తపోటు నియంత్రణ అవగాహన పొందే అవకాశం ఉంది. ఒకవేళ ఐదవ గ్రూపులో భాగంగా ఎంపికైతే, మీ పాత్ర భవిష్యత్తులో రక్తపోటు నియంత్రణ విధానాలకు మరింత మెరుగైన వైద్యసేవా విధానాలకు దారి తీసేందుకు సహాయపడవచ్చును.

ఈ పరిశోధన వలన ఎటువంటి ఇబ్బందులు ఎదురుకావు . ఈ పరిశోదనలో ఒక వేళా ఎదో ఒక సమయంలో మీకు ఆందోళన అనిపించినా మీరు స్వేచ్చగా ఈ పరిశోధన నుండి వైదోలగవచ్చు.

6. నేను ఈ పరిశోధనలో పాల్గొంటున్న విషయం గోప్యంగా ఉంచబడుతుందా?

   ఈ పరిశోధనలో భాగంగా మీనుండి సేకరించే సమాచారం కేవలం ఈ పరిశోధన బృందానికి మాత్రమె తెలుస్తుంది. సమాచారంలో మీ పేరు , చిరునామా తొలగించి మీకొక గుర్తింపు సంఖ్య ఇవ్వటం వలన మీ వివరాలు గోప్యంగా ఉంటుంది. అన్ని వ్యక్తిగత వివరాలు చట్టబద్ధమైన పరిధుల్లో గోప్యంగా ఉంచబడుతుంది

7. ఈ పరిశోధన ఫలితాలను ఎలా వాడతారు ?

   ఈ పరిశోధనలో మీ అందరి నుండి సేకరించే వివరాలు విశ్లేషిస్తే వచ్చే ఫలితాలు , సెంటర్ ఫర్ హెల్త్ సైకాలజీ, హైదరాబాద్ విశ్వవిద్యాలయం పరిశోధనలో భాగమౌతాయి. అటు తర్వాత వైజ్ఞానిక పత్రికల్లో ప్రచురితం కావచ్చు. మీ కోరిక మేరకు మీకు సంభందించిన ఫలితాలు మీకు లభ్యమౌతాయి.

   ఈ పరిశోధనకి సంభందించిన ఏ ఇతర సమాచారమైన ఈ ఫోన్ నంబర్ (9848814259) లేదా ఈ మెయిల్ చిరునామా (ashi.andrew@gmail.com) ద్వార పొందవచ్చు.

ఈ సమాచారమును చదవడానికి మీ సమయాన్ని కేటాయించినందుకు ధన్యవాదాలు. మీరు ఈ పరిశోధనలో పాల్గొనేందుకు అంగీకరిస్తే దయతో దీనితో జతపరచిన రోగ సమ్మతి పత్రం పై సంతకం చేయండి.

APPENDIX C5

PATIENT CONSENT FORM

Project title: **Form and Frequency of Cognitive Intervention: Impact on Adherence and Management of Primary Hypertension**

1. I confirm that I have read and understood the patient information sheet for the said study, and that I have had the opportunity to clarify doubts.
2. I understand that my participation is voluntary, and I am free to withdraw at any time without giving any reason
3. I am willing to be randomly assigned to any of the four intervention groups or control group while being aware that such assignment is determined by the method of random selection, and not by me or the research team
4. I understand that the data concerning me collected during this study may form the part of future publications by protecting my identity.
5. I agree to take part in the said study by answering the required questionnaires and partaking in the activities if I am assigned to any of the four Intervention groups.

_____ _____

_____

Name of the patient Signature

Date

Phone number _____ Residence: _____

Address: _____ Email:_____

_____

_____

_____

APPENDIX C5 (Telugu)

రోగ సమ్మతి పత్రం

ప్రాజెక్టు : అధిక రక్తపోటు చికిత్సాపాటింపు మరియు నియంత్రణ సమాచార మాధ్యమము యొక్క ప్రభావం

1. ఈ పరిశోధనకి సంభందించిన రోగికి ఇవ్వబడే సమాచార పత్రం నేను చదివి అర్థం చేసుకున్నానని , నాకు సందేహాలు తీర్చుకోవడానికి అవకాశం లభించిందని నేను నిర్దారిస్తున్నాను
2. నేను స్వచంధంగా పాల్గొంటున్నాను, పరిశోధనలో ఎప్పుడైనా విడిచి వెళ్ళే స్వేచ్చ ఉందని అర్థం చేసుకున్నాను.
3. నేను మొదటి నలుగు గ్రూపుల్లో గాని లేదా ఐదవ నియంత్రణ గ్రూపు లో కాని యాదృచ్చిక ఎంపిక ద్వారా కేటాయింపబడటానికి సిద్ధంగా ఉన్నాను. ఇది యాదృచ్చిక కేటాయింపు పద్ధతి మాత్రమే నిర్ణయింపబడుతుంది కాని నా చేత కాని, పరిశోధన బృందం చేత కాని కాదు అనే విషయం నా అవగాహనలో ఉన్నది.
4. ఈ పరిశోధనలో భాగంగా నా గురించి సేకరించిన సమాచారం (వ్యక్తిగత వివరాలు, ప్రశ్నావళుల సమాధానాలు) భవిష్యత్తులో ప్రచురణలో భాగం కావచ్చని, అటువంటి సమాచారం నా పేరుతో కాక అనామక విధానం లో ఉంటుందని అర్థం చేసుకున్నాను.
5. అడిగిన ప్రశ్నలకు జవాబు తెలుపుతూ, ఎ గ్రూపులో కేటాయించబడిన, తగిన సూచనలు పాటిస్తానని ,ఇట్లు నా అంగీకారం తెలుపుచున్నాను.

_____ _____ _____

రోగి పేరు సంతకం తేది

ఫోన్ నెం మొబైల్: _____ ఇంటి నెంబర్: _____

విలాసము :_____

ఈ-మెయిల్:_____

_____

_____

APPENDIX D
(Publications)

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Research Article

Hypertension Knowledge Test: Development and Validation

Asher Andrew[1], Meena Hariharan[2]*

ABSTRACT

This paper discusses the process of development and validation of Hypertension Knowledge Test on a total sample of 614 hypertensive patients recruited in three stages. Standard procedure of test development was followed. The final form of the test consisted of 22 items hierarchically arranged following the criteria of item difficulty and item discrimination. The test measures four dimensions of knowledge viz. General awareness, Lifestyle, Causes, Care, Casualty awareness and Management of medication. The test–retest reliability was 0.92 ($p<.001$).The construct validity measured by correlating hypertension knowledge scores with Blood Pressure readings was highly significant ($p<0.01$).

Keywords: *Hypertension Knowledge Test, HKT, Knowledge of Hypertension, Test Development, Test Validation, Illness Cognition.*

In the recent times, there is a mercurial rise in the incidence of hypertension. World Health Organization estimates that one in three adults aged 25 or above or about one million people are affected by hypertension (World Health Organization, 2013). The alarming proportion of 29.8% prevalence of hypertension in India (Anchala et al., 2014) is a signal to the health sector to plan interventions aimed at prevention and management involving all age groups with the future generations in view. This has to be the top priority in view of the fact that uncontrolled hypertension leading to cardiac emergencies and sometimes leading to cardiac deaths are avoidable with simple appropriate steps related to health literacy. Globally, hypertension levied a considerable economic burden of 10 percent of expenditure on health care (Gaziano, Bitton, Anand, Weinstein, 2009) which underlines the serious implications for developing countries with constrained economic resources. As such, Health economy figures India indicate a greater burden of annual income losses incurred due to cardiovascular diseases and hypertension translating to more than one third of all income losses (Mahal, Karan, & Engelgau, 2010). In addition to economic losses, Hypertension also impacts the productivity of an individual. A Global Burden of Disease Study conducted by Limet al.(2013) reports hypertension contributing to 7 % Disability Adjusted Life Years (DALYs) across the world .

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In this background, regulating the blood pressure and managing it appropriately is the need of the hour. Management of hypertension involves minimizing risk behaviours and optimizing health promoting behaviours. Any voluntary behavioural change in adult is desirable in view of probability of sustenance. Voluntary change in health risk and health promoting behaviour calls for a strong conviction. The conviction gains its origin and strength from a robust cognitive base.

Cognitive base is created through appropriate knowledge inculcation. Learned resourcefulness model (Rosenbaum, 1990) theoretically proposed that cognitions impact the self-control of health behaviour of a patient thereby the blood pressure control. Many intervention studies supported that with the increase in patients' knowledge, the hypertension control also increased (Wang et al., 2003;Panditet al., 2009; Xuet al., 2014). However, the research evidence on this essential knowledge level in patients rings an alarm for public health sector. It was found that patients did not understand the importance of the therapies in the management of their disease conditions (Ponnusankar, Surulivelrajan, Anandamoorthy, & Suresh, 2004); importance of regular clinic visits (Lawson, Lyne, Harvey, & Bundy, 2005), felt that medications need to be taken only when the symptoms are severe (Bender and Bender, 2005). Their knowledge about the disease, its management and the consequences of poor adherence were found to be very poor (Alm-Roijer et al, 2004); knowledge about the consequences of uncontrolled hypertension was also found to be poor (Wexler, Elton, Taylor, Pleister, & Feldman , 2009). Past research has reportedly emphasised the significance of patient education for effective chronic care management (Bodenheimer, Wagner, & Brumbach, 2002; Coleman, Austin, Brach & Wagner, 2009). It is desirable that patient education programmes are so planned to build upon the existing knowledge and address the misconceptions that requires unlearning before being substituted with right knowledge.

In order to measure the efficacy of the patient education programs, several studies have adapted the pre-existing tools to meet their study objectives, however these adapted tools could not be used across other studies (Sanne, Muntner, Kawasaki, Hyre, &DeSalvo, 2008); some others tools were specific to measuring particular domain of hypertensive knowledge such as knowledge about risk factors alone (Shaikh et al., 2011) and knowledge about hypertensive complications (Ghembaza, Senoussaoui, Kendouci Tani, & Meguenni, 2014), knowledge about medication alone (Ponnusankar et al., 2004). Few other tests lacked uniform response (Han et al., 2011; Schapiraet al., 2012).

Therefore, development and standardization of instruments to measure knowledge of hypertension are the need of the hour. The procedure of standardization should adhere to the standard procedures involving steps such as item writing, item analysis, reliability, validity testing (Baliz-Erkoc, Isikli, Metintas, & Kalyoncu, 2012), factor analysis where appropriate (Hariharan, Chivukula, & Rana, 2015; Hariharan, Thomas, & Rana, 2015) or base on item response theory (Han et al., 2011).

To our knowledge, several studies have used instruments that assessed the individual's knowledge about hypertension. However, psychometric properties were not established for majority of them. (Kusuma, Gupta, & Pandav, 2009; Ponnusankar et al., 2004; Ramachandran, Wu, Kowitlawakul, & Wang, 2016;Sanne et al., 2008; Viera, Cohen, Mitchell, & Sloane, 2008; Williams, Baker, Parker, & Nurss, 1998) and tested on samples as small as 90 (Kusuma et al., 2009). Out of twelve studies reviewed, only four studies (Baliz-Erkoc et al., 2012;Han et al., 2011; Peters, & Templin, 2008;Williams et al., 1998) reported the internal consistency reliability i.e. coefficient alpha ranging from .70 to .90 and four studies (Baliz-Erkoc et al., 2012;Han et al., 2011; Peters ,& Templin, 2008; Schapira et al., 2012) reported the validity of the instruments.

In this paper, we report the development and validation of the test named as Hypertension Knowledge Test (HKT).

Development and validation of the Hypertension Knowledge Test

The entire process of developing and validating the test is described under four phases viz. Phase I—Item writing and content validation, phase II —Item analysis, Phase III—Reliability testing, Phase IV—Validity testing.

PHASE I-ITEM WRITING AND CONTENT VALIDATION

In order to identify the essential aspects a hypertensive patient needs to know related to his/her condition, a thorough review of literature was carried out. Articles related to causes, consequences of uncontrolled hypertension, management of hypertension, lifestyle modification, medications and symptoms of hypertension were reviewed. In addition to research articles, the Joint National Committee's panel (JNC-8) guidelines for management of Hypertension in adults (James *et al*., 2014), patient education reports on high blood pressure by the University of Maryland Medical Center (2017), and American Heart Association's online test (test your blood pressure IQ, 2017) were critically reviewed. Apart from literature review and other documents, discussions were held with General Physicians and Cardiologists on the essential, desirable and value added knowledge domain for the patients diagnosed with primary hypertension. Based on the above, items were written down in the form of statements/question along with multiple choice answers. A total of 30 statements related to the cause, symptoms, management, lifestyle and repercussions of neglecting hypertension were written for the new test in English and also translated to the local language and followed by expert panel back translation.

Content validation

In order to identify and retain the essential items and discard those which are not relevant, a list was prepared which consisted of 30 items that were written in a proforma having two columns namely essential and non-essential against each item. This list was given to a panel of five experts (two Health Psychologists and three Medical Doctors). The experts were asked to mark each item as 'essential' or 'non-essential'. The items that were marked as

essential by all the experts were retained. Based on this criterion, 24 out of 30 items were retained.

PHASE II-ITEM ANALYSIS

Item analysis was carried out in order to evaluate the item characteristics of each item of the Hypertension Knowledge Test. Two types of item analysis such as item difficulty index and item discrimination value were calculated on the obtained data. The objective of assessing difficulty index for each item was to arrange them accordingly in the increasing order of the difficulty and also to drop the items that are extremely easy or extremely difficult. In addition, Item discrimination index, which is a basic measure of the validity of an item, was calculated in order to measure the ability of each item to discriminate between those who scored high on the total test score and those who scored low. This index showed the extent to which overall knowledge of the hypertension is related to the response of an item and also to ascertain whether the test taker got an item correct due to their level of knowledge of hypertension and not due to chance or test bias.

METHOD

Participants

A total of 150 hypertension patients were included at this stage following convenience sampling. The inclusion criteria were patients having the diagnosed condition of primary hypertension for at least one year prior to the study and able to read English or the local language. In the sample, 60 % of the participants were men and 40 % were women. They included school dropout (32.5 %),high school education (32.5 %), and graduation and above (34.4%). The age range was 30-65 years (M =52.17, SD=8.54). The mean duration of illness was 6.42 years (SD=5.63).

Procedure

The study procedure was approved by the institutional ethics committee of the University of Hyderabad (Approval number UH/IEC/2014/22).The patients were selected from the health Centre of a church from the state of Telangana when they visited for monthly consultation. Patients were approached and those who have given informed consent were recruited for the study. The newly developed Hypertension Knowledge Test-1 consisting of 24 items was administered individually when the participant was seated in the waiting lounge of the health Centre. The assessments took 20 to 25 minutes.

RESULTS

The obtained quantitative data were analyzed by using IBM SPSS Statistics 20 for item analysis. Two methods were used for item analysis—(i) item-difficulty value (p), and (ii) item-discrimination value (d). These values were taken as criteria to identify relevant items for the test.

Item-difficulty value: The formula to calculate the item-difficulty value(Crocker and Algina 1986) is: $p=N_p/N$; where N_p indicated the number of test takers in the total group who answered the item correctly and N denoted the total number of test takers in the group. On the

basis of the formula the item-difficulty value (*p*) was calculated for each item of the test and is presented in Table 1.

Table 1 Item-difficulty value (p), and item-discrimination value (d) of the 24 items

SN	DIMENSIONS & QUESTIONS	DIFFICULTY INDEX (*p*)	DESCRIMINATION INDEX (*d*)
I	**General awareness:**		
	1. Hypertension is called as silent killer because	0.27	0.12
	2. Once someone has high blood pressure, it usually lasts for	0.77	0.32
	3. The fact about High blood pressure is	0.62	0.61
	4. All are true statements about Hypertension except	0.38	0.29
	5. Hypertension is blood pressure recording more than	0.50	0.12
	6. High B.P is called Primary hypertension when	0.47	0.17
	7. If someone's blood pressure is 120/80, it is	0.88	0.17
II	**LIFESTYLE**		
	8. Risk of hypertension can be reduced by	0.60	0.54
	9. life style modifications for treating Hypertension include	0.44	0.63
	10. Dietary changes that are useful to control hypertension	0.81	0.34
	11. For patients with high B.P, reducing salt intake.	0.77	0.39
	12. Which of the following statement is wrong?	0.44	0.49
III	**CAUSES,CARE,CASUALITY AWARENESS:**		
	13. Hypertension is caused because of	0.64	0.39
	14. Damage caused by high blood pressure to body	0.37	0.34
	15. What happens when B.P shoots up very high crossing its limits	0.77	0.37
	16. Doctor needs to be informed about the medicines that a B.P patient is using when	0.73	0.37
	17. Warning signal during a heart attack	0.55	0.73
	18. In a patient of Hypertension, If suddenly one side of face starts drooping, speech becomes difficult, arm becomes weak then its possibly	0.58	0.46
IV	**MANAGEMENT: MEDICATION**		
	19. People with high blood pressure should take their medicine	0.77	0.54

SN	DIMENSIONS & QUESTIONS	DIFFICULTY INDEX (*p*)	DESCRIMINATION INDEX (*d*)
	20. Commonly used drugs to treat hypertension	0.56	0.49
	21. Medicines for hypertension	0.59	0.59
	22. Which one of the following is wrong	0.55	0.54
	23. Which of the following is correct?	0.53	0.32
	24. What should be done if a person misses a dose of medication?	0.55	0.59

Note: *p* denotes difficulty index and *d* denotes discrimination index

None of the items were deleted based on item-difficulty value (*p*) as all the items were well in the cut-off range of .10 to .90. Therefore all the items were remained.

Item-discrimination value *:*Item discrimination value (*d*) was calculated for each item by identifying 27% top scorers and 27% bottom scorers (Kelley 1939). The formula to calculate the item-discrimination value was: $d = U_p - L_p / U$; where U_p and L_p indicates the number of respondents in the upper and lower groups who pass the item and U is the total number of respondents in the upper group. Using the formula, the discrimination values were calculated for all the items of the test, and are presented in Table 1. Based on the cut-off range according to Ebel and Frisbie (1986), items with discrimination value below .19 are considered as 'poor' items needing revision. Accordingly item numbers 1 (*d*=0.12), item number 6 (*d*= 0.17) were dropped. Although the item number 7 had a low discrimination value (*d*=0.17) was retained because of its theoretical importance. Thus after dropping two items, the final form of Hypertension Knowledge Test had 22 items.

Description of Hypertension Knowledge Test: The newly developed test after item analysis consisted of 22 items written in statement format and each given a set of five options of which only one option was a correct. The correct response was given a score of 1 and the wrong responses and the responses of 'do not know' were given zero score. The 22 items were distributed under the following four domains on the agreement of the expert panel of two medical doctors and a Health Psychologist. The domains consisted of knowledge related to General awareness of hypertension (five items), lifestyle factors in hypertension care (five items), Causes, Care and Casualty awareness (six items), medication management (6 items). With this, the development of the test is completed. In order to establish the psychometric properties of the test, the phases of reliability and validity testing were followed.

PHASE III-RELIABILITY

In this phase, we planned to examine the reliability coefficient of the hypertension knowledge test by testing on a fresh sample of 130 hypertensive patients. The stability of the instrument over time was tested by the test-retest reliability method.

METHOD

Participants

The inclusion criteria were same as in phase II with an additional criterion of patient's consent of willingness to attend the health Centre twice with a gap of 50 days period. After attrition, 117 out of 130 (90%) patients attended the retesting session. This sample of 117 comprised of men (51.3%) and women(48.7 %). The sample had school dropout (12%), high school education (48.7 %) and Graduation or above (39.3%). The age range was 30-65 years (*M* =51.50, *SD*=8.70). The mean duration of illness was 6.11 years (*SD*=5.16).

Procedure

Administrative permission and informed consent were obtained from the health center of the church. The patients enrolled in the health Centre were contacted. Those who were willing to sign the informed consent and are willing to attend the health center twice with a gap of 50 days were recruited for the study. The participants were administered the 22 item Hypertension Knowledge Test on the first visit in group setting. After a gap of fifty days of initial administration, the same scale was re administered to the same group to ensure the test-retest reliability. Pearson's product moment correlation coefficient was used to measure the level of agreement between responses at test and re-test.

RESULTS

Pearson's product moment correlation coefficient was used to measure the level of agreement between responses at test and re-test. A high positive correlations were observed between the total scores ($r = 0.87$, $P < 0.001$). Similarly high positive correlations were also observed between test retest scores among each dimension of General Awareness ($r= 0.91$, $P < 0.001$), lifestyle ($r= 0.68$, $P < 0.001$), Causes, care, casualty awareness ($r= 0.90$, $P < 0.001$), and Medication management (=.75, P<.001).These values establish high reliability of the test.

PHASE IV-VALIDITY

We intended to establish criterion validity, where Hypertension Knowledge Test scores would be expected to match the scores of existing tools. Nonetheless, we could not trace a multidimensional similar test having uniform response pattern in literature. As an alternative, the construct such as blood pressure control that tends to have negative relationship with the construct of knowledge of hypertension (see Introduction) was considered for validity testing. Therefore, we explored the construct validity with the blood pressure readings assuming that high knowledge levels negatively correlating with the B.P readings indicate the validity of the test as has been used in the past research (Han et al., 2011; Panditet al., 2009;Wang et al., 2003; Xuet al., 2014)

METHOD

Participants

A fresh sample of 347 patients with hypertension was recruited following a convenience sampling. The participants were recruited for the study following the same inclusion criteria described in phase II. The participants were administered the 22 item Hypertensive

Knowledge Test. The blood pressure readings of the participants were measured by the physician at the church health Centre. The sample consisted of men (53.3 %) and women (46.7 %). The sample had school dropout (17.6%), high school education (47 %) and Graduation and above (35.4%). The age range was 30-65 years (*M* =52.20, *SD*=8.69). The mean duration of illness was 5.61 years (*SD*=5.16).

Procedure

The standard administrative and ethical procedures were followed in recruiting patients. The participants' blood pressure was checked and recorded at the Church Health Centreby the mercury sphygmomanometer by the physician by following standard procedures where the patient was asked to be comfortably seated for 30 minutes. BP was recorded by averaging the three B.P readings taken in succession with the gap of 10 minutes each. Thereafter the hypertension Knowledge test was administered. The assessments took 60 to 70 minutes for each participant.

RESULTS

Construct validity for the Hypertension Knowledge Test was assessed by testing the relationship between Hypertension knowledge and B.P control. The scores on the Hypertension Knowledge Test were correlated with Systolic Blood Pressure and Diastolic Blood Pressure values. A statistically significant inverse relationship was obtained between Hypertension knowledge and Systolic Blood Pressure (r= -.30, p=0.001), as well as Hypertension knowledge and Diastolic Blood Pressure (r= -.28, p=0.001).Further, the sample was divided into two groups based on the Joint National Committee's (JNC-8) guidelines for diagnosis of Hypertension in adults (James et al., 2014). The participants with blood pressure lesser than 140/90 mm/hg were grouped under 'controlled B.P' and the participants whose blood pressure reading was equal to or higher than 140/90 mm/hg were grouped under 'uncontrolled B.P'. An independent-samples t-test was conducted to compare the groups with controlled B.P and uncontrolled B.P on the Hypertension knowledge score. As hypothesized, those with controlled BP (*M*=13.76, *SD*=3.41) had significantly higher levels of Hypertension knowledge scores than those with uncontrolled B.P. (*M*=11.98, *SD*=4.14); *t* (345)= 4.28, *p*< 0.01. The construct validity of Hypertension Knowledge Test can be inferred from the above results.

DISCUSSION

A 22 item test for the assessment of a patient's level of knowledge has thus been developed and standardized to be used for hypertensive, pre-hypertensive and normotensive patients. The standardization is done both in English and local language. The test is developed as a screening tool to design and plan any educational interventions to improve the knowledge of the patients thereby enabling the patients to be active participant in the chronic disease management of the hypertension. The four domains of the test measures the knowledge specific to each area of the management of hypertension such as knowledge pertaining to the general awareness of the disease condition, the knowledge related to the lifestyle factors influencing hypertension and its management, the dietary regimen and exercise regulation,

the causes, care and casualty awareness of the hypertension, the medication management are covered in detail thereby the comprehensive knowledge required to empower patients' active participation in disease management can be assessed by the test. The scores in each dimension can throw light on the multidimensional knowledge related to hypertension care. Low scores in the dimension of knowledge related to lifestyle factors can help the Health Psychologists to educate the hypertensive patients by providing lifestyle modification interventions which have a profound impact on the management of primary hypertension (Elmeret al., 2006), which has also been recommended by 'the National Institute for Health and Clinical Excellence's (NICE) guidelines for hypertension management (Krauseet al., 2011).

Implications of the study

Hypertension knowledge test can be used effectively for clinical and research purposes. The tool is a comprehensive yet, short and user friendly form where the patient does not get fatigue in answering 22 questions with multiple choice answers. In countries where the doctor patient ratio is abysmally disproportionate, as in India where it is 1:1800 (Deo, 2013), the tool can aid in screening the patients scoring low on hypertension knowledge. Further, these patients can be recommended for group educational and counseling programs. This reduces lot of consultation time for the doctors and also empowers the patient in active management of their disease condition. The scale can be used by the nurses during the initial screening and assessment preceding consultation with the physician. This facilitates the physician's health communication with the patients in appraising them of their disease condition and the significance of adherence. The physician can focus his/her communication on the dimensions where the knowledge of the patient is weak. The test can also be used in the context of public health endeavors where the knowledge levels of community prior to introduction of the intervention can be assessed. In addition, in view of alarming future projections of hypertension, the test can be administered on children and youth to assess their levels of knowledge in hypertension so that interventions aiming at enhancing awareness can be planned based on their existing levels of knowledge and misconceptions. The tool helps the Health Psychologist in planning the patient lifestyle modification counseling sessions. The knowledge domain profiling of the patient would empower interventional studies to tailor the interventions based on individual/group need. Assessing the varied domains of the knowledge of the patient and providing the interventions accordingly, enables the health care industry in transiting to the much advocated patient centered and holistic approach.

Limitations of the study

The Hypertension Knowledge Test, though stood the robust test of psychometric assessments is standardized on a sample in one geographical area. Hence there is a need to test its validity on a larger sample through a multicenter project. This will also facilitate standardization of the tool on a few other languages apart in addition to English and of local language.

CONCLUSION

The present form of the Hypertension Knowledge Test is recommended for assessment of Hypertension knowledge in any population. This can be used as a preliminary screening test in individual clinical setting as well as groups as an assessment tool for any population. Thus this test is an aid for clinical practitioners as well as researchers.

Conflict of interest

The Authors declare that there is no conflict of interest

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Conceptualizing hypertension: A developmental trend in school children

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Abstract:

INTRODUCTION: The exponential rise in the prevalence of hypertension signals the urgent need to focus the attention on hypertension prevention and management strategies for the vulnerable groups.

OBJECTIVE: The objectives of the study were to explore children's conceptualization of hypertension and to track its changes in complexity or divergence along classes.

METHODS: A mixed methods approach combining qualitative and quantitative techniques was adopted. A total of 776 students of 6th to 12th standard from the schools catering to the need of lower socioeconomic status were recruited. A simple tool with a single open-ended question – "What do you know about hypertension/high blood pressure?" was administered. The responses were coded appropriately and content analyses of the responses were carried out following thematic method.

RESULTS: Four broad themes, namely, definition, causes, consequences, and management of hypertension emerged out of content analyses. About 22.57% of responses indicated misconceptions on hypertension. Children's understanding of hypertension, in general, was found to be inadequate. A new method of measuring the conceptual complexity of responses of each class by computing "entropy" values, or "divergent index" indicated progressive increase in complexity of conceptualizing hypertension across classes.

CONCLUSION: The need for enhancing children's knowledge of hypertension through curriculum and public health programs is emphasized in view of children constituting the vulnerable group with reference to future projections

Keywords:

Conceptualization of hypertension in children, developmental trend, entropy to measure conceptual complexity, hypertension

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Introduction

The last few years have witnessed a phenomenal spurt in the prevalence of hypertension which according to the World Health Organization has increased by 10% from 2010 to 2014.[1] The projections for 2025 sounded a caution with a predicted prevalence at 29% among men and 29.5% among women globally[2] and 22.9% among Indian men and 23.6% among Indian women.[1] Adding to the woes, the prevalence among the children has also escalated enormously in recent past. In an observational study conducted by Amritanshu, the prevalence was found to be 4.7% among those in the age range of 5–19 years.[3] Cardiovascular risk factors were found to be highly prevalent among school children.[4] This rings an alarm for Indian health-care system.

Although hypertension is one of the major risk factors for cardiovascular emergencies, only about 9.6% of Indian children studying

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in 6th to 10th classes are aware that cardiovascular diseases are preventable.[5] The level of knowledge was found to be inadequate.[6] Even among the entry-level students in a medical university knowledge gaps was evident.[7] In a similar study among 2nd-year medical students in Belgrade, older students were found to have significantly higher knowledge about cardiovascular disease risk factors as compared to their younger counterparts.[8]

Researcher's wisdom lies in formulating preventive interventions by empowering this group with adequate knowledge on health-promoting behaviors and health risk behaviors. This may be termed as "preventive readiness" to counter hypertension. One of the essential prerequisites for such interventions is to understand the existing level of knowledge about hypertension in the prospective vulnerable group, that is, children.

Children, when educated with rich information of diseases such as hypertension, were responsible for reduction in intake of high-salt food[9] and also in reduction of cardiovascular disease risk scores among their parents and other family members. However, before launching any awareness program, it is desirable to examine their level of understanding the concept of hypertension.

The present study aims to assess children's understanding and knowledge about the condition of hypertension and explore into the developmental complexity in the schema related to hypertension.

Research questions

The research questions for this study are as follows:

1. How do Indian schoolchildren conceptualize hypertension?
2. Does their knowledge of hypertension show a progressive increase in complexity across classes?

Objectives

The objectives of the study were to explore children's conceptualization of hypertension and to track its changes in complexity or divergence along classes.

Methods

A combination of qualitative and quantitative approach was adopted.

Participants

The participants of the study were children from lower socioeconomic status enrolled in 6th to 12th class. To reach the sample, three schools were identified on the single criteria of enrollment of children from lower socioeconomic status. In this study, we confined to a single socioeconomic group in order to avoid the confounding variable of varying degrees of exposure to health information in different socioeconomic groups that subsequently influence the responses. One state social welfare residential school (exclusively for girls) managed by the government, one school managed by Christian mission (exclusively for boys), and one school managed by a cement factory where 67% of enrollment is from tribal community of the hamlets in 5 km vicinity of the factory (for both boys and girls) were identified as the first unit of the sample. These three schools were willing to participate in the study and sign informed consent. All the children from 6th to 12th class in these three identified schools willing to participate in the study by signing the assent form constituted the last unit of sample. The initial total sample consisted of 815 children. After screening and cleaning, the data the total sample consisted of 776 students of which 384 (49.48%) were boys and 392 (50.52%) were girls.

Tool

A simple tool consisting of a single open-ended question – "What do you understand by hypertension or high blood pressure (BP)?" with six lines left for the students to write the response was the tool used in the study. The other side of the paper had provision to record the demographic details of the respondents such as name, age, gender, grade, and school.

Procedure

Informed consent was taken from the Principals of the schools. Assent was taken from the participants. All children assented to participate. The participants were assembled in their respective classes and were provided with the sheet consisting of the open-ended question – "What do you know about hypertension/high BP?" They were instructed to write their response in the blank space provided beneath the question. They were explained about the significance of their original genuine response. They were also appraised that, there is no evaluation for the answers. No time limit was specified to complete the answer. The students were instructed to give a descriptive answer to the question in the way they conceptualized hypertension. They could explain the concept in more than one-way.

Results

The results are presented in two sections. Section 1 presents content analysis that explains emergence of subthemes. Section 2 examines the developmental trend in conceptualization of hypertension across classes by applying a formula to measure the complexity of the concept by quantifying the divergence of responses for each class.

Section 1: Content analysis

The demographic data were coded appropriately. Content analysis of the responses was carried out following thematic method. The descriptive responses of participants were independently handled and coded by the investigators. The verbatim of each participant was read and re-read independently by three investigators to gain a holistic picture of the responses. Memos of specific meaning units were noted down in the margin of the response sheets. These units of information were carefully examined and collated. In case of any differences among the investigators in classifying the responses, consensus was arrived at after discussion. An inductive process was followed in which subthemes emerged. The several subthemes that emerged were then categorized under four broader themes, namely, definition, causes, consequences, and management of hypertension. Responses indicating misconceptions were brought under one category of "Myths and Misconceptions." The themes, subthemes, and sample responses are presented in Table 1.

As presented in Table 1, the following four domains emerged – "definition," "causes," "consequences," "management," and myths and misconceptions. The themes are exhaustive and nonmutual in nature. The responses that were generic (e.g., a dangerous disease) or with theoretical loading (e.g., increased pressure in the blood vessels) or with a medical definition of (e.g., BP of ≥140/90 mmHg) are classified

Table 1: Summary of themes and subthemes with one specimen response of participants

Themes	Subthemes	Sample responses
Definition	BP above 140/90 is hypertension	"If a person's BP reading goes above 140/90 mmHg then he has hypertension"
	A dangerous disease	"I think hypertension is a dangerous disease"
	A health problem	"Hypertension is a health problem"
	Increased pressure in blood vessels	"If there is high pressure in the blood vessels, then it is hypertension"
	Incurable disease	"Once a person gets BP, it cannot be cured"
	Common disease	"Hypertension is a most commonly seen disease nowadays"
	BP is seen in children nowadays	"Hypertension is seen in children also nowadays"
Causes	Stress	"Heavy tensions causes high BP"
	Unhealthy dietary habits	"Eating fast foods and oily foods causes high BP"
	Age	"Old age causes high BP"
	Family problems	"Family problems cause high BP"
	Sedentary lifestyle	"Lack of physical activities cause high BP"
	Emotional disturbance	"Excessive excitement may lead to high BP"
Consequences	Death	"Uncontrolled BP may lead to death"
	Giddiness	"High BP makes people fall down"
	Heart attack	"High BP leads to heart attacks"
	Anger	"High BP makes people shout"
	Illness	High BP results in poor health
	Fatigue	"BP patients get tired easily"
	Diabetes	"Having BP also leads to getting sugar disease"
	Functional decline	"BP patients cannot work"
	Headache	"BP patients complain of headache"
	Paralysis	"BP can cause paralysis"
	Coma	"High BP results in unconsciousness"
Management	Diet control	"Taking proper diet controls BP"
	Salt reduction	"Reducing salt in food helps in managing BP"
	Medication	"Taking regular medicines will control BP"
	Doctor consultation	"Meeting the doctor and following the prescription can help BP patients"
	Positive affect	"Being always happy is the solution for high BP"
Myths and Misconceptions	Feeling excessive stress/tension	"If a person feels more tension, then he has hypertension"
	A problem of old age	"Hypertension is mostly seen in old people"
	Excessive anger	"Angry people are called as hypertensive patients"
	Excessive salt consumption	"Excessive salt intake causes high BP"
	Sugar consumption	"Eating more sugars leads to high BP"
	Spicy foods	"Eating chilly foods causes high BP"
	Irritability	"BP patients will fight with others"
	Drinking less water	Drinking less water causes high BP
	Drinking excess water	"BP patients should drink more water"

BP = Blood pressure

under the theme of "definition" of hypertension. The responses that explained the underlined causation of the disease such as lifestyle factors (diet and sedentary lifestyle), the psychological factors (stress), and the demographic factor (age) are classified under the theme of "causes" of hypertension. Those responses that mentioned the possible ramifications of uncontrolled hypertension such as medical consequences (heart attack, headache, paralysis, coma, or death) and the behavioral impact (fatigue, anger, irritability, and functional decline) are classified under the theme of "consequences" of hypertension. The other responses that mentioned the necessary care required to control the BP such as medical management (regular doctor consultation and medications), behavioral management (positive affect), and the lifestyle management (salt reduction) are classified under the theme of "management" of hypertension. Table 1 also presents one example of response against each theme.

Table 2 presents the sample size of each class and also class-wise frequency and percentage of responses under each theme.

It may be observed from Table 2 that the conceptualization of hypertension of the school children in terms of causes is relatively higher followed by definition, management, and consequences of hypertension, respectively. Overall, the levels of knowledge in any of the four domains are found to be inadequate with the highest percentage of responses in the domain of causes being just over 40%. Further, the class-wise conceptualization in terms of themes does not follow a particular pattern. It is pertinent to notice the misconceptions of hypertension in the schoolchildren. Table 2 also shows the class-wise percentage of myths and misconceptions about hypertension. While there appears to be a declining trend with the progression of classes in general, a sudden shoot up from 6th to 7th class and again from 11th to 12th class is perplexing.

While the qualitative analyses provide us insight on children's conceptualization of hypertension under the themes such as causes, definition, consequences, and management, measuring the complexity of the concept across classes has been taken up by an innovative quantitative approach.

Section 2: Assessing the complexity of the concept

Step 1

To meet the objective of examining if the responses across classes showed a progressive developmental trend in conceptualization of hypertension, the frequency of responses under themes were plotted. The convergence or diversity in responses based on the relative frequency under different themes was observed by calculating the entropy for each class. The term "Entropy" borrowed from Physics is a measure of disorderliness or divergence in responses. For better conceptualization, the derivation of entropy is explained in the following steps:

Step 2

For a particular class, the proportion of responses of each theme (P) was evolved by computing the logarithm, indicated by I so as to stabilize the value for normality. This logarithmic value facilitates better comprehension by transforming the numerical data into a human-friendly scale that enables the appreciation of the changes in responses across themes.

$$I = -log\ (P)$$

Step 3

Finally, the entropy was computed using the formula

$$\text{Absolute entropy (E)} = \Sigma\ (P \times I)$$

This value so derived indicated the divergence of ideas (indicated by the spread of responses across themes) of each class. Higher entropy value denotes larger spread of responses across themes which indicated higher complexity in comprehension of the concept of hypertension or high BP.

Step 4

The composite value of entropy for each class evolved by the method described above would not stand the test

Table 2: Class-wise summary of themes

Class	*n*	Responses categorized into themes					
		Definition (%)	Causes (%)	Consequences (%)	Management (%)	Misconceptions (%)	Total
6	177	45 (24.59)	57 (31.14)	16 (8.7)	10 (5.46)	55 (30.05)	183
7	181	26 (14.28)	51 (28.02)	17 (9.34)	15 (8.24)	73 (40.10)	182
8	125	14 (11.02)	51 (40.15)	7 (5.51)	38 (29.92)	17 (13.38)	127
9	136	39 (19.89)	102 (52.04)	18 (9.18)	10 (5.10)	27 (13.77)	196
10	66	8 (8.42)	48 (50.52)	4 (4.21)	18 (18.94)	17 (17.89)	95
11	43	13 (24.07)	32 (59.25)	3 (5.55)	3 (5.55)	3 (5.55)	54
12	48	21 (20.58)	38 (37.25)	14 (13.72)	9 (8.82)	20 (19.60)	102
Total	776	166 (17.67)	379 (40.36)	79 (8.41)	103 (10.96)	212 (22.57)	939

n = Sample size of each class

of fitness for interclass comparison as the values inherit an error caused by class size. Each class has varying number of students. Hence, there is a need to balance the class size. This balancing factor (B_F) can be obtained by dividing the class size with the total sample. The formula is

$$B_F = \frac{\text{Sample size of a class of students}}{\text{Total sample size of students}}$$

Step 5

The absolute entropy value has to be divided by the B_F to arrive at an entropy value that is neutralized for class size. This is called neutralized entropy or E_n. It is also called "Divergence Index (*DI*)." The formula is

$$E_n \text{ or } DI = E / B_F$$

The above values are presented for each class in Table 3.

Table 3 reveals the figures explaining the number of responses for each class, scores of absolute entropy, response ratio, BF, and neutralized entropy otherwise called DI. It is of relevance to explain the column representing the response ratio (R) from the table. The response ratio is different from entropy in the sense that while entropy relates to spread of responses across themes the response ratio refers to the probability of the number of statements any child from a class may make to explain the concept of hypertension. These explanations may be variations of a single theme and subtheme.

The last column of Table 3 reveals that Neutralized Entropy or the DI increases with each class, whereas there is a slight drop in the entropy at 9th class. However, there is a sudden spurt in entropy from 9th to 10th Class. Again, a noticeable increasing trend is seen from 10th to 11th class and from 11th to 12th class successively. This developmental trend graphically represented [Figure 1] clearly indicates a steady progression in complexity of conceptualization but for an inexplicable marginable drop in 9th class.

Table 3: Presents the En values of different classes

Class	*n* (respondents)	Responses	*E*	*R*	B_F	E_n
6	120	128	0.513	1.06	0.20	2.49
7	109	109	0.545	1.00	0.18	2.92
8	103	110	0.502	1.06	0.17	2.84
9	117	169	0.448	1.44	0.20	2.23
10	59	78	0.442	1.32	0.10	4.37
11	41	51	0.497	1.24	0.07	7.07
12	35	72	0.481	2.05	0.05	8.02
Total	584	717				

B_F = Balancing factor for class size, *E* = Absolute entropy, *R* = Response ratio, E_n = Neutralized entropy

Discussion

The current study was conducted to understand the conceptualization about hypertension among children from 6th to 12th class and to track the developmental complexity in children's schema about hypertension. We found that, in general, children's knowledge about hypertension was inadequate. This reflects in the fact that only 40% of responses identified the causes, <10% of responses reflected understanding of consequences and about 11% could spell out the management of hypertension. This finding is in line with the findings of earlier studies that found knowledge related to hypertension was inadequate in schoolchildren.[6,10]

Further, it is of great concern to see the abysmally poor percentage of responses across the themes of consequences and management. Although 40% of the total responses pertained to the causes of hypertension, it is appalling that a sheer 8.4% of the total responses captured the knowledge relating to consequences of hypertension which signals that very few children understood the seriousness of the disease. This finding corroborates to the earlier findings which identified that the majority of the adolescents possessed knowledge related to causes alone and knowledge related to other areas of hypertension such as consequences and management was inadequate.[5] This indicates that there is an urgent need to orient children on the grave consequences of uncontrolled hypertension. The mere 11% of responses related to management of hypertension portrays a grim picture of future which needs to be viewed with its implications and the urgency of pragmatic steps in educating the children on hypertension as public health priority.

The second objective of the study was to find out if there was any developmental trend seen in the children in their knowledge about hypertension. The findings envisage that there was a clear developmental trend seen in the children's conceptual divergence of knowledge about hypertension. This trend corroborates with the findings of Piaget's stages of cognitive development.[11,12] The finding of the study that, increase in multidimensional knowledge about the disease with age also resonates with the findings of previous studies where a developmental trend was observed, wherein children during earlier years of their development conceptualized illness as unidimensional concept but with the progression of age, they started conceptualizing it multidimensionally across diverse themes of health and illness.[13-17] This is because with the progression in age increased sophistication in the grasp of health information culminates in cognitive amalgamation of different dimensions (etiologic factors, complications, and biopsychosocial management). This is possibly due to the integration of new information

learned across the classes by the child through the processes of assimilation and accommodation and also by creating new schemas if it did not fit into the existing ones. Thus, the child can perceive that there could be multiple causes of an illness.

It was argued that children's perceptions of illness are derived primarily from ideas they obtain from school and the media.[18] The sudden growth in the diversified knowledge from the 9th class to 10th class could be attributed to the curriculum related to Biological Sciences which covered the circulatory system and the chronic diseases. Most of the responses of 10th class students are found to be technical in the sense that they referred to the diagnostic cutoff values of the BP readings, use of the term "sphygmomanometer" and the consequences such as heart attack and stroke. Thus, inculcation of knowledge of hypertension in schools has enhanced the complexity of their schema from 10th class onward.

Children were also found to hold several misconceptions about various aspects related to hypertension. Around 22% of the responses were misconceptions. A commonly held misconception was that hypertension means feeling high levels of tension. The second most common misconception that children held was high BP makes a person vulnerable to "get angry," "shout at others," and leads to aggressive behavior what they term as "hyperbehavior." There is a dire need to dissipate such misconceptions with appropriate cognitive restructuring because misconceptions could be counterproductive.[19,20] It can be seen that children regard hypertension as a common disease that develops mostly in old age. This misconception could be harmful for the children as several studies based on the theory of the health belief model found that if children do not perceive their vulnerability or susceptibility to the condition, they would not engage in taking precautionary steps. This rings an alarm as the prevalence of hypertension and prehypertension have been increasing in children at a rapid rate. While the misconceptions among the whole sample were high, a decreasing trend was observed with the progress in class. However, a higher level of misconceptions at 12th class is difficult to explain. It may be related to the school curriculum. Many of the students from 12th class were from nonscience background. This suggests that the health-related topics taught at 10th class are not sustained as an important knowledge base. Hence, there may be a need to reinforce the knowledge by making health science education mandatory for all streams in intermediate education of 11th and 12th class.

Considering the paucity of studies that have addressed the knowledge of children about hypertension, our study is an attempt to fill in this gap.

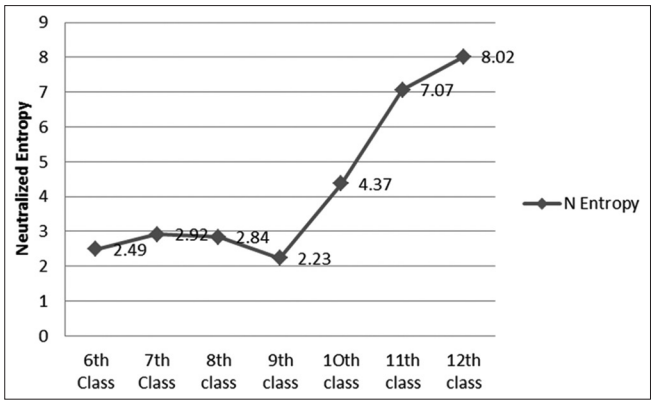

Figure 1: Line graph plotted with neutralized entropy values showing developmental trend in the conceptualization of hypertension among schoolchildren

Conclusion

The implications of this study may be discussed under two aspects, namely, research and policy implications. So far as future research in this area is concerned, it may be desirable to compare the children from different types of schools catering to different socioeconomic groups. Second, two intriguing observations related to drop in the entropy in 9th class and larger misconceptions held by students of 12th class may be used as triggering points for further research using Focus Group Interviews with the concerned groups.

At policy level, comprehensive, age-appropriate and tailor-made interventions need to be implemented in schools and colleges to facilitate enhanced knowledge and behavioral change among school children. Government as part of its health policy should direct the education department to prepare the Science curriculum in such a way that it instills the basic information on health and illness in a way that suits the child's cognitive level. Health education programs should include dissipation of common misconceptions.

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Conflicts of interest
There are no conflicts of interest.

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DOCTOR-PATIENT COMMUNICATION IN HEALTH CARE: ISSUES AND CHALLENGES

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ABSTRACT

Effective doctor-patient communication acts as a fulcrum in accommodating a smooth transition from doctor centered communication to the patient centered communication in the health care system. This review presents the significance of the doctor-patient communication health care scenario. The benefits and barriers of doctor-patient communication and the methods to enhance the doctor-patient communication are reviewed. The present qualitative and quantitative measurements of doctor patient communication are critically analyzed. Endorsing that communication is a two way process, this review suggests the need for quantifying the communication based on the bidirectional approach of communication.

Keywords: Doctor-patient communication, relevance, measurement, benefits, barriers.

INTRODUCTION

For a remarkable transformation of health care system, communication plays a decisive role as a cost effective strategy. Veritably, doctor–patient communication is one of the most essential dynamics in health care, affecting the course of patient care and clinical adherence (Matusitz & Spear, 2014). According to Schofield (2004), *'effective communication was a drug that could*

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be prescribed!' as the patient gains therapeutic benefit just from venting concerns in a safe environment with a caring clinician. The clinical adherence is high among the patients who have knowledge about the illness and good communication with the doctor (Conthe et al., 2014). This lays an emphasis for a patient centred approach in health communication process.

WHY PATIENT CENTRED COMMUNICATION?

Historically in medicine, there was a paternalistic approach to decide what should be done for a patient—the doctor knew the best and the patient accepted the recommendation without question. This era has come to an end, being replaced with consumerism and the movement toward shared decision-making. Patients are advised to educate and ask questions. Patient satisfaction with their care rests heavily on how successfully this transition is accomplished. Ready access to quality information and thoughtful patient-doctor discussions is at the fulcrum of this revolution.

Good doctor-patient communication has the potential to help regulate patients' emotions, facilitate comprehension of medical information, and allow for better identification of patients' needs, perceptions and expectations (van Zanten, Boulet, McKinley, DeChamplain, & Jobe, 2007; Bredart, Bouleuc, & Dolbeault, 2005; Arora, 2003; Platt & Keating, 2007). Thus the shift from doctor centered communication to the patient centered communication has begun. As a result, majority of patients are preferring family doctor over super specialist. Unfortunately Indian system has moved away from the age old practice of having family doctors.

Research evidence in the past three decades has proved that doctor-patient communication plays a pivotal role in delivery of high quality patient-centered health care (Golin, Thorpe, & DiMatteo, 2007). With the paradigm shift from biomedical to biopsychosocial approach in health care, the professional assessment of health providers also demands the skills of patient centred communication in addition to professional knowledge and technical skills (Mead & Bower, 2000). This is because the patient who suffers from a disease and seeks treatment does so in a psychosocial context.

It is essential to know if the patient is high on anxiety and depression (which impacts the cognition and thus the memory to be regular with medication), has a social support network of family and friends to aid in therapeutic adherence (that includes diet, exercise and other lifestyle factors) and the economic status to afford the medication and other treatment regimen prescribed. Such considerations can play a role in treatment line only when the doctor-patient communication in the initial consultation is effective to provide an insight to the doctor on the patient's psychosocial background. Once this is achieved, further process of health care ropes in the patient and family in major decision making which successfully enforces sharing of responsibility on both the patient and the

doctor. Such patient-centered care through biopsychosocial approach helps in developing a therapeutic alliance between the doctor and the patient, where inputs on patients' preferences and doctors' professional advice receive considerable assessment in the best of optimal outcome. In this process the doctor and the patient develop a bond where the patients' trust in the doctor goes beyond the perceived components like clinical competence and describes the doctor as 'supportive' and 'humane'.

Thus, while endorsing the doctor as a professional, the patient also perceives the important human face in the doctor which is very essential in developing a relationship. Thus effective communication skills are required for a patient-centered approach, emphasizing on building rapport through the use of empathy, listening skills and non-verbal communication skills (Platt & Gordon, 2004). Therefore, the health communication that takes a biopsychosocial approach forms a reciprocal relationship between the doctor and the patient.

SIGNIFICANCE OF DOCTOR-PATIENT COMMUNICATION

The ultimate aim of doctor-patient communication is to improve patient's health and optimize medical care (Duffy et al., 2004). With optimal adherence, the prognosis is expected to be the best (Swain, 2013). The basic elements of doctor-patient communication are to build the relationship, create a path for the discussion between the doctor and the patient, gather information about the patient's problems and issues, and to mutually decide the plan of action to handle them (Makoul, 2001).

A substantial body of evidence shows that effective communication between the doctors and the patients can lead to positive outcomes for patients, for doctors and others. A healthy doctor-patient communication leads to creating a good interpersonal relationship, exchange of information between the doctor and patient, and facilitates the decision-making process (Ha, Anat, & Longnecker, 2010). Studies give evidence that links effective doctor-patient communication to desirable health outcomes such as improved adherence to treatment and improved prognosis (Swain, 2013), lower patient stress levels and higher physician satisfaction (Guadagnino & Branch, 2006).

INDIAN SCENARIO: A CHALLENGE

A recent Indian statistics reveal that, because of its dramatic doctor-patient ratio of 1:1800, (Deo, 2013) India is listed under countries with critical shortage of health service providers. The average time a physician interacts with a patient is progressively becoming shorter across the globe and more so in India (Thomas, Hariharan, Rana, Swain, & Andrew, 2014). While the reason in Indian scenario can be attributed to the disproportionately large number of patients the doctor has to see in a day compared to his/her counterpart in the West, one cannot ignore the fact that technology dependence in health care is compelling the

doctors to distribute the time between the patients and computers and other electronic gadgets. This has reduced the average doctor-patient interaction time to something between two to ten minutes (Deveugele, Derese, van den Brink-Muinen, Bensing, & Maeseneer, 2002). Groopman's (2007) study found that a patient on an average is given just 18 seconds to describe the symptoms before the doctor interrupts which greatly increases the scope of making errors in diagnosis and treatment plans. With a desirable ratio between doctors and patients, if this is the state of affairs in developed countries, with the given doctor patient ratio, the Indian scenario with respect to consultation time is anybody's guess. While this reality cannot be transformed overnight, the challenge lies in accepting this reality and optimising time management and communication within the limited time.

Demand for effective doctor-patient communication assumes added significance in the light of chronic illness replacing acute problems, which can be attributed to life style changes. The non-communicable diseases (NCDs) demand effective lifelong management. The NCDs are viewed as epidemic posing the greatest global challenge to the 21st Century (Murray & Lopez, 1996; Reddy, 2003). Collectively, NCDs account for 63% of all deaths worldwide with 80% of those taking place in developing countries (Narayan, Ali, & Koplan, 2010; WHO, 2013). According to a report by WHO (2002), it is expected that chronic diseases will account for 73% of deaths and 60% of the global disease burden by 2020, and also for major percentage of diseases and deaths in India. Treatment of NCDs, like diabetes, hypertension, asthma, cancer or HIV/AIDs demand a dire need of life style changes along with medication. This calls for skills of counseling involving the competence to motivate the patient to enhance health promoting behaviours and minimise health risk practices.

These diseases being asymptomatic are termed as silent killers. The asymptomatic characteristic of the disease is likely to prompt the patient undermine the potential dangers of non-adherence. Unless the doctor impresses upon the patient the asymptomatic nature of the disease and the devastating impact on the prognosis, it would lead to lethal consequences. It is essential that communication of the doctor includes the significance of adherence to medication, diet, exercise and self-monitoring and also highlight the alarm signals that warrant immediate medical consultation. Such communication needs to be powerful with emphasis added at right places and also must be reinforced in subsequent consultation.

QUALITY OF DOCTOR-PATIENT COMMUNICATION: IT'S CONTRIBUTIONS

Impact on Patient Adherence

Among all the consequences of doctor-patient communication, the most outstanding effect is seen in the form of increased clinical adherence in the

patients and subsequently improved prognosis. Adherence is defined as the regularity and punctuality with which the patients takes the prescribed medication, follows the diet and exercise regimen (Hall, Willgoss, Humphrey, & Kongso, 2014). Effective communication from doctors in terms of explanation, feedback, sharing of medical data was found to have enhanced adherence in patients (Tongue, Epps, & Forese, 2005; Platt & Keating, 2007; Chen et al., 2007). Friedman et al. (2008) reported that patients who received less information from their doctors showed poor adherence. Gaps in the doctor-patient communication like uni-dimensional decision making, and physicians' lack of knowledge of patients, indicating sub-optimal communication, lead to non-adherence that adversely affects the health status of patients (Wilson et al., 2007).

Impact on Patient Mental State and Doctor-patient Relationship

The holistic approach to health care views the patient not just as a bearer of a disease, but as an individual and as a physical, psychological and social and spiritual entity. Hence apart from the treatment of the disease, the concomitant implication on affect, cognition, behaviour and other social aspects such as financial pressures and social relationships receive their due importance. In this context the impact of high quality doctor-patient communication can be perceived in all the dimensions mentioned above. Higher quality of doctor-patient communication leads to mutual understanding, patient satisfaction, trust, bilateral involvement in decision making, agreement about treatment, and patient motivation (Street et al., 2009).

Better intermediate outcomes include better adherence and self-care by patients, both of which lead to improved health outcomes (Moore et al., 2004)**.** Effective communication is also found to reduce psychological distress in patients along with higher rate of symptom reduction and better prognosis (Golin et al., 2007). Studies have proved that direct communication and support have a significant role in reducing visits to emergency department (Bolton, Tilley, Kuder, Reeves, & Schutz, 1991) and control of chronic illness (Tildesey, Mair, Sharpe, & Piaseczny, 1996). Literature has shown that effective communication in medical treatment leads to improved health, functional and emotional status, adherence to treatment regimen, doctors' satisfaction, and reduced medical malpractice risk (Wong & Lee, 2006). Effective communication has also been shown to manage post-operative pain in surgical patients (Sugai, Deptula, Parsa, & DonParsa, 2013).

Patients seem to have a clear preference for doctors based on the quality of communication. In a study by Schattner, Rudin, and Jellin (2004), it is reported that 38% of patients selected physicians on the basis of their professional expertise while 30% selected on the basis of physicians' patience and attentiveness, informing the patient, representing the patient's interests, being truthful and

respecting patient's preferences. Except the professional expertise, rest of the factors can be translated as outcomes of effective communication between the doctor and the patient.

Consulting the doctors high on quality of communication is found to be the key for patient satisfaction. In a qualitative study by Anden, Andersson, and Rudebeck (2005), it is reported that the patients' perception of the outcome of clinical consultation is greatly determined by the patients' understanding of communication leading to improved satisfaction. In a review study of interventions on cancer patients, the results revealed the importance of effective doctor-patient communication in promoting patient satisfaction with the health care (Bredart, Bloulec, & Dolbeault, 2005). The results of the review emphasized on the use of various strategies that improved patient satisfaction and resulted in positive health outcomes, effective doctor-patient communication being one of the major strategy.

Impact on Doctors

The positive impact is not just limited to patient benefit. The doctor is an equal beneficiary of high quality doctor-patient communication. For the doctor, the process of diagnosis involves three sequential and overlapping steps viz. data gathering, data integration and verification of diagnosis (Kuhn, 2002). Effective doctor-patient communication plays a pivotal role in collecting relevant data from the patient. It may be an exaggeration to state that this preliminary process determines the line of investigation through laboratory tests and further invasive diagnostic tests to arrive at a final diagnosis. In addition to this the studies pointed out the positive impact that good doctor-patient communication has on the doctor job satisfaction and productivity (Haas et al., 2000).

Physician satisfaction more often than not is linked to patient satisfaction with the health care service that they receive. Satisfied patients are advantageous for doctors in terms of greater job satisfaction, less work-related stress, and reduced burnout (Bredart et al., 2005). Satisfied patients are less likely to lodge formal complaints or initiate malpractice complaints on doctors (Brinkman et al., 2007).

Overall Outcome

The overall outcome of healthcare involves, democratic decision making, improved mutual trust and better doctor-patient relationship. Shared-decision making ensures shared responsibility which binds the patient to clinical adherence. Active doctor-patient communication facilitates communication of doctor's empathy to the patient. This lays the foundation for the trust in the relationship that breaks the ice facilitating the patient to unleash the fears, anxiety, and apprehension. Such interaction provides a scope for the doctor to effectively address the patients' emotions. This process helps in easing the emotional state

of the patient. Further, the effective communication of the doctor, through information exchange enhances the knowledge base of the patient about the disease, adherence requirements, which in turn help in giving desirable direction to the health behaviour of the patient. While the doctor's communication skills contributes in the ways described above, it is also true that equal participation of the patients creates a sense of partnership and involvement in decision making. This in turn contributes to the internal locus of control. Once the internal locus of control is stimulated and reinforced, the adherence behaviour is likely to be high and sustained. One may wonder, when quality communication has such inherent advantages casting its multifaceted impact, what prevents the practice of quality communication between the doctors and patients?

BARRIERS TO DOCTOR-PATIENT COMMUNICATION

Emerging data suggest a high prevalence of communication breakdowns among physicians, patients, and important members of the health care services who assist with the diagnostic process (Gandhi, 2005; Singh et al., 2007; Sutcliffe, Lewton, & Rosenthal, 2004). In a study on patients with abnormal mammograms, one third of the women in the sample reported not to have received appropriate follow-up (Poon et al., 2004). This indicates the barriers in communication can be possibly be caused by either the doctor or the patient or both.

In the context of doctor-patient communication, various socio-economic factors like age, gender, and educational qualification are seen to affect the communication. Studies identified that patients' age is a major determinant of the doctor's quality of listening (Govender & Penn-Kekana, 2007). In a study on elderly patients, it is found that doctors tend to communicate more in a patient-centered style with patients over the age of 65 years (Peck, 2011).

With regard to the gender, studies indicated an interaction between gender and income level posing a barrier in communicative style. A study conducted by Thorson and Johansson (2004) shows that woman patients of low income and status are described shy, hesitant and limited in their knowledge. They were found to verify with their husbands, family members and neighbours rather than adhering to the doctor's perception.

While the above study reported on differential behaviour by patients of two genders, there seems to exist a reciprocal relationship between the communication of doctors and patients. Bertakis, Franks, & Epstein, (2009) revealed that the doctors were more likely to have patient-centered style of interaction with female patients in comparison to male patients, suggesting that, women are more likely than men to express their feelings and talk about psychosocial issues.

The third barrier is educational level of the patient. Patients with a higher educational level have more skills and confidence in talking to their doctors and

tend to provide more information, ask more questions and speak longer than other patients. It was also found that highly educated patients are more expressive and opinionated. They also receive more diagnostic and health information than less educated people (Willems, De Maesschalck, Deveugele, Derese, & De Maeseneer, 2005). To sum up, it is likely that more educated, higher income and older patients receive more information because they have communicative styles that elicit information from the doctors.

It is found that hospitalized patients with limited health literacy reported poor communication in the domains of general clarity, responsiveness to patient concerns, and explanations of care compared with patients with higher health literacy (Kripalani, Jacobson, MugullaCawthon, Niesner, & Vaccarino, 2010; Katz, Jacobson, Veladar, & Kripalani, 2007).

Doctors are found to use medical jargons in their interaction with patients that is beyond the comprehension of patients. Doctor's use of complex medical language (Castro, Wilson, Wang, & Schillinger, 2007) may contribute to poor physician-patient communication. Extra care is to be taken while communicating with the patients in younger age group since younger participants have reported significantly lower level of knowledge of jargons than their older counterparts (Thomas, Hariharan, Rana, Swain & Andrew 2014). Cardiologists' communication involving jargons is, thus, not adequately reaching patients, specifically young adults. The use of such language leaves the patient confused and mystified, leading to poor comprehension of the doctor's instructions and consequently, inappropriate health behaviour that may bring about adverse health effects. A recent study on 96 preoperative patients reveals that usage of medical jargons leads to patient's dissatisfaction (Fields, Freiberg, Fickenscher, & Shelley, 2008). The usage of jargons distances the doctors from their patients and therefore it was suggested that the emphasis should be on interaction with the patients rather than telling the patients (Fields et al., 2008).

The personality factors sometimes may play a very dominant role in the quality of communication which may sometimes even camouflage the other factors such as age, gender, education, or socio-economic factors. The quality of doctor-patient communication is not singularly impacted by the patient. The doctor as the health provider has a significantly high contribution in the quality of communication.

In order to deliver patient-centered care, the physician must be equipped and educated to serve as trusted advisor, educator, and counselor, as well as medical expert, and must know how to encourage the patient's participation in the design and delivery of care. The caring component in doctor-patient communication manifests in the doctors expression of empathy, reassurance, support, positive reinforcements, psychosocial talk, sense of humour, and extension of courtesy (Beck et al., 2002). Communication is a two way process. When

the doctor is not proactive in sharing and initiating, the patient lacks encouragement for questions. Disregard for the patient's views, incomplete sharing of medical data with the patient, guarded discussion of the treatment effects, low response to the patient's remarks, lot of interruption in patients' speech are indicators of poor sharing in doctors' communication (Beck et al., 2002). A study conducted on 167 patients who have interacted on computer with virtual physicians who are simulated to show high and low caring, the high caring was found to lead to higher patient satisfaction (Cousin, Mast, Roter, & Hall, 2012).

Patient feedback is a valid reflection of doctor's quality of communication. Often the patients are found to complain about the duration of consultation that remains inadequate and hurried (Swaminathan, 2007). The pressure is felt more in times when there is a shortage of medical personnel. Given these circumstances, the doctors tend to fasten or even cut down on the consultation time. The lack of time is a constant factor associated with the doctors about which the patients are aware (Pollock & Grime, 2002).

Research has shown that apart from the patient and doctor factors, many other phenomena like patient's personality factors, doctor's personality factors influence the communication between the doctor and the patient, *e.g.* the social status of the patient. It is beyond the scope of the present review to enlist all the possible variables involved in this complex process.

METHODS FOR ENHANCING DOCTOR PATIENT COMMUNICATION

Primarily, training sessions on communication skills for the doctors is suggested (Finset, 2012). Several studies have reported that training the doctors in communication skills to meet the biopsychosocial needs of the patients is imperative (Chatterjee & Choudhury, 2011). In its report 'vision 2015', the Medical Council of India (2007) stressed on the importance on communication skills training of the doctors. Doctors need to individualize their communication to patients based on patients' needs and desires (Lazarus, 2013).

The need of the hour is acknowledging and training the health care professionals in effective communication skills leading to improved health care system, sensitizing clinicians to respond to patients' emotional cues, encouraging doctors to communicate without/with minimal use of medical terminologies (Terpstra, 2012), facilitating feedback from the patients after consultation, accelerating the empowerment of the patients (Chana, 2012), teaching doctor-patient communication skills during undergraduate medical curriculum (Egnew & Wilson, 2010; Sommer, Rieder, & Haller, 2011), promoting listening by the doctors (Snyder, 2008; Jagosh, Boudreau, Steinert, Macdonald, & Ingram, 2011) and involving family members **(**Kuzari, Biderman, & Cwikel, 2013; Guenter, Gillett, Cain, Pawluch, & Travers, 2010**).** All these are found to contribute

towards a correct diagnosis, enhance healing, apart from boosting the doctor-patient relationship. While doctor-patient communication is given heavy emphasis and innovative interventions are suggested to enhance the quality, the crucial question around which the entire issue revolves relates to the method of measuring the quality.

MEASUREMENT OF DOCTOR-PATIENT COMMUNICATION

Measuring communication is a challenging task. Health communication researchers have devised numerous ways to identify measure, quantify and categorize doctor-patient communication. Doctor-patient communication can be studied using qualitative and quantitative approaches. Quantitative approaches have focused on measuring aspects such as information exchange, shared decision making, patient enablement, verbal dominance, and communication control (Collins, Britten, Ruusuvori, & Thomson, 2007). In qualitative approaches, the focus of measurement is on professional responsibility and behaviour, and on details of observed and recorded communication in consultations, as well as on the structure of consultation and its phases (Collins et al., 2007). Quantitative approaches have used Interaction Analysis System (IAS), such as the Roter Interaction Analysis System (RIAS), Brown University Interpersonal Skill Evaluation (BUISE), Communication Assessment Tool (CAT), and Doctor-Patient Communication Inventory (DPCI).

The qualitative approach uses the method of coding the videotaped content of clinical consultations. The measurement comprises of both the verbal and non-verbal behaviour. The coding systems provide useful information like the extent to which patients talk in the consultation, factors influencing the interpersonal effectiveness of the health professional, such as length of consultation or continuity of care and communication competence of the doctors.

The problem with the coding systems relates to arbitrariness of relationship between coded actions. For example, it fails to connect doctor's communication style to the patient's level of information about their diagnosis, prognosis and treatment options. Further it speaks nothing about how the length of the consultation might have influenced the discussion of issues between the doctor and the patient. Further, these methods fail to capture the functional aspects related to the exchange of information about the present health status of the patient, dosage of medication, adverse effects, alarm signals, etc which contribute to a strong logical base for adherence.

Campbell, Lockyear, Laidlaw, and Macleod (2007) developed a Matched-Pair Instrument (MPI) to measure the communication skills of the doctor in terms of process and content. In a study on physician-patient communication behaviour on HIV patients in Kenya, Wachira, Middlestadt, Recee, Peng, and Braitstein (2013), reported that the MPI failed to capture the patient's role in the communication behaviours as usually the case with patient-centered communication measures.

The major qualitative approach for analyzing doctor-patient communication is through the use of content analysis. Conversation Analysis (CA) is one such method of content analysis that measured the communication using themes such as the themes that discussed the interrelationship between the patient's concerns and the biomedical agenda. In CA research, the consultation is regarded as consisting of phases of activities based on video or audio recordings of actual consultations. The phases observed in doctor–patient consultations are the opening of the consultation, the problem presentation, verbal examination (including history-taking), physical examination, discussions of treatment and closing. Various studies have used CA to study doctor-patient communication quality (Gafaranga & Britten, 2003; Heritage & Robinson, 2006).

Heritage and Maynard's (2006) review of the CA literature on patients' participation in the consultations revealed that patients had less opportunity to participate in diagnosis than in the treatment phase. CA studies concentrate on analyzing the process of interaction and cannot adequately deal with other equally relevant dimensions of the process of patient participation, such as what the patient could not reveal in the consultation, like what the patient said 'between the lines'.

NEED FOR QUANTIFICATION OF DOCTOR-PATIENT COMMUNICATION

Communication is a two-way process and the degree of the quality of communication is dependent on whether the receiver comprehended the message the way the sender intended it to be. In clinical context, it transforms into whether the patient comprehended what the doctors communicated. In a way, the patient has to validate his/her understanding about the doctor's instructions. Only a method that matches these two aspects can be considered as the one that is complete and objective.

The discussion based on the review clearly suggests the cost effectiveness of doctor-patient communication in the present context of health care and management. Given the high doctor-patient ratio resulting in low consultation time, optimising the quality of doctor patient communication remains a challenge. The only way this challenge can be met is by integrating innovative techniques and approaches of validating doctor-patient communication in the medical curriculum, reinforced by in service training programmes and involvement of Health Psychologists in developing disease specific check lists and communication packages for use in consultation. However the major lacunae in evaluating the effectiveness of this would be appropriate tool and method of measuring doctor-patient communication involving the communicator and receiver on the one hand and covering the content, affect and behaviour on the other. Concerted efforts are called for in health care research to fill this void. Therefore a reliable and valid method for measuring bi-directional communication is the need of the hour to replace the unidirectional approach.

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RESEARCH IN PROGRESS

Medical Jargons as Hindrance in Doctor–Patient Communication

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Abstract This study assessed patients' understanding of the jargons used by cardiologists during consultation, and to compare the knowledge of these jargons across three patient age groups. The Cardiac Jargons Comprehension Schedule (CAJCOMPS), consisting of 11 cardiac jargons, was developed and validated. It was found that the proportion of participants who were aware of the jargons ranged between 10 % and 96 % across the 11 jargons; however, mean scores across the jargons ranged only between 0 and 2 on a scale of 0–5. Significant effect of age on the overall level of understanding of jargons and of specific jargons (Angina, Heart Failure, Palpitation and Treadmill Test) was noted. Participants of the youngest age group (18–45 years) had reported significantly lower level of knowledge of jargons than their the older age counterparts (46–60 and 61–80 years). Cardiologists' communication involving jargons is, thus, not adequately reaching patients, young adults in particular.

Keywords Age · Cardiology · Health communication · Jargon · Patient awareness

Introduction

To convey one's expertise in a specialisation, the apt means may be to communicate through jargons. Jargons refer to the technical terms used by members of a profession, generally not understood by a lay person, to describe concept(s) related to their line of work. Jargons of a field evolve as shorthand for its affiliates to effectively discuss among themselves the complex work they undertake. However, in professions that centre on interactions with the diverse public, jargon-based communication can turn counterproductive. The medical consultation is a case in point given that the patient must recount his/her experience of illness while the doctor must formulate and communicate the diagnosis, prescription and treatment (Caudle et al. 1999; Ha and Longnecker 2010; Martin et al. 2005). The relevance of assessing jargon use and understanding in Indian settings becomes explicit in view of the enormous volume of patients with cardiovascular conditions and risk factors, e.g., 30 million patients presented with coronary heart disease and 118 million with hypertension in the year 2000 (Gupta 2008; Mohan et al. 2013). This study examined patients' comprehension of the common medical jargons used by Indian cardiologists.

Jargons figure frequently in doctors' interaction with their patients. Castro et al. (2007) reported that 81 % of consultations involved the use of at least one jargon not understood by patients. In the same vein, Deuster et al. (2008) further found while investigating 86 doctor–patient interactions for prostate and breast cancer screening that, on average, over 19 jargons were uttered during a visit. However, doctors, on average per consultation, explained to their patients only 15 % of the jargons that they had used. When consulting for screening, the patient may not only possess inadequate understanding of the condition s/he is undergoing tests for but may also harbour myths concerning its risks and treatment options. The use of medical terminology in this context would only be more intimidating. While doctor's technical language hindered their comprehension of information the information from nurses and former patients was reported to be more accessible and reassuring (Lyons et al. 2002). This reiterates the need for relevant simplified health talk between medical professionals and patients.

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Patients too have been found to utilise jargons during consultations. Černý (2008) recorded this trend but pointed out that patients had used medical terms to a lesser extent than doctors and these were terminology related to disease, medication and procedures but not to medical tools. Interestingly, patients had used these terms in their responses after they were mentioned by the doctor. With the ubiquity of media and health information sources in recent times, Černý (2008) fittingly affirmed that patients too must be viewed as experts in their own right and as being capable of using jargons. Nonetheless, the provision of explanation and consistent verification that the patient has understood the jargon were proposed as alternatives to complete avoidance of medical terms. This recommendation is noteworthy in context of chronic diseases where education is feasible and jargons are unavoidable considering the long-term management of the disease which involves diagnostic procedures, treatment and health events. Further, health knowledge varies across patients as Lerner et al. (2000) reported that age, education and suburban hospital location were positively related to the score on a test of common medical terms. This makes it vital and also convenient for healthcare providers to tailor their communication to suit patients' characteristics such as age.

Despite the rise in chronic diseases such as cardiac ailments which demand a biopsychosocial approach in diagnosis and treatment (Deter 2012), the parlance of cardiologists which is key to such a holistic consultation, however, has received minimal attention from the Indian research community. Our study, therefore, had two objectives. First, we aimed to evaluate patients' level of understanding of common medical jargons used by cardiologists in their health communication with patients. Secondly, we sought to compare variations in the understanding of jargons used in cardiac health communication across three age groups of patients.

Method

Participants

The study involved a two-stage sampling process in order to select hospitals and participants. In the first stage, two corporate hospitals were selected, from Hyderabad (India) on the basis of permission obtained. In the second stage, 119 cardiac outpatients, who consulted cardiologists in the respective hospitals were recruited. The inclusion criteria indicated that the participants must be aged 18 years and above, and that they should be literate. In order to ensure that the participants had sufficient interaction with their respective cardiologists, we excluded patients who were consulting cardiologists in the said hospitals for the first time.

Of the 119 participants, 82.4 % were men and 17.6 % were women. They were aged between 18 and 80 years (M=52.37). The participants' educational qualification included primary school (10.9 %), middle school (13.4 %), secondary school (15.1 %), senior secondary school (17.6 %), graduation (39.5 %) and post-graduation (3.4 %). The sample comprised employees (37 %), businessmen (15.1 %), housewives (12.6 %), farmers (10.9 %), retirees (22.7 %), students (0.8 %) and unemployed (0.8 %).

Measures

Cardiac Jargons Comprehension Schedule (CAJCOMPS) This schedule consisting of 11 medical terms related to cardiac health was developed by the authors. Initially, a list of 99 cardiac terms was identified by the investigators from standard medical dictionaries. Three practising cardiologists other than those whose patients contributed to the sample were asked to tick those terms in this list that they normally use in their communication with patients. The inclusion criterion was that they should be attached to a corporate hospital as cardiologists. Thirty nine jargons were ticked by the three cardiologists. These 39 terms were then screened for establishing content validity. Six practising cardiologists independent of those three cardiologists who identified 39 out of 99 jargons were given the list of 39 jargons with the instruction that they should indicate those terms which essentially constitute their day-to-day cardiac health communication with patients. Additionally, they had to tick in a separate column those items which do not essentially form part of their communication with patients. Applying Lawshe's (1975) criterion, jargons having a content validity ratio of 0.99 and above across the six doctors were retained to be included in the final schedule. The final list of CAJCOMPS consisted of 11 medical jargons related to cardiac health (Angina, Blockage, Cholesterol, Echocardiogram, Electrocardiogram, Heart Attack, Heart Failure, Hypertension, Lipid Profile, Palpitation and Treadmill Test). This schedule was individually administered on the sample. The responses were recorded and transcribed verbatim. To identify the participant's understanding of jargon score, each jargon was rated by three medical experts on a scale of 1–5 (ranging from 'poor response' to 'excellent response'). 'Do not know' and 'wrong answer' for each participant against each item were counted separately. The mean of the three experts' scores for each of the 11 terms was the composite score of the patient's understanding of that jargon. To calculate the total CAJCOMPS score for each participant, the mean scores of the participant across 11 items were added together, where 'do not know' and 'wrong answer' were given a score of '0'.

Demographic details were also recorded in the 'Patient Information Sheet'.

Procedure

During Phase II, CAJCOMPS was individually administered to each participant. The data were collected over a period of one month after obtaining administrative permission from the management of the concerned hospitals and after seeking informed consent from individual participants. Each participant was told that the investigator would read out a list of 11 terms related to cardiac health. S/he was requested to explain in her/his own words what the term meant to her/him. The responses were audio recorded using a dictaphone. Those were later transcribed into written responses which were given to three medical experts for evaluation and rating. Phase III was elaborate as it involved the transcription of responses by the investigator and the individual evaluation of these responses by three doctors who independently rated every response of the individual participant using a scale of 1–5 (ranging from 'poor response' to 'excellent response'). The scoring for the individual participant was evolved by taking the mean scores of the three experts' ratings.

Results

The data were analysed to find out the extent of awareness among patients about the medical jargons inadvertently used by cardiologists during the process of consultation. It was also aimed at determining the role of age on patients' understanding of jargons. In order to meet the above objectives, percentages, *M*, *SD*, and One-way between-subjects ANOVA were computed.

Proportion of Patients Aware of Cardiac Jargons

Based on the participants' total scores, the frequency and the percentage of participants who 'know', 'do not know' or gave the 'wrong answer' for the 11 jargons are presented in Table 1. The percentage of patients who understood the 11 jargons varied from as low as 10.1 % (for Palpitation) to as high as 95.8 % (for Hypertension). It was observed that only five out of the 11 terms, i.e., Blockage, Cholesterol, Electrocardiogram, Heart Attack and Hypertension, were known to a majority (over 80 %) of the participants. The least understood terms were Angina (21.8 %) and Palpitation (10.1 %). In fact, Angina was the most wrongly understood term (by 13.4 % of patients) when compared with the other 10 jargons. It is evident from these findings that the knowledge of two essential cardiac symptoms, namely Palpitation and Angina, was substantially low. Awareness of such symptoms is indispensable as these may warrant consultation. While these figures about the whole sample give a classification of the percentage of patients' understanding of the jargons, it is also necessary to find out the proportion of awareness in different age groups of patients.

As Table 1 reveals the participants of the 46–60 years age group consistently constituted the highest percentage (over 50 %) of participants who knew the jargons compared with the oldest and the youngest age groups. Participants of the youngest age group (18–45 years) contributed the lowest percentage of participants who knew the jargons relative to the older age groups for 7 out of 11 terms (i.e., Angina, Blockage, Echocardiogram, Heart Failure, Lipid Profile, Palpitation and Treadmill Test). It is evident from Table 1 that not even a single cardiac jargon used by cardiologists is understood by all the patients. It is not sufficient to know whether participants in different age groups understood the jargons or not. It is equally important to estimate and compare patients' level of knowledge of these jargons based on their age.

Variations Across Age Groups in the Level of Understanding of Cardiac Jargons

Table 2 presents the mean understanding of the 11 jargons for patients of different age groups. Figure 1 gives a visual representation of the mean understanding of the 11 jargons in different age groups of participants.

It may be noted from Table 2 that although the mean scores of understanding for the jargons could range between 0 and 5, no age group, in fact, had a mean score >2 for any of the 11 jargons. The mean scores of the sample, as a whole, also varied between 0 and 2 only. This indicates a below average understanding of the medical terms commonly used by cardiologists. Furthermore, participants in the youngest age group (18–45 years) had the lowest mean scores across the 11 jargons while those of the oldest age group (61–80 years) consistently scored the highest and were followed closely by participants in the middle age group (46–60 years). It can be clearly observed from Fig. 1 that the understanding of cardiac jargons among participants in the 18–45 years age group was consistently low for every jargon, indicating a poorer understanding in contrast to those of the older age groups.

The results of One-way ANOVA (Table 2) revealed a significant difference, $F(2,116)=5.17$, $p=0.007$ across participant age groups on total CAJCOMPS scores. Given the significant result, post-hoc comparisons using Tukey HSD test were carried out. These showed that the mean of the total CAJCOMPS score of participants of the 18–45 years age group ($M=10.70$, $SD=4.35$) differed significantly ($p<0.05$) from those of the 46–60 years age group ($M=14.21$, $SD=6.42$) and of the 61–80 years age group ($M=15.74$, $SD=7.59$) while the mean scores of participants in these two older age groups did not differ significantly from each other's.

Table 1 Frequency and percentage of patients (N=119) with respect to the understanding of cardiac jargons

Jargon	Understanding of jargon					
	Know				Do not know (Total)	Wrong answer (Total)
	Total	Age group				
		18–45 (n=31)	46–60 (n=62)	61–80 (n=26)		
1. Angina	26 (21.8)	4 (15.4)	14 (53.8)	8 (30.8)	77 (64.7)	16 (13.4)
2. Blockage	96 (80.7)	21 (21.9)	52 (54.2)	23 (24)	23 (19.3)	0 (0)
3. Cholesterol	107 (89.9)	28 (26.2)	56 (52.3)	23 (21.5)	10 (8.4)	2 (1.7)
4. Echocardiogram	78 (65.5)	17 (21.8)	42 (53.8)	19 (24.4)	38 (31.9)	3 (2.5)
5. Electrocardiogram	108 (90.8)	28 (25.9)	57 (52.8)	23 (21.3)	7 (5.9)	4 (3.4)
6. Heart attack	109 (91.6)	28 (25.7)	58 (53.2)	23 (21.1)	9 (7.6)	1 (0.8)
7. Heart failure	68 (57.1)	7 (10.3)	40 (58.8)	21 (30.9)	46 (38.7)	5 (4.2)
8. Hypertension	114 (95.8)	29 (25.4)	60 (52.6)	25 (21.9)	3 (2.5)	2 (1.7)
9. Lipid profile	36 (30.3)	5 (13.9)	21 (58.3)	10 (27.8)	80 (67.2)	3 (2.5)
10. Palpitation	12 (10.1)	0 (0)	3 (25)	9 (75)	106 (89.1)	1 (0.8)
11. Treadmill test	76 (63.9)	14 (18.4)	42 (55.3)	20 (26.3)	41 (34.5)	2 (1.7)

Figures in parentheses indicate percentages

We then computed separate One-way ANOVAs to examine differences among the participants of the three age groups for each of the 11 jargons. The scores of the participants in the three age groups differed significantly for the terms Angina, Heart Failure, Palpitation, and Treadmill Test. Post-hoc comparisons using Tukey HSD test revealed that in case of the jargon Angina, the mean score of participants in the 18–45 years age group (M=0.13, SD=0.34) differed significantly (p<0.05) only from that of participants in the 61–80 years age group (M=0.63, SD=1.04) while the mean score of participants in the 46–60 years age group (M=0.35, SD=0.73) did not differ significantly from those of the other two age groups. For the jargon Heart Failure, the mean score of participants in the 18–45 years age group (M=0.29, SD=0.58) was significantly different (p<0.05) from those of participants in the 46–60 years (M=0.92, SD=0.85) and the 61–80 years age groups (M=1.02, SD=0.71) although mean scores of participants in the latter two older age groups did not vary significantly. The mean scores of participants in the 18–45 years (M=0.00, SD=0.00) and the 46–80 years age group (M=0.14, SD=0.63) differed significantly (p<0.05) from

Table 2 Mean scores of patients' understanding of cardiac jargons across the three age groups and the whole sample

Jargon	Whole sample (N=119)	Age group				
		18–45 (n=31)	46–60 (n=62)	61–80 (n=26)	F(2,116)	p
1. Angina	0.35 (0.75)	0.13 (0.34)	0.35 (0.73)	0.63 (1.04)	3.23	0.043
2. Blockage	1.77 (1.05)	1.39 (1.10)	1.88 (1.03)	1.98 (0.95)	2.99	0.054
3. Cholesterol	1.77 (0.93)	1.72 (0.87)	1.77 (0.89)	1.85 (1.10)	<1	0.870
4. Echocardiogram	1.33 (1.11)	1.09 (1.10)	1.40 (1.13)	1.46 (1.08)	1.05	0.353
5. Electrocardiogram	1.51 (0.73)	1.38 (0.61)	1.55 (0.74)	1.58 (0.84)	<1	0.519
6. Heart attack	1.89 (0.88)	1.75 (0.83)	1.93 (0.86)	1.97 (0.98)	<1	0.576
7. Heart failure	0.78 (0.81)	0.29 (0.58)	0.92 (0.85)	1.02 (0.71)	8.82	<0.001
8. Hypertension	1.95 (0.79)	1.77 (0.69)	1.99 (0.79)	2.06 (0.91)	1.06	0.348
9. Lipid profile	0.67 (1.09)	0.28 (0.68)	0.82 (1.22)	0.78 (1.08)	2.81	0.064
10. Palpitation	0.21 (0.68)	0.00 (0.00)	0.14 (0.63)	0.65 (0.97)	8.03	0.001
11. Treadmill test	1.39 (1.21)	0.90 (1.09)	1.46 (1.18)	1.78 (1.29)	4.15	0.018
Total	13.63 (6.46)	10.70 (4.35)	14.21 (6.42)	15.74 (7.59)	5.17	0.007

Figures in parentheses indicate standard deviation scores

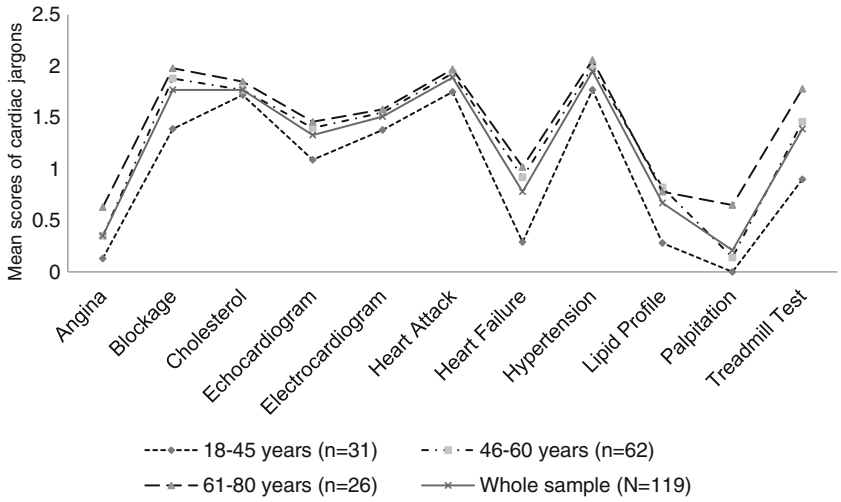

Fig. 1 Mean scores of patients' understanding of the cardiac jargons across the three age groups and the whole sample

that of participants in the 61–80 years age group (M=0.65, SD=0.97) for the jargon Palpitation. However, mean scores of participants in the 18–45 years and the 46–60 years age group demonstrated no significant difference. The mean score for the jargon Treadmill Test among participants in the 18–45 years age group (M=0.90, SD=1.09) differed significantly ($p<0.05$) only from that of participants in the 61–80 years age group (M=1.78, SD=1.29). The mean score of participants in the 46–60 years age group (M=1.46, SD=1.18) did not show any significant difference from those of participants in the 18–45 years and the 61–80 years age groups for this jargon.

Discussion

In a bid to understand the recipient's perspective of cardiac health communication, our study evaluated the proportion of patients who conceptually comprehended cardiologists' jargons, and examined the differences in the levels of knowledge of these jargons across three patient age groups. We found that our participants, in general, had a below par understanding of cardiac jargons, and further that participants in the youngest age group were at risk of ignorance about essential concepts related to cardiac health.

The proportion of awareness across the 11 jargons ranged from 10 % to 96 % of the participants. Surprisingly, only a minimal section of participants understood fundamental cardiac symptoms such as Palpitation and Angina although they had all been visiting cardiologists for review. Since the instrument used in this study (CAJCOMPS) was developed through content validation involving medical experts themselves, it can be inferred that doctors' inadvertent use of these jargons without prior explanation paves way for patients' lack of understanding about these terms. For example, a study by Boyle (1970) compared doctors' and patients' interpretations and illustrations of medical terms. With the exception of the term 'a good appetite', patients' and doctors' respective definitions of the other jargons (e.g., 'jaundice', 'least starchy food', 'heartburn' and 'palpitation') and illustrations of body organs (e.g., heart, lungs and liver) differed significantly. The continued use of medical jargons in such instances raises a question whether doctors misperceive the knowledge possessed and needed by patients. This was found to be true in Jukic et al.'s (2011) study wherein 30–50 % of doctors felt that they had provided adequate information to their patients about procedures and treatment refusal while only 8–11 % of patients reported receiving the same.

Our second important finding related to the dismal level of comprehension of jargons overall and particularly with reference to Angina, Heart Failure, Palpitation and Treadmill Test, among participants in the youngest age group (18–45 years) relative to those in the two older age groups (46–60 and 61–80 years). This reiterates Lerner et al.'s (2000) observation that younger patients are less likely to comprehend medical terms. The trend presents the potential risk of this group ignoring or bearing a serious cardiac symptom which warrants emergency consultation. The fact that younger age groups are increasingly coming under the bracket of risk for cardiac problems rings an alarm for the Indian healthcare system to protect this productive young group from cardiovascular deaths or irreversible medical consequences that incapacitate them. Healthcare professionals cannot be complacent about the lack of awareness of these symptoms as these very symptoms may necessitate emergency consultation. Considering the relatively premature age of onset of heart disease (50 % of acute myocardial infarctions occur among Indians aged <50 years) and its risk factors in India (Enas and Senthilkumar 2001; Prabhakaran and Singh 2011), cardiologists must pay added attention to patients in the youngest age group.

Patient-friendly communication not only positively impacts upon knowledge but additionally influences patients' prognosis and satisfaction. Adherence (i.e., how well the patient follows medical advice), for instance, is central to the maintenance of well-being in chronic diseases. In their review, Zolnierek and DiMatteo (2009) concluded that patients of doctors who communicate inefficiently tend to have 19 % higher risk of non-adherence. Further, an Indian study (Nikumb et al. 2009) found that effective doctor–patient communication was inversely related to pre-surgery anxiety. Doctor–patient interaction, therefore, impacts upon the patient's physical and psychological health. In view of the observation that doctors' jargons hinder patients' comprehension of health concepts, communicating in a manner that is accessible to the patient becomes an imperative for these professionals. Williams and Ogden (2004) reported that a group of patients whose doctors were asked to speak the lay vocabulary of their patients experienced higher satisfaction with the consultation and showed higher intent to adhere than the group whose doctors used medical terminology. Patients' satisfaction is reflective of their understanding as Falvo and Tippy (1988) noted that with higher satisfaction, the recall of doctor's advice increased which then, according to the authors, could lead to better patient adherence. Despite it being an economical and an effective facilitator of treatment and prognosis, doctor–patient communication, as an area of training, is ignored in the Indian medical curriculum (Agarwal et al. 2011). According to Marvel et al. (1999), doctors who had completed a fellowship in counselling and communication skills were more likely to give the patient the opportunity to express all concerns. Such two-way communication increases the involvement of patients as Zolnierek and DiMatteo (2009) observed that training doctors in communication doubles patients' adherence. In light of our finding that patients with chronic cardiac ailments have poor awareness of commonplace medical jargons, the Indian healthcare must wake up to the cost-effective means of enhancing doctor–patient collaborations and health outcomes in turn.

Communication, however, is always a two-way process and patients too can actively participate in their interaction with doctors. Moreover, the current Indian doctor–patient ratio of 1:1800 (Deo 2013) makes it difficult to satisfactorily educate each patient during consultation alone. This brings to the fore the need to go beyond doctors' communication and to enhance patients' health literacy. Audiovisual awareness initiatives in hospital waiting rooms, information booklets and peer patient group meetings conducted under professional supervision can resourcefully introduce patients to vital health concepts. Any unclarified aspects can further be discussed by patients with their doctors during consultation.

Ours is the first study to gauge Indian patients' level of understanding of the medical parlance used in cardiology settings. The approach has provided a means to appraise the deficits in cardiac health knowledge. Future research must be directed to evaluate Indian doctors' perceived use of jargons and the information actually received by their respective patients. Such comparative observations will help inform education modules for patients and training programmes for medical professionals.

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Research Article

Enhancing Hospital Well-being and Minimizing Intensive Care Unit Trauma: Cushioning Effects of Psychosocial Care

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Abstract

Context: Hospitalization has the potential to induce hospital anxiety, while admission in the Intensive Care Unit (ICU) is found to surpass the anxiety and result in what is termed as "ICU Trauma." **Aims:** This study aimed to determine the impact of psychosocial care and quality of ICU on ICU trauma and hospital well-being in patients who underwent coronary artery bypass grafting (CABG). **Settings and Design:** This correlational study involved 250 CABG patients, who were recruited from five major corporate hospitals. **Participants and Methods:** The ICU Psychosocial Care Scale, Hospital Wellbeing Scale, and ICU Trauma Scale were used. Each of the participants was assessed individually. The ICU Practices Checklist was used to assess the environment of the ICU in the hospital. **Statistical Analysis Used:** Descriptive statistics, correlation, and simple and multiple linear regression analyses were done. **Results:** The results revealed the significant contribution of psychosocial care in ICU in enhancing hospital well-being as well as minimizing ICU trauma of patients who underwent CABG. The results of multiple regressions clearly indicated that psychosocial care was a powerful predictor of hospital well-being and ICU trauma. **Conclusions:** Although psychosocial care was not a component of hospital well-being and had a negative correlation with ICU trauma, it contributed significantly with a cushioning effect to minimize trauma and helped enhance the feelings and experiences of well-being among patients in ICU.

Keywords: Coronary artery bypass grafting, hospital well-being, Intensive Care Unit trauma, psychosocial care

Introduction

Hospitalization has the potential to induce hospital anxiety, while admission in the Intensive Care Unit (ICU) is found to surpass the anxiety and result in what is termed as "ICU Trauma." ICU trauma refers to a phenomenon resulting from a patient's stay in ICU of a hospital. It is the patient's strong emotional experience such as vulnerability, shock, intense fear, or emotional numbing, which in turn impacts the cognition and behavior of the patient manifested in the form of cognitive disorientation, avoidance behavior, and taking many other negative forms. Patients undergoing coronary artery bypass graft (CABG) surgery are required to stay in the ICU for 4–6 days during which they convalesce under close monitoring. The extreme environmental conditions of the ICU induce physical and mental stress and anxiety in the patient. The management of such distress in the ICU necessitates psychosocial care and intervention in addition to the ongoing medical treatment. The subsequent outcomes of such care can be measured on medical and nonmedical criteria. The nonmedical criterion is measured in terms of hospital well-being which refers to the subjective perception and evaluation of a patient's health condition in terms of his/her affect states, psychological functioning, social relations, and spiritual well-being.

The ICU atmosphere is that of a large room, with artificial lightning, beeps of monitoring machines, sounds of ventilators, mourns of patients, constant movement of highly skilled doctors and nursing staff, and the absence of family. A stay in this environment impinges heavily upon patient's physical and psychological resources. A clinical review[1] reported that weight loss, fatigue, poor appetite, and muscle weakness may impair physical functioning, which results in severe exhaustion such that patients are unable to accomplish even simple physical tasks. Tubes and wires attached to the body

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immobilize patients which then increases dependency and vulnerability and adds to a feeling that they no longer are in charge of their physical condition.[2-4] The extreme physical environment of the ICU additionally engenders alterations in sensory inputs, namely, sensory deprivation, sensory overload, excessive noise, physical and social isolation, and restriction of movement, which are some of the causes of psychological trauma. A review study[5] on nocturnal care interactions in the ICU during 147 nights revealed that several nursing activities such as measuring vital signs, administering medication, obtaining blood samples, and bathing patients take place between 7 pm and 6 am, thus requiring continuous light at the nursing station and near the patient's bed. Strong lightning and noise affect physiological parameters such as blood pressure, heart rate, and sleep.[6] These stressors and ongoing activities contribute to the incidence of ICU delirium, i.e., a temporary loss of orientation in time and place and experience of unreal events.[7,8] The experience of ICU patients is equated to that of a torture victim,[9] claiming that debility and dependence in torture situations are produced by depriving people of food, drink, sleep, and human contact, and the same situation occurs in the ICU. Patients in ICU exhibit symptoms similar to posttraumatic stress disorder (PTSD). These reactions persist even after the ICU stay. The reactions appear as re-experiencing the event (flashbacks), avoiding situations that remind one of the events, a numbed reaction, and hyperarousal.[10] Thus, the traumatic experiences of the ICU are long-lasting and have adverse effects on patients' cognitive–affective functioning.[11] ICU patients showed strikingly high rates of psychological morbidity, which is claimed to be reduced using psychological interventions along with modified pharmacological and medical interventions.[12]

Consider also that the prevalence of anxiety and depression among cardiac patients is three times higher than in the general population, with 25%–30% of patients reporting persistent problems with anxiety and/or depression.[13] In combination with ICU trauma, the patient's state may only worsen. Research reveals that the management of delirium is done mainly through pharmacological treatment. However, few nonpharmacological interventions such as exercise and early mobility are found to be helpful in reducing delirium. An interventional study on early mobility and reduction of delirium in ICU patients[14] found that the group of patients who were given physical and occupational therapy along with the interruption of sedation were found to have a significant decrease in delirium (50%) in the ICU. Nonetheless, several studies on cardiac patients[15-18] noted that interventions such as guided imagery, relaxation techniques, emotional and informational support, personal attention by medical professionals, and breathing exercises helped reduce the impact of the ICU environment and enhanced patient outcomes. Evidence that multiple psychosocial factors may influence adaptation to heart surgery has implications for understanding and ameliorating presurgical distress and for improving postsurgical recovery.[19] Research has furthermore revealed that psychological preparation,[20] cognitive interventions such as preoperative information[21] and cardiac rehabilitation[22] can improve patient outcomes and reduce emotional distress. If postsurgery interventions and psychological preparation can improve the patient's well-being, then a strategically planned psychosocial care intervention in the ICU can have a greater impact on the overall patient outcomes. Consequently, an ICU which fosters psychosocial support can accelerate patients' holistic well-being and recovery.

National and international boards such as the National Accreditation Board for Hospitals (NABH),[23] the Joint Commission International (JCI),[24] and the Society of Critical Care Medicine (SCCM)[25] provide guidelines and set standards for hospitals to ensure holistic care for patients. Although psychosocial care in the health-care system is insisted upon by these guidelines, it has not received the attention and the significance it deserves. Moreover in India, the practices followed in hospitals are skewed toward the biomedical model, leaving aside psychosocial care. This brings us to a question whether adherence, partial adherence, or nonadherence to these standard guidelines for psychosocial care results in significant differences in hospital well-being and ICU trauma? Hence, the study was conceptualized to determine the impact of psychosocial care and ICU quality on ICU trauma and hospital well-being in patients who were admitted in cardiac ICUs for a stipulated period of time after CABG surgery.

Participants and Methods

Participants

The correlational study using a multistage sampling included 250 patients in the sample who were moved into the ward after a stay of 4–6 days in the ICU after undergoing CABG. The participants were a convenience sample selected from five corporate hospitals. From each hospital, fifty participants were selected. The participants included both men (69%) and women (31%). Their age ranged from 40 to 75 years, with a mean age of 55 years (standard deviation = 9.7). The inclusion criteria for hospitals and the sample were as follows.

Inclusion criteria for hospitals

We approached hospitals that were accredited by NABH, where at least 12 CABG surgeries per week were performed and that were willing to sign the informed consent form.

Inclusion criteria for patients

All patients aged between 40 and 75 years who underwent CABG with a minimum stay of 2 days in the ICU, who were in a condition to communicate verbally, and who were willing to participate in the study and signed the informed consent form were included in the patient sample.

Instruments

We used the ICU Psychosocial Care Scale, Hospital Wellbeing Scale, ICU Trauma Scale, and ICU Practices Checklist. These tools are described below.

The Intensive Care Unit psychosocial care scale

The scale was a revised version of Intensive Care Experience Rating Scale[11] and consisted of 18 items, each measured with a 5-point rating scale ranging from "Never" to "Always." The scale measured psychosocial care in three dimensions, namely, protection of human dignity with the dimension score ranging between 7 and 35, family–patient communication channel, where the dimension score ranged between 6 and 30, and family–patient anxiety prevention with the dimension scores ranging from 5 to 25. The total score ranged from 18 to 90. Cronbach's alpha was found to be 0.75 in the present sample.

The Hospital Wellbeing scale

The Hospital Wellbeing Scale was constructed taking the Warwick–Edinburgh Mental Wellbeing Scale[26] as the basis. It measured four important dimensions of health, i.e., physical, mental, social, and spiritual health using 28 items. The scale measured the feelings and experiences of the patients by assessing how often the patient feels the way described in the item on a 5-point scale ranging from "None of the time" to "All of the time." Sum of the items on each dimension was the score for that particular dimension. The maximum score for the scale was 140 and the minimum score was 28. Since each dimension comprised of 7 items, the scoring for each of the dimensions, namely, psychological, physical, social, and spiritual well-being ranged between 7 and 35. Cronbach's alpha was found to be 0.88 in the present sample.

The Intensive Care Unit trauma scale

The scale was a modified version of Davidson Trauma Scale.[27] It consisted of 15 items measuring three dimensions of trauma, namely, re-experience, emotional numbing and avoidance, and hyperarousal on a 5-point rating scale ranging from "Not at all" to "Always." The re-experience dimension had 5 items where the dimension scores ranged from 5 to 25. There were six items in emotional numbing and avoidance with the dimension scores ranging from 6 to 30. Four items measured hyperarousal that ranged the scores from 4 to 20. The overall trauma score ranged from 15 to 75. Cronbach's alpha was found to be 0.72 in the present sample.

The Intensive Care Unit practices checklist

The ICU Practices Checklist was used to measure ICU quality. This scale was developed based on the guidelines for maintaining standards of ICUs provided by various bodies such as the JCI, the Indian SCCM, and the NABH. The checklist consisted of 34 statements related to ICU practices. This was used by the investigators who checked the presence or absence of the practices stated in the checklist. The scores ranged between 0 and 34.

Procedure

After completing the administrative formalities and informed consent, the patients were contacted in the ward/rooms within 24 h of shifting them from ICU. The scales were administered on them. Sometimes, when they expressed tiredness, the administration of tools was staggered to suit their convenience.

The ICU Quality Checklist was used by the first author who observed each of the five ICUs at different points of time of the day and night.

Results

The results attempted to identify different factors positively contributing to hospital well-being and also those factors that contribute to minimize ICU trauma. Separate simple linear regression analyses were carried out for hospital well-being and ICU trauma. The independent variables for both the criterion variables were psychosocial care, ICU quality, income level, age, duration of stay (in the hospital), and gender. The findings of simple linear regression analyses are summarized in Table 1.

It can be observed from Table 1 that, with regard to hospital well-being, among all the predictors, psychosocial care explained statistically significant (18%) proportion of the variance, $R^2 = 0.18$ and adjusted $R^2 = 0.18$, $F(1, 248) = 56.80$, $P < 0.01$. The relationship between psychosocial care and well-being was positive, $\beta = 0.43$, $P < 0.01$, showing that high psychosocial care was associated with high well-being. The high β-value shows a strong relation between the predictor psychosocial care and criterion, i.e., hospital well-being. The results in addition showed that income level was also a significant predictor of well-being, though it accounted for only 2% of variance on the well-being scores, $R^2 = 0.02$, adjusted $R^2 = 0.01$, $F(1, 248) = 5.2$, $P < 0.05$. A positive correlation between income level and hospital well-being was observed ($\beta = 0.15$ and $P < 0.05$).

Table 1: Summary of simple regression analyses for variables predicting hospital well-being and Intensive Care Unit trauma in Intensive Care Unit patients who underwent coronary artery bypass grafting

Predictors	Hospital well-being						ICU trauma					
	B	SEB	β	SE	R^2	*F* (1,248)	*B*	SEB	β	SE	R^2	*F* (1,248)
Psychosocial care	0.81	0.11	0.43**	11.43	0.18	56.80**	−0.41	0.07	−0.34**	7.76	0.12	32.80**
ICU quality	0.23	0.22	0.06	12.64	0.004	1.09	−0.30	0.15	−0.13*	8.19	0.02	4.13*
Income level	2.2	0.98	0.15*	12.54	0.02	5.2*	−1.13	0.64	−0.11	8.21	0.01	3.15
Age	0.06	0.08	0.05	12.65	0.003	<1	0.04	0.05	0.05	8.25	0.01	<1
Duration of stay	1.18	0.91	0.08	12.63	0.007	1.7	−0.07	0.59	−0.01	8.26	0.01	<1
Gender	1.73	1.73	0.06	12.64	0.004	<1	1.88	1.13	0.10	8.21	0.01	2.73

n=250; *P<0.05; **P<0.01. *B*: Unstandardized beta coefficient; SEB: Standardized error of beta; β: Standardized beta coefficient; SE: Standard error of the estimates; ICU: Intensive Care Unit

The findings of simple linear regression analyses for the criterion ICU trauma revealed that statistically significant (11%) proportion of the variance in ICU trauma was explained by psychosocial care, $R^2 = 0.12$, adjusted $R^2 = 0.11$, F (1, 248) = 32.80, $P < 0.01$. The relationship between psychosocial care and ICU trauma was negative, $\beta = -0.34$, $P < 0.01$, stating that, with increase in the psychosocial care, the ICU trauma among patients decreased. Apart from the psychosocial care, ICU trauma was also caused by the very environment of the ICU vis-à-vis the physical condition of the patient. The results of simple linear regression analysis showed that the ICU quality had an impact on ICU trauma. A small yet a statistically significant (2%) proportion of the variance in ICU trauma was explained by ICU quality, $R^2 = 0.02$, adjusted $R^2 = 0.01$, F (1, 248) = 4.13, $P < 0.05$. ICU quality was inversely related to ICU trauma, $\beta = -0.13$ $P < 0.05$, i.e., improved ICU quality results in reduced ICU trauma.

The findings infer that psychosocial care and good ICU quality played a positive role in mitigating or minimizing ICU trauma. Evidence from literature associated psychological distress and trauma as a consequence of ICU stay. Studies have recommended the need of psychological approaches and psychosocial interventions in dealing with ICU trauma. Such interventions can be brought about only by enhancing psychosocial care. The results of simple linear regression analyses substantiated the above statement by indicating that psychosocial care and ICU quality were significant contributors in reducing ICU trauma, while variables such as age, gender, duration of stay in hospital, and income level played no significant role in determining ICU trauma.

Thus, two variables – psychosocial care and income level – were found to independently contribute to hospital well-being while two variables – psychosocial care and ICU quality – were found to independently contribute to ICU trauma. Carrying it forward, two separate multiple linear regression analyses using simultaneous method were conducted to find the combined effect of psychosocial care and income level on hospital well-being and the combined contribution of psychosocial care and ICU quality on ICU trauma. The results are presented in Table 2.

Simultaneous multiple linear regression analysis for hospital well-being presented in Table 2 revealed that the combined predictors of psychosocial care and income level explained 19% of variance in hospital well-being, $R^2 = 0.19$, adjusted $R^2 = 0.18$, F (2, 247) = 28.74, $P < 0.01$. Psychosocial care was the only significant predictor ($\beta = 0.45$, $P < 0.01$), whereas income level was not found to be a significant predictor ($\beta = 0.06$, $P > 0.05$) in the final model.

As it can be observed from Table 2, ICU trauma in patients was significantly negatively related, $\beta = -0.38$, $P < 0.01$, to psychosocial care showing that higher levels of psychosocial care are associated with lower levels of ICU trauma. The multiple linear regression revealed that the combined predictors of psychosocial care and ICU quality explained

Table 2: Summary of multiple regression analyses for variables such as psychosocial care and income level predicting the criterion hospital well-being, and psychosocial care and Intensive Care Unit quality predicting the criterion Intensive Care Unit trauma

Predictors	Hospital well-being			ICU trauma		
	B	SEB	β	*B*	SEB	β
Psychosocial care	0.85	0.12	0.45**	−0.47	0.09	−0.38**
Income level	0.85	0.99	0.06	-	-	-
ICU quality	-	-	-	0.20	0.17	−0.08*
R^2		0.19			0.12	
Constant		44.43			67.32	
F (2, 247)		28.74**			17.14**	

n=250; *P<0.05; **P<0.01. *B*: Unstandardized beta coefficient; SEB: Standardized error of beta; β: Standardized beta coefficient; ICU: Intensive Care Unit

12% of variance in ICU trauma, $R^2 = 0.12$, adjusted $R^2 = 0.12$, F (2, 247) = 17.14, $P < 0.01$. It can also be observed from Table 2 that ICU quality was also negatively correlated, $\beta = -0.08$, $P < 0.05$ with ICU trauma, showing that higher ICU quality was associated with lower levels of ICU trauma. Thus, both psychosocial care and ICU quality were found to be the significant predictors of ICU trauma.

The results of simple linear regression and multiple linear regression analyses showed that, while psychosocial care was a significant predictor of ICU trauma, the influence of ICU quality on ICU trauma was marginal. From the simple and multiple regression analyses to predict hospital well-being and ICU trauma, it is very evident that psychosocial care emerged as a significant predictor of hospital well-being and ICU trauma, while the contributions of income level to hospital well-being and the ICU quality to ICU trauma were marginal. Psychosocial care thus emerged as a significant major contributor in enhancing hospital well-being and minimizing ICU trauma.

The results of linear regression analyses revealed that a significantly higher degree of psychosocial care was found to have not only a positive impact on hospital well-being, but also minimize ICU trauma. This in turn is expected to have a noticeable influence on the pace of recovery, restoration of well-being, and minimizing the chances of re-hospitalization.

Discussion

The present study was taken up to examine if psychosocial care has a cushioning effect in enhancing hospital well-being and minimizing, if not, mitigating ICU trauma. The results clearly indicate the significant contribution of psychosocial care in ICU in enhancing hospital well-being as well as minimizing ICU trauma of patients who undergo CABG. The results of multiple regressions clearly indicated that psychosocial care is a powerful predictor of hospital well-being and ICU trauma.

Clinician–patient relationship is extremely vital in a critical care setting.[28] Supportive interventions, such as explanations,

giving advice, reassuring and raising faith and hope, strengthening patients' self-esteem, giving emotional warmth, empathetic listening and empathetic touch, emotional care, and spending extra time with patients are some of the psychological and social aspects.[29] Such interventions have a cushioning effect on the patient by providing the cushion for absorbing the adverse impact of ICU and minimize ICU trauma. Further, the cushion of psychosocial care also helps in springing up the well-being in patients.

ICU care that does not include the above aspects leaves the patient anxious, disoriented, uncertain, vulnerable, unattended, and perhaps unventilated and suppressed. This has its repercussion in the form of nightmares, flashbacks, re-experience, avoidance, and numbing culminating in trauma that sometimes closely resembles PTSD even after their discharge from ICU. The results of the present study corroborate with earlier findings that negative emotions, when intervened with psychosocial care, can prevent the immediate- and long-term negative impact. Negative emotions and stress have both immediate- and long-term effects on patients' physical and psychological well-being.[30] Providing psychosocial care helps reduce negative stress and restores well-being. The results of the study highlighted that patients who received high psychosocial care had higher levels of well-being and lower levels of ICU trauma. It is very clear that, though not a component of hospital well-being, psychosocial care helps in enhancing the feelings and experiences of well-being among patients in ICU. In the same manner, though independent of ICU trauma, it is found to have a negative correlation with ICU trauma and significantly contribute in minimizing trauma. Thus, the role of psychosocial care is that of a medium which influences ICU trauma and hospital well-being.

It is important for the hospitals to reorient themselves on psychosocial care in view of its great contribution in mitigating ICU trauma and enhancing well-being. Research has proved that trauma negatively impacts convalescence,[31] and sometimes is responsible for relapse and rehabilitation.[32] Psychosocial care functions as prophylactic in preventing such repercussions of ICU trauma.

Conclusion

Basically psychosocial care relates to the attitude and behavior of the middle-level workers, such as nursing staff and attendants. Psychosocial care relates to some extent to the ethical practices, such as protecting the patient's privacy, obtaining oral informed consent before procedures, explaining the procedures before initiating so as to minimize, if not mitigate the anxiety, responding to nonverbal communication of the patient, and liaisoning between the patient and family. These practices do not call for specific allocation of time or funds. This can be introduced, incorporated, monitored, and measured by introducing regular in-service training for the staff where they should be oriented and sensitized to the psychosocial needs of the patients. This minor intervention through a policy by the management of hospitals would be highly beneficial both to the patient and to the management in view of the pace of recovery for the patient and reputation of the hospital. A higher level of psychosocial care which demands a holistic approach and a marginal increase in time invested in communication may prove to be cost-effective when assessed for the impact on the patients' well-being. Hence, it calls for the hospitals to weigh its overall advantages and include it as an important dimension in ICU care.

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Conflicts of interest

There are no conflicts of interest.

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PLAGIARISM STATISTICS REPORT APPENDIX E

Form and Frequency of Cognitive Intervention: Impact on Adherence and Management of Primary Hypertension

by Asher Andrew

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