TO DETERMINE THE KNOWLEDGE, ATTITUDES AND PERCEPTIONS OF HYPERTENSIVE PATIENTS TOWARDS LIFESTYLE MODIFICATION IN CONTROLLING HYPERTENSION

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In partial fulfillment of MSc (Med) in the field of Sports Medicine

i.DECLARATION

I herewith declare this to be my own work, that I have acknowledged all the sources I have consulted in this research project itself and not only in the bibliography, that all the wording not accompanied by a reference is my own, and that no part of this assignment has been directly sourced from the internet or other sources without providing the necessary recognition. I acknowledge that if any part of this declaration is found to be false no marks will be allocated to me and that charges can be laid against me for plagiarism before the Central Disciplinary Committee of the University. I declare that this research is my own aided work and it is being submitted in partial fulfillment for the degree of MSc (Med) in the field of Sports Medicine to the University of Witwatersrand, Johannesburg. It has not been previously submitted for any degree or examination to any other university.

ii. ACKNOWLEDGEMENTS

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iii. ABSTRACT

BACKGROUND

Worldwide, hypertension is the third leading risk factor contributing to death, surpassed only by malnutrition and smoking. [1] Hypertension is common and treatable and because uncontrolled hypertension has serious consequences, preventive measures and control of blood pressure should be a high priority. A healthy lifestyle remains the cornerstone of the management of blood pressure (BP) for all severities of hypertension. It is possible to prevent the development of hypertension and to lower blood pressure levels by simply adopting a healthy lifestyle. [2] Health care workers can assess and contribute to the management of hypertension with exercise adequately if the patient is educated and convinced that lifestyle changes are essential and indeed the most cost effective method of obviating cardiovascular disease.

METHODS

Patients with hypertension (N=110) were identified from a cohort of patients attending the outpatients department of Carletonville Hospital, a district hospital situated in the mining town of Carletonville, South Africa, and were then invited to participate in the study. A cross-sectional descriptive study design was used to determine the knowledge and attitudes of these patients with respect to the importance of lifestyle modification in the management of hypertension. This was achieved by administering a questionnaire. Descriptive and inferential statistical methods were employed to analyze the data.

RESULTS

The largest number of respondents fell in the 50-59 year old age groups (28%). Females (62%) made up a significant majority of the study population. The population breakdown included the following: Black respondents were 75%, while 24 % were white and 1% coloured. Body Mass Index was more than 25 in 81% of the respondents and 84% of the population had schooling levels below high school. Fifty seven percent (57%) of the respondents ate fried foods regularly, 70 % cooked with salt, 18% add salt to their food, while 14% ate red meat regularly and 26 % consumed alcohol, with 6 % having more than 3 beers/day.

The majority of participants led sedentary lifestyles according to the physical activity score, with 74% having little or no activity. At the time of the study 69% had blood pressure (BP) levels above 140/90 mmHg with only 42% knowing what their normal BP should be. Seventy seven percent (77%) believed that exercise lowers BP, and only 30% reported having received such advice from a medical professional. Ninety five percent (95%) believed that a balanced diet is important in controlling hypertension and fifty one percent (51%) reported having being advised by a medical professional about a balanced diet. Ninety four percent (94%) knew that adding salt to food affects BP and sixty nine percent (69%) reported having being told by a medical professional about the effects of excessive salt intake in their diets. Eighty percent (80%) believed that alcohol affects blood pressure and forty four percent (44%) reported having received such information from a medical professional. Seventy five percent (75%) believed that smoking affects BP and thirty six percent (36%) got this information from a medical professional.

DISCUSSION

The results indicate that respondents reported having received advice about lifestyle modification from medical professionals. The advice varied between areas of lifestyle change, which included education on diet, alcohol, smoking and exercise. The most frequently given advice was on diet and salt intake, with exercise being the least often information provided to the patients by medical professionals. Reduced salt intake advice was the most frequently reported (69%), followed by a balanced diet (51%), reduced alcohol intake (44%), not smoking (35%) and benefits of exercise (30%).Despite this most of the respondents were leading sedentary lifestyles, were overweight (BMI>25) and had BP`s greater than 140/90 mmHg . The reasons provided for not exercising varied from “not being used to it”, “no- time” to “body pain”. Twenty one percent (21%) were not on a proper diet due to financial reasons, 16% stated lack of information as the reason and 9% just found unhealthy food to be very tempting.

CONCLUSION

The results of this study suggest that although patients do receive advice on lifestyle modification, it is not effective in changing patient behavior, and may therefore be inadequate and not emphasized enough and also not all patients are advised by medical professionals about lifestyle change. The reason for this is not known. Greeff (2006) in his study emphasized that building a trusting relationship between the healthcare worker and the patient is one of the most important aspects when motivating patients. [2]

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1. CHAPTER ONE:

1.1 INTRODUCTION

Worldwide, hypertension is the third leading risk factor contributing to death, surpassed only by malnutrition and smoking. [1] Hypertension is mainly due to an interaction of environmental and genetic factors. Although the precise genetic factors influencing blood pressure are largely unknown, many of the environmental and social factors that contribute to the development of high blood pressure are well known, and include obesity, excessive alcohol consumption, sedentary lifestyle, unhealthy diet and stress. [1] Hypertension is common and treatable and uncontrolled hypertension has serious consequences, such that preventive measures and the control of blood pressure should be a high priority. Furthermore, given the high cost and potential complications of treating large numbers of patients with drugs, alternatives and adjuncts to drug therapy need to be considered for those with hypertension. [1]

A healthy lifestyle remains the cornerstone of the management of hypertension at all levels of the disease. A healthy lifestyle decreases blood pressure, enhances antihypertensive drug efficacy and decreases total cardiovascular risk. [4] In 2009, the Department of Health of South Africa and the South African Hypertension Society released the South African Hypertension Guidelines, to assist health professionals in the management of hypertension. Their strategy for a healthy lifestyle is supported and includes the following elements: [5]

- Achieve and maintain ideal weight with a body mass index (BMI) between 18.5 and 24.9 kg/m^2 by means of limiting caloric intake and increasing daily physical activity. [5]
- Limit total sodium intake to less than 2400 mg per day (Less than one teaspoon of salt per day). [5]
- Limit alcohol intake to two standard drinks per day for men and one standard drink per day for women and small men. A standard drink contains about 10 g of ethanol (e.g. 25ml spirits, 125ml wine, 340ml beer) [5]
- Follow the World Health Organization nutrition guidelines. These guidelines emphasize a diet low in total fat with high intake of fruit and vegetables, regular use of low fat dairy products, a high intake of fibre containing wholegrain foods, fish rather than red meat, the use of products low in saturated fat, low salt, and sparing use of sugar and sugar-containing foods. Intake of beverages with high caffeine levels should be avoided. [5]
- Regular moderate-intensity exercise for at least 30 minutes on most or preferably all days of the week. Patients with uncontrolled hypertension should embark on exercise training only after medical evaluation and initiation of therapy. [5]
- Stop the use of all tobacco products, including snuff. [5]

This study aimed to determine the attitudes, perceptions and knowledge of hypertensive patients towards lifestyle modification in the control of hypertension.

1.2 PURPOSE OF THE STUDY

The purpose of this study was to determine the knowledge of patients towards lifestyle modification and its importance in the management of hypertension. This included determining the attitudes and perceptions that these patients had with respect to adopting healthy lifestyle changes.

A secondary aim was to determine the patient's perceptions about being counseled on lifestyle modification by medical professionals. This information may help shape health care policy, education and research aimed at reducing the adverse consequences of hypertension.

1.3 STATEMENT OF PROBLEM

Motivating patients to implement lifestyle changes is probably one of the most difficult aspects of managing hypertension. According to a review of literature in South Africa, [5, 6, 8] there appear to be no studies that have comprehensively assessed patient hypertension knowledge, attitudes and perceptions on the importance of lifestyle modification in controlling hypertension. In South Africa good lifestyle changes are further complicated by varying socio-economic conditions, education levels and poor health care delivery. This study will inform health care workers on possible education and lifestyle modification emphasis for these patients. This could augment already existing methods of treatment in the management of hypertension.

1.4 OBJECTIVES OF STUDY

The objectives of this study were:

- To determine the knowledge, attitudes and perceptions of hypertensive patients towards lifestyle modification in controlling blood pressure.
- To determine if patients perceive that they are being counseled on lifestyle modification.
- To ascertain how much time patients perceive that medical professionals spend counseling them on the importance of lifestyle modification in the management of their hypertension.

The hypothesis that the attitudes of patients towards adopting healthy lifestyle changes is influenced by the effective counseling they receive from medical professionals was tested using a questionnaire and the patients' medical records. The subjects were provided with a questionnaire and it is assumed that all respondents understood the questions and answered honestly and truthfully.

1.5 DEFINITION OF TERMS AND ABBREVIATIONS

WHO: World Health Organization

Blood Pressure: (BP) is a force exerted by circulating blood on the walls of blood vessels. It is a measure of the pressure exerted on the arterial walls by the blood when the heart is in systole (systolic pressure), and the pressure maintained by the elasticity of the arteries when the heart is in diastole (diastolic pressure) measured using a sphygmomanometer and the units of measure are millimeters of mercury (mmHg)

HYPERTENSION: high blood pressure, a common disorder in which blood pressure remains abnormally high (readings above 140/90 mmHg)

Body Mass Index: BMI, a measure of someone`s weight in relation to their height. It is measured by dividing the subject`s weight by the square of the height. It is the most widely used measurement for obesity. A BMI from 21-25 is considered normal, 25-29 is considered overweight and a BMI over 30 is considered obese

NUTRITION: Nutrition is the process in which one consumes food or nourishing liquids, digests and absorbs them and use them for health and growth.

SEDENTARY: a lifestyle of not engaging in any physical activity

PHYSICAL ACTIVITY: Physical activity is a broad term that encompasses all forms of muscle movements. These movements can range from sports to lifestyle activities. Furthermore, exercise can be defined as physical activity that is a planned, structured movement of the body designed to enhance physical fitness. Regimented or purposeful exercise consists of a program that includes twenty to sixty minutes of activity at least three to five days a week. Some examples of this type of activity include walking, running, cycling, or swimming.

LIFESTYLE MODIFICATION: adopting a healthy lifestyle. This includes losing weight if overweight or obese, limiting alcohol intake, increasing physical activity, reducing salt intake, limit alcohol intake and stop smoking

ALCOHOL CONSUMPTION: the drinking of beverages containing ethyl alcohol. Because of the effects that alcohol has on the body, it is advisable that alcohol intake be limited to no more than 1 ounce (30 ml) ethanol (e.g., 24 ounces [720 ml] beer, 10 ounces [300 ml] wine, or 2 ounces [60 ml] 100-proof whiskey) per day or 0.5 ounces (15 ml) ethanol per day for women and lighter weight people.

2. CHAPTER TWO (LITERATURE REVIEW)

2.1 INTRODUCTION

Hypertension is an increasingly important medical and public health issue worldwide. High blood pressure is estimated to have caused 7.6 million premature deaths (13,5% of the total) and contributed 92 million disability adjusted life years worldwide in 2001. [1] It has been suggested that the prevalence of cardiovascular disease and hypertension is increasing rapidly in sub-Saharan Africa. The current prevalence in many developing countries, particularly in urban societies, is said to be already as high as those seen in developed countries. The higher prevalence of hypertension in urban areas compared to rural areas strongly implicates differences in lifestyle as an explanatory factor. Higher levels of obesity and increased salt and fat intake from consuming more processed foods and engaging in jobs with minimal physical activity are likely explanations for higher hypertension in urban populations. [1]

Table 2.1: Blood Pressure Classification

CATEGORY	SBP/DBP
Optimal	**<120/80**
Normal	**120-129/80-84**
Borderline	**130-139/85-89**
Hypertension	**>140/90**
Stage 1	**140-159/90-99**
Stage 2	**160-179/100-109**
Stage 3	**>180/110**

Source: The sixth report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Arch Intern Med* 1997; 157: 2413-46.

Hypertension is defined as sustained resting blood pressure (BP) above 140/90 mmHg (Table 2.1). Approximately 17% of the adult westernized population has this disease. [2] Hypertension, at 59% prevalence, is the most common cardiovascular disease risk factor among black South Africans. [3] It is an extremely common finding in the community and a risk factor for myocardial infarction, stroke, congestive heart failure, end-stage renal disease, and peripheral vascular disease. Pharmacological treatment of hypertension has been shown to decrease the risk of cardiovascular disease complications, including stroke, coronary heart disease, and renal insufficiency. Non-pharmacological intervention provides an effective means to lower blood pressure and has been emphasized increasingly as a useful method for both prevention and treatment of high blood pressure. [4]

Lifestyle modifications to introduce healthy behaviour are important in both the primary and secondary prevention and management of hypertension. [5] Barriers to hypertension care and control are well recognized and exist at the patient, provider and organizational levels. [6] These barriers include lack of knowledge about the seriousness of untreated hypertension and the benefits of controlling hypertension, unemployment, alcohol and illicit drug use, cost of care and medications, drug side effects and complexity of the regimen. [6]

2.2 HYPERTENSION AETIOLOGY AND PATHOGENESIS

The Framingham study 1997 [7] studied the haemodynamic patterns of age-related changes in blood pressure. The normotensive and untreated hypertensive subjects in the study showed a linear rise in systolic blood pressure (SBP) from age 30 through 84 years and a concurrent early increase in diastolic blood pressure (DBP); after age 50 to 60 years, DBP declined, pulse pressure (PP) rose steeply, and mean arterial pressure (MAP) reached an asymptote. [7] Analysis of individual subject regressions as a function of index examination SBP groups showed that linear slopes differed for SBP, PP, and MAP, whereas it was curvature that differed for DBP; these represented divergent rather than parallel tracking patterns.

The reduction of DBP after age 60 years has been attributed to "burned out" diastolic hypertension, [7] but this decrease in DBP was observed in both normotensive and untreated hypertensive individuals, making it unlikely that "burned out" diastolic hypertension could explain the decreasing DBP in the elderly. A further hypothesis, namely an age-related decrease in cardiac output as the cause for the late fall in DBP, was inconsistent with the late rise in SBP. The most likely explanation, therefore, for the fall in DBP after age 60 years was increased large artery stiffness. [7, 8, 9]

The decline in DBP seen in the elderly was probably the result rather than the cause of the disease process. Age-related stiffening of the aorta was associated with a decreased capacity of the elastic reservoir and hence a greater peripheral runoff of stroke volume during systole. Thus, with less blood remaining in the aorta at the beginning of diastole, and with diminished elastic recoil, diastolic pressure decreases with increased steepness of diastolic decay. [7] The exaggerated fall in DBP seen in elderly hypertensive subjects suggests a process of transmural pressure-induced arterial wall damage resulting in large artery stiffness. [7]

The steep rise in PP after the sixth decade, in part secondary to the fall in DBP, cannot be due to elevated cardiac output or bradycardia, since studies in elderly hypertensives have shown a reduction in cardiac output at rest, [7] and a significant stepwise increase in heart rate with rising SBP was found in the analysis. The rise in heart rate, as noted in SBP groups 1 through 4, would decrease rather than increase PP. The most plausible explanation for both the late rise in PP and the fall in DBP is an increase in large artery stiffness caused by intrinsic structural abnormalities. The pathological processes of thinning, fragmentation, and eventual fracturing of elastin and increased collagen and calcium deposition in the large arteries were likely explanations. [7]

Age-related blood pressure changes were generally similar in both sexes, but as noted in previous studies, young women had lower blood pressure values than similarly aged men; these differences gradually narrowed and eventually reversed beyond age 60 years. The lower blood pressure in young women compared with young men has been explained by their shorter stature; blood pressure amplification from central to peripheral arteries increases with body height and is therefore more marked in men. Sex differences in blood pressure were more marked in hypertensive subjects. These findings suggest that there may be sex differences in arterial stiffening, with young women having more compliant vessels. With the onset of menopause this difference may be lost, with a resulting acceleration in arterial stiffening. [7]

Alterations in hemodynamics, in the absence of direct measurements, can be inferred by means of longitudinal changes in blood pressure variables as assessed in the present study. Arterial pressure can be divided into steady (MAP) and pulsatile components (PP).

MAP is determined by cardiac output and vascular resistance. The PP component, representing the variation in pressure around the mean, is influenced by left ventricular ejection, large artery stiffness, early pulse wave reflection, and heart rate. Both increased resistance and increased stiffness elevate SBP. In contrast, DBP rises with increased resistance but falls with increased stiffness; the relative contribution of each determines the ultimate DBP. Therefore, age-related changes in SBP and DBP may predict the relative contributions of vascular resistance and large artery stiffness. [7]

The haemodynamic significance of the rises in MAP, SBP, and DBP from age 30 to 49 years in the Framingham study was consistent with a gradual increase in peripheral vascular resistance with aging. [7] Increased cardiac output appears to produce similar changes in these arterial pressure components. However, the transitory increase in cardiac output observed in some hypertensive young adults reverts over time into a persistent increase in vascular resistance. Therefore, the slowly progressive increases in MAP, SBP, and DBP, noted in both normotensive and untreated hypertensive Framingham subjects from age 30 to 49, most likely result from increased peripheral vascular resistance. [7]

There is strong evidence [7, 8, 9, 10] that vascular resistance is not the dominant factor in the rise in SBP after age 60 years. While measurements of cardiac output and blood pressure suggest increased vascular resistance with aging, total peripheral resistance is only marginally elevated in older subjects with isolated systolic hypertension compared with age- and sex-matched normotensive control subjects. Furthermore, studies [8, 9, 10] of elderly subjects with isolated systolic hypertension showed that increased input impedance (large artery stiffness and early pulse wave reflection) predominated over increased vascular resistance. The age-related linear rise in SBP from age 30 to 84 years, coupled with an early rise and late fall in DBP, suggests three hemodynamic phases. Under age 50, the progressive rise in DBP suggests the predominance of increased vascular resistance. The constancy of DBP during the 50s, together with the asymptotic leveling of MAP and increased slope of PP, suggests that increased vascular resistance and large artery stiffness are both increasing in a parallel manner. The fall in DBP during the later ages signals a preponderance of large artery stiffness as the cause of further rise in SBP in the elderly. [7]

In most cases (>90%) the cause of hypertension is unknown and this is referred to as essential or primary hypertension, but the risk of the disorder is increased by obesity, a high serum sodium level, hypercholesterolemia, lack of physical activity and a family history of high blood pressure. [10] The association between obesity and hypertension has been well documented in many studies, [1, 2, 5, 8, 12] despite this clear association it has been suggested that the noxious effect of obesity in black people is less than in people from other population groups. [11]

The observation that the prevalence of hypertension is higher in urban black South Africans compared to their rural counterparts suggests a strong environmental influence on the pathogenesis of hypertension. [12] Similar rural/urban trends have been described in the rest of sub-Saharan Africa. [9] The rise in blood pressure is often seen within weeks of rural-urban migration, and the reasons for the change are likely to be multi-factorial. Tribal South Africans and the Khoi-San tribes traditionally lived a hunter-gatherer lifestyle with low levels of obesity, plenty of exercise and a low sodium and high potassium diet. [12]

Some dietary factors are related to hypertension, including increased salt (sodium) intake and the decrease in fruit and vegetables (potassium), while a higher intake of alcohol products, particularly by men, plays a role. [9]

The data on the association between high salt intake and hypertension in black people from Africa have been summarized by Seedat in 2005, [9] who suggests that black people have an abnormal transport mechanism of sodium and a low rennin activity. A high intake of sodium is common in South Africa, particularly in poor settings, as it is used to preserve food or to make food tastier. [9]

A high intake of salt (sodium chloride) adversely affects BP. Evidence includes results from animal studies, epidemiologic studies, and clinical trials. Studies have documented that a reduced sodium intake can prevent hypertension (TOHP2, phase 2 of the Trials of Hypertension Prevention) [27], can facilitate hypertension control in older-aged persons on medication (TONE, Trials of Non-Pharmacologic Interventions in the Elderly), [28] and can potentially prevent cardiovascular events in overweight individuals. [26, 27, 28] TOPH2 documented that sodium reduction, alone or combined with weight loss, can reduce the incidence of hypertension by approximately 20%. In the TONE study, a reduced salt intake with or without weight loss effectively reduced BP and the need for antihypertensive medication in older persons. In both trials, the dietary interventions reduced total sodium intake to 100 mmol/l. Such data reinforce current guidelines to limit salt intake to 6 g/l, the equivalent of 100 mmol of sodium (2400 mg) per day. [26, 27]

Liberal amounts of salt are added to food, while cooking and monosodium glutamate-based flavouring cubes or salts are widely used to give taste to food. In addition to a high salt intake, people in sub-Saharan Africa frequently eat small amounts of fruit and vegetables resulting in low potassium intakes. Bread is a staple food for many people in the country and contains high salt levels, 2g salt per 100g flour. [14] Salt facilitates the baking process of bread. Charlton et al 2005. [15] determined the habitual sodium, potassium, magnesium and calcium intake across South African population groups in 324 people in a study conducted in Cape Town. They also identified the foods that mainly contributed to sodium intake and the proportion of salt intake that is added when preparing or consuming meals (discretionary sodium intake). They found that the mean urinary sodium excretion values equate to a daily salt intake of 7.8 g, 8.5 g and 9.5 g in black, coloured and white South Africans respectively. Between 33% and 46% of total sodium intake was discretionary, while bread was the single greatest contributor to sodium intake of the non-discretionary sources in all population groups. Calcium intake differed among the groups, with black subjects having particularly low intakes. [15]

Despite the many environmental factors related to hypertension discussed above, various studies in South Africa suggest a possible genetic contribution to the origins of hypertension in black people. The heritability of hypertension is thought to range from 30% to 60%, with variable clinical presentation and drug response due to multiple contributory genes, genetic/ethnic heterogenicity and environmental effects. [10] Steyn et al. (unpublished data 1995-2005) [13] found that high blood pressure (BP) is associated with a strong family history of either hypertension or stroke. While Loock et al. [16] showed that a family history of hypertension occurred 4.3 times more frequently in patients who had ischaemic heart diseases (IHD) compared to a matched group of patients without the condition (odds ratio of 4.33, 95% CI 2.21-8.52).

The search for the genetic contribution to hypertension in South Africa has largely followed a candidate gene approach particularly in regard to genes that regulate sodium excretion. This is based on the observation that African Americans are more likely to have salt sensitive hypertension. [17] In a study from South Africa, suppressed plasma rennin activity (an index of salt sensitivity) was significantly lower in both normotensive and hypertensive indigenous African patients compared to whites despite comparable sodium intake. [17]

2.3 HYPERTENSION IN SOUTH AFRICA

High blood pressure in South Africa is estimated to have caused 46,888 deaths and 390,860 disability-adjusted life years in 2000. [10] Detection and management of hypertension remains suboptimal due to inadequate public health care facilities. Mass migration of rural blacks to urban areas and rapid changes in lifestyle and risk factors account for the rising prevalence of hypertension, but genetic factors may also play an important contributory role. Black South Africans also appear to be more prone to complications of hypertension, particularly stroke, heart failure, and hypertensive nephrosclerosis, and respond poorly to ACE inhibitors as monotherapy. [10]

South Africa is in the midst of a complex health transition with the collision of an HIV/AIDS pandemic and a rising occurrence of non-communicable diseases.

Hypertension is one of the most important risks of cardiovascular disease, and rapid urbanization and changing lifestyles are contributing to a rising epidemic of cardiovascular disease, especially amongst the majority black ethnic group. [10]

Although South Africa spends 8.7% of its gross domestic product on health care, the distribution of spending largely occurs in the private sector, leaving the majority of the population, who lack health insurance, to be cared for in an ailing and underfunded public health system resulting in suboptimal detection and management of hypertension. [10]

Socioeconomic circumstances of black people in South Africa may also be important determinants of hypertension. Due to the policies of apartheid, blacks were condemned to live in overcrowded townships with extremely poor infrastructure and limited access to primary health care clinics, which has not substantially changed since the democratic transition.

The stress of living in these conditions contributes to alcoholism, reduced physical activity and increased autonomic activity that may contribute to hypertension. [10]

Some sub-Saharan African countries still maintain large urban/rural prevalence differences. However, in South Africa such differences are no longer apparent. The prevalence rates in the rural areas have indeed increased to levels similar to those found only in the cities in the past. As an example, in the early 1990`s, Mollentze et al 1996. [18] showed that the rural community of QwaQwa in the Free State had a prevalence rate of 29% in a sample aged 25 years and older. This was similar to the prevalence rate of 30.3% in the peri-urban community of Mangaung in the same province. [18] However, Steyn et al 1996 [19] found in the black community of Cape Town, that the duration of urbanization independently predicted the presence of hypertension.

The THUSA study conducted by a group at Potchefstroom University focused on the factors related to hypertension in a black community undergoing the health transition. [20] Van Rooyen et al 2000 [20] found that the Blood pressure (BP) was highest in the group of newcomers to the urban setting, and that factors related to urbanization were positively associated with hypertension.

Blood pressure correlated positively with age, level of urbanization, waist: hip ratio and smoking tobacco. Additional factor analyses of these data found clusters of risk factors relating to hypertension. The most important of these included a cluster of malnutrition, which included high intakes of saturated fat, animal protein, sodium, and vitamins A and B6. [20]

A second cluster that was identified had the characteristics of the metabolic syndrome. A third cluster consisted of a hypercholesterolaemic and obesity group of factors which included ageing, total and LDL cholesterol, triglycerides, high body mass index (BMI) and central obesity. [20]

Stress as a precipitating factor for hypertension is frequently mentioned, however, the scientific measurement of stress presents a challenge for scientists and consequently studies on this association is seldom reported in South African literature.

The quality of care received by South Africans is reflected in the proportion of persons with hypertension that are aware of having the condition, the proportion that are taking antihypertension medication, and the proportion with blood pressure levels below the accepted level. In 1998 when the first Demographic and Health Survey was conducted, the blood pressure cut-off point of >160/95 mmHg was used to identify patients with uncomplicated hypertension. (Table 2.1)

However, the international accepted cut-off point was >140/90mmHg. Since 1998, the latter cut-off point has also been accepted in South Africa. [10] In 1998, only 26% and 38% of men and women with hypertension, respectively, had blood pressures below 160/95 mmHg. If the cut-off point of >140/90 mmHg is used to identify those with hypertension and who had controlled blood pressure, only 10% of men and 18% of women had controlled blood pressure. Such poor levels of control will contribute to the high rates of strokes and heart attacks occurring in the country. [13]

According to the first Demographic and Health Survey conducted in 1998, the awareness of hypertension, the use of hypertension medication, and the control of hypertension among the subjects with hypertension increased with increasing wealth and were highest in the wealthiest group. Interestingly, higher levels of education among the participants with hypertension added no better treatment status than that achieved by being wealthier. Older participants with hypertension were more likely to be aware, use medication, and have a controlled blood pressure. In fact, for people with hypertension a participant above age 44 years was about 28 times more likely to have controlled blood pressure compared with those who were between 15 and 25 years. Indian people with hypertension were more likely to be on medication and have higher levels of control than African men and women. There were no differences in the treatment status among the African, white and coloured participants with hypertension. Although rural participants with hypertension were significantly less aware of having the condition than their urban counterparts, no differences were seen between those on medication and those with controlled BP. Women were more aware of hypertension, took more medication and their blood pressure was more controlled compared to men. The finding that young people with hypertension have poor hypertension control is of particular concern as they could be exposed to high blood pressure for many years. This will result in serious end-organ damage affecting their eyes, kidneys, and coronary and cerebral arteries. Hypertension control in men was far less than that for women, suggesting that the group of people with hypertension with the least degree of hypertension control is the young, poor men irrespective of their population group. [13]

2.4 LIFESTYLE MODIFICATION

The South African Hypertension Guidelines 2009 recommend lifestyle changes in all hypertensive patients. Management of obesity, exercise, reduction in alcohol and increased dietary intake of potassium and reduced salt are the obvious targets but remain difficult to implement. [17]

It is possible to prevent the development of hypertension and to lower blood pressure levels by simply adopting a healthy lifestyle. [22] The frustrations of advocating lifestyle changes are obvious to healthcare providers in clinical practice. Community resources are rarely available or convenient, counseling takes considerable time, and many patients do not adhere to treatment. Even with extensive publicity regarding the importance of blood pressure control and the benefits of drug therapy, only 16% of people with hypertension in Canada have the condition under control. [2] Physicians and other health care professionals could also be strong advocates for community resources to assist patients with lifestyle changes.

Patients interested in healthy lifestyles produce a consumer demand to which government and the free market respond. [2] In a study by Hester, et al, (2007) [23] 52 patients were instructed by a registered dietician on proper diet, salt restriction, weight control, physical activity and alcohol consumption.

Prior to the study, education sessions were conducted for the six resident physicians focusing on improving interpersonal communication and patient-education tools. [23]

The study showed a reduction of systolic blood pressure in all patients from an average of 160 mmHg to 139 mmHg. This showed the enormous impact that counseling on lifestyle modification has on blood pressure if done properly. Long established lifestyle modifications that effectively lower blood pressure include weight loss, reduced sodium intake, increased physical activity, and limited alcohol consumption. [23] These lifestyle modifications are recommended for non-hypertensive individuals with above optimal blood pressure (pre-hypertensives) and as initial treatment for stage 1 hypertension. For individuals taking antihypertensive medication, lifestyle modification is recommended as adjunctive therapy. [23]

Lifestyle modification, previously termed non-pharmacologic therapy, plays an important role in hypertensive as well as non-hypertensive individuals. [25] In hypertensive individuals, lifestyle modifications can serve as initial treatment before the start of drug therapy and as an adjunct to medication in persons already on drug therapy. In hypertensive individuals with medication-controlled BP, these therapies can facilitate drug step-down and drug withdrawal in highly motivated individuals who achieve and sustain lifestyle changes. In non-hypertensives, lifestyle modifications have the potential to prevent hypertension, and more broadly to reduce BP and thereby lower the risk of BP-related clinical complications in whole populations. Indeed, even an apparently small reduction in BP, if applied to an entire population, could have an enormous beneficial effect on cardiovascular events. For instance, a 3-mmHg reduction in systolic BP should lead to an 8% reduction in stroke mortality and a 5% reduction in mortality from coronary heart disease. [25]

An increased level of physical activity can lower BP, independent of concomitant changes in weight. A recent meta-analysis of 27 randomized trials documented a 4 mmHg net reduction in systolic BP among individuals assigned to an aerobic exercise intervention. [26, 27] Interestingly, the magnitude of BP change appeared to be independent of the exercise intensity. In addition to a direct beneficial effect on BP, increased physical activity should also lower BP by facilitating initial weight loss and by promoting maintenance of weight loss, once achieved. In aggregate, these findings support the recommendation of the US Surgeon General that persons exercise 30 min or more on most, if not all, days of the week. [26]

Results from the Dietary Approaches to Stop Hypertension (DASH) (1999)-Sodium feeding study have documented that an even lower intake of sodium, approximately 60 mmol/l, further reduces BP in a broad population of non-hypertensive and hypertensive individuals. [11] The DASH-Sodium trial tested the effects on BP of three levels of sodium reduction in two distinct diets. The three sodium levels were "higher" (target of approximately 143 mmol/d, reflecting typical US consumption), "intermediate" (target of 106 mmol/d, reflecting the upper limit of current US recommendations), and "lower" (target of 65 mmol/d, reflecting a level that could produce additional lowering of BP).

In a typical American (control) diet, reducing sodium intake from the higher to the intermediate level significantly reduced systolic BP by 2.1 mmHg; reducing sodium intake from the intermediate to the lower level further reduced systolic BP by 4.6 mmHg. In the DASH diet, corresponding changes in systolic BP were -1.3 and -1.7 mmHg, respectively. The effects of sodium reduction tended to be greater in blacks than whites. Compared with the control diet with higher sodium, the DASH diet with lower sodium reduced systolic BP by 7.1 mmHg in nonhypertensive persons, and 11.5 mmHg in hypertensives. The pattern of results was similar for diastolic BP. [11]

A consistent body of evidence from observational studies and clinical trials indicates that weight is positively associated with BP and hypertension. [1, 2, 5, 8, 12] The importance of this relationship is reinforced by the high and increasing prevalence of overweight and obesity throughout the world. Virtually every clinical trial that has examined the influence of weight loss on BP has documented that weight reduction lowers BP. [24] Interestingly, reductions in BP occur before (and without) attainment of desirable body weight. In one study that aggregated results across 11 weight loss trials, average systolic and diastolic BP reductions were 1.6/1.1 mmHg per kilogram of weight loss. [11] Lifestyle intervention trials have uniformly achieved short-term weight loss. In several instances, substantial weight loss has also been sustained over 3 yr or more. [11]

OBESITY

Rumantir et al, (1999) [29] conducted a study to test two hypotheses concerning mechanisms of weight gain and of blood pressure elevation in obesity. The first hypothesis is that in human obesity sympathetic nervous system under activity is present, as a metabolic basis for the obesity. The second hypothesis, is that sympathetic nervous activation occurs with chronic overeating, elevating blood pressure. These are not mutually exclusive hypotheses, since obesity is a heterogeneous disorder. Whole body and regional sympathetic nervous system activity, in the kidneys and heart, was measured at rest using noradrenaline isotope dilution methodology in a total of 86 research voluteers in four different subject groups, in lean and in obese people who either did, or did not, have high blood pressure. In the lean hypertensive patients, noradrenaline spillover for the whole body, and from the heart and kidneys was substantially higher than in the healthy lean volunteers.

In normotensive obesity, the whole body noradrenaline spillover rate was normal, mean renal noradrenaline spillover was elevated (twice normal), and cardiac noradrenaline spillover reduced by approximately 50%. In obesity-related hypertension, there was elevation of renal noradrenaline spillover, comparable to that present in normotensive obese individuals but not accompanied by suppression of cardiac noradrenaline spillover, which was more than double that of normotensive obese individuals ($P < 0.05$), and 25% higher than in healthy volunteers. There was a parallel elevation of heart rate in hypertensive obese individuals. [29]

The study concluded that sympathetic underactivity hypothesis of obesity causation was untenable, as based on measures of noradrenaline spillover, sympathetic nervous system activity was normal for the whole body and increased for the kidneys; the low sympathetic activity in the heart would have only a trifling impact on total energy balance.

The increase in renal sympathetic activity in obesity may possibly be a necessary cause for the development of hypertension in obese individuals, although clearly not a sufficient cause, being present in both normotensive and hypertensive obese individuals. The discriminating feature of obesity-related hypertension was an absence of the suppression of the cardiac sympathetic outflow seen in normotensive obese individuals. Sympathetic nervous changes in obesity related hypertension conformed rather closely to the second hypothesis. [29]

In developing countries undergoing health or epidemiological transition, a complex picture relating to nutritional status of the population is frequently found. In these communities, a malnutrition pattern is predominantly characterized by undernutrition in children, whereas in adults, ever-increasing obesity is found. [30] In 1997, the World Health Organization emphasized that obesity is becoming a major health problem in many developing countries, particularly in adult women. [9] This presents a significant threat to the emergence of noncommunicable diseases in the developing world. Obesity is associated with increasing risk of developing hypertension, coronary heart diseases, diabetes, stroke, and some forms of cancer, in both African and white populations.

The associations of obesity and alcohol consumption in relation to blood pressure and the prevalence of hypertension were studied in 5550 male and female subjects aged 25 to 64 years, surveyed in the National Heart Foundation of Australia in 1980 in the Risk Factor Prevalence Study. [5]

Body mass index (BMI) was significantly and independently associated with blood pressure levels in both sexes. A maximum of 30% of hypertension in the study population could be attributed to being overweight.

The association between body mass index and hypertension was greater in men under 45 years of age in whom a maximum of 60% of hypertension could be attributed to being overweight. In both men and women receiving antihypertensive treatment, body mass index was positively associated with blood pressure. Overweight individuals with hypertension were less likely to achieve normal blood pressure on treatment.

In the 2003 South African Demographic and Health Survey, obesity (BMI > 30) was present in 21% of rural blacks compared to 33.8% of urban dwellers. [31] Black females had the highest prevalence of obesity and the largest waist circumferences. Studies have shown that the more urbanized these African communities were, the higher the rate of obesity and the less prudent their diets became. [31]

A further complexity to the possible prevention and management of obesity in Africans relates to their traditional and cultural perceptions concerning body size. Mvo et al 1999. [32] has shown that being overweight has many positive connotations in the African community in South Africa. This qualitative research identified that being obese is perceived to reflect affluence and happiness in many sectors of the African population.

Obesity or overweight in women is thought to reflect on a husband`s ability to care for his wife and family. In addition, with the explosive increase in prevalence of African people with full-blown AIDS, obesity is seen to reflect persons who are healthy and without human immunodeficiency virus/ AIDS. [32]

The difference in self-perceived rates of obesity between African and white women is also of interest. Although the highest rates of obesity were reported among African women, fewer perceived themselves to be obese compared with perceptions reported by white women. [32]

Additional factors that could explain the high obesity rates in adult South Africans include changes in nutritional patterns over time and the degree of urbanization that Africans are undergoing.

In 1940, Fox [33] found that the African population consumed a typical traditional diet, where the fat intake was only 16% of the total calories. By 1990, the fat intake in an urban African community had increased to 26%. [33] When these data were analyzed further, it was shown that those people who had lived in cities for most of their lives already consumed a typical Westernized diet with 30% of calories from total fat, whereas those who had spent less than 20% of their lives in the city only consumed 22.5% of calories from total fat. [33] The possible explanation of these findings are prevailing conditions in industrialized societies, including availability and low cost unhealthy food, and the use of labour-saving mechanical devices, which have greatly influenced excess calorie intake and decreased energy expenditure. Similarly, data from the US have shown that obesity is associated with availability of fast food, passive entertainment, such as watching television, and less physical activity in urban settings. [34]

Abdominal obesity is highest in white urban and nonurban African women. This type of obesity has been shown to have more adverse health consequences than peripheral obesity. [30] Individuals with abdominal obesity are more likely to develop hypertension, diabetes mellitus, cardiovascular disease, and stroke. The highest rates of abdominal obesity were found in white men and in urban African and mixed-ancestry women. Abdominal obesity has been linked to diabetes and hypertension in regional prevalence studies in the African and mixed-ancestry communities of the Western Cape. [35] Therefore, waist circumference and waist:hip ration may be important adult health indicators for ongoing surveillance.

In South Africa, obesity in women seems to start at a young age; these data show that 10% of women were obese at the age of 15 to 24 years. [36] Therefore, primary prevention of obesity must start at a young age, particularly for girls. The multivariate regression analysis identified various groups who should be targeted for interventions for specific characteristics. In African women, the highest rate of obesity is predominantly in the urban women. The relationship between education and body mass index (BMI) is of interest because women with no education had lower BMI`s than those with schooling. These women tend to do more manual labour than their better educated counterparts. Women with tertiary education also had a lower BMI than those with some schooling. [36]

Two possible explanations could be considered. Firstly, this group of women are aware of the connection between body weight and health, secondly one could anticipate that this female group would take more cognizance of the preferred body image of thinness that reach them through the media. Consequently, they would try to control their body weight in an attempt to conform to the media images that they internalize. Obesity management is specifically required for older women in all the population groups. [36]

The most important group to target for intervention among men is the urbanized, higher educated, and older white men, who have by far the highest rates of obesity among South-African men.[55] In comparing the data from Ghana, Mali, Tanzania with those from South Africa, it was found clear that these countries have much lower obesity rates than South Africa, whereas the rates reported for Mauritius fall more or less between these extremes. The African Americans had rates closer to those found in Africans from South Africa. [30]

Overall, these data suggest that the predominant pattern of malnutrition in adult South Africans, particularly in African women, is one of overweight and remarkably high rates of abdominal obesity.

The distribution of anthropometric variables in the South African population differed by age, gender, education background, and area of residence. Therefore, suggesting that attention be directed toward interventions, which are culturally sensitive for particular target groups. Policies should be directed toward raising the educational status of women, because they are key figures in improving the nutritional status of the whole nation. The most challenging aspects of obesity management in South Africa relates to the perceptions of the African community regarding the positive values ascribed to obesity.

SALT RESTRICTION

Epidemiologic, clinical and experimental studies suggest that ingestion of a diet habitually high in salt plays a role in the aetiology and pathogenesis of hypertension. Sodium chloride is the most abundant naturally occurring salt in food. However, the largest quantities of salt now consumed originate from industry processed food. Only 20% to 30% of total dietary sodium consumption is discretionary-or consumer controlled-through the addition of salt to food after its preparation. The rest is derived from naturally occurring sources or commercial processes. [4]

The question of whether restriction of dietary salt can prevent primary hypertension and whether a low-salt diet is an efficacious intervention in the treatment of hypertension is still controversial.

The most recent Canadian consensus statement on the role of salt in controlling hypertension was published in 1990. [4] That document recommended moderate salt reduction in normotensive people and salt restriction in those with high blood pressure. Over the past 20 years, more than 60 randomized controlled trials have been published studying the effects of salt intake in normotensive and hypertensive subjects. Despite the vast literature on this issue, there is still little agreement as to the efficacy, safety and acceptability of this dietary intervention.

For people with high blood pressure, salt restriction seems to have significant value in reducing blood pressure. Midgley et al (1996). [22] found that in trials with hypertensive subjects, the adjusted decrease in blood pressure associated with a reduction in daily sodium intake of 100mmol was 3.7mmHg for systolic blood pressure and 0.9mmHg for diastolic blood pressure.

This effect was more pronounced in people older than 44 years of age. In a subgroup analysis using only trials in which the mean age was 44 years or older, the decrease was much greater: for a reduction in daily sodium intake of 100mmol the reduction in systolic blood pressure was 6.3mmHg and the reduction in diastolic blood pressure was 2.2 mmHg. For younger hypertensive patients, the decrease was 2.4 mmHg for systolic blood pressure and negative for diastolic blood pressure. [22]

Salt reduction has been suggested as a possible adjunct to pharmacologic treatment to enhance blood pressure control. Several studies [4, 16, 22] have investigated this issue and found that, for hypertensive patients who are receiving antihypertensive medication, salt restriction provides additional benefits in terms of blood pressure control. One of the larger studies of this type was conducted by Erwtemann et al (1984). [37] who found that an additional 3 mmHg decrease in diastolic blood pressure could be achieved through salt restriction among patients taking diuretics and B-blockers.

Similar results were reported in another study involving 356 patients, in which a low-salt diet provided an additional 4 mmHg decrease in systolic blood pressure and an additional 2 mmHg decrease in diastolic blood pressure. [38]

ALCOHOL

The mechanism by which regular alcohol consumption leads to chronic elevations in blood pressure is uncertain and has been the subject of comparatively few investigations. A number of studies [25, 28, 31, 39, 40] have investigated the mechanisms by which alcohol ingestion results in acute changes in blood pressure; however, there are problems in extrapolating from the results of such studies explanations for the chronic blood pressure elevation associated with long term regular consumption.

One hypothesis has developed from observations of the acute effects on blood pressure of alcohol withdrawal. The degree of blood pressure elevation was found to be related to the severity of alcohol withdrawal in heavy drinkers during detoxification. [39] Subsequently, it was suggested that long-term alcohol consumption leads to a state of intermittent withdrawal even at low levels of consumption that may be responsible for the elevation in blood pressure. This hypothesis is consistent with the observations in the LRC Prevalence Study [40] that blood pressure measured after 12 hours of fasting was more closely associated with alcohol consumed in the previous 24 hours than with the alcohol consumed in the previous week.

The observation that psychological stress results in acute increases in blood pressure has led to the hypothesis that stress may independently predispose to both hypertension and alcohol use. While there are many difficulties in measuring stress, there are instruments for measuring a variety of psychological characteristics often considered to be influenced by stress. [39]

In the Australian Risk Factor Prevalence Study [39] and in a study by Arkwright et al. [41] the association of blood pressure with alcohol consumption was shown to be independent of a number of such psychological characteristics, including type A behavior, trait anxiety, recent life stress, neuroticism, and extroversion or introversion.

The role of catecholamines in mediating the acute effects on blood pressure of alcohol administration has been investigated in a study by Ireland et al (1984). [42] who observed acute increases in blood pressure and plasma epinephrine immediately following alcohol ingestion in normotensive men. These authors have suggested that repeated activation of this adrenergic system may produce a slow pressor effect involving small increments in plasma epinephrine and result in chronic increases in blood pressure. [42]

The observations from this study suggest that a detailed history of alcohol consumption should be obtained from patients with hypertension, particularly in men, in whom heavy alcohol consumption is more frequent. Such patients should be encouraged to reduce their alcohol consumption and be referred for treatment of alcohol dependence when appropriate. [41, 42]

An increased prevalence of hypertension in groups with high alcohol consumption has been recognized for a number of years. More recently, several studies have suggested an independent association between alcohol consumption and blood pressure levels in samples from general populations. In multivariate analyses the association was shown to be independent of a variety of potential confounding factors, including age, relative body weight, exercise, and smoking status, that are known to be or are likely to be related to both blood pressure and alcohol consumption. Of 30 cross-sectional population studies reviewed, the majority reported small but significant elevations in blood pressure in those consuming three drinks or more per day in comparison with nondrinkers. In two studies, one from the United States and one from Australia, the maximum contribution to the prevalence of hypertension of alcohol consumption greater than two drinks per day was estimated to be 5% to 7%; the contribution in men (11%) was greater than that in women because of their greater alcohol consumption. [39]

However, the evidence is conflicting as to whether the blood pressure of persons consuming small amounts of alcohol (1-2 drinks per day) is greater, less, or no different than that of nondrinkers.

PHYSICAL ACTIVITY

Lifestyle modifications are advocated for the prevention, treatment and control of hypertension. Exercise programs that primarily involve endurance activity prevent the development of hypertension and lower blood pressure in adults with normal blood pressure and those with hypertension. The blood pressure lowering effects of exercise are most pronounced in people with hypertension who engage in endurance exercise with blood pressure decreasing approximately 5-7 mmHg after an isolated exercise session (acute) or following exercise training (chronic). [29]

Moreover, blood pressure is reduced for up to 22 hours after an endurance exercise bout with the greatest decreases among those with the highest baseline blood pressure. [29]

The proposed mechanisms for the blood pressure lowering effects of exercise include neurohumoral, vascular, and structural adaptations. Decreases in catecholamines and total peripheral resistance, improved insulin sensitivity, and alterations in vasodilators and vasoconstrictors are some of the postulated explanations for the antihypertensive effects of exercise. Emerging data suggest genetic links to the blood pressure reductions associated with acute and chronic endurance exercise. Nonetheless, definitive conclusions regarding the mechanisms for the blood pressure reductions following endurance exercise cannot be made at this time. [29]

Individuals with controlled hypertension and no cardiovascular or renal complications may participate in an exercise program or competitive athletics, but should be evaluated, treated and monitored closely. Preliminary peak or symptom-limited exercise testing may be warranted, especially for men over 45 and women over 55 years planning a vigorous exercise program (i.e., >60% VO_2max). [29]

In the interim, while formal evaluation and management are taking place, it is reasonable for the majority of patients to begin moderate intensity exercise training (40-60% VO_2max) such as walking.

Training frequencies between 3 and 5 days a week are effective in reducing blood pressure. [13] Although limited evidence suggests seven sessions may be more effective than three sessions per week, [13, 43] other data suggest that there is no association between frequency of weekly exercise and blood pressure reduction. [44, 45] However, because a single bout of exercise can cause an acute reduction in blood pressure that lasts many hours, augmenting or contributing to the reductions in blood pressure resulting from exercise training, consideration should be given to daily or near daily exercise. [45]

Randomized controlled trials to date have generally used continuous rather than intermittent exercise, with durations between 30 minutes and 60 minutes per session. [45] The reduction in resting blood pressure resulting from endurance exercise training does not appear to differ for exercise durations within this range. Intermittent shorter bouts of activity may also elicit reductions in blood pressure. [45] Moreover, other health benefits may be derived when multiple bouts of physical activity are performed throughout the day. [45] A study by Cleroux et al. (1999) [45] suggests 30-60 minutes of aerobic exercise per week conducted at 50% VO_2max in previously sedentary hypertensive adults is effective in reducing resting blood pressure. Greater reductions in systolic blood pressure were observed with 61-90 minutes of aerobic exercise per week, but further increases in exercise time per week did not cause additional reductions in blood pressure.

Most intervention trials [43, 44, 45] have used endurance exercises such as walking, jogging, running, or cycling as the exercise modality. However, any activity that uses large muscle groups, can be maintained continuously, and is rhythmical and aerobic in nature is recommended as the primary modality for those with hypertension. Individual preference is an important factor to maximize long-term adherence. Resistance training is also an important component of a well-rounded exercise program.

Although limited data suggest resistance training has a favourable effect on resting blood pressure, the magnitude of the acute and chronic blood pressure reductions are less than those reported for endurance exercise. The present recommendation is for resistance training to serve as an adjunct to an aerobic-based exercise program. [43]

Age does not seem to have any bearing on the antihypertensive effects of exercise. In the studies reviewed, similar reductions in blood pressure were observed in younger (e.g., 30-35 year old subjects) and older (e.g., 60-79 year old subjects). [44] Also studies that compared response to exercise in men and women found that the decrease in blood pressure after training was similar in both women and men (mean reduction of 9/8 and 10/10 mmHg respectively). [44] Race also does not appear to influence the effect of regular exercise in reducing blood pressure; comparable antihypertensive effects have been seen among black American, Japanese and white subjects. [44]

Exercise remains a cornerstone therapy for the primary prevention, treatment and control of hypertension. The optimal training frequency, intensity, time and type (FITT) need to be better defined to optimize the blood pressure lowering capacities of exercise, particularly in children, women, older adults, and certain ethnic groups.

Based on evidence, [43, 44, 45] the following exercise prescription is recommended for those with high blood pressure:

Frequency: on most, preferably all days of the week

Intensity: moderate intensity (40-60% VO_2max)

Time : >30 minutes of continuous or accumulated physical activity per day

Type: primarily endurance physical activity supplemented by resistance exercise

Many persons with hypertension are overweight or obese. [31, 32, 36] Therefore, an exercise program that emphasizes a daily caloric expenditure of more than 300 kcal, coupled with reductions in energy intake, should be recommended. This may be accomplished best with moderate-intensity, prolonged exercise, such as walking. The combination of regular exercise and weight loss should be effective in lowering resting blood pressure. [43]

2.5 KNOWLEDGE, AWARENESS AND ATTITUDES

Health care workers can only assess and manage hypertension adequately with lifestyle modification if the patient is educated and convinced that lifestyle changes are essential and the most cost effective method of obviating cardiovascular disease as one of the possible complications. Health care workers can help their patients by checking blood pressure at every opportunity and by counseling patients and their families about preventing hypertension and the positive influence of lifestyle modification. All patients would benefit from general advice on healthy lifestyle habits, in particular healthy body weight, moderate consumption of alcohol and regular exercise. [2]

In a descriptive survey by Oliviera et al (2005).[46] to understand the current status of hypertension knowledge, awareness, and attitudes in a group of hypertensive patients, results showed that patients are knowledgeable about hypertension in general, but are less knowledgeable about specific factors related to their condition. The median duration of hypertension was 14 years, suggesting that even though these patients have had this condition for a long time their knowledge was inadequate.

Ninety six percent (96%) knew that lowering blood pressure would improve health and 96% thought that people can do things to lower their blood pressure but only 36% had adopted lifestyle modifications to control their blood pressure. [46]

Viera, et al, (2007) [47] in their study used data from a population-based sample of hypertensive adults (N=28 457) in America and examined variations in reports of receiving lifestyle modification advice by patient characteristics. Most adults (90, 3%) with known hypertension reported receiving some advice. Exercise advice was reported most frequently (74, 6%), followed by advice to reduce salt intake (69, 3%), change eating habits (61, 9%), and reduce alcohol intake (43, 5%). Compared with adults aged 60 years or older, patients aged 18 to 39 years were most likely to report receiving advice. Overweight and obese persons were also more likely to report receiving advice. Persons receiving antihypertensive medication were also more likely to report receiving advice. [47]

Halel et al. (1998) [48] conducted a descriptive study at Baragwanath Hospital in Soweto in South Africa to survey residual disability and handicap following stroke. Information on four risk factors, namely hypertension, age, smoking, and alcohol abuse, was obtained. Enquiry was made into the subjects' insight into the causes of their problems. A total of 361 patients were initially screened. Only 54 fulfilled all inclusion criteria, 38 (70%) over 50 years of age and 16 (30%) under 50 years. Ninety-three of the 361 died within the first 3 months of natural causes; 71% of all patients knew that they had suffered a stroke. Only 20% of the total group understood that hypertension had probably caused their stroke, although 76% of the older group and 56% of the younger group had been told at some stage that they were hypertensive.

Of the older group 32% knew the name of their medication, 21% could not name their medication and 23% claimed they were on no medication. Similarly in the younger group, 19% could name their medication, 25% could not name their medication, and 12% were on no medication. In addition, 16% of the older group and 56% of the younger group admitted to smoking. The abuse of alcohol in both groups was low, but this figure was taken from subjective assessment and may not reflect the true extent of drinking as a risk factor. Most patients in this study appear well aware of their hypertension and take medication. However, they seem unaware that their hypertension and stroke are causally linked and their hypertension knowledge is suboptimal. It is also apparent that smoking is increasing as a major risk factor for stroke in the black population of South Africa. [48] Patients need more education regarding hypertension and its consequences.

Motivating patients to implement lifestyle changes is probably one of the most difficult aspects of managing hypertension. It is relatively easy to measure blood pressure, do screening investigations for risk factors or secondary causes, identify target organ damage and prescribe drugs according to the latest evidence and national guidelines. To change behaviour is difficult. Patients are often asymptomatic and are expected to change the way they eat, to lose weight, exercise and stop smoking for no immediate tangible benefits. [25]

Greeff, 2006, [25] also emphasized that building a trusting relationship between the healthcare worker and the patient is one of the most important aspects when motivating patients. He also pointed out that adherence to lifestyle interventions by the healthcare workers themselves is probably the best starting point when attempting to motivate and convince patients to adopt healthy lifestyles. [2]

Sengwana et al (2004). [49] conducted a study to explore the perceptions and attitudes of community health workers (CHWs) about hypertension. The level of knowledge of hypertension, as well as their personal attitude towards this is crucial in the style and quality of their interventions. CHWs, whose role in health promotion is being increasingly recognised, can help contain or reduce the prevalence of hypertension by influencing the community to adopt healthy lifestyles. Forty-three CHWs employed by Zanempilo in two study areas, Sites B and C in Khayelitsha in the Cape Peninsula, South Africa, were included in the study. Firstly, focus group discussions were conduced with 17 purposively selected CHWs to explore attitudes, beliefs and perceptions of hypertension. Secondly, interviews were conducted to assess their basic knowledge about causes, prevention and control of hypertension. The focus group discussions revealed that CHWs were uncertain about the causes of hypertension.

They also found it difficult to grasp the fact that people without risk factors, such as overweight or a family history of hypertension, could be hypertensive. Many CHWs believe in traditional medicines and home-brewed beer as the best treatment for hypertension. They believe that people who take medical treatment become sicker and that their health deteriorates rapidly. Risk factors of hypertension mentioned during the structured interviews include inheritance, lack of physical activity, consuming lots of salty and fatty food. Conclusions drawn from the findings of the CHWs' responses highlighted their insufficient knowledge about hypertension as a chronic disease of lifestyle. Meanwhile they are expected to play a role in stimulating community residents' interest in the broad principle of preventive health maintenance and follow-up.

Data obtained from this research can be used for the planning of health-promotion programmes. These should include preventing hypertension and improving primary management of individual sufferers. Because of their working relations and close link with CHWs, community nurses in primary health-care facilities need to recognise these beliefs and attitudes since these may differ from their own.

In summary, the preceding literature review show that lifestyle changes play a major role in the holistic management of hypertension and the treatment of the disease.

3. CHAPTER THREE (METHODS)

In this section the methods employed in the study will be discussed, including, a summary of the questionnaire, subject selection, ethical considerations that were taken into account and the analysis of data.

3.1 STUDY DESIGN

A cross-sectional descriptive study design was used via the administration of a questionnaire to hypertensive patients to determine their knowledge and attitudes with respect to the importance of lifestyle modification in the management of hypertension.

3.2 SITE OF STUDY

This study was conducted at Carletonville hospital, a district hospital in the mining town of Carletonville. Carletonville is a semi-rural town located in the Merafong Municipality, with a population of 28 090 and unemployment rate of 46, 7% and 20, 9% of the residents having schooled to matric level or higher according to Statistics South Africa Census 2008.

3.3 STUDY POPULATION

A convenience sample of 110 patients with hypertension was randomly selected from a cohort of patients attending the hospital outpatients department over a period of 1 month. All the patients that were invited to participate in the study volunteered to take part in the study. This was a descriptive study with no formal statistical hypothesis testing, the sample size was determined based on available resources.

3.3.1 INCLUSION CRITERIA

- All patients aged between 25 and 80 who are hypertensive were included in the study.
- Patients with co-morbidities and other chronic diseases were also included in the study, e. g diabetes mellitus, osteoarthritis, HIV, etc

3.3.2 EXCLUSION CRITERIA

- Patients with mental illnesses leading to confusion were excluded from participating in the study, e.g. delirium, dementia, psychosis, schizophrenia etc.

3.4 TESTING PROCEDURES, MEASURING TOOLS AND INSTRUMENTS

The Questionnaire (Appendix 3)

The first part of the questionnaire gathered data relating to the demographics of the patients, their age, gender, Body Mass Index, race , education level and employment status. The second set of questions relates to levels of physical activity, the third set about lifestyle. The fourth and fifth parts focused on their knowledge on hypertension, co-morbid illnesses and their treatment, and their attitudes and perceptions on lifestyle modification. The questionnaires were researcher administered to collect demographic data, information on lifestyle and level of physical activity, knowledge, attitudes and perceptions on the importance of lifestyle modification in hypertension control. The questionnaire was compiled in English and then translated to the respondent in their mother tongue by the interviewer as she was interviewing the respondents.

To validate the questionnaire a small group of 5 patients was invited to complete the questionnaire initially and then again after 2 weeks to check for consistency and its reliability was determined.

Medical record review was performed by going through the participant`s medical files to collect actual BP readings to check for adequate BP control.

3.5 ETHICAL CLEARANCE

Patients identified as hypertensive were given a patient information sheet (Appendix 1) inviting them to participate in the study and informed consent forms (Appendix 2) to sign. The research proposal was reviewed and approved by the University of Witwatersrand Human Research Ethics Committee- Medical (ethical clearance certificate attached in Appendix 5).

3.6 DATA ANALYSIS

The questionnaires were coded and analyzed with SPPS version 11.0 (Statistical Program Package for Social Sciences). Chi square tests were used to test the relationship between variables in the cross-tables.

4. CHAPTER FOUR: RESULTS

In this chapter the results will be presented in the form of tables and figures.

4.1 Data related to- DEMOGRAPHICS

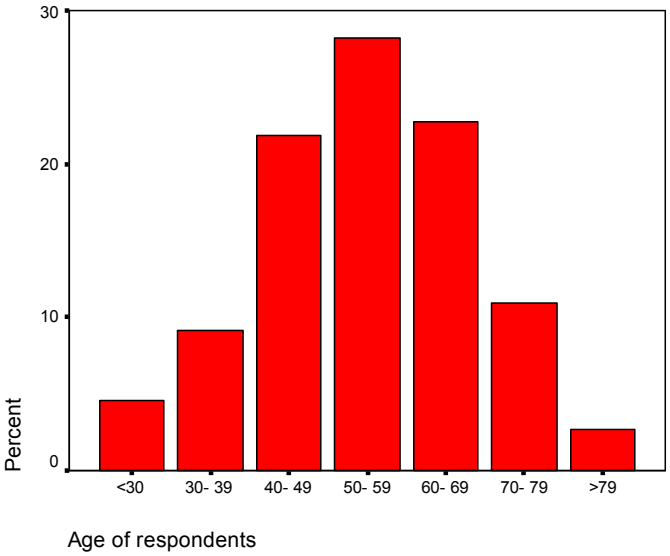

Figure 4.1: Age of respondents

One hundred and ten patients with hypertension were identified and a response rate of 100% was achieved as all those that were invited participated in the study. The largest number of respondents fell in the 50-59 age group (28%) as can be seen in Figure 4.1. This bar graph also indicates a normal distribution of the subjects tested.

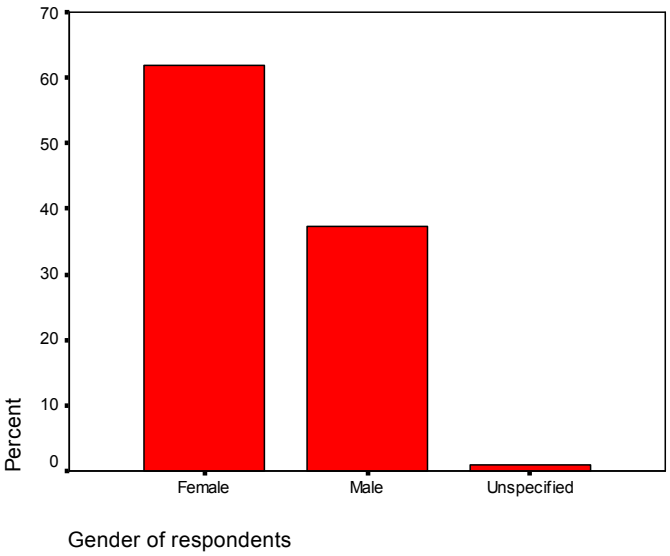

Figure 4.2: Gender of respondents

Females made up a significant majority of the study population with 61% (Figure 4.2)

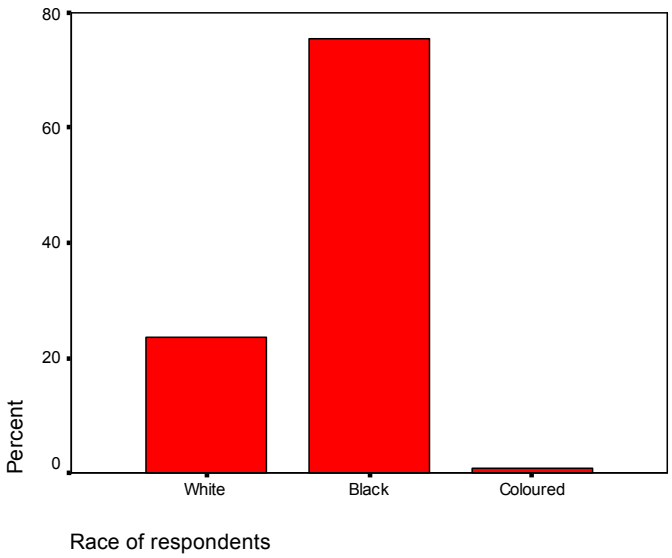

Figure 4.3: Race of respondents

The majority of the interviewed respondents were black (76%), followed by white respondents (23%) and the remaining 0.9% were coloured, as represented in Figure 4.3

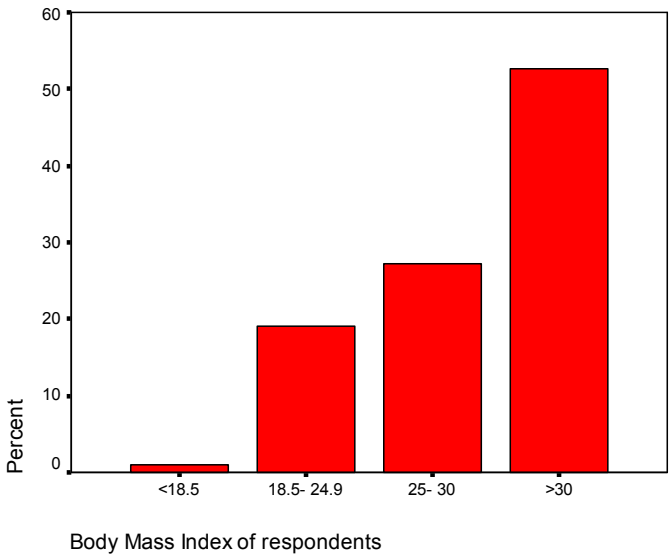

Figure 4.4: Body Mass index of Respondents

BMI readings revealed that 80% of our respondents were overweight with levels above 25 (Figure 4.4). Table 4.1 compares BMI of males and females and it shows that more females (89%) than males (63%) were overweight.

Table 4.1 Gender of respondents v/s Body Mass Index of respondents

		BODY MASS INDEX				TOTAL
		<18.5	18.5-24.9	25-30	>30	
GENDER OF RESPONDENTS	FEMALE	1	6	20	41	68
	MALE		15	10	16	41
	UNSPECIFIED				1	1
TOTAL		1	21	30	58	110
P VALUES		0.132	0.000	0.007	0.007	

Significant difference between males and females ($p < 0.05$)

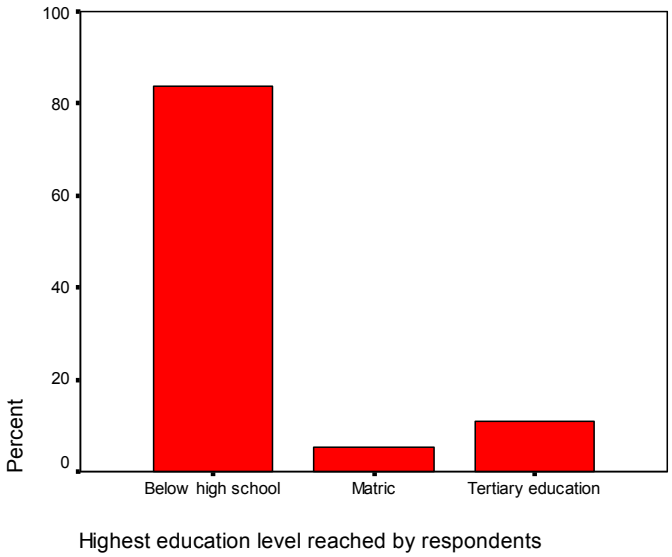

Figure 4.5: Highest education level reached by respondents

A large majority (84%) of the respondents had schooling below high school level, with only 11% having received tertiary education, as presented in Figure 4.5

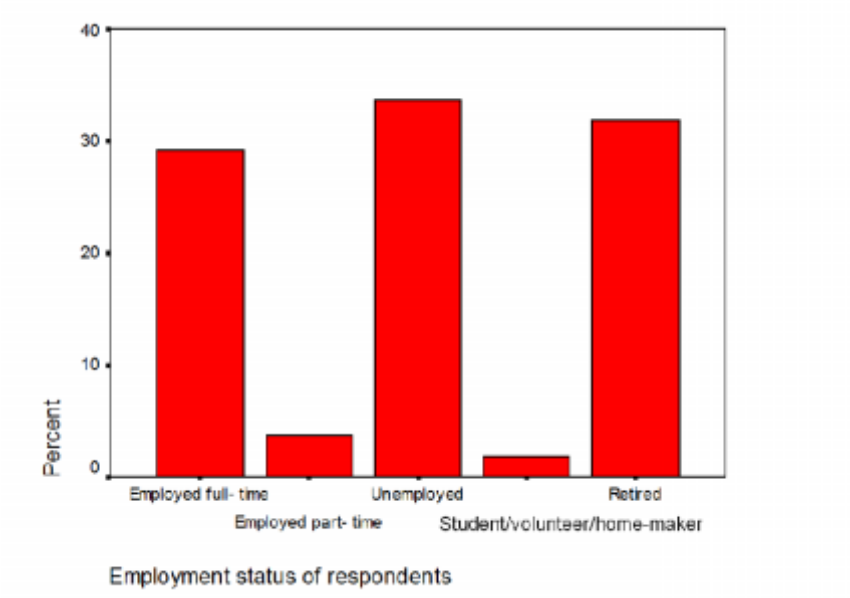

Figure 4.6: Employment status of respondents

Thirty four percent of the respondents were unemployed, followed by 32% who had retired. Those that were full-time employed made up 29%, represented in Figure 4.6. When comparing males to females as seen on Table 4.2, there were no statistically significant differences between males and females.

Table 4.2 Gender of respondents v/s Employment status of respondents

		EMPLOYMENT STATUS OF RESPONDENTS					**TOTAL**
		FULL-TIME	PART-TIME	UNEMPLOYED	STUDENT/VOLUNTEER/ HOMEMAKER	RETIRED	
GENDER OF RESPONDENTS	FEMALE	17	2	24	2	23	68
	MALE	15	2	13		11	41
	UNSPECIFIED					1	1
TOTAL		32	4	37	2	35	110
P VALUE		0.686	0.668	0.503	0.000	0.380	

P values > 0.05 not statistically significant

4.2 Results pertaining to -LIFESTYLE

When enquiring about the patient`s level of physical activity, focusing on walking briskly or running, 44% reported “little or no activity”, while 30% reported occasional activity and only 26% walked briskly or ran three or more times a week. Lifting or carrying was done regularly by only 6 % of respondents, with 79% saying they did very “little or no” lifting.

Sixty three percent (63 %) reported that their daily activities involved walking or some other form of exercise. However, 29% of the respondents primarily spent their days sitting. Seventy three percent (73%) also reported that they never take part in any vigorous exercise, 10% engaged in vigorous exercise between three and five times a week and 11% six or more times a week.

All the factors were tabled and the respondents were given a score to determine their overall physical activity levels. The physical activity score was measured by assigning numbers to the different levels in section ii of the questionnaire according to the participant`s response, 1 for little or no activity and 5 for the most physically active. The numbers were then added for all the questions in the section to come up with the physical activity score. The results showed that 74% engaged in little or no activity at all, 21% engaged in occasional activity and only 4% took part in regular physical activity, represented in Figure 4.7

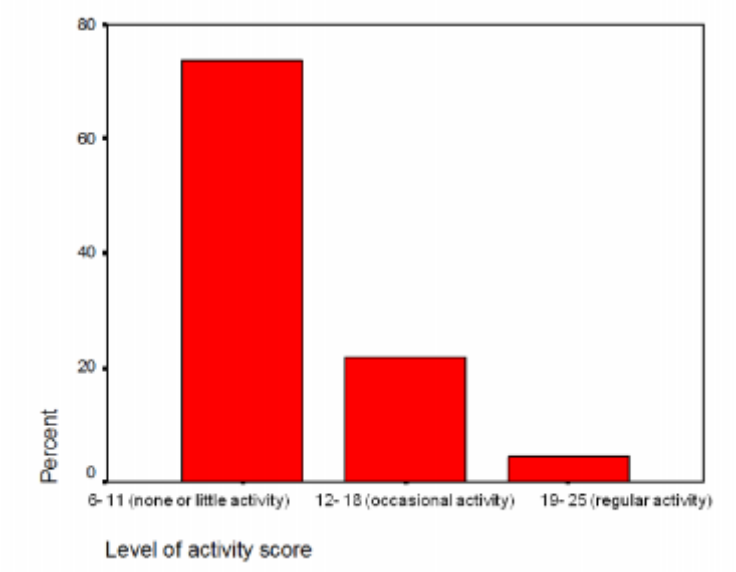

Figure 4.7: Respondents’ level of activity score

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Table 4.3 shows that respondents with high BMI generally have lowest level of activity, and more females than males have lower levels of activity score.

Table 4.3: Body Mass Index of respondent s versus level of activity score

Level of activity score			Body Mass Index of Respondents					P values
			<18.5	18.5- 24.9	25-30	>30	Total	
6-11 (none or little activity	Gender of respondents	Female		4	16	37	57	0.016
		Male		9	6	9	24	
	Total			13	22	46	81	
12- 18 (occasional activity)	Gender of respondents	Female	1	2	3	3	9	0.000
		Male		4	3	7	14	
		Unspec				1	1	
	Total		1	6	6	11	24	
19- 25 (regular activity)	Gender of respondents	Female		2	1	1	2	0.001
		Male			1		3	
	Total			2	2	1	5	

Significant difference between males and females (p< 0.05)

Table 4.4 shows that respondents with uncontrolled hypertension are also those with lowest level of activity

Table 4.4: Blood pressure readings versus Level of activity score

Respondent's current BP reading: systolic * Level of activity score

Respondents` current Bp reading		Body Mass Index of Respondents					Total	P
			<18.5	18.5-24.9	25-30	>30		
<120	Gender	Female		1	2		3	0.003
		Male						
	Total			1	2		3	
120-140	Gender	Female	1	1	7	10	19	0.005
		Male		4	4	2	10	
	Total		1	5	11	12	29	
141-180	Gender	Female		2	10	23	35	0.016
		Male		9	5	10	24	
		Unspecified				1	1	
	Total			11	15	34	60	
>180	Gender	Female		2	1	8	11	0.021
		Male		2	1	4	7	
	Total			4	2	12	18	

Respondent's current BP reading: diastolic * Level of activity score

Respondents` current Bp reading		Body Mass Index of Respondents				Total	P
			<18.5	18.5-24.9	25-30	>30	
<80	Gender	Female		1	6	10	17
		Male		2	2	3	7
	Total			3	8	13	24
80-90	Gender	Female	1	2	6	15	24
		Male		4	5	4	13
	Total		1	6	11	19	37
91-120	Gender	Female		3	8	14	25
		Male		9	3	8	20
		Unspecified				1	1
	Total			12	11	23	46
>120	Gender	Female				2	2
		Male				1	1
	Total					3	3

0.003
0.007
0.013
0.021

Significant difference between males and females ($p < 0.05$)

Nutritional Information

When respondents reported about their daily diet, 54% of respondents did not eat cheese at all, and 22.7% ate it rarely, 18% occasionally and 6% regularly. Respondents who ate eggs regularly were 15%, 45% occasionally and 32% rarely. With fish, a vast majority (70%) ate this rarely or not at all, with only 26% eating fish regularly. 94% of the respondents ate poultry on a regular basis. Fifty seven percent (57%) have fried foods regularly and 70% cooked with salt regularly and 18% added salt regularly to their food. Thirty seven percent (37%) of the respondents ate red meat occasionally, 36% rarely and 14% regularly. The alcohol intake results indicated that 26% of respondents drank alcohol, with 14% having 1-2 drinks per day and 6% having more than 3 drinks per day.

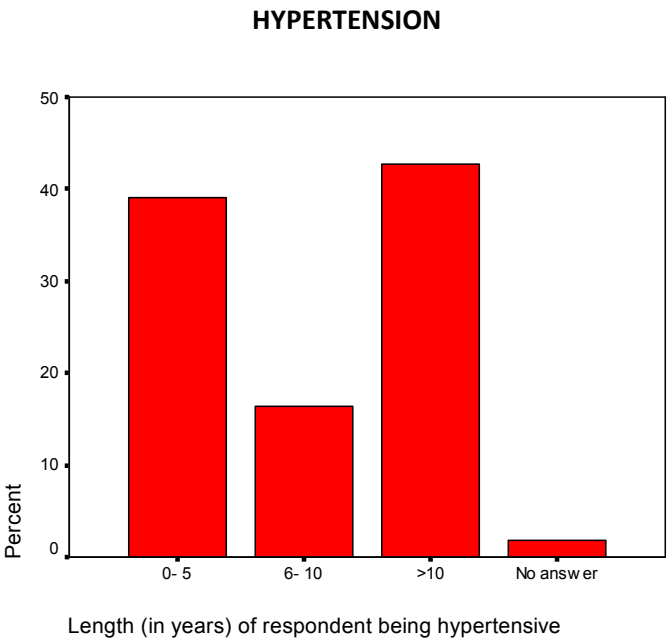

Figure 4.8: Length in years that respondent has been hypertensive

Forty three percent (43%) of the respondents had been hypertensive for more than 10 years, 39% for less than 5 years and 15 % between 5-10 years, Figure 4.8

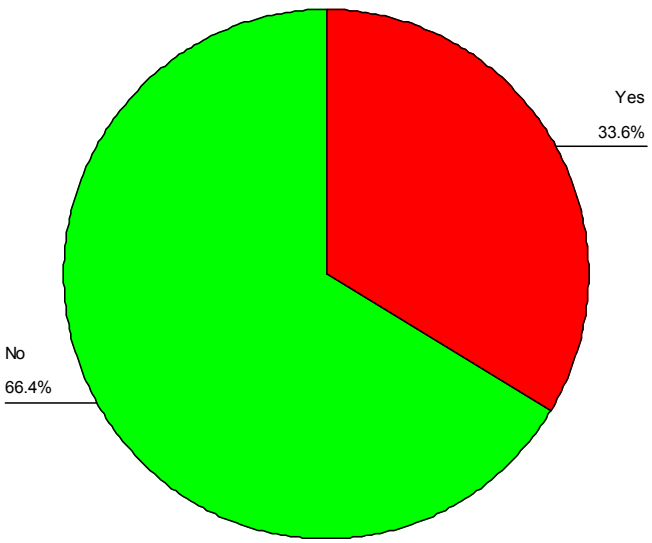

Figure 4.9: Respondents having arthritis

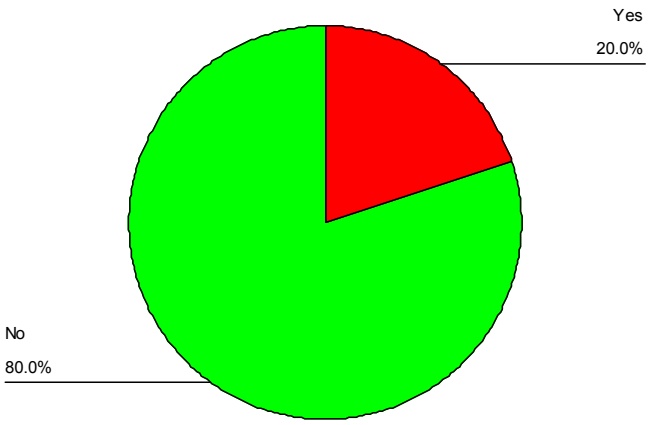

Figure 4.10: Respondents having diabetes mellitus

A few of the respondents had other chronic co-morbidities such as arthritis (34%) and diabetes mellitus (20%), Figure 4.9 and 4.10 respectively. Only 53% knew what medication they were currently on and on interrogating the hospital records it was noted that 70% of current blood pressure readings were above 141/91 mmHg.

4.3 KNOWLEDGE, ATTITUDES AND PERCEPTIONS OF PATIENTS

Respondents were asked various questions to determine how much they know about blood pressure, if they perceived that medical professionals educated them on lifestyle modification and what attitudes they had with regards to adopting healthy lifestyles.

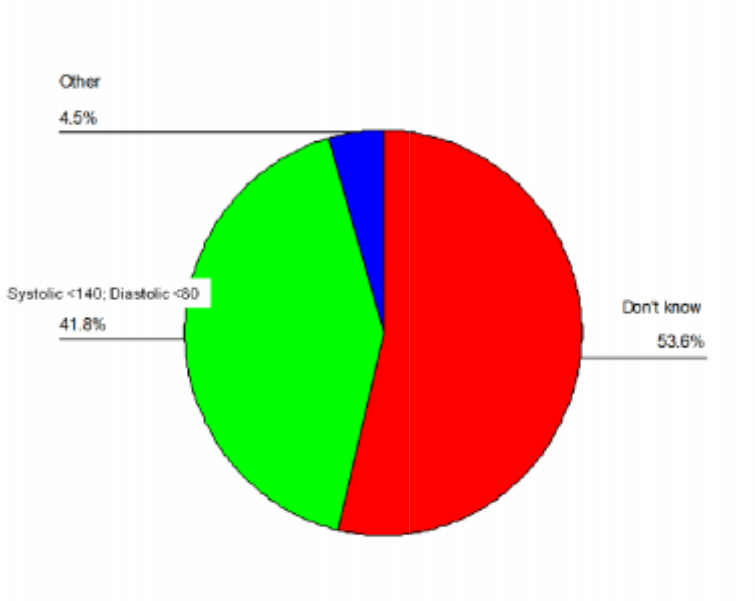

Figure 4.11: Respondent`s knowledge of ideal BP

A majority of respondents (54%) did not know what their ideal BP should be, represented in Figure 4.11

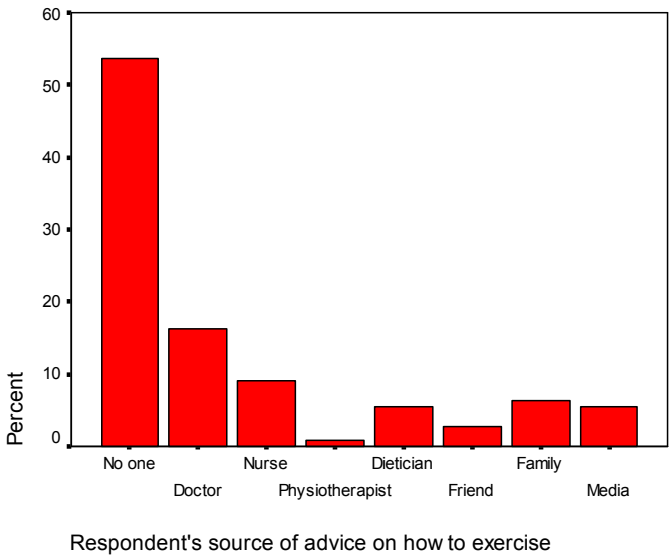

Figure 4.12: Respondent`s source of advice on how to exercise

Seventy seven percent (77%) believed in the importance of exercise in lowering BP. Fifty three percent (53%) said no-one advised them on how to exercise, 15 % received advice to exercise from medical doctors, 7% from nurses and 4% from dieticians, with 15% saying they received this advice from family, friends and the media, Figure 4.12.

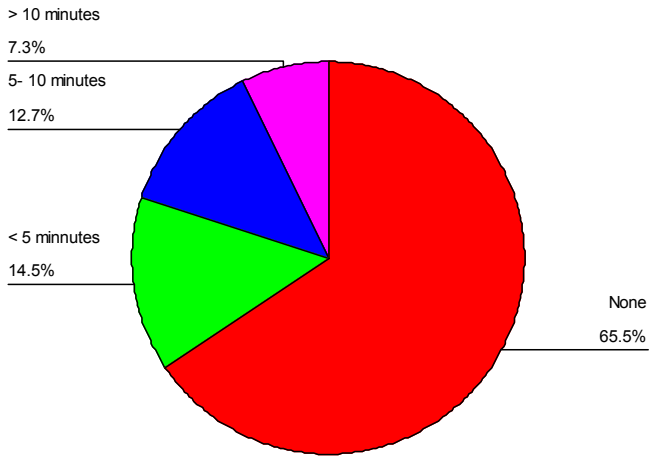

Figure 4.13: Time spent by medical professionals explaining benefits of exercise

When asked about the amount of time the respondents perceived medical professionals spend talking about the benefits of exercise to them, 66 % said none, 15% said less than 5 minutes, 13% said 5-10 minutes and 7% said more than 10 minutes, represented in Figure 4.13

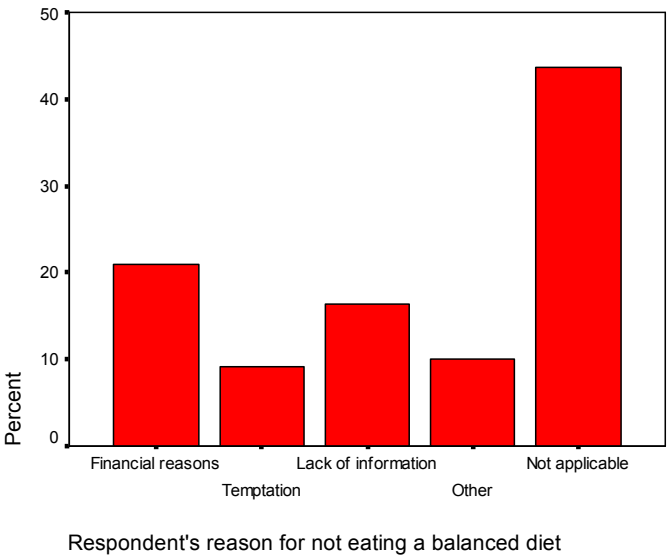

Figure 4.14: Respondent`s reason for not eating a balanced diet

While more than 82 % respondents said they believed exercise is important in controlling hypertension, more than 70% of our respondents did not exercise. The most common reason (28%) was laziness and not being familiar with exercise, followed by 15% who said they perceived the house-chores they do as enough exercise, and 11% said they do not exercise because they have painful joints. Other reasons provided included too old (5%), too tired (2%) and no-reason (5%).

More than 96% believed that a balanced diet was important in controlling BP, but only 51% said they had been taught this by a medical professional. Only 44% reported eating a balanced diet, and 56% said they do not. The reasons for not eating a balanced diet were financial (21%), 16% did not know what a balanced diet constituted of, and 9% said it was because of temptation, represented in Figure 4.14

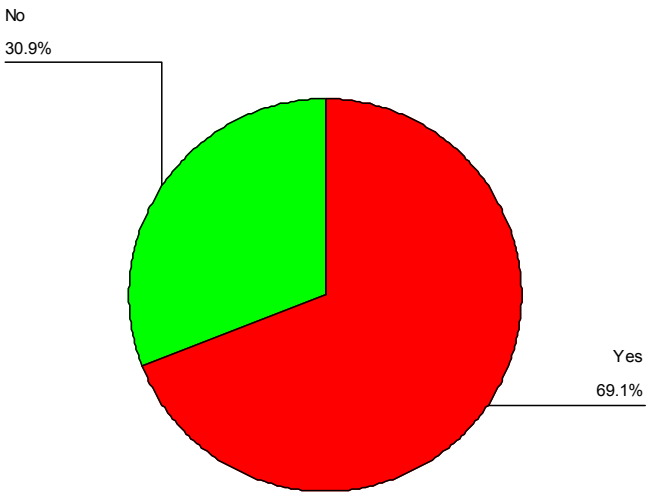

Figure 4.15: Respondents who had been taught the dangers of too much salt by a medical professional

Ninety three percent (93%) believed that intake of too much salt affects blood pressure, and 69% had been taught this by a medical professional, represented in Figure 4. 15.

With regards to alcohol, 80% believed that it affects blood pressure and 44% had been educated by a medical professional on the abuse of alcohol. And 75% of respondents knew that smoking affected blood pressure and only 36% said they had been informed by a medical professional on the dangers of smoking. Only 14% of the respondents smoked.

5. CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 DISCUSSION

Non communicable diseases such as hypertension, asthma, diabetes and epilepsy are placing an increasing burden on clinical services in developing countries and innovative strategies are therefore needed to optimize existing services. [30] The prevalence in developing countries is rising because of increased life expectancy and changing lifestyles because of urbanization. [33]

Hypertension is an enormous public health issue, because it is a reversible risk factor for stroke, ischaemic heart disease, congestive heart failure, renal failure and peripheral vascular disease. Studies have shown that cardiovascular disease can be prevented by altering diet and lifestyle and by reducing risk factors such as hypertension. [8] Lifestyle modifications is a suitable primary therapy for patients with mild hypertension and is a suitable adjunct to pharmacologic therapy. All patients would benefit from general advice on healthy lifestyles, habits, in particular healthy body weights, moderate consumption of alcohol and regular exercise. Reducing blood pressure and the risk of cardiovascular disease by changing lifestyle habits could decrease the cost of health care by decreasing the use of pharmacologic and invasive cardiovascular treatments. [8] Health promotion and disease prevention should be the mainstay for public health and treatment of diseases.

The relationship between obesity and hypertension has been investigated in a large number of studies and they have all shown that in most populations, blood pressure increases linearly with increasing relative body weight or body mass index. It is estimated that as much as one-third of all hypertension may be attributable to obesity in populations where hypertension and obesity are widely prevalent. The effects of weight reduction on blood pressure have been investigated in a small number of randomized, controlled trials involving a total of about 600 participants. Overall, the results of the trials indicated that weight reduction lowers blood pressure over intervals of up to one year. [9]

Epidemiologic, clinical and experimental studies suggest that ingestion of a diet habitually high in salt plays a role in the aetiology and pathogenesis of hypertension. Sodium chloride is the most abundant salt occurring naturally in food. However, the largest quantities of salt now consumed originate from industrially processed food. Salt reduction has been suggested as a possible adjunct to pharmacologic treatment to enhance blood pressure control. Several studies have investigated this issue and found that, for hypertensive patients who are receiving antihypertensive medication; salt restriction provides additional benefits in terms of blood pressure control. [10] It is thus important that in hypertensive patients, counseling and assistance in embarking on a low salt diet should be an integral part of the overall therapeutic regimen.

An increased prevalence of hypertension in groups with high alcohol consumption has been recognized for a number of years. Majority of studies have reported small but significant elevations in blood pressure in those consuming three or more drinks per day in comparison with non-drinkers. In multivariate analyses the association was shown to be independent of a variety of potential confounding factors, including age, relative body weight, exercise, and smoking status, that are known to be or are likely to be related to both blood pressure and alcohol consumption. [11]

A detailed history of alcohol consumption should be obtained from patients with hypertension. Such patients should be encouraged to reduce their consumption and be referred for treatment of alcohol dependence.

There is consistent evidence that regular dynamic physical exercise (including walking, cycling, noncompetitive swimming and other equivalent leisure activities) decreases both systolic and diastolic blood pressure by 5-7 mmHg independent of weight loss, alcohol intake or salt intake. There is also evidence that moderate intensity exercise, in sessions of 50-60 minutes, 3 or 4 times per week, may be more effective than vigorous exercise in decreasing blood pressure in hypertensive patients. Physical activity has often been used in conjunction with weight reduction strategies for the treatment of hypertension. Increased physical activity, together with a reduction in caloric intake alone or in combination with a reduction in alcohol intake and with or without a reduction in sodium intake reduces the relative risk of hypertension.

This cross-sectional descriptive study was conducted to understand the current knowledge, attitudes and perceptions of hypertensive patients with regard to the importance of lifestyle modification in controlling their hypertension. Carletonville Hospital was used as the study site, which is in a small mining town of Carletonville. The results suggest that patients are knowledgeable about hypertension in general and the lifestyle modifications required to control it. However, less than 50% reported having received such advice in lifestyle modification from medical professionals usually spending less than five minutes.

Reduced salt intake advice was reported most frequently (69%), followed by a balanced diet (50%), reduced alcohol intake (44%), not smoking (36%) and exercise advice (30%), this is in contrast to the Viera, et al. study conducted in America where exercise advice was reported most frequently (75%), followed by advice to reduce salt intake (69%), change eating habits (62%), and reduce alcohol intake (44%).[5] However, in this study the patients were told about lifestyle change, but very little detail with respect to counseling was offered as to how to go about these lifestyle changes.

Despite this most of the respondents were leading sedentary lifestyles, were overweight (BMI>25) and had BP >140/90. Respondents with lower level of activity score had higher BMI`s and uncontrolled hypertension as shown in **Table 4.3** and **Table 4.4**. The reasons used for not exercising varied from laziness, “not being used to it”, no time to body pain. Twenty one percent (21%) were not on a proper diet due to financial reasons, 16% stated lack of information as the reason and 9% just found unhealthy food to be very tempting. The researcher believes that if the medical practitioners at hospital emphasized the importance of exercise in the control of hypertension, maybe more patients would have participated in exercise. It may also be that the doctors were not equipped to provide more information regarding exercise as it did not form part of their medical training.

More than 50 % of the respondents had been hypertensive for more than 5 years, and only 53% knew what medication they were currently on and 54% did not know what the ideal BP should be. These results suggested that although patients did receive some advice on hypertension and the importance of lifestyle modification, it was not adequate.

Greeff in 2006 emphasized that building a trusting relationship between the healthcare worker and the patient is one of the most important aspects when motivating patients. [25] The researcher believes that trained lifestyle counselors should be placed in all public hospitals in order to assist with education.

According to the author`s knowledge, no other study has comprehensively assessed patient hypertension knowledge, attitudes and perceptions on the importance of lifestyle modification in controlling hypertension in South Africa. The author hopes that this study's results could be acted on by the Department of Health and other authorities.

Detailed patient interviews were conducted to begin to understand the current knowledge, attitudes and perceptions in a hypertensive population, and actual BP readings were collected from medical records.

There were limitations to this study. The selection of a single region like Carletonville, in which to conduct this study may limit the generalizability of the findings to populations with different demographics and socio-economic conditions. The sample is only directly comparable to a population similar to that represented in this study.

Hypertensive patients in the study may differ from the general hypertensive population in terms of access to medical care, socio-economic status, general health/co-morbidity status and other factors. However, based on the comprehensiveness of the patient questionnaires, which in some instances lasted up to an hour, available resources were adequately used to obtain detailed information from the respondents and their medical records.

There is no standardized instrument available to assess hypertension and lifestyle modification knowledge, attitudes and perceptions. [7] The author used the existing literature to design a data collection instrument that would be comprehensive and detailed. Furthermore, the sample size was small and the analyses must be considered exploratory in nature. The author does not claim that the results of this study are representative of the entire South African population.

5.2 CONCLUSIONS

The findings in this study suggest that to achieve the ultimate goal of improving health by controlling hypertension, it is important to understand the current status of patient knowledge, attitudes and perceptions of patients towards lifestyle modification as an important factor in lowering blood pressure. It is necessary to understand these patient factors in order to develop effective strategies and interventions that enlist the patient as a participant in the management of their health. As the absolute risk of cardiovascular disease is higher in older individuals, public health strategies for implementing multicomponent lifestyle intervention should include this segment of the population.

5.3 RECOMMENDATIONS

Many patients look to their medical professionals for information and guidance, it is thus important that doctors are thoroughly educated on the importance of lifestyle modification in controlling hypertension, with focus on improving their interpersonal communication with patients.

REFERENCES

1. Addo J, Smeeth L, Leon D. Hypertension In Sub-Saharan Africa: A Systematic review. Hypertension 2007; **50**; 1012-1018

2. Campbell N, Burgess E, Taylor G, et al. Lifestyle changes to prevent And control Hypertension: Do they work? Can Med Assoc J 1999; **160**: 1341- 3

3. Dennison C, Peer N, Steyn K. Determinants of hypertension care and control among Peri-urban black South Africans: The HiHi study. Ethnicity & Disease 2007; **17:** 484-491

4. Egan B, Lackland D, Cutler N. Awareness, knowledge, and attitudes of older Americans about high blood pressure. Arch Int Med 2003; **163:** 681-687

5. Bryer A, Connor MD, Houg P. South African Guideline for management of ischaemic stroke and transient ischaemic attack 2010: A guideline from the South African Stroke Society (SASS) and SASS writing committee. S Afr Med J 2010; **100**: 747-778

6. Goldstein et al. Guidelines for the primary prevention of Stroke. Stroke 2011; **42:** 517-584

7. Stanley S, William G, Nathan D. The Framingham Heart Study:Hemodynamic Patterns of Age-Related Changes in Blood Pressure. Circulation 1997;**96**:308-315

8. Connor M, Rheeder P, Meredith M. The South African stroke risk in general practice study. S Afr Med J 2005; **95:** 334-339

9. Opie L, Seedat Y. Hypertension in sub-saharan African populations. Circulation 2005; **112:** 3562-3568

10. Dennison C, Peer N, Lombard C. Cardiovascular risk and comorbid conditions among black South Africans with hypertension in public and private primary care settings. The HiHi study. Ethn Dis 2007; **17:** 477-483

11. Svetkey L. Effects of dietary patterns on blood pressure: subgroup analysis of the Dietary Approaches to Stop Hypertension (DASH) randomized controlled trial. Arch Intern Med 1999; **159:** 285-293

12. World Health Oganization. Obesity: preventing and managing the Global epidemic. Report of a WHO Consultation on Obesity. Geneva, Switzerland: World Health Organization; 1998

13. Steyn K. Hypertension in South Africa. Chronic Diseases of Lifestyle in South Africa since 1995-2005. 80-96

14. Rayner B. Hypertension: Detection and Management in South Africa. Nephron Clin Pract 2010; **116**; c269-c273

15. Charlton K, Steyn K, Levitt N. Diet and blood pressure in South Africa: intake of foods containing sodium, potassium, calcium and magnesium in three ethnic groups. Nutrition 2005; **21**; 39-50

16. Loock M, Steyn K, Becker P. Coronary heart diseases and their risk factors in black South Africans- a case control study. Ethn Dis. In press

17. Seedat Y. Is the pathogenesis of Hypertension different in black patients? J Hum Hypertension 1996; **3 (suppl)**; 535-37

18. Mollentze W, Moore A, Joubert G. Coronary heart disease risk factors in a rural and urban Orange Free State black population. S Afr Med J 1996; **85**; 90-96

19. Steyn K, Fourie J, Lombard C. Hypertension in the black community of the Cape peninsula, South Africa. East Afr Med J 1996; **11**; 758-763

20. Van Rooyen J, Kruger H, Huisman H. An epidemiological study of hypertension and its determinants in a population in transition: the THUSA study. J Hum Hypertension 2000; **14**; 779-787Stevens V. Long-term weight loss and changes in blood pressure: results of the trials of hypertension prevention, Phase II. Ann Intern Med 2001; **134:** 1-11

21. Girgis S, Neal B, Prescott J. A one-quarter reduction in the salt content of bread can be made without detection. Eu J of Clin Nutr 2003; **57**; 616-620

22. Midgley J, Matthew A, Greenwood C. Effect of reduced dietary sodium on blood pressure: a meta-analysis of randomized controlled trials. JAMA 1996; **275(20)**; 1590-7

23. Hester W, Howell R, Lawrimore C. Improving patient compliance and Outcomes in hypertension management in the `Stroke Capital` of the World. Mcleod Family Medicine Residency Program 2007

24. Seedat Y, Croasdale M, Milne F. South African Hypertension Guidelines 2006. S Afr Med J 2006; **96(4)**: 337-362

25. Greef D. Lifestyle modification to control hypertension. S Afr Pharm J 2006; **25**: 14-19

26. Svetkey L, Erlinger T, Vollmer W. Effect of lifestyle modifications on blood pressure by race, sex, hypertension status, and age. J of Human Hyp 2005; **19:** 21-31

27. The sixth report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure (JNC-VI). Arch Intern Med 1997; **157:** 2413-2446

28. TOHP Research Group. The effects of non-pharmalogic interventions on blood pressure of persons with high normal levels. Results of the trials of hypertension prevention, Phase I. JAMA 1992; **267:** 1213-1220

29. Rumantir M, Vaz M, Jennings G. Neural mechanisms in human obesity-related hypertension. J of Hypert 1999; **8**; 1125-1133

30. Puoane T, Steyn K, Bradshaw D. Obesity in South Africa: the South African demographic and health survey. Obes Res 2002; **10:** 1038-1048

31. Appel L. Effects of comprehensive lifestyle modification on blood pressure control: main results of the PREMIER clinical trial. JAMA 2003; **289:** 2083-2093

32. Mvo Z, Dick J, Steyn K. Perceptions of overweight African women about acceptable body size of women and children. Curationis. 1999; **22**; 27-31

33. Fox F. Diet in the urban locations as indicated by the survey. In: M Janish, ed. A study of African Income and Expenditure in 987 families in Johannesburg. Johannesburg, South Africa: City of Johannesburg, Department of Non-European and Native Affairs; 1940

34. Jeffery R, French S. Epidemic obesity in the United States: are fast foods and television viewing contributing? Am J Public Health 1998; **88**; 277-80

35. Bourne L. Dietary Intake in an Urban African Population in South Africa-With Special Reference to the Nutrition Transition. Cape Town, South Africa: University of Cape Town; 1996. Thesis

36. Dawson D. Ethnic differences in female overweight: data from the 1985 National Health Interview Survey. Am J Public Health 1988; **78**; 1326-9

37. Erwteman T, Nagelkerke N, Lubsen J. Beta-blockade, diuretics, and salt restriction for the management of mild hypertension: a randomized double blind trial. BMJ 1984; **289**; 406-9

38. Suppa G,Pollavini G, Alberti D. Effects of a low-sodium high-potassium salt in hypertensive patients treated with metropolol: a multi-centre study. J Hypertens 1988;**6**; 787-90

39. MacMahon S, Blackett R, Macdonald G. Obesity, alcohol consumption and blood pressure in Australian men and women. J Hypertens 1984; **2;** 85-91

40. Criqui M, Wallace R, Mishkel M. Alcohol consumption and blood pressure: the Lipid Research Clinics Prevalence Study. Hypertension 1981; **3;** 557-565

41. Arkwright P, Beilin L, Rouse I. Alcohol, personality and predisposition to essential hypertension. J Hypertens 1983; **1**; 365-371

42. Ireland M, Vandongen R, Davidson L. Acute effects of moderate alcohol consumption on blood pressure and plasma catecholamines. Clin Sci 1984; **66**; 643-648

43. Svetkey L. PREMIER: a clinical trial of comprehensive lifestyle modification for blood pressure control: rationale, design and baseline characteristics. Ann Epidemiol 2003; **13:** 462-471

44. WHO/ISH Mild Hypertension Liaison Committee. Guidelines for the management of mild hypertension. Journal of Hypertension 1993; **11:** 905-918

45. Cleroux J, Feldman R, Petrella R. Recommendations on physical exercise training. Can Med Assoc J 1999; **160(9 suppl):** 21-28

46. SusanA, Olivera ScD, Roland S. Hypertension knowledge, awareness and Attitudes in hypertensive population. J of Int Med 2005; **20:** 219-225

47. Viera A, Krishrgasar A, Hinderliter A. Lifestyle modification advice for lowering or Controlling high blood pressure : Who`s getting it? J of Clin Hypertension 2007; **9:** 850-8

48. Halel A, Fritz V, Eales C. Do stroke patients realize that a consequence of hypertension is stroke? Departments of Physiotherapy and Neurology, University of the Witwatersrand, Johannesburg, South Africa. SAMJ 1998 ; 88 : 455-465

49. Sengwana M, Puoane T. Knowledge, beliefs and attitudes of community health workers about hypertension in the Cape Peninsula, South Africa. Curationis 2004; 27(1):65-71

50. Mollentze W, Moore A, Joubert G. Cardiovascular risk factors in the black population of QwaQwa. S Afr J Clin Nutr 1993; **6**; 50-1

51. Donahue R, Abbott R, Bloom E. Central obesity and coronary heart disease in men. Lancet 1987; **1**; 821-4

52. Steyn K, Fourie J, Lombard C. Hypertension in the black community of the Cape Peninsula. The BRISK study. East Afr Med J 1996; **73**; 756-60

53. Fodor J, Whitmore B, Leenen F. Recommendations on dietary salt. Can Med Assoc J 1999; **160**: 29-34

54. MacMahon S. Alcohol consumption and hypertension. J of the Am Heart Assoc 1987; **9:** 111-121

55. Steyn K, Fourie J, Lombard C. Hypertension in the black community of the Cape peninsula, South Africa. East Afr Med J 1996; **11:** 758-763

56. Whelton P. Primary prevention of hypertension. Clinical and public health advisory from the National high blood pressure education program. JAMA 2002; **288:** 1882-1888

57. Karanja N. Descriptive characteristics of the dietary patterns used in the Dietary Approaches to Stop Hypertension trial. J Am Diet Assoc 1999; **99** (suppl): S19-S27

58. Watson D, Tharp R. Self-directed behavior: Self-modification for personal adjustment, 5th ed. Brooks/Cole: Pacific Grove, CA, 1989

59. Rose G, McCartney P, Reid D. Self administration of a questionnaire on chest pain and intermittent claudication. Br J Prev Soc Med 1977; **31:** 42-48

60. Coleman R, Gill G, Wilkinson. Noncommunicable disease management in resource-poor settings: a primary care model for South Africa. Bulletin of the World Health Organization 1998; **76 (6):** 633-640

61. Zimmet P, Lefebre P. The global NIDDM epidemic, treating the disease and ignoring the symptom. Diabetalogia 1996; **39:** 1247-1248

62. Beevers D, Prince J. Hypertension: an emerging problem in tropical countries. Transactions of the Royal Society of Tropical Medicine and Hygiene 1991; **85:** 324-326

63. Papoz L. Diabetes Mellitus in Tunisia: description in urban and rural populations. International Journal of Epidemiology 1988; **2:** 419-422

64. Murray C, Lopez A. Alternative projections of mortality and disability by cause 1990-2020. Global burden of disease study. Lancet 1997; **349:** 1498-1504

65. Heart Foundation Hyperetnsion Consensus Symposium (endorsed by the Medical Research Council and Hypertension Society of Southern Africa) Management guidelines for hypertension in Southern Africa. SAMJ 1992: 1-4

66. Seedat Y. Varying responses to hypotensive agents in different racial groups: black versus white differences. Journal of hypertension 1989; **7:** 515-518

67. Diabetes Mellitus. Report of a WHO study group Geneva, World Health Organization, 1985 (WHO Technical Report Series No. 727)

68. Puoane T, Steyn K, Bradshaw D. Obesity in South Africa: The South African Demographic and Health Survey. Obesity Research 2002; **10;** 1038-1048

APPENDIX 1

PATIENT INFORMATION SHEET

GOOD MORNING,

MY NAME IS MMAMONTSHENG DULCY RAKUMAKOE, I AM A MEDICAL DOCTOR AND A M Sc (SPORTS MEDICINE) STUDENT AT WITS UNIVERSITY.

I WISH TO INVITE YOU TO PARTICIPATE IN THE STUDY THAT I AM CONDUCTING TO DETERMINE THE KNOWLEDGE, ATTITUDES AND PERCEPTIONS OF HYPERTENSIVE PATIENTS TOWARDS LIFESTYLE MODIFICATION IN CONTROLLING HYPERTENSION.

PARTICIPATION IS VOLUNTARY AND REFUSAL TO PARTICIPATE WILL INVOLVE NO PENALTY OR LOSS OF BENEFITS TO WHICH YOU ARE ENTITLED. YOU ARE FREE TO DISCONTINUE WITH THE STUDY AT ANY TIME WITHOUT PENALTY OR LOSS OF BENEFITS.

THE STUDY WILL INVOLVE ANSWERING A QUESTIONNAIRE ABOUT YOUR DEMOGRAPHIC DATA, LIFESTYLE AND LEVEL OF PHYSICAL ACTIVITY, AND YOUR KNOWLEDGE AND ATTITUDES ON THE IMPORTANCE OF LIFESTYLE MODIFICATION IN HYPERTENSION CONTROL. YOUR MEDICAL RECORDS WILL ALSO BE REVIEWED TO SEE HOW WELL YOUR BLOOD PRESSURE IS CONTROLLED. IF YOU GRANT PERMISSION FOR YOUR RECORDS TO BE REVIEWED AND TO ANSWER THE QUESTIONNAIRE, YOU WILL BE REQUIRED TO FILL IN THE SUPPLIED INFORMED CONSENT FORM.

I WILL BE PERSONALLY CONDUCTING THE RESEARCH. YOUR NAME WILL NOT BE USED IN THE STUDY THUS CONFIDENTIALITY WILL BE MAINTAINED. I CAN BE CONTACTED ON 0824982625 FOR ANY FURTHER ENQUIRIES.

THANK YOU

……

APPENDIX 2

TITLE OF STUDY : TO DETERMINE THE KNOWLEDGE, ATTITUDES AND PERCEPTIONS OF HYPERTENSIVE PATIENTS TOWARDS LIFESTYLE MODIFICATION IN CONTROLLING HYPERTENSION.

INFORMED CONSENT FORM

Dear Sir/Madam

My name is M.D Rakumakoe, I am a medical doctor and a student at the University of the Witwatersrand. I am conducting a study to find out the attitudes and perceptions of hypertensive patients towards lifestyle modification in controlling hypertension.

The findings will show if there are any pitfalls in how we currently educate our patients and then show which areas need to be improved in order to benefit the patients. I therefore invite you to participate in this study.

It is a questionnaire based study and there are no damages to you participating and there are no costs involved for you. I also request permission to look into your medical files to check for blood pressure control.

If you agree to be part of this study please complete below:

I ……..agree to participate in the research conducted by Dr M.D Rakumakoe (MP0516406). I acknowledge that the information obtained from my medical records and questionnaires will be used solely for research educational purposes. I also acknowledge that my identity will not be divulged. I agree that the procedures to be followed have been explained fully to me and the benefits of the study. I am free to withdraw consent and discontinue participation in the project at any time.

Signature…… Date…….

Witness……..

APPENDIX 3

questionnaire

i. demographics

1. age……..

2. height…….. weight……. bmi……..

3. girth measurements

waist…….. hip…….. waist/hip……..

4. race

[ ] white

[ ] black

[ ] indian

[ ] coloured

5. what is your marital status?

[ ] single

[ ] married

[ ] divorced

[ ] widowed

6. what is your highest level of education?

[ ] below high school

[ ] matric

[ ] tertiary education

7. what is your employment status?

[ ] employed full-time

[ ] employed part-time

[ ] unemployed

[ ] student/volunteer/home-maker

[ ] retired

ii. physical activity

1. how would you rate your overall physical activity level?

a. walking briskly, running

[ ] level 1- little or no activity

[ ] level 2- occasional activity

[ ] level 3- regular physical activity at least

3 times per week

b. lifting and carrying

[ ] level 1- little or no activity

[ ] level 2- occasional activity

[ ] level 3- regular physical activity at least

3 times per week

2. does your work or daily activity primarily

Involve (tick most appropriate) :

[ ] sitting

[ ] standing

[ ] walking or other exercise

[ ] heavy labour

[ ] other (please specify) : ……

3. how often do you engage in vigorous exercise which markedly increases your breathing such as : vigorous walking, cycling, running, swimming, etc?

[ ] seldom or never

[ ] less than once a week

[ ] 1-2 times per week

[ ] 3-5 times per week

[ ] 6 or more times per week

4. when you exercise, how long do you spend at each session?

[ ] 0-14 minutes

[ ] 15-29 minutes

[ ] 30-44 minutes

[ ] 45-59 minutes

[ ] 60 or more minutes

5. On average, how many times per day do you lift objects which weigh 25kg or more?

[ ] rarely or never

[ ] 1-4 times

[ ] 5-14 times

[ ] 15-24 times

[ ] 25 times or more

iii. lifestyle

please check how often you use each of the following on a weekly basis. please mark a box for every food item according to your usual intake. if you eat some foods only rarely or occassionally, mark the "less than one" category.

	times per week				
	none	**<1**	**1-3**	**4-7**	**>7**
cheese	[ ]	[ ]	[ ]	[ ]	[ ]
eggs	[ ]	[ ]	[ ]	[ ]	[ ]
fried foods (chips,					
fried meat, eggs)	[ ]	[ ]	[ ]	[ ]	[ ]
cooked salt	[ ]	[ ]	[ ]	[ ]	[ ]
added salt	[ ]	[ ]	[ ]	[ ]	[ ]
fish	[ ]	[ ]	[ ]	[ ]	[ ]
beef, pork,lamb	[ ]	[ ]	[ ]	[ ]	[ ]
poultry	[ ]	[ ]	[ ]	[ ]	[ ]
drugs or medication					
for headache	[ ]	[ ]	[ ]	[ ]	[ ]
for sleeping	[ ]	[ ]	[ ]	[ ]	[ ]
for mood/relaxing	[ ]	[ ]	[ ]	[ ]	[ ]
recreational	[ ]	[ ]	[ ]	[ ]	[ ]

do you consume alcoholic beverages? yes[ ] no [ ]

if yes, how much?

[ ] 1-2 drinks per day

[ ] 3-4 drinks per day [ ] more than 4 drinks per day

iv. hypertension

1. do you suffer from :	yes	no
hypertension	[ ]	[ ]
asthma	[ ]	[ ]
athritis	[ ]	[ ]
diabetes mellitus	[ ]	[ ]
cancer	[ ]	[ ]
tb	[ ]	[ ]
coronary heart disease	[ ]	[ ]
hiv/aids	[ ]	[ ]
other…….	[ ]	[ ]

2. how long have you been hypertensive?

[ ] 0-5 years

[ ] 6-10 years

[ ] > 10 years

3.what medication do you take for your hypertension and how long have you been on the current treatment ?

.....
.....

4. what is your current bp reading?

systolic	diastolic
[ ] < 120	[ ] < 80
[ ] 121-140	[ ] 81-90
[ ] 141-180	[ ] 91-120
[ ] >181	[ ] >121

v. knowledge, attitudes and perceptions

1. what bp reading do you consider to be your ideal? ……..

2. do you believe exercise can help lower your blood pressure?

[ ] yes [ ] no

3. if you do exercise, who advised you on how to exercise?

no one [ ] doctor [ ] nurse [ ] physiotherapist [ ]

dietitian [ ] friend [ ] family [ ] media [ ]

4. how much time do you think the medical professionals spend talking to you about the benefits of exercise?

None [ ] less than 5 minutes [ ] 5-10 minutes [ ]

More than 10 minutes [ ]

5. what are the benefits of exercise?

a……

b……

c……

d……

e…….

6. if you do not exercise, why not?……
……

7. can a balanced diet assist in lowering bp?

[ ] yes [ ] no

8. did a medical professional teach you a balanced diet?

[ ] yes [ ] no

9. do you eat a balanced diet?

[ ] yes [ ] no

10. why/ why not?

……
……

11. does adding salt to food affect your Bp?

[ ] yes [ ] no

12. did a medical professional teach you about the dangers of too much salt?

[ ] yes [ ] no

13. does alcohol affect bp?

[ ] yes [ ] no

14. did a medical professional teach you about the dangers of alcohol?

[ ] yes [ ] no

15. does smoking affect blood pressure?

[ ] yes [ ] no

16. did a medical professional teach you about the dangers of smoking?

[ ] yes [ ] no

17. do you smoke?

[ ] yes [ ] no

18. if yes, how many per day?

……