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Review Article

The Increasing Burden of Uncontrolled Hypertension in Nigeria: The Role of Lifestyle Modification Practices as an Effective Strategy to Reverse the Trend

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ABSTRACT

Background: Globally, uncontrolled hypertension is a serious prevalent risk factor for cardiovascular and renal diseases. The current approach to the control of hypertension and its complications includes drug treatment of hypertensive patients and implementation of adequate lifestyle modifications (LMs) which are beneficial for non-hypertensive and hypertensive individuals. Practices of LMs are abysmally low in Nigeria.
Aim: This review aims to provide healthcare professionals with useful clinical information to guide their patient care promote the understanding of LMs and motivate hypertensive patients and the public to adopt and maintain multiple LMs.
Methodology: Manual literature and computer programmes (Cochrane Library, EMBASE, OVID, Pub Med, HINARI, Goggle Scholar etc) were searched for relevant information.
Results/Discussion: The search showed that LM practices such as regular physical activity/exercises, weight loss by the overweight or obese, reduced salt and increase potassium (K^+) intake, adoption of the Dietary Approaches to Stop Hypertension (DASH) diet (that emphasizes consumption of fruits, vegetables, low-fat dairy products, reduced saturated fat and cholesterol), moderation in alcohol intake and cessation of smoking, have significant beneficial effects on blood pressure (BP). High religiosity or spirituality promotes cardiovascular health possibly by its preventive or prohibitive influence on lifestyle risk factors such as smoking and excessive alcohol drinking.
Conclusion: The current challenge to healthcare providers and the public is evolvement and implementation of effective clinical and public health strategies that lead to sustained LM practices. There is urgent need to intensify LM education and counseling to both hypertensive patients and the public, particularly in Nigeria.

Key words: Uncontrolled hypertension, Lifestyle modification, Strategy for controlling hypertension, Nigeria.

INTRODUCTION

Cardiovascular diseases (CVDs), mostly heart disease and stroke, account for a third of deaths worldwide with about 80% of these deaths happening in low and middle income countries.[1] The biggest risk factor in

CVD is hypertension, as it is directly responsible for 62% of strokes and 49% of heart disease. [1,2] The International Forum for Hypertension Control and Prevention in Africa suggested that strategies that modify the risk factor for hypertension, such as promoting healthy diets, weight reduction, reducing salt intake, smoking cessation and moderation in alcohol intake and engaging in physical exercises, could lower the prevalence of high blood pressure and subsequently reduce the burden of CVD. [3] This combination of strategies is also recommended in the guidelines on hypertension by the various Hypertension Writing Groups such as the World Health Organization (WHO)/International Society of Hypertension (ISH). [4] European Society of Hypertension (ESH)/European Society of Cardiology (ESC) [5] and the US 8th Joint National Committee for the Prevention, Detection, Evaluation and Treatment of High Blood Pressure. [6] Aside from other risk factors such as tobacco use, undernutrition, unsafe water and unsafe sex, hypertension is reported to rank highest as a preventable cause of death in both developed as well as in developing countries such as Nigeria where hypertension and urbanization have been close companions. [1,5,7,8]

It has long been recognized that drug treatment alone is an incomplete solution to the epidemic of high BP. [1-69-11] It is known that the risk of BP-related cardiovascular and renal disease increases progressively throughout the range of BP, including ranges of BP previously considered normal but now called prehypertension. Although the number of patients with hypertension and prehypertension continues to rise and affects a large portion of the population, recognition and adequate treatment are grossly inadequate. [12]

The cost of drug treatment of hypertension represents a significant amount of healthcare resources use and the total annual medical expenditure attributed to hypertension including comorbidities are estimated to range from USD 108-110 billion. [13,14] The adverse effects such as dizziness, headache, fatigue, chest discomfort, cough, sexual dysfunction, caused by some antihypertensive drugs, may prompt some patients to discontinue therapy, predisposing them to the danger of cardiovascular events. But LMs are cheap and have virtually no side effect. [15-17]
In view of the above considerations, national and international policy-making bodies recommend LM practices as a means to prevent and treat hypertension and thereby prevent cardiovascular and renal disease in the whole population. [1-8,10,18]

THE BURDEN OF UNCONTROLLED HYPERTENSION IN NIGERIA

In Nigeria, hypertension is a serious major public health and clinical problem that causes disability and death among the adult population as well as playing an important role in the causation of heart failure, heart attack, stroke, renal failure, and arterio-sclerosis in the population. [19,20] Indeed, it has been reported that the incidence of hypertension is rising in Nigeria. [21-26] A nation-wide survey [27] in 1992 showed that 11.2% of adults were hypertensive but recent studies done in different parts of the country have shown prevalence rates that ranged from 28.8% to 36.6% [22,24-26] This increasing burden of hypertension is stretching medical facilities in Nigeria and this is shown by increase rate of in-patient hospital admissions for strokes and heart disease. [28-30] Therefore, there is a need for population-wide strategies to prevent hypertension in Nigeria before it becomes an unmanageable epidemic. [31]

Recent surveys in Nigeria reveal continuing deficiencies in the knowledge, perception, prevention and control of

hypertension. In most cases, failure to achieve BP control was attributed to the poverty of patients' knowledge and lack of or inadequate practice of LMs. [21,28,29,32,33] The result is that excess morbidity and premature mortality from severe hypertension have remained high among Nigerian patients. [34,35] Worse still, the coexistence of hypertension and diabetes in this group dramatically and synergistically increases the risk of microvascular and macrovascular complications, a worrisome condition associated with widespread disability, excess mortality, reduced capacity for work and disruption of social/family life among the indigenous people. [36-38]

Thus hypertension has become a big burden in Nigeria, a country experiencing the epidemiological transition from communicable to non-communicable diseases, a phenomenon referred to as *a double burden of disease*. Rural-to-urban migration coupled with acculturation and modernization has become the trend that is strongly linked with changes in individual and societal lifestyles such as an increase in tobacco use, excessive alcohol consumption, reduced physical activity and adoption of western diets that are high in salt, refined sugar and unhealthy fats and oils. [32,35]

THE ROLE OF LIFESTYLE MODIFICATIONS (LMs) AS AN EFFECTIVE STRATEGY TO REDUCE HYPERTENSION

LMs, previously referred to as non-pharmacological therapy, have important roles in hypertensive and non-hypertensive individuals. In hypertensive individuals, LMs can serve as initial treatment before the commencement of antihypertensive therapy and as an adjunct to medications in persons already on drug therapy. [11,12] In hypertensive individuals with medication-controlled BP, these therapies can facilitate drug step-down and drug withdrawal in highly motivated individuals who are consistent with LM practices. [35] In non-hypertensives, LMs have the potential to prevent hypertension, and more broadly to reduce BP and its complications in whole (including prehypertensive) population. 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 80% reduction in stroke mortality and a 5% reduction in mortality from coronary heart disease. [9,12]

It is remarkable that hypertension, the key driver of cardiovascular complications, is mainly associated with environmental and lifestyle factors rather than with genetics and has a stronger association and causal link with the following modifiable (reversible) risk factors that can reduce BP if properly utilized. [9,12,35]

Regular physical activity/exercise

Adequate physical activity including regular aerobic (isotonic) exercises such as brisk walking, dancing, swimming, jogging 30-45 minutes 3-4 days a week, has been shown to have health promoting benefits and has a direct, independent role in reducing BP. Hence, even in elderly people, tolerance exercise is advised. [35,39-41]

Hitherto, it was thought that a high level of physical activity could in part explain the low level of chronic disease found in most of Africa. However, the amount of physical activity has decreased as a result of a high rate of urbanization. Adequate physical activity is more prevalent in rural than urban areas of Nigeria, which partly explains the high prevalence of obesity in urban areas. [15,21,35-38] Government and stakeholders should motivate and mobilize the citizenry to engage in useful physical activities.

Maintaining a healthy body weight

Observational studies and virtually every clinical trial, that have examined the effect of weight loss on BP, have documented that weight reduction in the overweight or obese lowers BP. [42-45] Interestingly, reductions in BP occur before (and without) attainment of desirable body weight. Since the mean weight of populations is not stable but has increased in recent years world-wide, lifestyle intervention trials have uniformly achieved short term weight loss (that is, the efficacy of weight control interventions is lost with time). [5] However, in several instances, substantial weight loss has been sustained for over 3 years. [43,44,46]

Reducing dietary table salt (sodium (Na^+) chloride) intake

A high intake of salt has adverse effect on BP. Evidence includes results from animal [47] and epidemiologic [48,49] studies as well as clinical trials. [50-52] These studies demonstrate that hypertension can be induced in both salt-sensitive animals and humans by high dietary salt load. Salt (Na^+) sensitivity is the hallmark of hypertension in the majority of blacks, the obese as well as the elderly and they respond very well to Na^+ restriction and to diuretics/natriuretic agents. [17,34,36,52-56]

Essential hypertension is seen primarily in societies with average Na^+ intake above 100 mmol/day (2.3g Na^+). [50,57] These observations suggest that the development of hypertension requires a threshold level of Na^+ intake and this effect appears to be independent of other risk factors for hypertension eg obesity. Reducing Na^+ intake to 100 mmol/day has been reported to lower the mean BP in normotensive adults by approximately 2/1 mmHg and in hypertensive adults by 5/3 mmHg. [58] It has therefore been suggested that the inexorable and deleterious natural history of BP rising with aging in societies consuming large amounts of salt, such as Nigeria, [33] could be aborted in the very beginning by a low-salt diet. [59] Above data have reinforced current guidelines to limit salt intake to 6g per day, the equivalent of 100 mmol of Na^+ (2400 mg) per day. Results from the DASH Na^+ feeding study [52] have documented that an even lower intake of Na^+, approximately 60 mmol/day, further reduces BP in a broad population of non-hypertensive and hypertensive individuals.

Low salt intake not only reduces BP and its related CVD risk, but also has additional benefits such as direct effect on reducing stroke, left ventricular hypertrophy, aortic stiffness as well as chronic kidney disease and proteinuria. [9,35,51] Salt reduction in the diet (low salt in cooking and no additional salt at table) at the population-wide level as a means of reducing the burden of hypertension in Nigeria could be one of the *best buy strategies* due to its attractive low cost of implementation. [32,35,60,61]

Increasing potassium (K^+) intake

In various human populations (and animals too), high BP is correlated more closely with low K^+ intake than with high Na^+ intake and hypertensive patients have been found to have lower plasma and total body K^+ as well as lower urine K^+ excretion levels. [53,54,56] Potassium supplementation or high K^+ diet including fresh fruits like bananas, oranges, apples and vegetables (the preferred strategy to increase K^+ intake because this is accompanied by a variety of other nutrients), has been demonstrated to lower BP (more in hypertensives than normotensives), potentiate the effects of diuretics and lessen renal K^+ wasting. [62] However, a subsequent report of a systematic review of available meta-analyses and randomized controlled trials found no statistically significant effect of K^+ supplementation on BP excluding one trial

in an African population with very high baseline BP that resulted in small overall reductions in BP. [63]

Other dietary factors that might influence BP: Calcium (Ca^{2+}), Magnesium (Mg^{2+}), Zinc (Zn^{2+}), high protein intake, DASH-diet

Hypertension is more common in the presence of hypercalcaemia and there is direct positive relationship between total serum Ca^{2+} and BP. [64] Ca^{2+} supplements may lower the blood pressure in those who have lower serum Ca^{2+} [65] and high parathyroid hormone level but with the potential risk of causing kidney stones. [66] Increase in Na^{+} may increase BP, whereas the reverse is for K^{+} and Mg^{2+}, hence dietary measures to reduce BP have been reported to be more effective when intake of several minerals is affected simultaneously. [67] This is because the cations (Na^{+}, K^{+}, Mg^{2+}, Ca^{2+}) functionally act in concert. [68,69] Mg^{2+} deficiency is associated with significant hypertension [70] and oral Mg^{2+} supplementation has been reported to prevent and lower BP. [71] Reducing Na^{+} intake together with increasing Ca^{+} and Mg^{2+} intake are important in the prevention and treatment of hypertension. [67] The US National Health and Examination Nutrition Survey (NHANES II 1976-1980) found an inverse relationship between serum Zn^{2+} level and BP. [72]

Epidemiological studies strongly support the hypothesis that increased protein intake can lower BP. [73] The most effective diet, now termed the DASH diet, [9] emphasizes fruits, vegetables, and low-fat dietary products; includes whole grains, poultry, fish and nuts; and is reduced in fat, red meat, sweets, and sugar-containing beverages. The diet is rich in K^{+}, Mg^{2+}, and Ca^{2+}. Among non-hypertensive individuals, this diet reduced systolic and diastolic BP by 3.5 and 2.1 mmHg, respectively. In hypertensives, corresponding BP reductions were striking, i.e., 11.4 and 5.5 mmHg. Similar to the meta-analysis of K^{+}, the DASH diet reduced BP to a greater extent in blacks than non-blacks. [74]

Moderation in alcohol intake (among drinkers)

Consumption of alcohol is increasingly becoming more frequent in Africa including Nigeria. [7,35] The effects of heavy [75] and even moderate [76,77] drinking leading to increased BP has been reported in Nigeria and elsewhere, respectively. Trials have also reported that reductions in alcohol intake can lower BP in normotensive and hypertensive men who are heavy drinkers. [78,79] Evidence supports a recommendation to limit alcohol intake to $\leq$ 1drink per day for women and $\leq$ 2 drinks per day for men, in the absence of binge drinking. One drink is defined as 12 oz of regular beer, 5 oz of wine (12% alcohol), and 1.5 oz of 80-proof spirit, all equivalent to about 15g alcohol. [80] The plausible beneficial effects of this level of alcohol consumption include reduction in platelet aggregation and thrombotic markers such as fibrinogen, increases in HDL cholesterol (about 80%) [81] and anti-inflammatory effects such as lowering C- reactive protein levels. [82] However, amounts in or near this level have been associated with an increased risk for hypertension, [76,77] although it is said that this may be due to heavy drinkers who under report their intake. [77,83] Again, this beneficial effects of moderate alcohol drinking are not evident in South Asians, [84] Indian men [85] and American blacks. [86]

Thus, according to Naimi and colleagues, [87] alcohol is not a good candidate as a population-based hypertension prevention strategy especially when one considers the special concerns about addiction, cost of alcoholism on family life, drunk driving, treatment of liver disease, atrial fibrillation, stroke, cardiomyopathy, cancer and dementia.

Hence the current advice of the American Heart Association in relation to alcohol and prevention of hypertension and other cardiovascular diseases is "If you drink alcohol, do so in moderation. If you don't drink, don't start." [80] Interventions to limit alcohol use should be introduced in a multi-sectoral manner and adapted to the local situation. Such interventions, like the ones utilized for reducing tobacco use, can also be applicable eg increasing taxes on alcohol, and banning alcohol advertising especially to young people. [88]

Cessation of cigarette smoking

Among its many negative effects, smoking increases BP and the harms associated with hypertension by damaging blood vessels and hardening arteries (atherosclerosis), which can lead to impaired organ function and blood clots. [89,90] Moreover, as a group, smokers tend to have more behavioural risk factors than do non-smokers, including poorer diet, less frequent exercises, and higher alcohol consumption, which also put them at greater risk for developing more severe forms of hypertension. [91] Smoking cessation is known to reduce the overall risk of cardiovascular diseases. [92] In order to reduce smoking at the population level, it is important to implement multi-sectoral interventions like increasing taxes on tobacco products, banning of tobacco advertisements and banning smoking in public places. [88]

High religiosity or spirituality

The concept that religious behaviour, religiosity or spirituality, was associated with longevity was observed in the 1990s, when mortality was found to be lower among frequent church-goers than among non-attenders. [93] One proposed mechanism for improving mortality among healthy, religious individuals is reduced cardiovascular risk, possibly related to lifestyle or other cardioprotective effects of religious behaviour such as its prohibitive influence on smoking or alcoholism. [94,95] The above is true of many religious groups in Nigeria and it should be encouraged because it is an effective strategy for controlling these deleterious risk factors for hypertension. [24,28]

CONCLUSION

Although each LM practice has a modest effect, the combined (comprehensive LM) effects, particularly the ones involving DASH-diet, exercise and weight loss, can be substantial. From a public health perspective, even a small reduction in BP should have a significant beneficial effect on the occurrence in prehypertension/ hypertension and their complications. Given the current high prevalence of BP-related diseases and the established salutary effects of LMs on BP, public health policies should be focussed on reducing the risk factors of hypertension. This can be done by developing and implementing hypertension control programmes just like the concerted efforts of the Federal, State and the Local Governments that attended the eradication of guinea worm, poliomyelitis and the recent ebola virus disease infections in the country. Government at all levels should put in place effective monitoring and surveillance programmes in order to track progress in reducing the prevalence of hypertension and its control.

There should be a strong focus on development and improvement in the health service delivery system to address the control of hypertension and its complications. This can be done through community based screening programmes and strengthening primary health care system to manage simple cases of hypertension but also establishing a strong referral link to General Hospitals and tertiary health facilities to ensure continuity of care. Antihypertensives should be made

free or highly subsidized and available. There should be continued training and retraining of medical and allied health staff as well as developing and implementing National standard guidelines for treatment and management of hypertension to ensure consistent quality care of hypertensive patients. There is urgent need to intensify LM education and counseling to both hypertensive patients and the public, particularly in Nigeria.

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