PREVALENCE OF MALNUTRITION AMONG PEOPLE LIVING WITH OBESITY AND HYPERTENSION

ABSTRACT

Background: Obesity is a growing public health problem and should be kept in mind when treating patients with hypertension because it is a strong predictor of uncontrolled hypertension. As obesity and its metabolic and vascular effects remained during the years, research has provided evidence justifying the management of metabolic components in obese individuals. The purpose of this review is to provide more evidence justifying the management of metabolic problems in obese hypertensive individuals.

Conclusion: Obesity is a multi factorial pathology and chronic diet related non-communicable disease. The most widely used parameter for it diagnosis is the body mass index (BMI) which is not suitable for assessing the body fat and other metabolic components. Obesity is an independent risk factor for hypertension.

Recommendation: Anthropometrics like the waist circumference, waist to height ratio (WHtR), waist-hip ratio (WHR) and metabolic/biochemical components should be considered in the diagnosis of obesity.

Keywords: Prevalence, Malnutrition, Metabolic Syndrome, obesity, hypertension.

Introduction: "Given the increase of sedentary lifestyle and bad diet in our life, the prevalence of obesity and hypertension has remarkably increased among most population in the last years [1]. Obesity is a growing public health problem and should be kept in mind when treating patients with hypertension because it is a strong predictor of un-controlled blood pressure" [1]. "As obesity and its metabolic and hemodynamic consequences are sustained during many years, renal injury gradually makes the hypertension more severe and more resistance to therapy" [2].

"Although weight loss is helpful in managing hypertension, many obese patients are unable to sustain adequate weight loss through lifestyle modifications and there are few available drugs that safely and effectively produce adequate long-term weight loss. Current therapeutic approaches are, therefore, aimed mainly at treating the hypertension and metabolic consequences of obesity, including diabetes mellitus, dyslipidemia, and inflammation" [3].

The obesity scourge began in the 1970s, at first in the United States and afterwards spreading globally. Roughly 60-80% of adults in many Western countries are becoming overweight or obese, which is novel in human history [4]. A recent study by Jennifer et al. reveals that obesity was independently associated with hypertension in population-based controls [5]. "There is a high rate of unrecognized hypertension and obesity among Bus Drivers from different regions which was connected with individual lifestyle and behaviors" [6]. "Improved awareness through educational and screening activities will initiate lifestyle modifications that will reduce the onset of cardio-metabolic disorders and give ideas for better disease prognosis, prevention and personalized medical care" [6]. "Hypertension is the commonest risk factor for cardiovascular diseases and it is associated with many morbidities and mortalities worldwide" [7].

"Physiological researches and epidemiological data have suggested a potential inverse relationship between height and blood pressure in adult" [8]. "Cogent data exist connecting increased height and leg length with normotension. These findings identify shorter individuals as having higher risk with regard to hypertension and cardiovascular disease" [8, 9]. Substantial epidemiological studies have revealed that high blood pressure is more than twice present in those who are obese than in lean subjects. Furthermore, the values of blood pressure and body weight have a direct association at any age of life [10, 11]. The growing prevalence of chronic

diseases linked to obesity endangers both human lives and economies [12]. The goal is prevention today, given the enormous expenses of obesity (both public and personal) and how challenging it is to shed weight once one is obese [13].

Additionally, there are also differences in obesity-related hypertension according to sex, race, and ethnicity. Obesity-related public health and policy developments are required to lower morbidity and mortality [14]. In obese females, hypertension and dyslipidemia usually coexisted with other illnesses. Diabetes and dyslipidemia were the two main illnesses in the co-morbidity network in obese males. Results show that managing metabolic components in obese people is justified. The findings will aid in prioritizing strategies for reducing co-morbidity as a public health objective [15].

Methods: This was a review study. Journal articles and publications from 2004 to 2022 were reviewed. PubMed, Google Scholar, Science Direct, and Cochrane were some of the search engines used. Search terms included prevalence, malnutrition, metabolic syndrome, obesity and hypertension. A total of 150 papers were retrieved during the search; 51 were included in this review and 41of the papers were on nutritional-related issues.

Global: Malnutrition is a global problem that no nation can afford to ignore. 39% of the world's adults are obese (2018 Global Nutrition Report). Beyond health, the social and economic growth of nations is being impacted by the poor progress on malnutrition. According to estimates, all types of malnutrition might cost society up to US$3.5 trillion annually, with obesity alone costing US$500 billion. [16]. According to the 2018 Global Nutrition Report, more illnesses are caused by malnutrition than by any other factor [16]. According to WHO, "an energy imbalance between calories taken and calories expended is the primary cause of obesity" [17]. "Globally, there has been a rise in the consumption of calorie-dense foods that are high in fat and sugar, as well as a rise in physical inactivity as a result of the sedentary nature of many occupations,

evolving transportation options, and escalating urbanization. Body mass index (BMI) is a straightforward measure of weight in relation to height that is frequently used to categorize adult overweight and obesity. It is determined by dividing the individual's weight in kilograms by the square of his or her height in meters (kg/m2). WHO defines obesity in adults as having a BMI of 30 or higher" [17]. "As BMI rises, the risk for these non-communicable diseases also rises" [17]. "An estimated four million people die each year as a result of obesity and hypertension's negative health effects" [18].

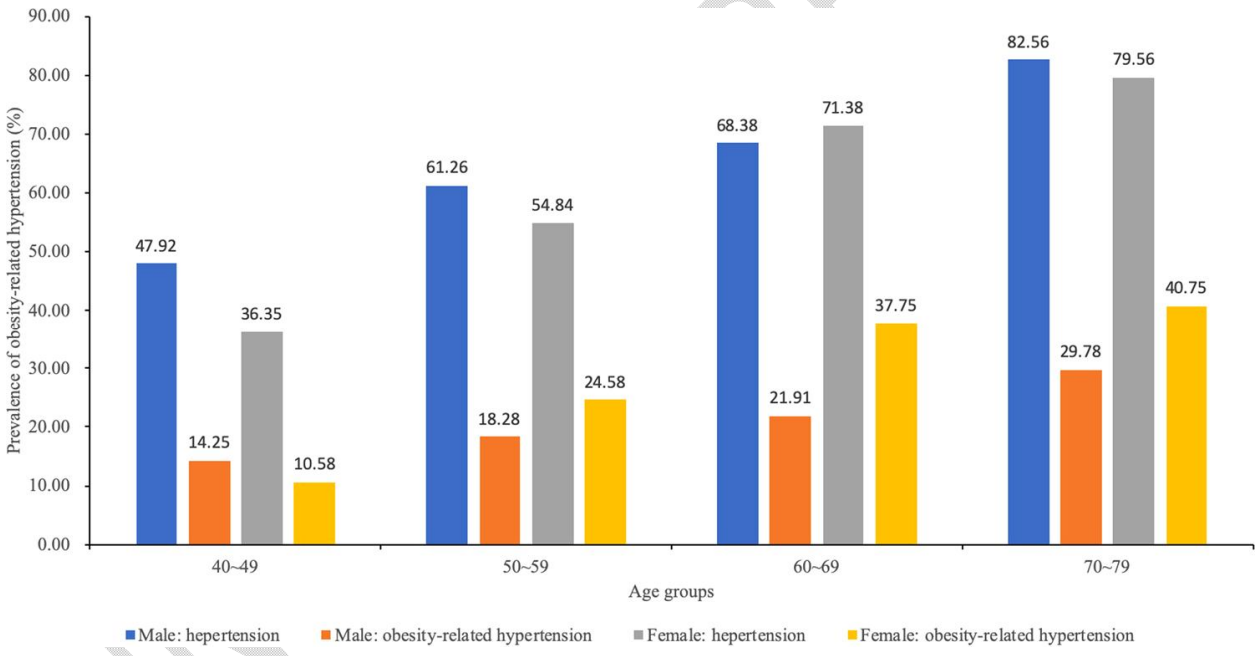

Figure 1 shows the prevalence of hypertension and hypertension caused by obesity in various age groups [19].

Since 1975, the global rate of obesity has nearly tripled. Over 650 million persons, or 13% of adults, were obese in 2016. The majority of individuals on earth reside in nations where obesity kills more people than underweight [17]. “The leading cause of lost years of life with a handicap in the world is hypertension. According to the American Heart Association (AHA), hypertension affects 86 million adults in the US, or 34% of the population. The AHA defines hypertension as having a systolic blood pressure (SBP) of 140 mm Hg or higher, or a diastolic blood pressure (DBP) of 90 mm Hg or higher, taking antihypertensive medication, or being identified as having hypertension by a doctor at least twice” [20]. Hypertension affects most people over 60 in the population [21]. The allocation of healthcare resources for the condition and associated co-morbidities is predicted to approach $150 billion annually in the United States, making obesity and hypertension the next big epidemiologic challenge facing today's clinicians [22]. According to a different study by Omair and Travis, “obesity is a major global public health issue and is intrinsically connected to poor cardiovascular outcomes” [23]. “It is commonly known that an increase in blood pressure is correlated with an increase in body fat, and that 65-78% of primary hypertension cases are thought to be attributable to obesity” [23]. An estimated one billion individuals worldwide are affected by high blood pressure, which continues to be a significant contributor to the burden of non-communicable diseases and death internationally [24, 25].

At a median follow-up of 9.5 years in a study on cardiovascular disease that evaluated intakes of white rice, whole grains, and refined grains, 9.2% of the participants experienced a primary outcome that was a composite of death and major cardiovascular events (cardiovascular death, nonfatal myocardial infarction, heart failure, or stroke). A higher risk was linked to consuming more refined grains [26].

“Unhealthy weight gain is a major contributor to hypertension, accounting for 65% to 75% of the risk for human primary (essential) hypertension, especially when coupled with increasing visceral adiposity. Pressure natriuresis is impaired by increased renal tubular sodium re-absorption, which is a major factor in the development of obesity-related hypertension” [27].

Limiting total fat and sugar intake, increasing fruit and vegetable consumption, as well as legume, whole grain, and nut consumption, and engaging in regular physical activity (60 minutes per day for children, and 150 minutes spread throughout the week for adults) are all effective ways to prevent disease on an individual level. This is made feasible by the persistent use of population-based, evidence-based policies that enable everyone, including the poorest people, to have regular access to healthy eating and physical activity. One such measure is a charge on beverages with added sugars [17].

“Reduced fat, sugar, and salt content in processed foods, availability of affordable, healthy food options for all consumers, restrictions on marketing of foods high in sugar, salt, and fats, especially those marketed to children and teenagers, availability of healthy food options, and encouragement of regular physical activity in the workplace are all ways that the industry can prevent obesity and hypertension” [17, 28].

Africa: Obesity and hypertension are significant public health issues that have a significant impact on the rising global trend in morbidity and early mortality [29]. From 4.5% in 2000 to 7% in 2010 and up to 29.2% (28.8%-29.7%) by 2025, the worldwide burden of disease attributed to hypertension has dramatically increased. Africa has the highest prevalence of hypertension compared to other WHO regions, with a 46% total prevalence in persons aged 25 and older [29].

The risk of hypertension and other cardiovascular illnesses is significantly increased by obesity. Its prevalence is increasing worldwide, and current estimates indicate that 20% to 50% of metropolitan African residents are either overweight or obese. Consequently, two of the most significant risk factors for morbidity and mortality in Africa are hypertension and obesity [29].

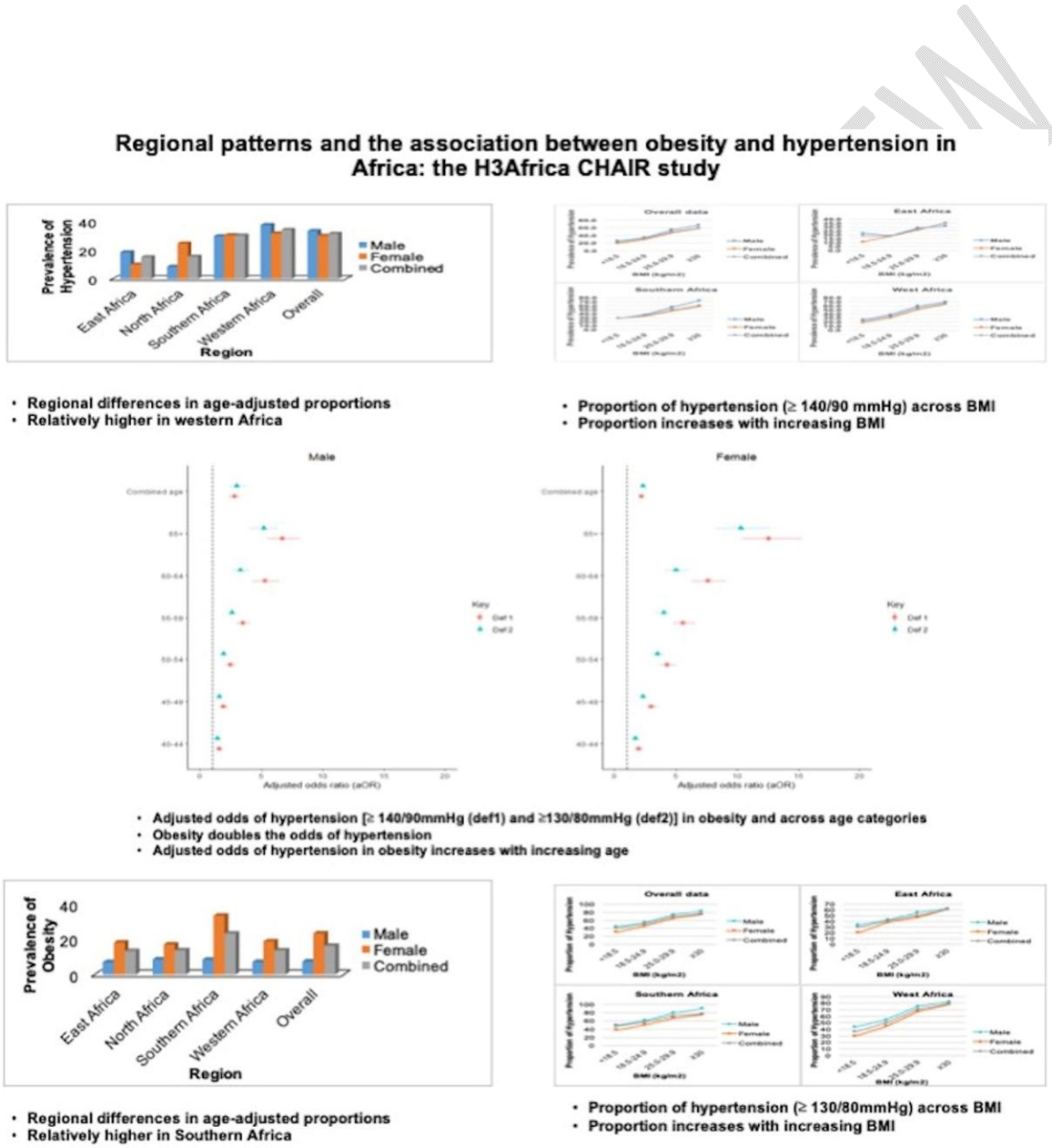

Figure 2: Obesity and Hypertension in Africa: Regional Patterns and Association [30].

Age-standardized prevalence of hypertension in rural Nigeria was 19.3% (95% CI: 17.3-21.3), in rural Kenya it was 21.4% (19.8-23.0), in urban Tanzania it was 23.7% (21.3-26.2), and in urban Namibia it was 38.0% (35.9-40.1). These findings come from research by Akpa et al [29]. “The percentage of people with grade 2 or grade 3 hypertension (180/110 mmHg) ranged from 29.2% (Namibia) to 43.3% (Nigeria) in those with hypertension” [31]. Hendriks et al. reported that “the prevalence of hypertension control varied from 2.6% in Kenya to 17.8% in Namibia. Obesity prevalence (BMI 30) ranged from 6.1% in Nigeria to 17.4% in Tanzania, and BMI independently predicted blood pressure level in all study populations along with age and gender” [31].

The two most significant modifiable risk factors for cardiovascular illnesses, obesity and hypertension, according to Jennifer et al., are not well understood in Africa [5]. The leading cause of death in 2012 was cardiovascular disease, which is mostly heart disease and stroke. Obesity and hypertension are significant risk factors for cardiovascular illnesses. Hypertension is a serious public health concern globally [32]. Once uncommon in traditional African civilizations, hypertension has become a significant public health issue due to an increase in its risk factors [33]; being the main reason for admissions and deaths in Ghana, it is a serious health issue there [34]. In Ghana, hypertension affects more than one in four persons. Both rural and urban populations share this high incidence, which has persisted for decades. If Ghana is to attain the worldwide target for hypertension, additional investments in cardiovascular health are necessary given the low awareness and poor control of hypertension [34]. Currently, 46% of the population in low- and middle-income nations and sub-Saharan Africa (SSA) suffers from hypertension. Subclinical disease, often known as inadequate health, is more concerning. This condition is marked by a sense of physical weakness and a lack of vitality, and is viewed as a transitional state between health and chronic diseases like hypertension [6]. Africans who were

obese had a more than twofold increased risk of having hypertension, and the risk rose with age. The prevalence of hypertension is rising globally, particularly in Sub-Saharan African nations. In addition to being the largest risk factor for mortality from cardiovascular diseases globally, hypertension is also the leading risk factor for premature death and disability [35]. among Eastern Sudan, hypertension is prevalent, especially among older and obese people. Prevention strategies, like dietary changes, should be used [35].

Southeast Asian nations have seen a sharp rise in the global prevalence of hypertension during the past 20 years. A thorough analysis was done to determine the prevalence of hypertension and associated risk factors among Southeast Asian metropolitan populations. We discovered that male gender, ethnicity, socioeconomic status, education, waist circumference, smoking, and dyslipidemia were common risk factors. Activities for primary and secondary prevention are urgently needed, according to the study. To enhance the general health outcomes of all populations in all Southeast Asian countries, a multisectoral and intersectoral approach and collaboration should be used [36]. It is necessary to view obesity as a true disorder. One of the main global public health problems linked to higher morbidity and mortality rates is obesity. Unfortunately, despite various educational initiatives, the battle against obesity does not appear to be successful: in recent years, the incidence kept rising [37].

Nigeria and Edo State: According to a study by Chukwuonye et al., obesity and overweight are currently very common among urban adults in Nigeria. The study also provides solid data that may be used to highlight the urgent need to reinforce and put preventive measures into place in order to shift the paradigm [38]. “The combined crude prevalence rates of obesity and overweight in Nigeria were 25.0% (95% confidence interval, CI: 20.4-29.6) and 14.3% (95% CI:

12.0-15.5), respectively, based on 35 studies (n = 52,816). Women were more likely than men to be overweight or obese, with prevalence rates of 25.5% (95% CI: 17.1-34.0) versus 25.2% (95% CI: 18.0-32.4) and 19.8% (95% CI: 3.9-25.6) versus 12.9% (95% CI: 9.1-16.7), respectively. Waist circumference and body mass index (BMI) were combined to yield mean values of 25.6 kg/m2 and 86.5 cm, respectively. In 2020, we predicted that there will be 21 million and 12 million overweight and obese people in Nigeria, representing an age-adjusted prevalence of 20.3% and 11.6%, respectively. Overweight and obesity were more prevalent than usual rates" [39].

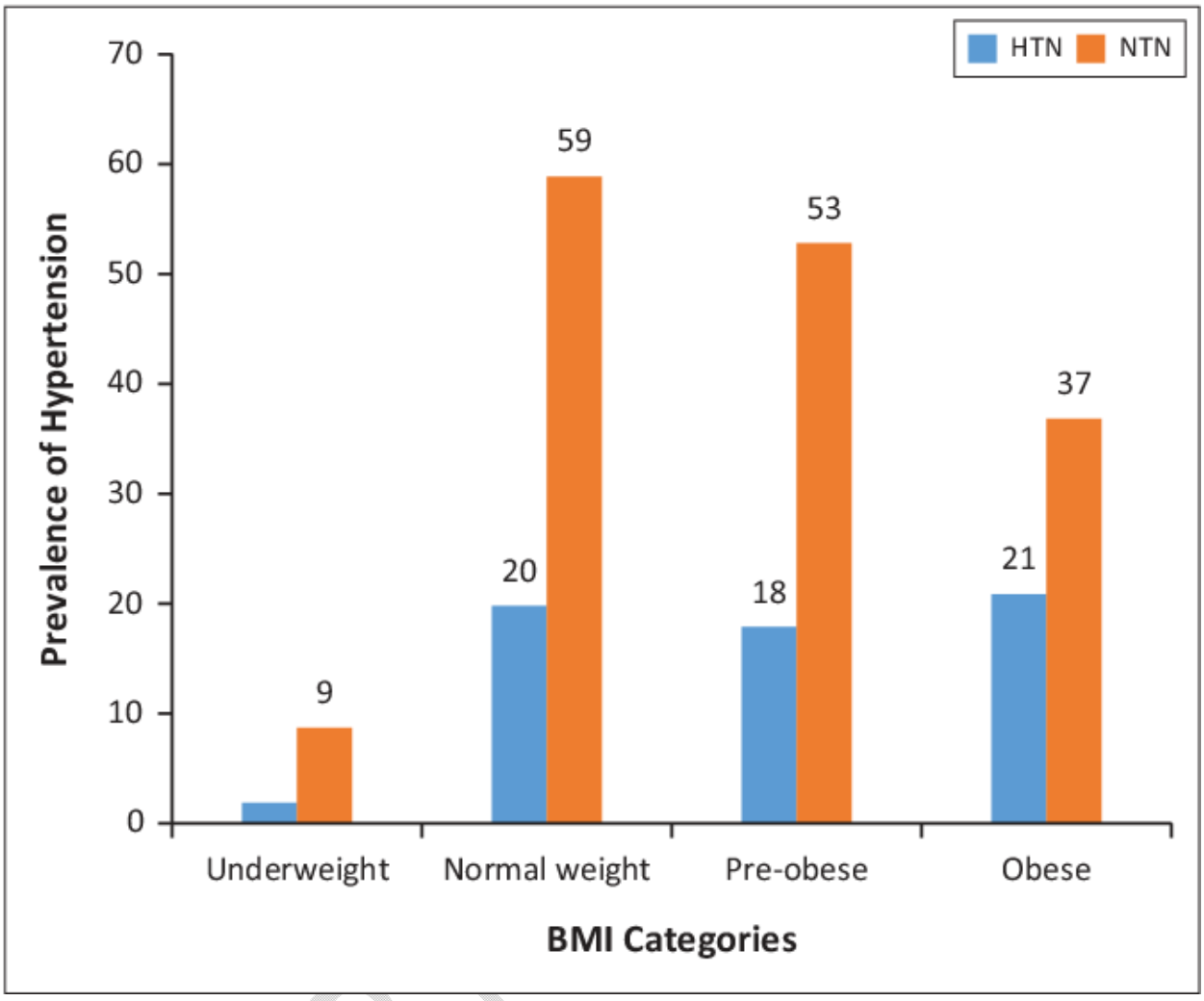

Figure 3 shows the prevalence of hypertension in a rural population in the state of Edo in relation to body mass index [40].

A higher prevalence of obesity and hypertension is associated with negative cardiovascular outcomes [41]. “A secondary analysis of data was conducted for 5135 participants aged ≥ 16 years from community-based hypertension prevalence study to determine the prevalence of obesity and association between multiple anthropometric indices and blood pressure (BP). The indices were waist circumference (WC), body mass index (BMI), waist-to-height ratio (WHtR), waist-to-hip ratio (WHR), a body shape index(ABSI), abdominal volume index (AVI), body

adiposity index (BAI), body roundness index (BRI), visceral adiposity index (VAI) and conicity index (CI). A statistical analysis was performed to determine the association, predictive ability, cutoff values and independent determinants of hypertension. Crude prevalence of obesity was 136 per 1000 (95% confidence interval 126–146). BMI had the strongest correlation with systolic and diastolic BP ($r = 0.260$ and 0.264, respectively). Indices of central adiposity (AVI, WC, WHtR, BRI) were the strongest predictors of hypertension ($\geq 140/90$ mmHg), and their cut-off values were generally higher in females than males. WHR, age, BMI and CI were independent determinants of hypertension ≥ 140 mmHg ($p < 0.05$). The study concluded that measures of central adiposity are the strongest predictors and independent determinants of hypertension in the studied population" [41].

Obesity and overweight were prevalent at 13.8% and 9.4%, respectively. In obese versus normal BMI females, the prevalence of hypertensive range systolic blood pressure was 16% versus 23% (p=0.00), while in men, it was 12.1% versus 6.4% (p=0.27). In obese versus normal BMI females, the prevalence of hypertensive range diastolic BP was 12% versus 1.4% (p=0.00), while in men, it was 15.2% versus 3.5% (p=0.01). The pre-hypertension and hypertensive range systolic blood pressure in overweight (P = 0.01, P = 0.002) and obese (P = 0.00, P = 0.00) patients, as well as the hypertensive range diastolic blood pressure in only obese subjects, were significantly correlated with BMI in group B. Obesity and pre-hypertensive range diastolic blood pressure had the only statistically significant link in group A (P = 0.00) [42].

In rural areas, women and men's cardiovascular risk factors for hypertension and obesity differ significantly [43]. Nigeria's targeted public health response to obesity is comparatively underdeveloped because of the lack of epidemiologic knowledge [44]. The prevalence of hypertension was 33.1% overall (males 36.8%, females 31.1%). 11.1% of people self-reported

having high blood pressure, whereas 5.1% were currently taking anti-hypertensive medication. The average age of the responders was 38.8 15.6 years. In the categories of underweight, normal, overweight, and obese, the respondents' body mass indices were 5.2%, 52.0%, 29.5%, and 13.3%, respectively. 11.5% and 3.2%, respectively, reported using alcohol or cigarettes. Binary logistic regression analysis showed a significant association between hypertension and age groups 30-49 years (OR 2.258, 95% CI: 1.311-3.884), 50 years (OR 7.145, 95% CI: 3.644-14.011), and being overweight or obese (OR 2.281, 95% CI: 1.022-5.088). Being underweight was negatively correlated with having hypertension (OR 0.537, 95% CI: 0.395-0.832) [45].

The study also reveals that anthropometric indices of central adiposity and BMI are both significant risk factors for the development of hypertension. It was suggested that clinical treatment should routinely use these anthropometric measures of central adiposity (WHR, CI, AVI, WC, WHtR) rather than too relying on BMI alone because they may be more accurate predictors of hypertension. The findings also emphasized the relative imprecision of cutoffs and cautioned against using population-specific ranges or cutoff values as a baseline for implementing lifestyle changes in practice rather than population-specific ranges or cutoff values. Therefore, it was accepted that additional confirmation of the findings in the context of population [38].

Results: The result from this review revealed that the incidence of obesity has served as the primary impetus for study into the processes that underlie this illness and the ailments that it is associated with. As a result, the condition worsens and obesity-related pathologies like diabetes, cardiovascular disease, and cancer become more prevalent. As evidence for the connection between obesity and hypertension, people with significantly higher values for their weight, body mass index, waist to height ratio, hip circumference, fat mass and fat-free mass also had hypertension compared to those with normotension. In developing nations, hypertension and

excess body weight are two key risk factors for cardiovascular morbidity and mortality. Age, regular alcohol use, physical activity level, obesity, stress, and fasting blood glucose concentration in blood are some risk factors linked to the development of hypertension in adults.

Discussion: The majority of economically developed nations have experienced a steady and rapid rise in obesity rates over the past ten years, which has served as the main driver for study into the pathophysiological mechanisms behind this disease and its associated illnesses [37]. Lower health costs for primary and secondary prevention of the most common degenerative diseases linked to obesity will result from the consequences of an accurate and early identification of the condition [37]. As a result, the fundamental risk is directly proportionate to the absolute therapeutic benefit. In order to minimize the negative effects of under- and overdiagnosis, there is increasing interest worldwide in early obesity diagnosis. As a result, the condition will worsen and an increase in obesity-related pathologies like diabetes, cardiovascular disease, and cancer will occur [37].

The clustering of obesity and other metabolic syndrome symptoms may have significant preventative implications, particularly in relation to whether visceral obesity-specific therapies might reduce cardiovascular and renal morbidity [46]. Incidence and prevalence of idiopathic intracranial hypertension are rising sharply in tandem with rises in body mass index in the population. Given the comorbidities, difficulties, and higher use of healthcare services linked to idiopathic intracranial hypertension, this has significant implications for health care providers and policy makers [47].

Estimating how much obesity is increasing in the population and how that affects incident hypertension has significant consequences for public health policy [14]. The direct correlation between obesity and hypertension was supported by participants who had hypertension

compared to those with normotension and had significantly greater weight, body mass index, waist, hip, and fat mass values [48].

Major risk factors for cardiovascular morbidity and mortality in emerging nations include hypertension and excess body weight. “According to study, obesity is very common in Nigeria. This is especially noticeable in metropolitan Nigeria and among women, which may be partly explained by a generalized sedentary lifestyle and an increase in fast food restaurants, which is a general tendency in many African settings” [44]. “According to all research, Umuahia, Abia State, South-east Nigeria has the highest prevalence of obesity in 2012, at 33.7% [49], with Kano, North-West Nigeria, recording the lowest rate in 2013 at 0.84%” [50]. Age, regular alcohol use, amount of physical activity, obesity, stress, and fasting blood glucose levels are some risk factors linked to the development of hypertension (HTN) in adults. More than 60% of study participants practiced healthy eating habits, exercise, and understanding of hypertension [33]. Similar to reports from other suburban communities, Irrua's obesity rate is slightly higher than anticipated for the area [12]. This can be the result of residents' lifestyles gradually changing. The study's obesity indicators revealed a positive relationship between co-morbidities like hypertension and stroke, the world's top cause of death and disability and one in which hypertension is the most common risk factor [51, 12]. According to this study, obesity and its co-morbidities are becoming a bigger issue in this area [12].

Conclusion: Obesity is a multi factorial pathology and chronic diet related non-communicable disease. Body mass index (BMI), the most frequently used metric for its diagnosis, is ineffective for determining body fat. Numerous researches show that using BMI alone to determine obesity is ineffective. Obesity, particularly abdominal obesity, increases the risk of developing and

progressing hypertension independently. The majority of studies on the relationship between body mass index (BMI) and hypertension, a prevalent health problem, focused on this relationship.

The regulation of blood pressure is positively impacted by increased physical activity, quitting smoking and drinking, eating more fruits and vegetables, and consuming less red and assorted meats, fats, highly processed and refined foods.

Recommendation: Health talks on diet, frequent exercise, and screening are advised.

Sensitization of the population on hypertension and its complications is important.

Along with recommendations to lose weight, there should be specific guidelines for treating obesity-related hypertension.

Weight-reduction interventions are essential for reducing the prevalence of hypertension.

Other parameters like the waist-hip ratio (WHR), waist-height ratio (WHtR) and waist circumference should be considered in the diagnosis of obesity which has been found to have a strong association with systolic and diastolic blood pressures.

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