

# Critical Evaluation of Hypertension: Diagnosis, Causes, Prevalence, and Treatment in Adults

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**Abstract:** Hypertension (or HTN) is a systolic blood pressure of 140 mm Hg or greater and/or a diastolic pressure of 90 mm Hg or greater in subjects who are not taking antihypertensive medication. High blood pressure contributes to the risk of coronary heart disease, stroke (thromboembolic and haemorrhagic) and damage to the heart, brain, kidneys and retina. It is a major cause for cardiovascular complications and diseases leading to death. Approximately more than half of the world's adult population with hypertension are unaware and undiagnosed, and only about half of the ones diagnosed are receiving effective medical and personal care. Hypertension, also known as High Blood Pressure (HBP), leads to the death of at least 9 million people globally, per year. The paper looks at the diagnosis, causes, prevalence and treatment of hypertension in adults. The research design for this paper is both quantitative and qualitative, and data were collection from secondary sources based on content/documentary analysis. Descriptive and narrative approaches form the data analysis. Finding shows that prevalence of hypertension is more on adult population with prevalence rate of 32.9%. Out of this, 40.9% are males while 26% are females. Further finding shows that currently, about 26% of the world's population (972 million people) has hypertension, and the prevalence is projected to increase to 29% by 2025, driven largely by increases in economically developing nations. One of the recommendations of this paper for effective care of hypertension is to create adequate awareness, and when properly done, it is considered as the first step in achieving effective care and treatment.

**Keywords:** Hypertension, Evaluation, Adult, Diagnosis, Causes, Prevalence

## 1 INTRODUCTION

Hypertension (HTN), also called high blood pressure (HBP) is dangerous because it can lead to strokes, cardiovascular diseases and complications such as heart failure, heart attacks, coronary artery disease, as well as peripheral arterial disease, aortic aneurysms, vascular dementia, kidney diseases (WebMD, 2019). According to the Global Burden of Disease (GBD) study, in 2017, CVDs accounted for 52,78.4 per 100,000 age-standardized disability-adjusted life years (DALYs). Hypertension-related diseases (specifically ischaemic heart disease and cerebrovascular disease) are the top two leading causes of DALYs and years of life lost (YLLs) globally (Global Burden of Disease, 2017a; Global Burden of Disease Study, 2017b).

Hypertension has been identified by World Health Organization (WHO) as one of the most significant risk factors for morbidity and mortality worldwide and is responsible for the deaths of approximately nine million people annually (WHO, 2013). In the UK, the National Institute for Health and Care Excellence (NICE) (2011) defines high blood pressure (BP), also known as hypertension, as a clinic blood pressure of 140/90mmHg or higher confirmed by a subsequent ambulatory blood pressure monitoring daytime average (or home blood pressure monitoring average) of 135/85 mmHg or higher. Okubadejo et al. (2019), observe that "hypertension is the single most important risk factor for cardiovascular diseases (CVD) and a key driver of global disease burden. It is also a high-yield target to reverse the epidemic of non-communicable diseases (NCDs) globally" (p. 1). The World Health Organisation (WHO) estimates that high blood pressure directly or indirectly causes deaths of at least nine million people globally every year.

Hypertension is defined as systolic BP level of  $\geq 140$ mmHg and/or diastolic BP level  $\geq 90$ mmHg. The grey area falling between 120–139mmHg systolic BP and 80–89mmHg diastolic BP is defined as 'prehypertension' (Kumar et al., 2016; Chobanian, 2003). Although prehypertension is not a medical condition in itself, prehypertensive subjects are at more risk of developing HTN (Erem et al., 2009). It is a silent killer as very rarely any symptom can be seen in its early stages until a severe medical crisis takes place like heart attack, stroke, or chronic kidney disease (Chobanian, 2003; Wikipedia; Prabakaran, 2013). Since people are unaware of excessive blood pressure, it is only through measurements that detection can be done. Although majority of patients with hypertension remain asymptomatic, some people with HTN report headaches, lightheadedness, vertigo, altered vision, or fainting episode (Fisher & Williams, 2005). The study tends to discuss the effective way of diagnosing and finding the causes of hypertension. It will further discuss prevalence rate and the best way for treatment and care for hypertension in adult population.

## 2 METHODS

The research design for the study is both quantitative and qualitative. The sources and method of data collection for this study are descriptive and narrative based on secondary data from textbooks, archival materials, the internet, official gazettes, newspapers,

magazines, academic journals, seminar papers, bulletins, and materials that have relevance and related contents on the subject matter of the study. Data are analysed based on contents and documentary evidences of the secondary data collected. The reliability and validity of the secondary data are predicated on the fact they have already passed publication criteria.

### 3 DISCUSSION

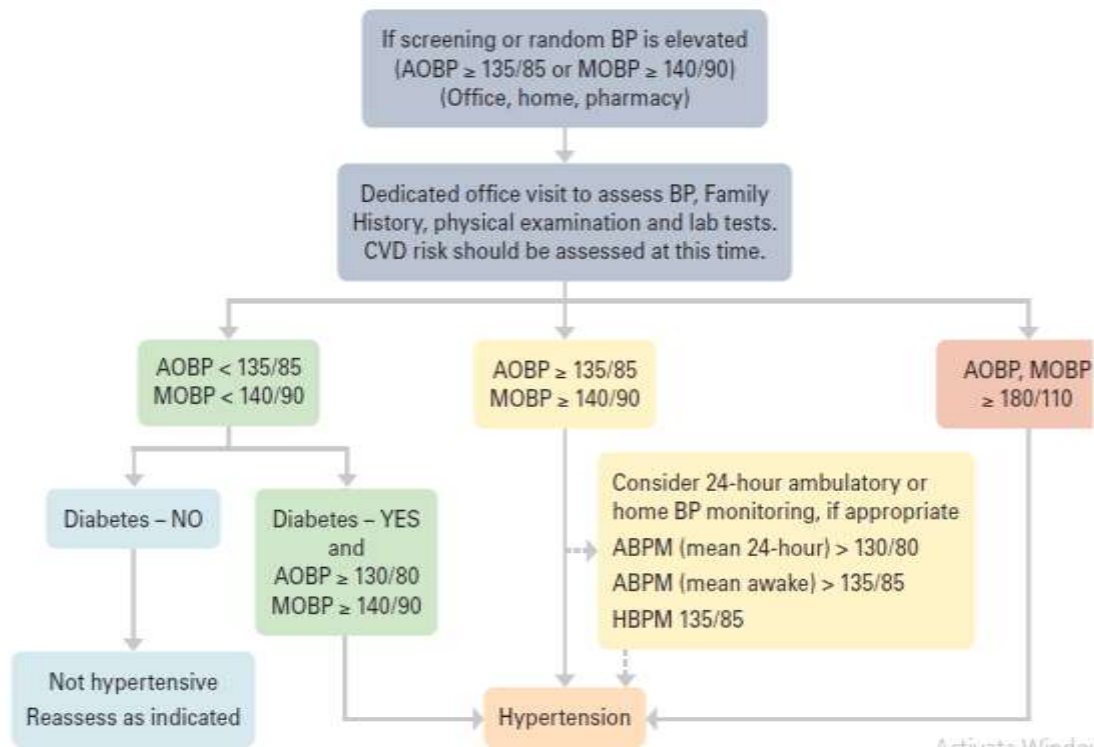
#### 3.1 DIAGNOSIS OF HYPERTENSION

An accurate measurement of blood pressure is the key to diagnosis. Several determinations should be made over a period of several weeks. At any given visit, an average of 3 blood pressure readings taken 2 minutes apart using a mercury manometer is preferable (Chobanian et al., 2003; Institute for Clinical Systems Improvement (ICSI), 2010). On the first visit, blood pressure should be checked in both arms and in one leg to avoid missing the diagnosis of coarctation of aorta or subclavian artery stenosis. In adults aged 50 years and older, the 2010 Institute for Clinical Systems Improvement (ICSI) guideline on the diagnosis and treatment of hypertension indicates that systolic blood pressure (SBP) should be the major factor to detect, evaluate, and treat hypertension (ICSI, 2010). The patient should rest quietly for at least 5 minutes before the measurement. Blood pressure should be measured in both the supine and sitting positions, auscultating with the bell of the stethoscope. As the improper cuff size may influence blood pressure measurement, a wider cuff is preferable, particularly if the patient's arm circumference exceeds 30cm. Although somewhat controversial, the common practice is to document phase V (a disappearance of all sounds) of Korotkoff sounds as the diastolic pressure (Alexander & Yang, 2019).

Hypertension is diagnosed when blood pressure is consistently elevated, and hypertensive emergency can be diagnosed based on very high blood pressure, even if it is not recurrent. There are some conditions that can produce consistently high blood pressure or severe high blood pressure, even if hypertension itself is not present, which your doctor will need to consider (Piper, 2015). Hypertension is diagnosed when the average systolic blood pressure is 140 mmHg or higher, or when the average diastolic blood pressure is 90 mmHg or higher, taken on two or more separate days. Systolic and diastolic blood pressure of less than 120 mmHg and 80 mmHg, respectively, is considered normal. Most people who think that their blood pressure is low actually have normal blood pressure (World Health Organization, 2017).

In those patients who screen positive for possible HTN, accurate measurement of BP is essential to confirm a diagnosis of HTN (Lovibond et al., 2011). Traditionally, this has been achieved using clinic measurements based on individual readings taken on several different occasions (National Institute for Health and Care Excellence, 2016; Mancia et al., 2007; Chobanian et al., 2003). However, it has long been recognized that home or ambulatory (out-of-office) BP provide more accurate estimates of the patients' true mean BP. This is in part because multiple readings are taken (giving a statistical advantage) and measurements taken outside of a clinic environment (during ordinary activity) are better correlated with long-term cardiovascular outcomes including stroke (Mancia et al., 1997; Ohkubo et al., 2000; Staessen et al., 1999). Clinic BP readings often are different from the corresponding out-of-office BP. Those with high clinic BP readings (>140/90 mm Hg), but normal mean out-of-office pressure (<135/85 mm Hg) are considered to have white-coat HTN (Pickering et al., 1999).

Figure 1. Diagnosis of hypertension algorithm



**Source:** BCGuidelines (2020, p. 4)

**Abbreviations:** AOBP = automatic office blood pressure; ABPM = ambulatory blood pressure monitoring; BP = blood pressure; CVD = cardiovascular disease; DBP = diastolic blood pressure; HBPM = home blood pressure monitoring; MOBP = manual office blood pressure.

For effective diagnosis of hypertension, automated office BP measuring electronic device is recommended, in preference to manual office BP technique. Using automated office BP reduces errors and avoids an overestimation of BP values (white-coat HTN), underestimation of BP values (masked HTN), reduces threshold avoidance (where the BP reading is adjusted to avoid thresholds that entail making a diagnosis) and digit preference (rounding their BP recording to a nearest zero end-digit) (Roerecke et al., 2019; Pappaccogli et al., 2019; Greiver et al., 2019). Hypertension is diagnosed when the average systolic blood pressure is 140 mmHg or higher, or when the average diastolic blood pressure is 90 mmHg or higher, taken on two or more separate days.

Ambulatory (or home) blood pressure monitoring (ABPM) is used to monitor daily and nocturnal blood pressure, providing information such as the percentage of elevated BP readings, overall BP load, and extent of BP fall during sleep. In general, these readings are lower than those in a physician office setting and have a better correlation with target-organ injury. There is usually a 10-20% BP drop during the night. People who do not demonstrate such a decrease in BP are at increased risk for cardiovascular events. Patients with 24-hour BP greater than 135/85 mm Hg have been shown to have almost double the likelihood of having a cardiovascular event (Chobanian et al., 2003). Ambulatory blood pressure monitoring provides a more accurate prediction of cardiovascular risk than do office blood pressure readings (Redon et al., 1998).

These patients have a cardiovascular risk similar to patients with normotension, are at risk for overtreatment but do need following up for future development of HTN (Pickering et al., 1999). Conversely, patients with high out-of-office BP ( $>135/85$  mm Hg) but normal clinic BP ( $<140/90$  mm Hg) have an increased risk for target organ damage (Sega et al., 2001) and cardiovascular morbidity and mortality (Ohkubo et al., 2005; Mancia et al., 2006), but often remain unrecognized and therefore potentially undertreated. Thus, relying on clinic BP alone can lead to incorrect classification of BP status and hence inappropriate management (Hodgkinson et al., 2011; Jin et al., 2012).

### **3.2 CAUSES OF HYPERTENSION**

Along with these risk factors, the American Heart Association's most recent guidelines for diagnosing and treating heart-related diseases identifies the following issues as causes of hypertension (Aungst, 2019). There are several factors predisposing to hypertension. These factors vary from country to country and even there is difference between urban and rural regions of the same place (Rani et al., 2015). Few of these causes of hypertension are discussed in this section of the study.

#### **3.2.1 Kidney Disease**

The kidneys are very important organs, responsible for getting rid of many waste products and toxins when you urinate. Unfortunately, when the kidneys don't work well, it can cause your body to retain fluid, leading to higher blood pressure and possibly, hypertension. Many things can cause kidney dysfunction. If your doctors suspect you have kidney dysfunction, they may have you take some blood tests to see if your kidneys have any problems (Aungst, 2019)

Also, statistics from the United States National Kidney Foundation collaborates the fact that kidney disease is the leading cause of high blood pressure, just behind diabetes. There is some speculation on whether high blood pressure causes kidney disease or the other way around. High blood pressure leads to narrowed, weakened and hardened arteries which cannot deliver blood efficiently to the kidneys (Pinto, 2007). Alternatively, kidney disease can damage the blood vessels of the kidneys which cannot then remove waste appropriately. This can lead to pressure on the arteries leading to hypertension. Development of these conditions can cause blood pressure to rise, but this can also exacerbate existing conditions. Maintaining a healthy diet and lifestyle lowers the risk of developing hypertension in elderly people (Writes, 2017).

#### **3.2.2 Obesity**

Studies show that the increase in body mass index as well as the increase in age are linked to rising blood pressure and can lead to hypertension. Statistics from the Journal of American Medicine show that, in 2017, 37% of Americans over 60 years old are classified as obese (Kabakov, 2006). Aside from high blood pressure, obesity is linked to many other health issues such as high cholesterol, heart disease and stroke, all of which have links to high blood pressure (Writes, 2017). Multiple studies show that people who are overweight or obese tend to have higher blood pressure than those who are not, and some have even suggested that significant excess weight is behind almost 40% of all hypertension diagnoses. If you are overweight, the best thing to do to reduce your risk for hypertension is to lose weight by maintaining a healthy diet and exercising regularly (Aungst, 2019).

#### **3.2.3 Diabetes**

Diabetes is often linked to obesity and is also a contributor to the development of high blood pressure in elderly people (see <https://www.cdc.gov/obesity/data/adult.html>). Poor diet and high sugar intake can aid the development of diabetes and the incidence of the disease increases with age among older adults according to statistics. This can lead to further issues such as heart disease. A 2007 review in the Postgraduate Medical Journal shows that older individuals with systolic hypertension are at greater risk of mortality due to heart disease (see <http://care.diabetesjournals.org/content/35/12/2650>).

#### **3.2.4 Genetics**

Some researchers believe that certain genes in your DNA can cause hypertension. Although there is little we can do to change our genetics at this time, telling your healthcare provider if your parents, grandparents, or siblings have hypertension can help them know if it runs in your family and if you might be at risk for hypertension (Aungst, 2019).

#### **3.2.5 Chronic, Excessive Alcohol Consumption**

It is known for over a century that excessive alcohol consumption can cause hypertension. In fact, almost 10% of the global population may have hypertension due to drinking excessive amounts of alcohol. Not only does alcohol cause your blood pressure to rise, but high amounts of alcohol can increase your cholesterol levels, which can also be bad for your heart. For these and other health reason, it is important to limit your alcohol intake to less than two drinks a day for men and less than one drink a day for women. One drink is defined as 12 oz beer, 4 oz of wine, 1.5 oz of 80-proof spirits, or 1 oz of 100-proof spirits (Aungst, 2019).

#### **3.2.6 Eating too much Sodium, and too little of Potassium**

Regularly eating too much sodium (such as from table salt or the salt in processed foods) is known to increase your risk of hypertension. Americans seem to over-consume salt. The American Heart Association recommends eating less than 1500 mg of salt a day, but on average, eat over 3400 mg daily. Reducing that by just 1000 mg can have great benefits. Long-term, high-salt intake can increase your risk for stroke, heart problems, and other health issues. Older adults, African Americans, and people with diabetes or kidney problems may need to aim for even lower salt intake than the 1500 mg per day recommendation, as research shows that blood pressure in these groups tends to respond more strongly to salt. If you regularly consume a lot of salt, lowering your salt intake can help to lower your risk for hypertension and other heart problems. While high sodium intake can cause high blood pressure, not enough potassium could also be a problem. People who regularly eat a healthy amount of potassium may have lower blood pressure.

The American Heart Association recommends eating 3500 mg to 5000 mg of potassium a day. Eating too much potassium can also be bad and cause heart problems, so make sure to talk to your provider about your potassium levels and what kinds of potassium-containing foods you should eat (Aungst, 2019).

### 3.3 RISK FACTORS OF HYPERTENSION

Research has indicated that blood vessels naturally ‘harden’ with age, losing their elasticity. This may be one explanation for why older people are more at risk of developing high blood pressure. High blood pressure, also known as hypertension, is unlike low blood pressure in that it rarely has any noticeable symptoms. However, it often causes long-term health problems if undetected (see <https://www.sciencedaily.com/releases/2006/11/061103104048.htm>). A number of factors increase the risk of hypertension.

#### 3.3.1 Age

Hypertension is more common in people who are more than 60 years of age. Blood pressure can increase steadily with age as the arteries stiffen and narrow due to plaque buildup (Spriggs, 2019). According to the finding of Timothy Aungst, an associate professor of pharmacy at Massachusetts College of Pharmacy and Health Sciences, U. S., older people tend to experience higher rates of hypertension. For example, over 77% of men and 75% of women age 65 and older are estimated to have hypertension. In contrast, only about 30% of men and 19% of women age 44 and younger have hypertension. More men than not experience hypertension by age 45. For women, that threshold is at age 55 (Aungst, 2019).

#### 3.3.2 Ethnicity

Some ethnic groups are more prone to hypertension than others. African Americans have a higher risk Trusted Source than other ethnic groups, for example. · Size and weight: Being overweight or obese is a primary risk factor (Spriggs, 2019).

#### 3.3.3 Alcohol and Tobacco use

Regularly consuming large quantities of alcohol or tobacco can increase blood pressure (Spriggs, 2019).

#### 3.3.4 Sex

According to a 2018 review Trusted Source, males have a higher risk of developing hypertension than females. However, this is only until after women reach menopause (Spriggs, 2019). Based on research, men overall seem to have a higher risk of developing hypertension compared to women (Aungst, 2019).

#### 3.3.5 Existing Health Conditions

Cardiovascular disease, diabetes, chronic kidney disease, and high cholesterol levels can lead to hypertension, especially as people age (Spriggs, 2019). If you have high cholesterol and high blood sugar over a long period of time, you can have a higher risk of having hypertension later in life (Aungst, 2019).

The above characteristics, or risk factors, can increase your chances of developing hypertension. While the following may not make you have hypertension for sure, they can increase your risk of having hypertension later in life (Aungst, 2019).

### 3.4 PREVALENCE OF HYPERTENSION

Globally, it is that estimated about 26% of the world’s population (972 million people) has hypertension, and the prevalence is expected to increase to 29% by 2025, driven largely by increases in economically developing nations (Kearney et al., 2005). The high prevalence of hypertension exacts a tremendous public health burden. As a primary contributor to heart disease and stroke, the first and third leading causes of death worldwide, respectively, high blood pressure was the top modifiable risk factor for disability adjusted life-years lost worldwide in 2013 (Forouzanfar et al., 2015; Global Burden of Disease Study, 2015).

World Health Organization chose ‘Urbanization and Health’ as the theme for World Health Day 2010 (WHO, 2010) in determining the global prevalence of hypertension. Urbanization is considered a determinant of health and one of the key drivers of non-communicable diseases (NCDs), especially in low- and middle-income countries (LMICs) (Angkurawaranon et al., 2013). Urban people are more at risk of these diseases as compared to their rural counterparts. Men exhibit higher prevalence of hypertension and prehypertension than their female counterparts (M: 40.9% and F: 26.0%) and (M: 45.9% and F: 38.05%), respectively. Similarly, various studies came out with the higher percentage of hypertension in men than women (Singh et al., 2013; Gao et al., 2013; Dhungana et al., 2016; Thankappan et al., 2013; Krishnan et al., 2008; Bhagyalaxmi et al., 2013; Prabakaran et al., 2013).

One of the possible explanations for this gender disparity in hypertension prevalence could be partially due to biological sex difference and partially due to behavioural risk factors like smoking, alcohol consumption, or physical activity. It is speculated that absence from alcohol and smoking might be few of those protective factors against hypertension in women. Other than that, women

are more interested in health care services utilization and also more frequently report their poor health and therefore they are more likely to have better health (Tabrizi et al., 2016; Everett & Zajacova, 2015).

Epidemiologically, hypertension is a worldwide epidemic. Consequently, its epidemiology has been well studied. Data from National Health and Nutrition Examination Survey (NHANES) spanning 2011-2014 in the United States found that in the population aged 20 years or older, an estimated 86 million adults had hypertension, with a prevalence of 34% (Benjamin et al., 2017). 2017 Data from the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS) spanning 2015-2016 show a hypertension prevalence of 29.0% among those aged 18 and older (see the following image) (Fryar et al., 2017). The following image shows prevalence of hypertension among adults aged 18 and over, by sex and age between 2015–2016.

### 3.5 TYPES OF HYPERTENSION

There are two primary hypertension types. For 95% of people with high blood pressure, the cause of their hypertension is unknown — this is called essential, or primary hypertension. When a cause can be found, the condition is called secondary hypertension.

#### 3.5.1 Essential/Primary Hypertension

This type of hypertension is diagnosed after a doctor notices that your blood pressure is high on three or more visits and eliminates all other causes of hypertension. Usually people with essential hypertension have no symptoms, but you may experience frequent headaches, tiredness, dizziness, or nose bleeds. Although the cause is unknown, researchers do know that obesity, smoking, alcohol, diet, and heredity all play a role in essential hypertension (Iliades, 2009). This is the more common type of high blood pressure that affects about 90% of individuals. It is usually not related to any medical condition.

#### 3.5.2 Secondary Hypertension

The most common cause of secondary hypertension is an abnormality in the arteries supplying blood to the kidneys. Other causes include airway obstruction during sleep, diseases and tumors of the adrenal glands, hormone abnormalities, thyroid disease, and too much salt or alcohol in the diet. Drugs can cause secondary hypertension, including over-the-counter medications such as ibuprofen (Motrin, Advil, and others) and pseudoephedrine (Afrin, Sudafed, and others). The good news is that if the cause is found, hypertension can often be controlled (Iliades, 2009). Secondary hypertension occurs as a result of other medical conditions that cause high blood pressure, usually occurring in the kidneys, heart, arteries or endocrine system (Stanfordhealthcare, n.d.).

Other types of hypertension include: Malignant hypertension, Resistant hypertension, and Isolated systolic hypertension. These types of hypertension are detected after specific diagnoses are carried out on the individual.

#### 3.5.3 Malignant Hypertension

This is a term used to describe patients with elevated blood pressure, and multiple complications. It is a hypertensive crisis that occurs when the blood pressure level is  $>180/120$ mmHg (Naranjo & Paul, 2020). This type of hypertension is generally considered as a hypertensive medical emergency due to the rapid increase in the blood pressure level, with its causes often resulting from organ complications or organ damages. Likewise, Domek et al. (2020, p. 2) propose a new definition that presents the malignant hypertension as “a group of disorders with highly elevated blood pressure, leading to the damage of at least three different target organs.” It is advised that “early malignant hypertension diagnosis and immediate start of the therapy is paramount for better prognosis and preservation of the target organs function” (Shantsila & Lip, 2017, p. 545).

According to Iliades, (2009), this type of hypertension occurs in only about 1% of people with hypertension. It is more common in younger adults, African-American men, and women who have pregnancy toxemia. Malignant hypertension occurs when your blood pressure rises extremely quickly. If your diastolic pressure goes over 130, you may have malignant hypertension. This is a medical emergency and should be treated in a hospital. Symptoms include numbness in the arms and legs, blurred vision, confusion, chest pain, and headache.

Some organ damages that lead to malignant hypertension include polycystic kidney, hypertensive retinopathy, pregnancy toxemia, endothelial dysfunction, lipid abnormalities left ventricular hypertrophy, crushing disease, central nervous system disorder etc.

#### 3.5.4 Resistant Hypertension

Some cases of resistant hypertension are as a result of genetic factors. According to Yaxley and Thambar (2015) “resistant hypertension is poorly responsive to treatment and requires multiple medications to achieve acceptable blood pressure levels” (p. 195). Additionally, “resistant hypertension is defined as uncontrolled blood pressure despite the use of  $\geq 3$  antihypertensive agents of different classes. Observational studies and clinical trials of antihypertensive treatment show that patients with resistant hypertension are at increased risk of cardiovascular diseases” (Acelajado et al., 2019, p. 1064).

Some common causes of resistant hypertension are “secondary causes, such as; drug induced, obstructive sleep apnoea, primary aldosteronism, and chronic kidney disease. Data from large clinical trials point towards a relatively prevalence of resistant hypertension” (Faselis et al., 2011, p. 11). Additionally, “the importance of resistant hypertension is the ability to identify patients at high risk of suffering complications from reversible hypertension, and patients who may directly benefit from a diagnostic or therapeutic approach” (Makris et al., 2011, p. 6). However, resistant hypertension is more common in patients that are overweight (obese), older, or have underlying illnesses. It may occur in 20% to 30% of high blood pressure cases (Everydayhealth, 2009).

### 3.5.5 Isolated Systolic Hypertension

Blood pressure is recorded in two numbers: The upper, or first, number is the systolic pressure, which is the pressure exerted during the heartbeat; the lower, or second, number is the diastolic pressure, which is the pressure as the heart is resting between beats. Normal blood pressure is considered under 120/80. With isolated systolic hypertension, the systolic pressure rises above 140, while the lower number stays near the normal range, below 90. This type of hypertension is most common in people over the age of 65 and is caused by the loss of elasticity in the arteries. The systolic pressure is much more important than the diastolic pressure when it comes to the risk of cardiovascular disease for an older person (Iliades, 2009). “This is mainly the clinical expression of arterial stiffening as a result of aging. There is a constant rise in systolic hypertension worldwide” (Benetos et al., 2019, p. 1046). Also, “it is a predominant form of hypertension in the elderly population, with a systolic blood pressures >140mmHg and a diastolic blood pressure <90mmHg” (Tan & Thakur, 2020, p. 6).

If your doctor has prescribed three different types of antihypertensive medications and your blood pressure is still too high, you may have resistant hypertension. Resistant hypertension may occur in 20 to 30 percent of high blood pressure cases. Resistant hypertension may have a genetic component and is more common in people who are older, obese, female, African American, or have an underlying illness, such as diabetes or kidney disease (Iliades, 2009).

### 3.6 TREATMENT AND CARE FOR HYPERTENSION

Treatment for hypertension comes in many forms, from lifestyle changes to medication. Learn more from this overview about how to lower blood pressure.

The choice of hypertension medication for treatment should be informed by evidence about its effectiveness in reducing adverse health outcomes, including stroke, myocardial infarction, and mortality. In this section, the author quantifies the effectiveness of four classes of antihypertensive medications (i.e., thiazide diuretics, beta blockers, ACE inhibitors, and CCBs) versus placebo in reducing mortality, stroke, coronary heart disease (CHD), and cardiovascular events (Wright & Musini, 2009). If taken for five years, thiazide diuretics were highly effective in the secondary prevention of cardiovascular events (absolute risk reduction (ARR) = 5.5 percent; number needed to treat (NNT) = 18). In patients with moderate to severe hypertension (i.e., systolic blood pressure greater than 160 mm Hg), thiazide diuretics were effective in the primary prevention of cardiovascular events (ARR = 5.1 percent; NNT = 20). However, only low-dose thiazide diuretics were effective; high-dose thiazide diuretics were no different than placebo in risk of mortality and cardiovascular events (Wright & Musini, 2009).

The strongest body of evidence indicates that for most patients with hypertension, thiazide diuretics are the best proven first-line treatment in reducing morbidity and mortality. They are particularly effective in the secondary prevention of cardiovascular events in all patients with hypertension, and in the primary prevention of cardiovascular events in patients with moderate to severe hypertension. Current evidence does not support the use of beta blockers, particularly atenolol, as first-line treatment for hypertension. Although there is increasing evidence that ACE inhibitors and possibly CCBs may be equivalent to thiazide diuretics in reducing morbidity and mortality, the relative expense of these medications makes thiazide diuretics a more favorable first-line choice in patients who do not have contraindications for their use (Bui, 2010).

Thiazide diuretics and ACE inhibitors significantly reduced the risk of CHD, whereas beta blockers (risk ratio (RR) = 0.90; 95% confidence interval (CI), 0.86 to 1.07) and CCBs (RR = 0.77; 95% CI, 0.55 to 1.09) did not. Beta blockers and CCBs were also no different from placebo in reducing mortality risk. Thiazide diuretics and ACE inhibitors reduced total mortality risk significantly, but this risk reduction was smaller than that of cardiovascular events and stroke (Wright & Musini, 2009).

The American Heart Association released an updated hypertension guideline in 2017 that discussed new blood pressure targets and treatment recommendations for patients with high blood pressure. In the new hypertension guideline, the definition of hypertension was altered to reflect new targets for systolic and diastolic blood pressure measurements. These blood pressure targets help guide clinical decision making by categorizing hypertension: normal BP, elevated BP, stage 1, and stage 2 (American Heart Association, 2017).

Previously, high blood pressure was defined as a systolic blood pressure measurement of 140 mmHg or higher or a diastolic blood pressure measurement of 90 mmHg or higher. The updated guideline redefines hypertension as a systolic blood pressure measurement of 130 mmHg and greater or diastolic blood pressure measurement of 80 mmHg and beyond. As a result, patients with systolic BP measurements greater than or equal to 140/90 mmHg are now considered to have stage 2 hypertension (American Heart Association, 2017).

There are more hypertensive patients than ever before—this widespread condition is projected to increase 8% between 2013 and 2030 (American Heart Association and American Stroke Association, 2017). Therefore, the hypertension guideline provided new treatment recommendations that included both lifestyle changes and pharmacological strategies to help manage this condition (American Heart Association, 2017). It is key for healthcare providers to have a comprehensive understanding of how to effectively treat the various stages of hypertension to help prevent its dangerous effects.

A normal blood pressure reading is defined as below 120/80 mm Hg. When a patient has a normal reading, physicians should promote optimal lifestyle habits. These lifestyle changes include a healthy diet and exercise. For example, the dietary approaches to stop hypertension (DASH) diet, which is an eating plan low in sodium and saturated fat and high in vegetables and fruit, can help a patient lose weight and allow them to maintain a healthier diet. Physicians should reassess BP readings every year for patients in this category (Berg, 2019).

According to American Heart Association (2017), normal blood pressure is defined as a systolic blood pressure measurement of <120 mmHg and diastolic blood pressure (BP) of <80 mmHg. For treatment at this stage, for treatment and care, patients with normal blood pressure levels are encouraged to continue living a healthy lifestyle to maintain their normal BP levels and prevent the development of hypertension. Patients with normal BP measurements can have their levels evaluated annually.

Elevated BP is defined as a BP reading of 120–129 mm Hg systolic and less than 80 mm Hg diastolic. Non-pharmacological therapy is recommended for treatment of this category of blood pressure. This includes consuming a heart-healthy diet such as DASH, reducing sodium intake, increasing physical activity- exercising on a regular basis, maintaining a healthy weight, managing stress levels, limiting alcohol intake, avoid smoking, have quality sleep, eat fruits and vegetables, whole grains and low-fat products (American Heart Association, 2017).

**Stage 1 Hypertension:** Patients who have a BP reading of 130-139 mm Hg systolic and 80-89 mm Hg diastolic have stage 1 hypertension. If there is known clinical atherosclerotic cardiovascular disease, diabetes, chronic kidney disease or an estimated 10-year cardiovascular disease risk at or above 10 percent, physicians should provide non-pharmacological therapy and BP-lowering medication (Berg, 2019).

Reassessment should occur after one month and if the BP goal is not met, assess and optimize adherence to therapy. Physicians should also consider intensification of therapy. And if there is a less than 10 percent 10-year atherosclerotic cardiovascular disease risk, non-pharmacological therapy should be recommended with reassessment after three to six months (Berg, 2019).

**Stage 2 Hypertension:** The recommended action for a patient with stage 2 hypertension—BP readings at or above 140/90 mm Hg—is both non-pharmacological therapy and BP-lowering medication. Patients' blood pressure should be reassessed after one month. If the blood pressure goal has been met, reassess in three to six months. However, if the BP goal was not met, physicians should assess and optimize adherence to therapy, and consider intensification of therapy (Berg, 2019).

### **Hypertensive Urgency vs. Emergency Stage**

If the patient has severe BP elevation (systolic BP greater than 180 mmHg or diastolic BP greater than 120 mmHg) and does not have signs or symptoms indicating target organ damage or dysfunction they are considered a hypertensive urgency. Antihypertensive drug therapy should be increased in these patients. If the patient's severe BP elevation is accompanied by new or worsening target organ damage it is considered a hypertensive emergency. Patients who have a hypertensive emergency should be admitted into an intensive care unit. An agent should be administered to reduce BP levels, and the patient's BP should be continuously monitored (American Heart Association, 2017): If left untreated, the median survival rate is 10.4 months (Keith et al., 1974).

### **3.7 CONCLUSION**

The World Health organization's latest report on Improving Hypertension Control in 3 Million People: Country Experiences of Programme Development and Implementation: in 18 countries including Nigeria, estimates that about 1.13 billion people globally have hypertension, of whom two-thirds are living in low- and middle-income countries (WHO, 2020). Furthermore, the World Health Organization (WHO) Global Hearts Initiative supports governments to strengthen prevention and control of cardiovascular diseases (CVDs) with high-impact and evidence-based interventions through five technical packages.



Hypertension is a serious medical condition and can increase the risk of heart, brain, kidney and other diseases. It is a major cause of premature death worldwide, with upwards of 1 in 4 men and 1 in 5 women – over a billion people – having the condition. The burden of hypertension is felt disproportionately in low- and middle-income countries, where two thirds of cases are found, largely due to increased risk factors in those populations in recent decades (WHO, 2020).

### 3.7 RECOMMENDATIONS

Hypertension can easily lead to the deterioration of an individual's health, and as such, it is necessary that both carriers and the healthcare practitioners should engage in effective communication, and become proactive in trying to curb this menacing illness. From the findings of this study the following recommendations for the control, care and treatment of hypertension are forwarded:

- i. The first step towards achieving effective treatment and care for hypertension is to adequately get tested. Getting a proper clinical test is required to thoroughly ascertain the blood pressure of the individual, and subsequently identify the stage of the hypertension. Therefore, acknowledging that “hypertension is a clinical problem with a significant proportion of patients failing to achieve blood pressure control despite extensive medical therapy” (Yaxley & Thambar, 2015, p. 195). It is therefore paramount that an individual first gets a clinical diagnosis/test done, which indicates whether the hypertension is essential/primary or secondary.
- ii. Also, work needs to be done to ensure the most appropriate and beneficial aspects of technology are effectively utilised within the healthcare system (Kitt et al., 2019).
- iii. Further, it is of high importance that healthcare practitioners and providers develop more and better means of creating awareness on hypertension to the general public. Practices involving free clinical diagnoses can greatly impact the population of those individuals that are unaware (including carriers and non-carriers). Additionally, the healthcare system should “address possible biases towards diagnosing and not diagnosing certain types of patients (based on ethnicity, race, religion, social status, or psychology), noting that adequate knowledge and awareness of the care team can reduce these disparities in hypertension care and identification” (Meador et al., 2020, p. 37).
- iv. Furthermore, proper education on the various types and stages of hypertension should be taught, as this may help improve the patient's understanding of what their individual hypertensive case may be, and also learn how to better manage and care for themselves.

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