STUDY OF HYPERTENSION PREVALENCE AND AWARENESS ON MULTIPLE CATEGORIES

G. Nagaraju[1*], V. Sirisha[2], Kavati Ramakrishna[3] and Hareesh Dara[1]

[1*]Department of Pharmaceutical Chemistry, Dhanvanthari Institute of Pharmaceutical Sciences, Sujathanagar, Kothagudem.
[1]Department of Pharmaceutics, Sree College of Pharmay, Nayakulagudem, Kothagudem, Telangana.
[2]Department of Pharmaceutics, Dhanvanthari Institute of Pharmaceutical Sciences, Sujathanagar, Kothagudem.
[3]Department of Pharmaceutics, Pulipati Prasad college of pharmacy, Pulipati Prasad college of pharmaceutical sciences, Khammam.

*Corresponding Author Email: gdp413@gmail.com

ABSTRACT

Hypertension is the most important cardiovascular risk factor in India, and representative studies of middle-aged and older India adults have been lacking. Our objectives were to estimate the proportions of hypertensive adults who had been diagnosed, took antihypertensive medication, and achieved control in the middle-aged and older India population and to investigate the association between access to healthcare and hypertension management. The overall prevalence of hypertension in childhood is 2% to 5% and the leading type of hypertension is primary hypertension, especially in adolescence. As in adults, the leading risk factor for children with primary hypertension are excess adiposity and suboptimal lifestyle; however, environmental stress, low birth weight, and genetic factors may also be important. Hypertensive children are highly likely to become hypertensive adults and to have measurable target organ injury, particularly left ventricular hypertrophy and vascular stiffening. Ambulatory and home blood pressure monitoring facilitate diagnosis.

KEY WORDS

Lacking, Adolescence, Adiposity, Suboptimal, Hypertrophy, Stiffening, Ambulatory.

INTRODUCTION:

Blood pressure is the force of circulating blood on the walls of the arteries [1]. It has   components, namely, systolic BP [SBP] and diastolic BP [DBP][2] SBP is the maximum blood pressure during contraction of the ventricles, and DBP is the minimum pressure recorded before the next contraction [3]. BP is written with the SBP first, followed by the DBP [eg,120/80]. Based on SBP/DBP, BP in adults is classified with normal [<120/80], prehypertension [120-139/80-89], stage one hypertension [140-159/90-99], and stage two hypertension [>160/>100][4]. Hypertension bring about the damage of the heart, damage of blood vessels in the brain and the kidneys enlargements of the heart, heart failure, blindness, and cognitive impairment [5]

Globally, an estimated17.9 million people died from cardiovascular   diseases in 2016, representing 31% of all global deaths. Of these deaths, 85% are due to heart attack and stroke [6]. Hypertension is the leading risk factor for mortality and the main cause of global disability- adjusted life years [DALYs]. In 2015, SBP attributed to 10.7 million deaths and nearly 212 million DALYs [7]. The prevalence of hypertension increases after 2000 may be due to lifestyle changes, and the highest global hypertension prevalence has shifted from high- and medium – income countries [HMIC] to low and medium -income countries [LMIC] [8]. For example, in

2010, 28.5% of adult hypertension was in high-income countries and 31.5% in low -and middle -income countries [9]. Because of weak health system, the number of people with hypertension who were undiagnosed, untreated, and uncontrolled is also higher in low- and middle- income countries compared to the high- income countries [10]. By 2025, the projected number of people globally [11].

Hypertension is a widespread problem in sub- Saharan Africa [SSA], and in some communities, has been reported to be as high as 38% [12]. In 2015, the prevalence of hypertension among the Ethiopian population was estimated to be 19.6% [23.7% among urban population and 14.7% among the rural and urban combined population] [20.6% among males and 19.2% among females][13].

Studies in different parts of Ethiopia also showed a high prevalence of hypertension in the country. The prevalence of hypertension in Jimma was 21.3% [22.2% in males and females][14], 25.1% in Bahir Dar city [15],16.45% [16] in Addis Ababa [19.13% among bankers and 21.8% among teachers][17], and 27.9% in Dabat district and Gondar town [30.7% among urban and 25.3% among rural residents][18].

There is no single precise cause of hypertension [19]. However, there are known risk factors that increase the possibility of hypertension. The risk factors of hypertension can be classified as modifiable and nonmodified [20]. modifiable risk factors are risk factors of hypertension that many people can reduce their blood pressure by changing their diet and lifestyle. They include unhealthy diets high in saturated fat and trans fats, and low intake of fruits and vegetables], physical inactivity, consumption of tobacco and alcohol, and being overweight or obese, whereas the nonmodifiable risk factors of hypertension, age over 65 years, gender, genetics, and coexisting disease such as diabetes or kidney disease [21].

Many studies in Ethiopian have identified risk factors associated with hypertension ,for example, the male gender, overweight, and sleep duration of <5 hours[22];age, having ever smoked cigarette , the number of hours spent walking/cycling per day, history of diabetics , adding salts to food in addition to the normal amount that is added to the during cooking, and body mass index [15] ; having ever been told hypertensive ,using animal product butter, physical inactivity, BMI 25.0 to 29.9 and greater than 30[23]; age,

cigarette smoking , alcohol drinking, and tobacco use, alcohol abuse, overweight[24].

Generally, different literatures showed that the prevalence of hypertension in increasing radically especially in developing countries like Ethiopia and particularly in urban settings. Its prevalence is associated with socioeconomic, demographic, lifestyle, and dietary factors. The present study thus aimed to evaluate the prevalence of hypertension and associated risk factors.

BLOOD PRESSURE [BP]:

Blood pressure is defined as lateral pressure everted by the blood on the walls of the blood vessels while following through them. Blood pressure in a blood vessel depends upon two things.

1)Distance from the heart and 2) Nature of the blood vessel.

Blood pressure is more in blood vessels close to the heart. Blood pressure is more in arterial system then in the venous system. This is because walls of arteries are thicker and less elastic; the walls of the veins are thinner and more elastic.

Normal blood pressure is 120/80mmHg.systolic BP (SBP) is the maximum BP during the ventricular systole-120mmHg. Range:110-130mmHg. Diastolic BP (DBP) is the minimum pressure during the ventricular diastole. It is 80mmHg. Range: 70-90mmHg.

PHYSIOLOGICAL VARIATIONS:

Age: BP more in adult then in children.

SEX: BP more in male than female.

PREGNANCY: During the later stages of pregnancy BP usually increase.

ALTITUDE: BP is higher in people living at higher altitude.

EXERCISE: Systolic BP increases during exercise.

EMOTION: BP rises during emotional expressions.

SLEEP: BP falls during sleep.

HYPERTENSION:

- Therefore, Salt consumption: salt intake can promote rigidity to vascular smooth muscle and excessive salt intake [more than 8-10gm per day] may result in hypertension is defined as abnormally high blood pressure (more then 120/80mmHg) in the arteries. Persistent increase in systemic arterial blood pressure is known as hypertension. Usually, a mean arterial pressure greater then in 110mmHg under resting condition is *hypertensive; this level normally occurs when the diastolic blood pressure* is greater than 90mmHg and the systolic pressure is greater than a bout

135-140mmHg. Hypertension is generally symptom less, but increases the risk of various another cardiovascular disease like stroke, heart attack and non-cardiovascular disease like renal damage, end stage of renal failure, etc.

- Although hypertension is a common health problem with some times devastating consequence it often remains asymptomatic until late in its course. A sustained diastolic pressure greater than 90mm Hg, or sustained systolic pressure more than 140mm Hg, is considered to constitute hypertension 90-95% of hypertension is idiopathic [essential hypertension]. Which is complication supervening. Most of the reminder of ''benign hypertension '' secondary to renal disease or less often to narrowing of the renal artery, usually by an atheromatous plaque [renovascular hypertension]. Infrequently, hypertension is secondary to diseases of the adrenal glands, such as primary aldosteronism, Cushing syndrome, pheochromocytoma, or other disorders. Various determinants play important role of hypertension condition and in causation of premature cardiovascular risk over and beyond hypertension.

Smoking: Tobacco combustion results

It is divided into two types

1. Primary Hypertension [Essential Hypertension]
2. Secondary Hypertension [Non-Essential Hypertension]

PRIMARY HYPERTENSION:

It results when arterial blood pressure is increased due to increase peripheral resistance. It is further divided into two types namely Benign and malignant hypertension

1. Benign hypertension:

Here, there is a moderate increase in blood pressure with systolic pressure of 200 mm Hg and the diastolic pressure of above 100 mm Hg. However, in resting condition and sleep, the blood pressure returns to normal level.

2. Malignant hypertension:

The blood pressure elevated to a great extends of about 250 mm Hg of systolic pressure and 150 mmHg of diastolic pressure. It produces severe symptoms like renal disease, retinal diseases, and being a fatal disease. It causes death within few years.

Some of the characteristics:

- The mean arterial pressure is increased 40-60%

- The renal blood flow in the later stage is decreased about one half of normal
- The resistance to blood flow through the kidney is increased 2-4-fold.
- The kidney will not excrete adequate amounts of salt and water unless the arterial pressure is high.

SECONDARY HYPERTENSION:

Cardiovascular hypertension: it is produced due to

- Atherosclerosis-hardening and narrowing of blood vessel
- Contraction of aorta- narrowing of aorta.

Renal hypertension: it is produced due to

- Stenosis renal arteries- narrowing of one or both renal arteries, so that the renal function is impaired.
- Glomerulonephritis- nephritis with inflammation of the capillary loops in the renal glomeruli.

Endocrine hypertension: it is occurring due to

- Pheochromocytoma Tumer in adrenal medulla
- Hyperaldosteronism-excess secretion of aldosterone from adrenal cortex
  - Cushing's syndrome-excess secretion of cortisone
  - Gigantism or Acromegaly-excess secretion of growth hormone.

Neurogenic hypertension: Acute hypertension can be caused by strong stimulating of the sympathetic nervous system

- Section of the baroreceptor's nerves.
- Lesions in tractus solitarius.

FACTOR EFFECTING BLOOD PRESSURE

1) Volume of blood
2) Force of contraction of the heart
3) Heart rate and BP are inversely proportional
4) Viscosity of blood
5) Nature of the blood
6) Elasticity of blood vessel

ETIOLOGY OF HYPERTENSION:

Although hypertension may occur secondary to other disease processes, more than 90% of patients have essential hypertension, a disorder of unknown origin affecting blood pressure regulating mechanism. A family history of hypertension is increasing the likelihood that an individual will develop hypertensive disease. Essential hypertensions occur four times more frequently blacks than whites, and it occur more often middle-aged males than amount middle-aged females. Environmental factors such as stressful lifestyle, high

dietary intake of sodium, obesity and smoking all further predispose an individual to the occurrence of hypertension

PATHOGENESIS OF HYPERTENSION:

The multiple mechanism of hypertension constitutes aberrations of the normal physiologic regulation of blood pressure. Regulation of normal blood pressure; The blood pressure level is a complex trait that is determined by the interaction of multiple genetic, environmental, and demographic factors that influence to hemodynamic variables; cardiac output and total peripheral resistance. cardiac output affected by the blood volume, itself greatly dependent on body sodium homeostasis. Total peripheral resistance is predominantly determined at the level of the arterioles and depends on the effect of neutral and hormonal influence. Normal vascular tone reflects the balance between humoral vasoconstriction influences [including angiotensin 2 and catecholamine]and vasodilators [including kinins, prostaglandins, and nitric oxide]. Resistance vessels also exhibit autoregulation, whereby increased blood flow induced vasoconstriction to protect against tissue hyper perfusion.

The kidney plays important role in blood pressure regulation, as follow:

- Renin- angiotensin system, the kidney influence both peripheral resistance and sodium homeostasis. renin elaborated by the juxta glomerular cells of kidney transforms plasm angiotensinogen to angiotensin 1, which is then convert to angiotensin 2 by angiotensin converting enzyme [ACE]. Angiotensin2 raises blood pressure by increasing both peripheral resistance [direct action on vascular SMCs] and blood volume [stimulation of aldosterone secretion, increase in distal tubular reabsorption of sodium]
- The kidney also produced a variety of vasodepressor or antihypertensive substance. When the blood volume is reduced, the glomerular filtration rate falls, leading to increased reabsorption of sodium and water by proximal tubules and thereby conserving sodium and expanding blood volume.

METHODOLOGY:

RESEARCH APPROACH: -

For the survey, we should approach different categories like teachers\lectures, daily workers, bank employees, shop owners, students etc

research design: during the survey the standard questionnaire was used to called medical history from each member

age, sex, marital status, education, work history, smoking, alcohol intake and physical activity level were recorded

Ask about personal and family history of hypertension, diabetic mellitus, cardiovascular disease and chronic kidney disease.

Blood pressure measurements were performed mentioned from the members.

STATISTICAL ANALYSIS:

The categorical analysis variables were expressed as percentages.

Multi variate logistic regression analysis was performed to determine predictors of hypertension.

CAUSES:

- Essential hypertension
- Renal [acute nephritis]
- Vascular: arteriosclerosis
- Endocrine: pheochromocytoma, Cushing's syndrome, thyrotoxicosis
- Neurological: raised intracranial tension, lead encephalopathy etc.

EFFECT OF HYPERTENSION:

The common organ damage by standing hypertension is heart, blood vessel, retina, and central nervous system.

- **CVS:** DYSPNEA on exertion [insipient LVF]
  - Anginal chest pain [IHD]
  - Palpitation
    - **Kidney:** HEMATURIA, POLYURIS
  - **CNS:** Transient ischemic attacks [TLA OR STROKE] with focal neurological deficit.
    - Hypertensive encephalopathy [headache, vomiting, convulsion, unconsciousness, focal neurological deficit].
    - Dizziness tinnitus and syncope.
  - Retina: Blurred vision

SYMPTOMS:

EDEMA and puffy face- Acute nephritis

- Weight gain, hirsutism
- Weight loss, tremors, palpitation and sweating
- Hyperthyroidism
- Joint pains
- Symptoms: polyarteritis nodosa.

SIGNS

General examination: Moon face, truncal obesity

- Puffy face, rough skin, obesity
- Tremors, tachycardia, exophthalmos and goitre- hyperthyroidism.

TREATMENT FOR HYPERTENSION

Antihypertensive drugs:

Arterial pressure is product of cardiac output and peripheral vascular resistance, it can be lowered by the action of drugs on either the peripheral resistance or cardiac output, or both drugs may be reduced cardiac output by either inhibiting myocardial contractility or decreasing ventricular filling pressure. reduction in ventricular filling pressure may be achieved by action on the venous tone or on blood volume via renal effect. drugs can reduce peripheral resistance by acting on smooth muscle to relaxation of resistance vessel by interfering with the activity of systems that produced constriction of resistance vessel

The simultaneous use of drugs with similar mechanism of action and hemodynamic effects often products little additional benefit. However, concurrent use of drugs from different classes is strategy for achieving effecting control of blood pressure while minimising the dose related adverse effects.

N0N-PHARMACOLOGICAL MANAGEMENT OF HYPERENSION:

The non-pharmacological measures can lower the BP in most of individuals, in some patients, who do not show any reduction even after 04-066 months need drug therapy.it is treatment and helpful either to eliminate the requirement of drug or reduce the dose as well as dose regimen, non-pharmacological approach to the reduction of blood pressure generally are advisable as the initial approach to treatment of patient with diastolic blood pressure in the range of 90-95 mmHg. Reduction of weight, restriction of salt, and moderate in the use of alcohol may be reduced blood pressure and improve the effect of drug treatment

Some of those are.

- Reduction of body weight
- Sodium restriction
- Alcohol restriction
- Physical exercise
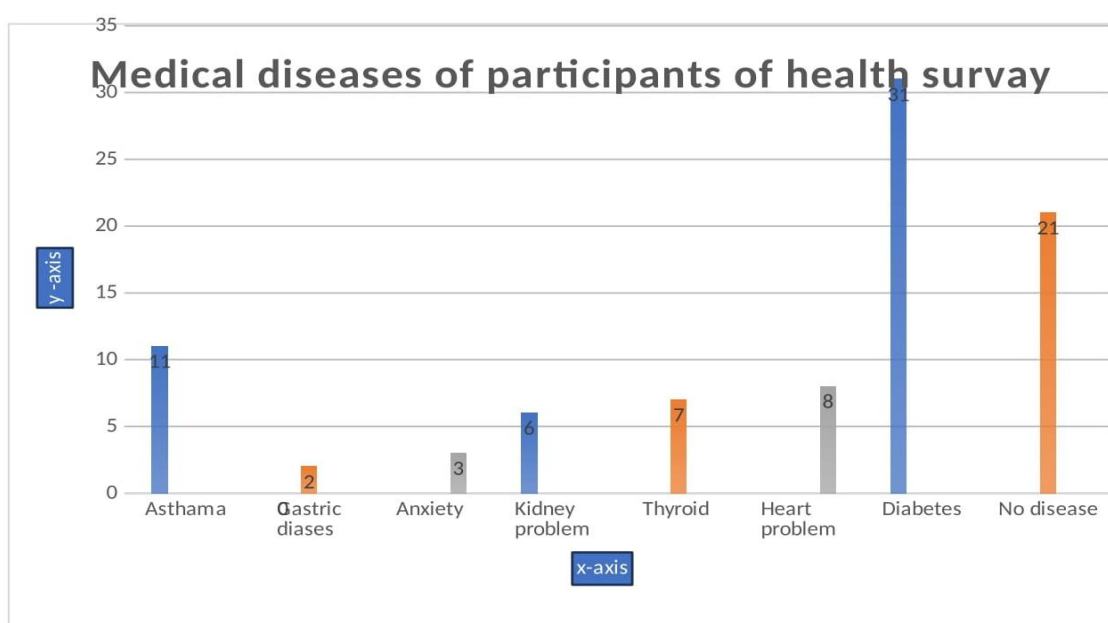- Relaxation and biofeedback therapy.

GRAPH:1

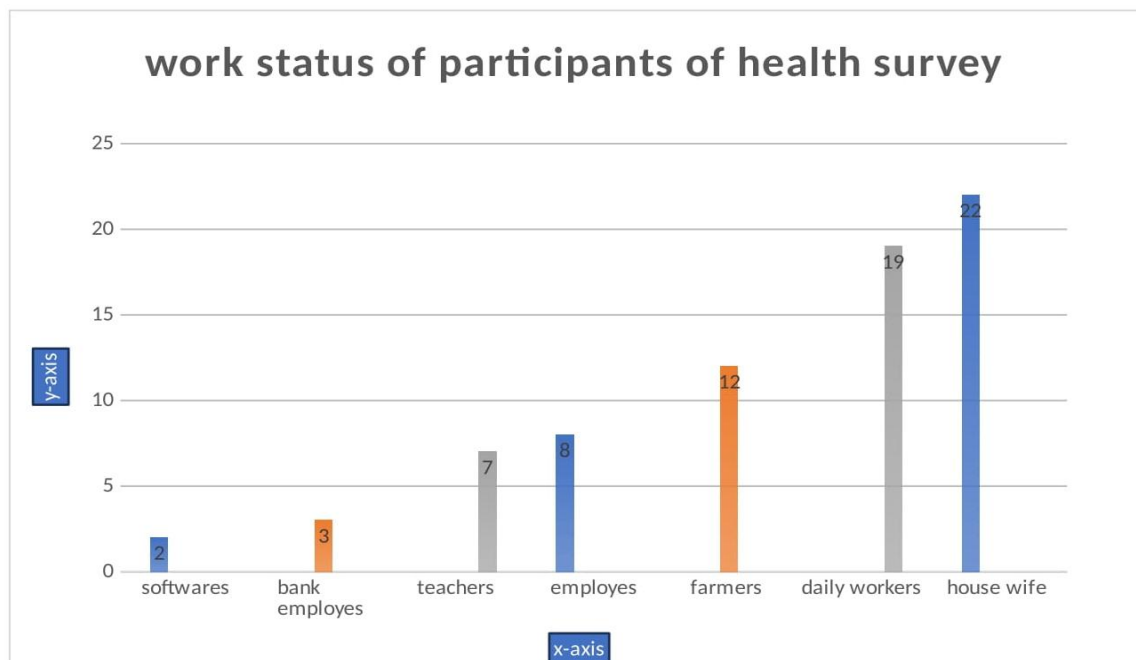Figure-1.1 **Medical diseases of participants of health survey**

GRAPH:2

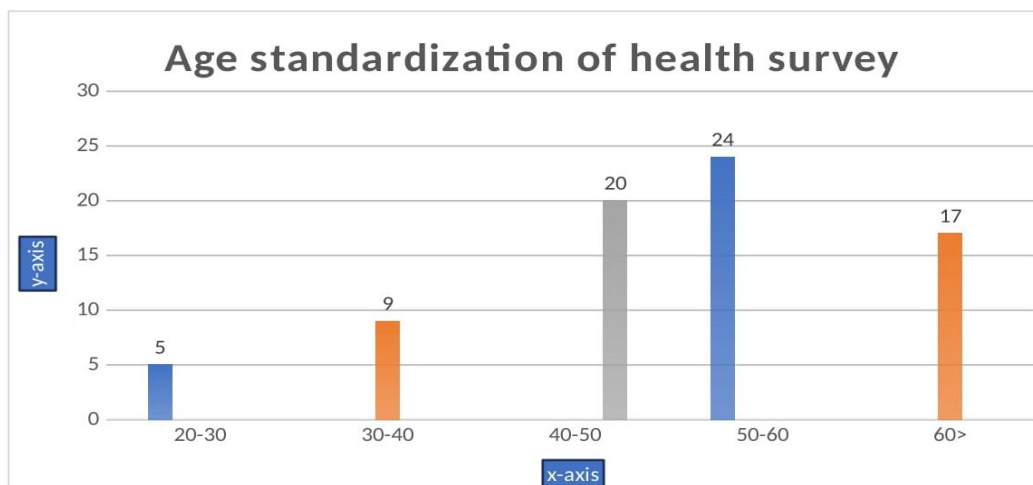Figure-1.2 **Work status of participants of health survey**

GRAPH:3

Figure-1.3 **Age standardization of health survey**

CONCLUSION:

The initial approach to hypertension should start with ruling out secondary causes, detecting &treating other cardiovascular risk factors and looking for target organ damage. treatment should always include lifestyle changes. medication use should be guided by the severity of HTN and the presents of "compelling" indications. most patients will require two or more anti-hypertensive drugs. Overall goal of treating hypertension is to reduce hypertension associating complications.

REFERENCES:

1   Institutes of Health, *NCI Dictionary of Cancer Terms*, National Institutes of 1National Health, Bethesda, MD, USA, 2018.

2   P. Muntner, R. M. Carey et al., "Measurement of blood pressure in humans: a scientific statement from the American Heart Association," *Hypertension*, vol. 73, no. 5, pp. e35–e66, 2019.

3   W. A. Brzezinski, *Blood Pressure. Clinical Methods: The History, Physical, and Laboratory Examinations*, Butterworths, New York, NY, USA, 1990, http://www.NCBI. NLM NTH. Gov/pub med / 21250111

4   World Health Organization, *Q&As on Hypertension (Online)*, World Health Organization, Geneva, Switzerland, 2015.

5   World Health Organization, *Cardiovascular Diseases (CVDs) Fact Sheet*, World Health Organization, Geneva, Switzerland, 2017.

6   G. Mensah, in *Epidemiology and Pathophysiology of Hypertension-Oxford Medicine Online*, Oxford University Press, Oxford, UK, 2020.

7   H. Salem, D. M. Hasan, A. Eameash, H. A. El-Mageed, S. Hasan, and R. Ali, "Worldwide prevalence of hypertension: a pooled meta-analysis of 1670 studies in 71 countries with 29.5 million participants," *Journal of the American College of Cardiology*, vol. 71, no. 11, p. A1819, 2018. View at: Publisher Site | Google Scholar

8   K. T. Mills, J. D. Bundy, T. N. Kelly et al., "Global disparities of hypertension prevalence and control," *Circulation*, vol. 134, no. 6, pp. 441–450, 2016. View at: Publisher Site | Google Scholar

9   World Health Organization, *A Global Brief on Hypertension: Silent Killer, Global Public Health Crisis: World Health Day 2013*, World Health Organization, Geneva, A. Chockalingam, N. R. Campbell, and J. George Fodor, "Worldwide epidemic of Switzerland, 2013.

10 Hypertension," *Canadian Journal of Cardiology*, vol. 22, no. 7, pp. 553–555, 2006. View at: Publisher Site | Google Scholar

11 D. Guwatudde, J. Nankya-Mutyoba, R. Kalyesubula et al., "The burden of hypertension in sub-Saharan Africa: a four-country cross sectional study," *BMC Public Health*, vol. 15, no. 1, Article ID 1211, 2015.

12 K. T. Kibret and Y. M. Mesfin, "Prevalence of hypertension in Ethiopia: a systematic meta-analysis," *Public Health Reviews*, vol. 36, no. 1, pp. 1–12, 2015. View at: Publisher Site | Google Scholar

13 B. Sisay, M. Andualem, and G. Teshome, "Prevalence of hypertension and its association with substance use among adults living in Jimma Town Southwest Ethiopia 2012," *World Journal of Medicine and Medical Science*, vol. 2, no. 1, pp. 1–11, 2014.

14 Z. Anteneh, W. Birhanu, and D. B. Abitew, "Prevalence and correlation of hypertension among adult population in Bahir Dar city, northwest Ethiopia: a community based cross-sectional study," *International Journal of General Medicine*, vol. 8, p. 175, 2015

15 Hoel D, Howard RB. Hypertension-stalking the silent killer. Postgrad MedJ1997; 101:1 16-121.

16 Familoni OB. Hypertension-How much do our patients know? Afr Health. 2002;24: 13.

17 Marques-Vidal P, Toumilehto J. Hypertension awareness, treatment, and control in the community. Is "the rule of halves" still valid? J. Hum. Hypertens. 1997; 11:213-220.

18 Familoni OB. High blood pressure. Med Dig. 1992; 18:54-55.

19 Salako LA. Treatment of hypertension. In: Cardiovascular Diseases in Africa 1979. Ciba-Geigy. pp. 22-27.

20 Tao S, Wu X, Duan X, et al. Hypertension prevalence and status of awareness, treatment, and control in China. Chi Med J 1995; 108:483-489.

21 Anderson S. Mechanisms of nephrosclerosis and glomerulosclerosis in: Izzo JL, Black HR (eds.) Hypertension Primer Dal las American Heart Association. 1993.

22 Kadiri S. Management of hypertension with special emphasis on Nigeria. Arch Ibadan Med. 1999;1: 19-21.

23 Oyediran ABO, Akinkugbe 00. Chronic renal failure in Nigeria. Trop Geogr Med. 1970; 22:41.

24 1999 WHO/ISH Guidelines for the management of hypertension. Blood Press. 1999;(suppl1) 8:9-43

*Corresponding Author:
G. Nagaraju*
Email: gdp413@gmail.com