

Study of Various Clinical Presentations, Laboratory Parameters and Echocardiographic Findings in Newly Diagnosed Hypertensive Patients

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ABSTRACT

Objective: To study various clinical presentations, laboratory parameters, electrocardiographic and echocardiographic findings in newly diagnosed hypertensive patients. **Methods:** This study included 100 cases of newly diagnosed hypertension. The target population involved all adults presented with first time hypertension as indoor as well as outdoor patients of age > 18 years in both male and female according to JNC 8 guideline. (Systolic blood pressure > 140; Diastolic Blood Pressure > 90). **Results:** Incidence of hypertension was found higher among the 61-70 years age group and least among 18-30 age group. Incidence was higher in male (62%) patients than female (38%) patients. Addiction like tobacco/biddi/chhikani/alcohol, dyslipidemia, positive history of CVD and obesity were associated risk factors seen in 44%, 44%, 30% and 16% respectively. Commonest symptom was Headache (25%), followed by chest pain (21%). Total mean systolic and diastolic blood pressure was (175/100 mmHg). Among all newly diagnosed hypertension patients, abnormal triglyceride, total cholesterol, LDL, HDL, Urine R/M and serum creatinine were present in 44%, 40%, 38%, 36%, 17% and 5% patients respectively. The most common finding in ECG was LV Strain (42%), followed by LVH (30%). Commonest finding in 2D ECHO was concentric LVH (64%). 14% patients had retinopathy at the time of diagnosis of hypertension. **Conclusion:** Development of hypertension is depended on multiple risk factors like age, sex, decreased physical activity, obesity, various addiction and hormonal changes. Identifying the risk factors helps in further management and prevention of complications of hypertension.

Key words: Hypertension, Adults, Newly diagnosed, Electrocardiographic, Echocardiographic.

INTRODUCTION

Hypertension is a major worldwide public health problems because of its high prevalence with vascular disease, premature death, stroke, renal diseases and retinopathy.¹ It is the most important risk factor for cardiovascular diseases which kill about 12 million annually worldwide, more than any other disease.² According to American Heart Association, the estimated prevalence of hypertension was 73,600,000 (35,300,000 males and 38,300,000 females).³ Hypertension affects about one billion individuals' worldwide and 60 million persons in the United States. In an analysis of worldwide data for the global burden of HTN, 20.6% of Indian men and 20.9% of Indian women were suffering from HTN in 2005.⁴ Poorly controlled hypertension is

a significant public health concern all over the world, in terms of morbidity, mortality and economic burden especially among older adults.⁵

Hypertension is defined as a medical condition in which the blood pressure in the arteries is elevated exceeding 140 over 90 mmHg. This elevation makes the heart work harder than usual to circulate blood through the blood vessels.^{6,7} Many patients suffer from this disease are not aware about this condition early because it is usually occur without any symptoms. Hypertension takes a long time before diagnosed thereby causing major health problems as damage to organs as the brain and kidneys and so on are the long term effect of hypertension

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disease.⁸ Various risk factors have been associated with hypertension including; age where majority of cases of uncontrolled hypertension are amongst elderly people, sex, race, decrease physical activity, obesity, smoking, dietary, hormonal changes which play key role in the development of hypertension.⁹ Identifying these risk factors may help in strategizing modalities for reducing preventable risk factors such as weight, excess salt intake, cigarette smoking and alcohol use.¹⁰

The goal of hypertension management is to prevent short and long term complications by achieving and maintaining the blood pressure at 140/90 mm Hg or lower.^{11,12} These patients need to be aware of various aspects of hypertension, especially of risk factors which may be modified. This will assist for bringing necessary modifications in lifestyle behaviors.¹³ Lifestyle behavior modifications are the first line of intervention for all patients with hypertension, in combination with pharmacological treatment which is also important for the disease management to control its progress and prevent short and long term complications.¹²

This study has been performed to study various clinical presentations, laboratory parameters, electrocardiographic and echocardiographic findings in newly diagnosed hypertensive patients.

MATERIAL AND METHODS

The present study is a hospital Based Descriptive Cross-Sectional Study undertaken in medical department of a tertiary care hospital. The target population involved all adults presented with first time hypertension as indoor as well as outdoor patients. The study duration was from August 2014 to July 2016.

All the patients were interviewed with proper interview sheet, which was designed especially for this study and was filled by the author.

Inclusion Criteria

Consenting adult patients with the following features:-

First time diagnosed hypertensive patients of age > 18 years in both male and female according to JNC 8 guideline. (Systolic blood pressure >140; Diastolic Blood Pressure >90)

Exclusion Criteria

1. Patients less than 18 years age and pregnant patients.

2. Patients having history of diabetes mellitus, ischemic heart disease, hypertension or cerebrovascular accidents.
3. Patients on any medications or on hormonal therapy that may affect blood pressure readings.
4. Patients needing ICU and ventilatory support.

Investigations

Blood pressure was measured with a mercury sphygmomanometer. Two blood pressure readings were taken more than 15 minutes apart on each arm with the patient sitting and supine, which was considered the second measure. The individuals were then classified as hypertensive or normotensive according to the JNC 8 guideline¹⁴ (hypertensive individuals: systolic pressure >140mmHg or diastolic pressure >90mmHg).

Biochemical tests and the hemogram were performed according to automated methods in the central laboratory of the hospital, in the morning, after a 12-hour fasting period. The classification of lipid disorders followed the proposal of the normal cholesterol (<200mg/dL), intermediate values of cholesterol (between 200mg/dL and 239mg/dL) and high cholesterol (>240mg/dL); and desired levels of triglycerides (<200mg/dL) or elevated levels of triglycerides (>200mg/dL). The diagnosis of diabetes was made when glycemia was higher than 126 mg/dL in only one dosage, according to the definition of the American Diabetes Society.¹⁵ Some diagnoses based on the other examinations were assessed, such as anemia hemoglobin <12g/dL), elevated creatinine (>1.4mg/dL), hypopotassemia (<3.5mEq/L), hyperpotassemia (>5.5 mEq/L), hyperuricemia (uric acid >7.0mg/dL), and hypercalcemia (>5.5mEq/L).

In all individuals, weight and height were measured with an anthropometric scale and the patients wearing light-weight clothing. The BMI was obtained by dividing the weight (in kg) by the square of the height (in m²). According to the definitions of the World Health Organization for obesity, the patients were classified as follows: normal weight (BMI < 25 kg/m²), overweight (BMI 25kg/m² and <30kg/m²) and obese (BMI > 30 kg/m²).

Electrocardiographically, LVH was diagnosed on the basis of increased voltage (LVH alone) and repolarization abnormality (LVH and Strain). Sokolow-Lyon criteria (S in V1 + R in V5 or V6 ≥ 35 mm) and Cornell voltage criteria (In men: SV3 + RaVL > 28 mm in women: SV3 + RaVL > 20 mm) were used to diagnose LVH electrocardiographically. Measurement of left ventricular wall thickness e.g. interventricular septal thickness (IVST)

and left ventricular posterior wall thickness in diastole (PWTd) by Mmode echocardiography was done. LVH was considered to be present if the IVST and PWTd are above their normal limits (> 12 mm in diastole).

The completed interview sheets were kept and transformed to a master sheet. The contents of the sheet were entered into a microcomputer. Then the results were analyzed using the student *t*-test for variables.

OBSERVATION

In this study, we had included 100 patients of 18 and above years of age. Our observations are as follows.

Table 1 and Figure 1 shows that highest no. of (37%) patients were in 61-70 age group and lowest (1%) in 18-30 age group. The youngest patient was 30 yrs and oldest was 79 yrs. In study done by Reis *et al*¹⁶ highest incidences was present in 51-60 age group. The high incidence in this age group is because of the fact that the life-long risk of developing hypertension in normotensives after the sixth decade of life is approximately 90%.¹⁷

Table 2 shows that the 62 (62%) patients were male. Remaining 38 (38%) were female. In a study done by C. Cuspidi *et al*,¹⁸ similar results were observed (52.4% vs 47.6%). Observed gender differences in hypertension are due to both biological and behavioral factors. The biological factors include sex hormones, chromosomal differences, and other biological sex differences that are protective against hypertension in women. These biological factors become evident during adolescence and persist through adulthood until women reach menopause, at which point gender differences in hypertension become correspondingly smaller or nonexistent. The difference can also be supported by the fact that renin activity is greater in men than in women of similar age.¹⁹

Table 3 and Figure 2 show that headache was the most common symptom seen in 25 (25%) patients. Chest pain was the next commonest symptom occurring in 21 (21%). The least common symptoms were epistaxis and altered sensorium seen in 2 (2%) patients for each. Few patients had more than one complaint at the time of diagnosis of hypertension.

In study of Gus *et al*,²⁰ headache was the commonest complaint seen in 33% patients. However there are no supportive evidence found which suggests relationship between headache and hypertension. But psychoneurosis, anxiety and sleep apnea are some of the possible explanations for the association between headache and hypertension.²¹⁻²²

Table 1: Age Wise Distribution		
Age in Years	No of Patients	Percentage of Patients
18-30	1	1%
31-40	8	8%
41-50	20	20%
51-60	21	21%
61-70	37	37%
71-80	13	13%
Total	100	100 %

Table 2: Sex Wise Distribution		
Sex	No. of Patients	Percentage of Patients
Male	62	62%
Female	38	38%
Total	100	100%

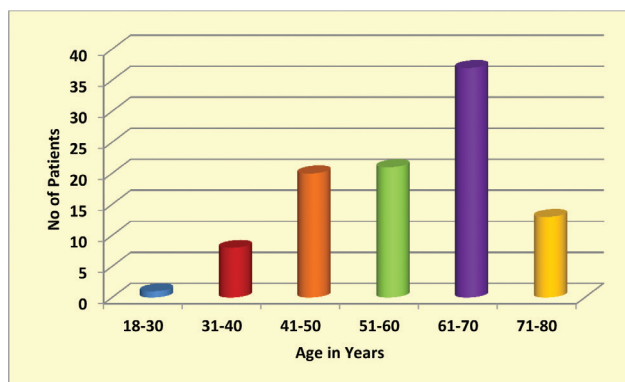


Figure 1: Age wise distribution

Table 3: Complaints Wise Distribution		
Complaints	No. of Patients	Percentage of Patients
Headache	25	25 %
Chest Pain	21	21 %
Nausea	15	15 %
Giddiness	15	15 %
Limb Weakness	14	14 %
Gabharaman	12	12 %
Perspiration	11	11%
Vomiting	10	10 %
Slurring of Speech	7	7 %
Dyspnea	6	6 %
Vision Disturbance	4	4 %
Epistaxis	2	2 %
Altered Sensorium	2	2 %

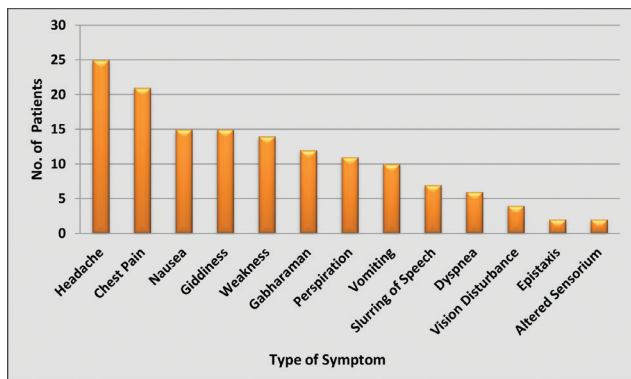


Figure 2: Complaints wise Distribution

BMI (kg/m ²)	MALE	FEMALE	TOTAL
< 25	36	20	56
25 – 30	16	12	28
> 30	10	6	16
Total	62	38	100

Risk Factors	No. of Patients
Addiction	44 (44%)
Dyslipidemia	44 (44%)
Positive Family History	30 (30%)
Obesity	16 (16%)
More than 1 Risk factor	9 (9%)

	MALE (n=62)	FEMALE (n=38)
Stage 1:		
Systolic Blood Pressure	153.90 ± 7.46	154.45 ± 6.63
Diastolic Blood Pressure	95.61 ± 4.62	94.45 ± 4.41
Stage 2:		
Systolic Blood Pressure	184.53 ± 14.71	186.51 ± 15.54
Diastolic Blood Pressure	102.68 ± 4.22	102.88 ± 5.51
Mean Systolic Blood Pressure	174.16 ± 16.24	177.23 ± 11.08
Mean Diastolic Blood Pressure	100.29 ± 4.41	100.44 ± 4.96
Total Mean Blood Pressure (S/D)	(175/100)	

Fundus Examination	No of Patients	Percentage of Patients
Retinopathy Present	14	14%
Retinopathy Absent	86	86%
Total	100	100%

As in Table 4, 56 (56%) patients had normal BMI, 28 (28%) were overweight and 16 (16%) were obese. In the study of Reis *et al*,¹⁶ (17.4%) patients were obese which is comparable to this study. (p=0.2138). Few studies had established a pathophysiological link between overweight/obesity and hypertension.²³⁻²⁶

Table 5 shows, addictions like tobacco/bidi/chikkani/ alcohol was present in 44 (44%) patients. Family history of HTN, CVD, DM was present in 30 (30%) patients, Dyslipidemia was present in 44 (44%) patients whereas 16 (16%) patients had obesity. It has also observed that 9 (9%) of patients had more than one risk factor. In the study of Reis *et al*,¹⁶ (30.4%) patients were smokers, (17.4%) patients were obese, (35.4%) patients were having Dyslipidemia. In the study of Seham *et al*,²⁷ (75 %) patients had positive family history of cardiovascular diseases.

Chemical compounds in tobacco mixtures are responsible for structural and functional alterations of heart and blood vessels, in turn responsible for development of hypertension.²⁸ Association of alcohol and blood pressure is also explained by few studies.²⁹⁻³¹ Family history of CVD is important for hypertension because family members share genes, behaviors, lifestyles and environments that can influence their health and their risk for disease.³² Dyslipidemia causes endothelial damage and loss of physiological vasomotor activity, this damage may manifest as elevated blood pressure.³³ As explained earlier, obesity is also linked with hypertension.²³⁻²⁶

Table 6 shows that the overall Mean Blood Pressure is 175/100, which is comparable to study done by Cuspidi *et al*¹⁸ where Mean Blood Pressure is 168/103 (SBP/DBP). There is no significant difference in mean Diastolic Blood Pressure between male and female and little higher mean Systolic Blood Pressure in female in our study. This may be because of majority of female patients (29 out of 38) were post menopausal in our study in whom protective mechanism of estrogen against androgen might had been lost.

Table 7 shows that retinopathy was present in 14 (14%) patients at the time of diagnosis of hypertension. In a study done by Meenakshisundaram R,³⁴ retinopathy was seen in 69% patients in newly detected hypertensive patients. High blood pressure can damage the vessels supplying blood to the retina, causing retinopathy. This condition can lead to bleeding in the eye, blurred vision and complete loss of vision.

From the Table 8, it is observed that 44 (44%) patients had altered triglyceride, 40 (40%) had altered cholesterol, 36 (36%) had low HDL and 38 (38%) had altered LDL.

Table 8: Biochemical Investigations

Variables	No of Patients	Percentage of Patients
FBS (mmol/L)		
FBS < 100	62	62 %
FBS >100 to <125	27	27 %
FBS >125	11	11%
Serum Creatinine (mg/dl)		
S. Creatinine < 1.4	95	95 %
S. Creatinine ≥ 1.4	5	5%
Cholesterol (mg/dL)		
Cholesterol < 200	60	60 %
Cholesterol ≥ 200	40	40 %
Triglyceride (mg/dL)		
Triglyceride < 150	56	56 %
Triglyceride ≥ 150	44	44 %
HDL (mg/dL)		
HDL ≥ 40	64	64%
HDL < 40	36	36%
LDL (mg/dL)		
LDL < 130	62	62%
LDL ≥ 130	38	38%
Urine R/M		
Albumin Present	17	17%
Albumin Absent	83	83%

Table 9: ECG Findings

Ecg Findings	No of Patients	Percentage of Patients
LV Strain	42	42%
LVH Alone	30	30%
ST- T Changes	14	14%
T wave changes	9	9%
Normal	5	5%
Total	100	100%

It has also observed that 27 (27%) patients had impaired glucose tolerance, 11 (11%) patients were diagnosed having diabetes mellitus and 17 (17%) had albuminuria. In the study of Reis *et al.*¹⁶ (35.4%) patients were having dyslipidemia. Other parameters like complete blood count, urea, electrolytes, liver function tests, calcium and uric acid were within normal range in all patients included in our study.

Table 9 shows that LV Strain was the most common finding seen in ECG (42%). While other findings like LVH alone, ST-T changes, T wave changes and normal electrocardiogram were present in 30 (30%); 14 (14%); 9 (9%) and 5 (5%) patients respectively. These results are comparable to a study done by Razzak *et al.*³⁵

Left ventricular hypertrophy reflects an adaptation to an increased work load of the heart due to pressure or volume overload accompanying hypertension.³⁶

As observed in Table 10 2D- Echocardiography finding

Table 10: Echocardiographic Findings

Echo Finding	No of Patients	Percentage of Patients
Concentric LVH	64	64%
RWMA	24	24%
No Significant abnormality	21	21%

Table 11: Associated Newly Diagnosed Diseases

Disease	No of Patients
Impaired glucose tolerance	27(27%)
Cardiovascular disease	24 (24%)
Stroke	20 (20%)
Diabetes Mellitus	11 (11%)
Renovascular disease	5 (5%)

shows Concentric LVH in 64 (64%) patients, RWMA in 24 (24%) patients and no Significant abnormality in 21 (21%) patients. In a study by Razzak *et al.*³³ Concentric LVH was seen in (66%) patients.

Table 11 shows that Majority of the patients (41%) were having accelerated hypertension. Other 10% had incidental diagnosis of hypertension. Whereas from remaining patients, (27%) patients were found to have impaired glucose tolerance, (24%) presented with CVD; (20%) presented with Stroke; (5%) with Renal Pathology. Out of 100 patients, 11 (11%) were diagnosed having Diabetes mellitus. In a study done by Ayodele OE *et al.*³⁷ (14.9%) had associated Diabetes and 19.7% had associated Cardiovascular disease.

DISCUSSION

This study included 100 cases of newly diagnosed hypertension. Incidence of hypertension was found higher among the 61-70 years age group and least among 18-30 age group. Incidence was higher in male (62%) patients than female (38%) patients. Addiction like tobacco/biddi/chhikani/alcohol, dyslipidemia, positive history of CVD and obesity were associated risk factors seen in 44%, 44%, 30% and 16% respectively. Commonest symptom was Headache (25%), followed by chest pain (21%). Least common symptoms were epistaxis (2%) and altered sensorium (2%). 28% patients were overweight and 16% patients were obese when diagnosis of hypertension was made. Total mean systolic and diastolic blood pressure was (175/100). While male have lower mean systolic blood pressure compared to female (174/100 vs 177/100). No significant difference was seen in mean diastolic blood pressure.

Among all newly diagnosed hypertension patients, abnormal triglyceride, total cholesterol, LDL, HDL, Urine R/M and serum creatinine were present in (44%), (40%), (38%), (36%), (17%) and (5%) patients respectively. The most common finding in ECG was LV Strain (42%), followed by LVH (30%). Whereas commonest finding in 2D ECHO was concentric LVH (64%). 14% patients had retinopathy at the time of diagnosis of hypertension. Majority of the patients (41%) were diagnosed having essential hypertension. (27%) patients had impaired glucose tolerance, (24%) had CVD, (20%) had Stroke, (11%) had diabetes mellitus and (5%) had Renal Pathology at the time of diagnosis of hypertension.

Development of hypertension is depended on multiple risk factors like age, sex, decreased physical activity, obesity, various addiction and hormonal changes. The initial drug choice for the management of hypertension also depended on a number of factors such as patient's age, presence of associated co-morbidities & clinical conditions, organ damage and interactions with other drugs. In elderly hypertensive patients, calcium channel blockers were chosen for treatment unless there was comorbid CKD, in which case angiotension converting enzyme inhibitors were preferred. In hypertensive patients with CKD, angiotension converting enzyme inhibitors/ angiotensin receptor blockers were preferred to improve kidney outcomes. In hypertensive patients with coronary artery disease and congestive heart failure, beta blockers and RAAS blockers were the preferred treatment option.

Identifying the risk factors helps in further management and prevention of complications of hypertension. Thus, it is advisable to do regular checkup of blood pressure and awareness should be made for that. After diagnosis of hypertension, regular follow up is also desirable for early diagnosis and prevention of complications.

Because of the limitations that relatively small number of patients were included and patients already diagnosed having diabetes, ischemic heart disease, cerebrovascular disease were excluded, exact incidence could not be found. Study with large number of patients would be more conclusive.

CONFLICT OF INTEREST

The author declares there is no conflict of interest.

ABBREVIATION USED

JNC: Joint National Committee **CVD:** Cardiovascular Disease **LDL:** Low Density Lipoprotein **HDL:** High Density Lipoprotein **LVH:** Left ventricular hypertrophy **HTN:** Hypertension **ICU:** Intensive Care Unit **DM:** Diabetes Mellitus **FBS:** Fasting Blood Sugar **RAAS:** Renin Angiotensin Aldosterone System **CKD:** Chronic Kidney Disease

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