

Study of clinical and etiological profile of hypertension in young patients



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ABSTRACT

Background: Hypertension significantly impacts global health, leading to coronary heart disease, stroke, and renal disease. Addressing it in young adults is crucial due to its potentially reversible causes and early intervention. **Aims and Objectives:** (1) To study the clinical profile of newly diagnosed hypertension in young patients (2) To study the etiological profile of hypertension in young. **Materials and Methods:** In this cross-sectional study after obtaining clearance from the institutional ethics committee, the patients fulfilling the inclusion criteria were enrolled after obtaining informed consent. Data were collected using a pretested proforma, meeting the objectives of the study. A detailed assessment of patients was performed including history and clinical examination of all systems. Laboratory investigations were conducted and analyzed. **Results:** The mean age of participants was 34.38 ± 4.729 years, with 63% being male. Common symptoms included headache (18%) and giddiness (18%). A significant proportion (58%) had secondary hypertension, primarily due to renal and endocrine causes. Essential hypertension accounted for 42% of cases. The mean systolic and diastolic blood pressures were 178.06 ± 14.112 mmHg and 92.17 ± 11.441 mmHg, respectively. Lifestyle factors such as smoking and alcohol use were noted in 12% and 4% of participants, respectively. **Conclusion:** Early detection and management of hypertension in young adults are crucial to prevent long-term complications. Secondary hypertension is common in this demographic, requiring specific treatments.

Key words: Hypertension; Young adults; Secondary hypertension; Renal pathology

INTRODUCTION

Hypertension, the most prevalent chronic non-communicable disease globally, is the leading risk factor for cardiovascular and cerebrovascular mortality. According to the World Health Organization,¹ approximately 1.28 billion adults worldwide are affected by arterial hypertension, but only half of these individuals have been accurately diagnosed and managed. This condition arises when the arterioles, or smaller blood vessels, constrict, causing blood to exert excessive pressure against the vessel walls and compelling the heart to work harder to maintain this pressure. Hypertension is defined as a systolic blood pressure (SBP) of 140 mmHg or higher, or a

diastolic blood pressure (DBP) of 90 mmHg or higher.² For adults aged 18 years or older, blood pressure classifications are as follows: normal (systolic <120 mmHg and diastolic <80 mmHg), prehypertension (systolic 120–139 mmHg or diastolic 80–89 mmHg), Stage 1 hypertension (systolic 140–159 mmHg or diastolic 90–99 mmHg), and Stage 2 hypertension (systolic 160 mmHg or greater, or diastolic 100 mmHg or greater).^{3,4}

Increasing body mass index (BMI), obesity, and abdominal circumference are associated with higher rates of hypertension in young adults.⁵ Other chronic conditions linked to childhood hypertension include disordered sleep

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(e.g., obstructive sleep apnea, primary snoring disorders, and sleep fragmentation) and chronic kidney disease (CKD).^{6,7} Race and ethnicity also play a role, with Hispanic and black young adults at greater risk for hypertension.⁸ Additional risk factors include a family history of hypertension or cardiovascular disease (CVD), male sex, low birth weight, and maternal smoking during pregnancy. Conversely, young adults who were breastfed have a reduced risk of developing hypertension. The overall prevalence of hypertension among adults in India is about 30% with an urban prevalence of 34% and a rural prevalence of 28%.^{5,8-11} Unfortunately, only 25% of rural and 38% of urban Indians with hypertension are being treated.

India is a youthful nation, with approximately 32% of its 1.2 billion population being young adults aged 20–39 years.¹² With an estimated hypertension prevalence of around 7% in this age group,¹³ this translates to approximately 27 million young adults in India suffering from hypertension. Elevated blood pressure during young adulthood is known to cause vascular damage, leading to clinical events and increased mortality later in life. In the past several decades, hypertension in young adults (18–24 years) and middle-aged people (25–44 years) has emerged as a serious issue for public health across the world. One of the leading causes of death and disability worldwide is the rising prevalence of hypertension.¹⁴

Due to its lack of severe symptoms and potentially fatal effects, hypertension has been known as a silent killer. The necessity of hypertension screening and treatment at an early stage cannot be overstated.¹⁵ According to a recent national census, 15.2% of adults in Saudi Arabia have hypertension, and 57.8% of those cases are undetected.

In addition, prehypertension, which is more common in young people than full-blown hypertension, is a major antecedent for developing hypertension and CVD later in life, and when diagnosed early, it may be decreased, although not always effectively, by lifestyle adjustments.^{15,16} Despite this, there is a deficiency in prehypertension and hypertension screening among young people, and doctors are less likely to prescribe anti-hypertensive drugs to young adults with hypertension than they are to older patients.

Aims and objectives

1. To study the clinical profile and lab parameters, electrocardiogram (ECG), ECHO, and ultrasound (USG) findings of newly diagnosed hypertension in young patients
2. To study the etiological profile of hypertension in young.

MATERIALS AND METHODS

It was a cross-sectional study conducted from September 2022 to March 2024. All prospective patients, meeting the specified inclusion and exclusion criteria and who were admitted to the Department of General Medicine, ESIC-MC and PGIMSIR, Bengaluru during the study period of September 2022–January 2024.

Sample size estimation

A study conducted by Goswami et al., in 2019 in India. The most common complaint among newly diagnosed hypertension patients was headache 25%. At a 95% confidence level, an absolute allowable error of 9% and at 5% dropout rate. The sample size was $n=94$. Therefore, at least 94 newly diagnosed hypertensive patients should be included in the study. Considering 5% dropouts, the estimated sample size is 94. Accordingly, we have included 100 sample size in the study.

Inclusion criteria

1. Patient willing to give informed consent
2. Patient between 18 and 40 years of age group
3. Patients newly diagnosed with hypertension according to JNC 8 guidelines (SBP >140 and DBP >90).

Exclusion criteria

1. Patients who are on any medications or hormonal therapy that may alter blood pressure
2. Patients with comorbidities such as diabetes mellitus, ischemic heart disease, and cardiovascular accidents
3. Gestational hypertension.

Study protocol

After obtaining approval and clearance from the institutional ethics committee, the patients fulfilling the inclusion criteria will be enrolled in the study after obtaining informed consent. A standard proforma was used to record a detailed history of present complaints, past history including hypertension, ischemic heart disease, family history of hypertension, diabetes, and smoking.

Diagnosis of hypertension was made by measurement of blood pressure in the arm with a sphygmomanometer according to the JNC 8. Blood pressure was measured with a Diamond mercury sphygmomanometer whose accuracy has been validated. Participants were asked to refrain from smoking cigarettes and drinking alcohol or caffeinated beverages for at least 60 min before examination. The blood pressure in the left arm was measured after resting for at least 5 min. The blood pressure was taken in the sitting position, legs uncrossed, with the arm resting on a table and the antecubital fossa at the level of the lower sternum. Three blood pressure readings were measured to the nearest

mmHg 3 min apart and the mean of the closest two values was used for analyses.

Detailed clinical examination along with necessary basic routine investigations such as complete blood count, renal function test, serum calcium, serum phosphorus, serum uric acid, Urine routine analysis, 24 h urine creatinine protein ratio, Fasting blood sugar, Post-prandial blood sugar, hemoglobin A1C (HbA1c), fasting lipid profile, thyroid profile, ECG, 2DEcho, fundus examination was conducted.

Patients would be subjected to specific investigations such as urinary metanephrines, serum aldosterone, plasma renin, and other necessary investigations for the evaluation of hypertension if the study demands.

Based on the findings obtained, a final diagnosis regarding the clinical profile and etiological causes of hypertension will be made.

Statistical analysis

All the data collected were entered and compiled in Microsoft Excel. All the Qualitative variables were presented with frequency percentage. All the quantitative variables were presented in mean with standard deviation and median with interquartile range. Qualitative data were compared using Chi-square test or Fischer exact test, based on the observations. When the observed variable was more than 5, Chi-square test was used. Quantitative data were compared using t-test. $P < 0.05$ was deemed significant.

The data were analyzed using statistical software Epi Data.

RESULTS AND OBSERVATIONS

18% of the study participants had complaints of headache (Table 1), and 18% of the study participants had complaints of giddiness. Blurry vision was found in 9% followed by limb weakness in 7% and palpitation in 6%.

The mean blood urea (Table 2) of the study participants was found to be 25.2912 ± 16.9697 . The mean serum creatinine of the study participants was found to be 1.1095 ± 0.8018 . The mean Serum cortisol of the study participants was found to be 17.1371 ± 6.3727 . The mean plasma renin of the study participants was found to be 0.7282 ± 0.1844 . The mean urine metanephrines of the study participants were found to be 29.5182 ± 2.7590 . The mean serum aldosterone of the study participants was found to be 4.8818 ± 1.5856 . The mean serum uric acid of the study participants was found to be 4.538 ± 1.2361 . The mean serum calcium of the study participants was found to be 8.93 ± 0.8329 . The mean serum phosphorous of the study participants was

found to be 3.9279 ± 0.5261 . The mean urine polymerase chain reaction (PCR) of the study participants was found to be 0.2859 ± 0.5131 .

In this study finally, 42% of patient found to have essential hypertension (Table 3), and 58% patient found to have secondary hypertension out of which 27% diagnosed with CKD, 15% diagnosed with hypothyroidism, 4% diagnosed with hyperthyroidism, 2% with thyrotoxicosis, 1% mixed connective tissue disease (CTD), 5% diagnosed with nephritic syndrome, 1% nephrotic syndrome, 1% polycystic kidney disease, 1% renal artery stenosis and 1% diagnosed with scleroderma.

DISCUSSION

Hypertension, or high blood pressure, is a significant health issue globally, affecting millions of individuals across various age groups. Traditionally, hypertension has been viewed predominantly as a disease of middle-aged and elderly populations. However, there has been a rising prevalence of hypertension among young adults, necessitating a closer examination of its clinical and etiological aspects in this demographic. Hypertension in young patients is often underdiagnosed and undertreated, partly due to the misconception that young individuals are less likely to develop this condition. This study aims to provide a comprehensive analysis of the clinical presentation, etiological factors, and implications of hypertension in young adults, defined here as individuals aged 18–40 years.

Hypertension in young adults can be asymptomatic, making it challenging to diagnose early. When symptoms do occur, they are often nonspecific and can include headaches, dizziness, palpitations, fatigue, and visual disturbances. Unlike older patients who may present with organ damage or complications like stroke or myocardial infarction, young hypertensive patients often exhibit subtle clinical signs. Hypertension in young adults can result from a complex interplay of genetic, lifestyle, environmental, and secondary causes. Understanding these factors is crucial for effective prevention and management.

With this background, we conducted this research to study the clinical and etiological profile of hypertension in young patients.

In our study, the mean age of the study participants was found to be 34.38 ± 4.729 years with the minimum age of 18 and maximum age of 40. 63% of the study participants were males and 35% of the study participants were females. 18% of the study participants had complaints of headache, and 18% of the study participants had complaints of giddiness. Blurry vision was found in 9% followed by limb weakness in 7% and palpitation in 6%.

12% of the study participants had a history of smoking, 5% had a history of smoking and alcohol and 4% had history of alcohol. 97% of the study participants did not have a family history. Of the 3% with family history, 2 were from the mother's side and 1 was from father's side.

The mean height of the study participants was found to be 5.47 ± 0.32 ft. The mean weight of the study participants was found to be 63.29 ± 8.337 kg. The mean BMI of the study participants was found to be 22.765 ± 3.08 kg/m².

The mean SBP of the study participants was found to be 178.06 ± 14.112 mmHg. The mean DBP of the study participants was found to be 92.17 ± 11.441 mmHg.

The mean fasting blood sugar of the study participants was found to be 112.41 ± 31.51 mg/dL. The mean post-prandial blood sugar of the study participants was found to be 158.330 ± 46.4607 mg/dL. The mean HbA1c of the study participants was found to be $5.908 \pm 0.75\%$.

The mean total cholesterol of the study participants was found to be 176.096 ± 46.6461 mg/dL. The mean triglycerides of the study participants were found to be 155.001 ± 52.92 mg/dL. The mean low-density lipoprotein of the study participants was found to be 111.23 ± 39.171 mg/dL. The mean high-density lipoprotein of the study participants was found to be 33.85 ± 6.832 mg/dL.

The mean thyroid stimulating hormone of the study participants was found to be 4.15 ± 4.19 mIU/L. The mean T3 of the study participants was found to be 2.98 ± 1.13 . The mean T4 of the study participants was found to be 1.6876 ± 2.90853 .

The mean hemoglobin of the study participants was found to be 12.095 ± 2.6173 . The mean TLC of the study participants was found to be 8588.70 ± 3662.580 . The mean platelets of the study participants were found to be 2.5832 ± 0.95455 .

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found to be 3.9279 ± 0.5261 . The mean urine PCR of the study participants was found to be 0.2859 ± 0.5131 .

The mean Sodium (Na⁺) of the study participants was found to be 135.549 ± 12.7444 . The mean Potassium (K⁺) of the study participants was found to be 4.4145 ± 3.28023 . The mean chloride (Cl) of the study participants was found to be 103.121 ± 8.9456 .

There was nil urine albumin in 77% of study participants, 1+ in 14%, 2+ in 6%, and 3+ in 3% of the study participants. There was nil urine RBC in 86% of the study participants, 1+ in 10% and 2+ in 4% of the study participants.

The mean estimated glomerular filtration rate of the study participants was found to be 105.86 ± 51.874 . 59% of the study participants were found to have stage 1 CKD, 22% with Stage 2 CKD. Stage 3a and 3b CKD were found in 9% and 8% of the study participants, respectively. 2% of the study participants were found to have stage 4 CKD.

100% of the study participants had normal sinus rhythm, and 27% were found to have left ventricular hypertrophy in ECG. ST-T wave changes were found in 2% and T wave inversion at v4-v6 was found in 1% of the study participants. 46% of the study participants were found to have Concentric left ventricular hypertrophy in ECHO. Of the 52% of the study participants with Left ventricular diastolic dysfunction (LVDD) detected on ECHO, 46% had Grade 1 LVDD, 4% had Grade 2 LVDD and 2% had Grade 3 LVDD. The mean ejection fraction of the study participants was found to be 57.222 ± 9.9097 .

USG showed normal findings in 70% of the study participants. 27% had renal parenchymal disease and 2% had polycystic kidney disease. 1% had renal artery stenosis.

Fundus examination showed normal findings in 97% of the study participants. 3% had Grade 1 Hypertensive retinopathy changes, 2% had Non-proliferative diabetic retinopathy changes, 1% had Grade 2 hypertensive retinopathy changes and 1% showed mixed retinopathy changes.

Finally, in our study, the total incidence of secondary hypertension was 58% out of which 27% diagnosed with CKD, 15% diagnosed with hypothyroidism, 4% diagnosed with hyperthyroidism, 2% with thyrotoxicosis, 1% mixed CTD, 5% diagnosed with nephritic syndrome, 1% nephrotic syndrome, 1% polycystic kidney disease, 1% renal artery stenosis, and 1% diagnosed with scleroderma.

In young people, hypertension is a condition that is often ignored. Young people have a problem with underdiagnosed

Table 1: Symptoms

Symptoms	Frequency	Percentage
Headache	18	18.0
Giddiness	18	18.0
Blurry vision	9	9.0
Limb weakness	7	7.0
Palpitation	6	6.0
Edema	8	8.0

Table 2: Laboratory parameters

Laboratory parameters	Mean	Standard deviation
Blood UREA	25.2912	16.9697
Creatinine	1.1095	0.8018
Serum cortisol mcg/dL	17.1371	6.3727
Plasma renin	0.7282	0.1844
Urine metanephrines	29.5182	2.7590
Serum aldosterone	4.8818	1.5856
Serum uric acid	4.538	1.2361
Calcium	8.931	0.8329
Phosphorous	3.9279	0.5261
Urine PCR	0.2859	0.5131

PCR: Polymerase chain reaction

Table 3: Diagnosis

Diagnosis	Frequency	Percentage
Essential hypertension	42	42.0
CKD	27	27.0
Hyperthyroidism	4	4.0
Hypothyroidism	15	15.0
Thyrotoxicosis	2	2.0
Mixed CTD	1	1.0
Nephritic syndrome	5	5.0
Nephrotic syndrome	1	1.0
Polycystic kidney disease	1	1.0
Renal artery stenosis	1	1.0
Scleroderma	1	1.0

CKD: Chronic kidney disease, CTD: Connective tissue disease

hypertension. According to this study, compared to the general population, young people with hypertension had greater rates of obesity, dyslipidemia, smoking, and excessive salt intake. To avoid and effectively manage hypertension, addressing these variables is just as important as taking medication. They came to the conclusion that the study's results are promising since they suggest new directions for the management of hypertension and associated risk factors. To treat all elements of hypertension and related issues, particularly in young people, full implementation of the National Programme for Prevention and Control of Cancer, Diabetes, CVDs, and Stroke and other national or international level programs is required.

Limitations of the study

1. Sample size less.
2. Study is done in institution, so it cannot be generalized for all patients.

CONCLUSION

Early detection and effective management of hypertension in young adults are crucial to prevent long-term complications such as CVD, stroke, CKD, and premature mortality. Young hypertensive patients, particularly those with secondary causes, require ongoing monitoring and management to achieve optimal blood pressure control and reduce the risk of target organ damage.

Hypertension in young patients is a multifaceted condition with a distinct clinical and etiological profile compared to older populations. A thorough understanding of the contributing factors and appropriate diagnostic evaluation is essential for effective management. Lifestyle modifications remain the cornerstone of treatment, supplemented by pharmacotherapy when necessary. Early intervention and sustained management are vital to mitigating the long-term health consequences of hypertension in this demographic. Further research is needed to explore the genetic and molecular mechanisms underlying hypertension in young adults and to develop targeted therapies for improved outcomes.

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SRN- Concept and design of the study; prepared first draft of manuscript, interpreted the results; **MTR-** Reviewed the literature and manuscript preparation; **MTR-** Concept, coordination, review of literature and manuscript preparation; **AR-** Statistically analysed and interpreted, preparation of manuscript and revision of the manuscript.

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