

Research Article

# Clinical, biochemical and echocardiographic profile of young hypertensive patients

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## ABSTRACT

**Introduction:** Essential hypertension (idiopathic) and secondary hypertension (secondary to a recognized cause) are the two main categories of hypertension. Even in younger patients, about two-thirds of those with hypertension have essential hypertension. The term "young hypertension" refers to the start of the condition before the age of 45. <sup>6</sup> It is a major contributor to cardiovascular morbidity and death in the productive age group and is frequently asymptomatic at this age. Obesity, a positive family history, and a sedentary lifestyle are typical risk factors for hypertension.

**Aim:** to study clinical, biochemical and echocardiographic profile of the young hypertensive patients attending PES medical college

**Results:** The median age of the study participants was 30 years. Majority of the patients were male. Chronic Kidney disease was seen in 4 patients(6.25%). Mean Systolic blood pressure was 159 mm Hg (155, 163). Mean Diastolic blood pressure was 101 mm Hg (98.8 - 103). Abnormal ECG findings was seen in 35.9% i.e., 23 patients.

**Conclusion:** Majority had proteinuria. Among ECG findings Left ventricular hypertrophy was commonest followed by LBBB, Prolonged PR interval. Among Echocardiography findings, Diastolic dysfunction was common followed by Left Ventricular Hypertrophy, Left atrial enlargement. Hypertensive retinopathy was seen in more than half of study population

**Keywords:** Young hypertensives, Tertiary care hospital, Clinical, biochemical, Echocardiographic

## INTRODUCTION

Hypertension is a common non communicable disease affecting around 25% of the world's adult population. By 2025, the figure will amount to 1.56 billion people or 29% of the world's adult population. Studies from various parts of India have shown an increasing prevalence of hypertension.<sup>1</sup>

Increased prevalence of hypertension even among young adults. The prevalence of stage I hypertension or prehypertension in young age groups is more common than expected and it is gradually increasing over the years.<sup>2</sup> Long-established predisposing factors for hypertension in the general population are

increasing in prevalence in the younger population, such as physical inactivity, diabetes mellitus, and obesity certainly, but not completely, explain the increasing prevalence of hypertension in young adults.<sup>3</sup> Secondary hypertension has around 10% prevalence in the general hypertensive population but often requires a high index of suspicion and extensive investigations to diagnose it.<sup>4</sup> Secondary hypertension is defined as elevated blood pressure (BP), secondary to a known diagnosable etiology.<sup>5</sup> The term "young hypertension" refers to the start of the condition before the age of 45. <sup>6</sup> It is a major contributor to cardiovascular

morbidity and death in the productive age group and is frequently asymptomatic at this age. Obesity, a positive family history, and a sedentary lifestyle are typical risk factors for hypertension.<sup>7</sup> Since it has a low prevalence, it is not recommended to evaluate routinely each case of hypertension in view of the high cost-to-benefit ratio and is also time consuming.<sup>8</sup>

In India, hypertension is common, even in urban, rural, and tribal areas, according to several epidemiological research.<sup>9,10</sup> Nevertheless, a thorough review of the literature turned up no research describing the prevalence of hypertension in the general population. There are just a few research on the prevalence of hypertension from the Western population.<sup>11,12</sup> Current study aimed to study clinical, biochemical and echocardiographic profile of the young hypertensive patients attending PES medical college.

#### MATERIAL AND METHODS

Present study was Observational cross sectional study done in All Young hypertensive patients presented to the department of general medicine of the hospital. Sampling method was Purposive Sampling. Sample Size was 64 .The sample size is taken based on study previously done by sotonye Tamunobelesa Dodiya Manuel in 2022.<sup>13</sup>

Prevalence was 21%, Sample size calculation=  $3.96 \times P \times Q / L^2$ ,  $Q = 100 - P = 79$ ,  $L =$  absolute error, considering absolute error as 10%. Sample size comes 64.

#### Inclusion criteria:

1. Patients of both male & female genders presenting with hypertension, diagnosed between the ages of 18 and 40, attending the General Medicine department.
2. The cut off for hypertension as per the JNC 8 guidelines is taken as a SBP  $\geq 140$  & DBP  $\geq 90$ mmHG. This is to be the average of two readings.
3. Patients are may be newly diagnosed or already diagnosed

#### Exclusion criteria:

1. Subjects unwilling to give consent.
2. Pregnant women

#### Tools

Proforma includes age, gender, presenting complaints, past history, history of

medications, clinical examination and laboratory investigations. 12 lead ECG, Urine PCR, urine microalbuminuria, FBS, PPBS and HBA1C, Serum urea and creatinine, Total Cholesterol, Triglycerides, HDL, LDL, 2D Echocardiography and examination of fundus.

#### Methodology

Age, marital status, socio economic status, religion, use of tobacco, Alcohol consumption, salt consumption, Non veg consumption, use of social drugs, history of hypertension in family, family history of cardiovascular diseases , stress levels, duration of working hours, engagement in physical activities, History of hypertension & duration, drugs used for hypertension .

The BP was recorded after subjects had relaxed for a minimum of 5 minutes. Body Mass Index (BMI) was calculated as body weight in kilograms divided by the height squared in meters (kg/m<sup>2</sup>). BMI greater than 30kg/m<sup>2</sup> was considered obese.<sup>14</sup> Clinical examination and laboratory investigations, 12 lead electrocardiogram, echocardiogram and Renal artery Doppler was done according to standard protocol. To correlate etiological, clinical factors with biochemical and echocardiographic changes. Cardiovascular complications was assessed by correlating with 2D echo changes like left ventricular mass , left ventricular hypertrophy, left ventricular diastolic dysfunction, Ejection fraction.

#### Statistical analysis of data:

The data was entered into MS Excel 2007 version and further analyzed using SPSS, version 26.0 SPSS Inc.,Chicago IL,USA).

For descriptive analysis, the categorical variables was analyzed by using frequency and percentages and the continuous variables was analyzed by calculating mean  $\pm$  Standard Deviation. Appropriate graphs were included wherever necessary. P value at  $<0.05$  was considered as significant.

#### Measurement of physical activity and stress

**Physical activity:** WHO recommends physical activity should do at least 150 minutes of moderate-intensity physical activity throughout the week, or do at least 75 minutes of vigorous-intensity physical activity, or an equivalent combination of both.<sup>15</sup>

**Stress:** Stress was assessed by perceived stress scale<sup>16</sup>

## RESULTS

Table 1: Socio demographic profile

Demographic profile		Percentage
Median age(years)	30 years	
Male	36/ 64	56.25%
Rural residence	42/64	65.65

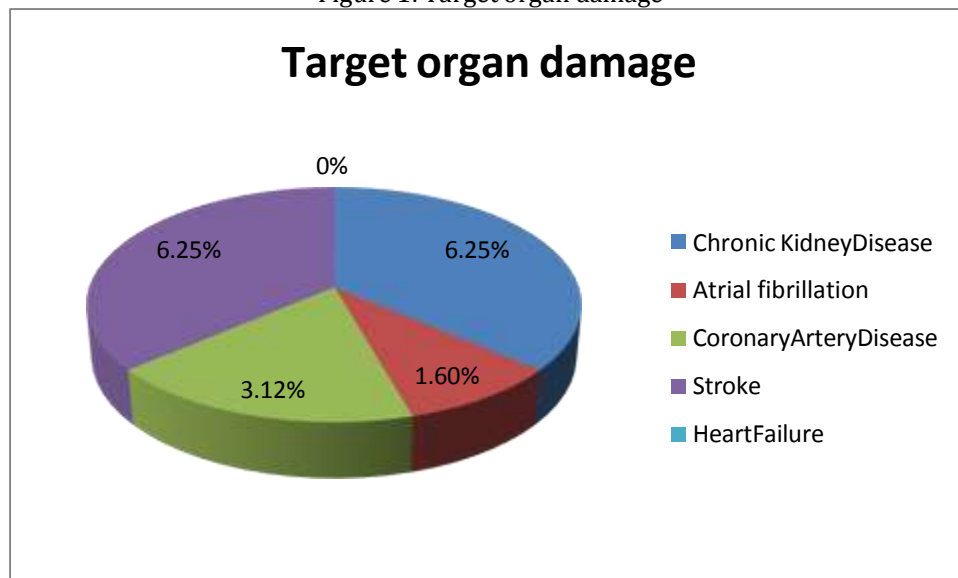
Table 2: Clinical profile

Parameter		
Diagnosis		
Primary	58	90.6%
Symptoms		
Asymptomatic	38	59.4%
Symptomatic	26	40.6%
• Dizziness	10	38.5%
• Headache	8	30.7%
• Epistaxis	2	7.7%
• Stroke	4	15.4%
• Palpitation	2	7.7%
Mean age at diagnosis	27 [25.9- 28.1] years	
Preexisting Diabetes	20	31.2%
Family history	26	40.6%
Stress present	16	25%
Sedentary lifestyle	15	23.4%
Salt intake Excess	41	64.1%
Smoking	18	28.1
Alcohol	22	34.4
Mean Height Mean $\pm$ SD	1.59 $\pm$ 0.05 meters	
Mean weight Mean $\pm$ SD	74.64 $\pm$ 10.62 Kgs	
Mean BMI Kg/M <sup>2</sup>	29.70 $\pm$ 4.09 Kg/M <sup>2</sup>	
Systolic blood pressure	159 $\pm$ 16.1 mmHg	
Diastolic blood pressure	101 $\pm$ 7.63 mmHg	

The median age of the study participants was 30 years. Majority of the patients were male i.e., 36, 56.25% and rural residents. Majority of them diagnosed with Primary hypertension i.e., 58, 90.6% while Secondary hypertension in 6 patients i.e., 9.4%. Among the 64 young hypertensive patients attending the hospital, 59.4% (38) are asymptomatic. Among the symptoms, Dizziness is the most common type of symptom among which patients presented i.e., 38.5%(10) followed by headache in 30.7%(8), stroke in 15.4%(4) and Epistaxis (7.7%), Palpitation(7.7%). Among study population, 40.6% (26) patients had history of hypertension in their family,

31.2% (20) patients were already suffering with Diabetes mellitus, 25% (16) patients were having stress. Among 16 patients, 52% were having severe stress, 31.25% had moderate stress and 18.75% had low stress levels according to Perceived Stress scale. 34.4% (22) patients were alcoholic, 28.1% (18) patients were having the habit of smoking currently. Mean SBP was 159 mm Hg (155, 163). Mean DBP was 101 (98.8 – 103), 50% patients were on CCB, 45.3% on ACEI, 3.1% were on beta blockers, 1.5% were on diuretics. In this study majority of the patients i.e., 64.1% were having excess salt intake in their diet

Figure 1: Target organ damage



Chronic Kidney disease was seen in 4 patients(6.25%), stroke in 4 patients (6.25%) and 1 patient(1.6%) with Atrial fibrillation. Thus out of 64 patients 11 patients (17.2%) had adverse outcome.

Table 3: Biochemical profile 1

Characteristics		N = 64
Proteinuria	No	56(87.5%)
	+	5(7.8%)
	++	2 (3.1%)
	+++	1(1.6%)
Hematuria	Microscopic	13(20.3%)
	Macroscopic	1(1.6%)
	No	50(78.1%)
UACr(mg/g)		25.4 [24, 26.8]
Normal < 30mg/g		56 (87.5%)
Abnormal >30mg/g		8(12.5%)

Table 4: Biochemical profile 2

Characteristics		N = 64
TotalCholesterol(mg/dL)		204[199,210]
Total Cholesterol	Normal<200	29(45.3%)
	Abnormal>=200	35(54.7%)
Triglycerides(mg/dL)		163[159, 168]
Triglycerides	Normal<150	26(40.6%)
	Abnormal>=150	38(59.4%)
HDLCholesterol(mg/dL)		43.1 [41, 45.1]
HDLCholesterol	Normal>=40	37(57.8%)
	Abnormal<40	27(42.2%)
LDLCholesterol(mg/dL)		117 [112, 122]
LDLCholesterol	Normal<100	25(39.1%)

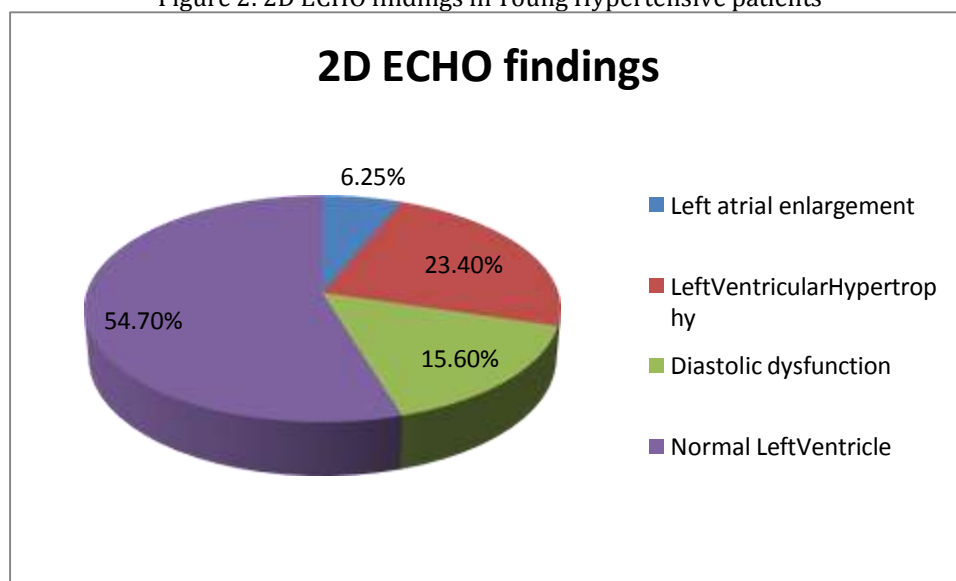
	Abnormal $\geq$ 100	39(60.9%)
VLDL Cholesterol (mg/dL)		45.3[42,48.7]
VLDL Cholesterol	Normal $<$ 30	19(29.7%)
	Abnormal $\geq$ 30	45(70.3%)
HBA1c(%) (n=64)		5.77 [5.57, 6.00]
HBA1c	Normal $<$ 5.7	33(51.6%)
	Pre-Diabetes 5.7 – 6.49	20(31.2%)
	Diabetes $>$ 6.5	11(17.2%)

Urine 1+ proteinuria was seen in 7.8% of patients, 2+ in 3.1% and 3+ in one patient (1.6%). Macroscopic hematuria was seen in one patient (1.6%) and microscopic hematuria in 20.3% of patients. Urine albumin Creatinine ratio which depicts the early sign of kidney dysfunction was also tested. Mean UACr was 25.4mg/g. UACr values ranged from 16 to 42 mg/g. Taking 30 mg/g as cut off value , 8 patients (12.5%) were having increased UACr values. Abnormal total cholesterol was seen in

54.7% (35). Abnormal Triglycerides was seen in 59.4%(38), HDL in 42.2%, LDL in 60.9% and VLDL in 70.3%.

Electrocardiography was done in all patients. Abnormal ECG findings was seen in 35.9% i.e., 23 patients. Among those with abnormal ECG findings, Left ventricular hypertrophy was common i.e., 10 patients, 15.6%(10/64), next was LBBB (5,7.8%), and Prolonged PR interval (5,7.8%) followed by Left atrial enlargement (3, 4.7%).

Figure 2: 2D ECHO findings in Young Hypertensive patients



2D ECHO findings showed that Normal left ventricle was seen in 54.7% of patients, while Diastolic dysfunction was seen in 15.6% of patients i.e., 10 cases, Left Ventricular Hypertrophy was seen in 23.4% of patients i.e., 15 cases and Left atrial enlargement in 6.25% of patients i.e., 4 cases. Majority of the patients i.e., in 31 cases, 48.44% had no hypertensive retinopathy. Grade I Retinopathy was seen in 23.44%, Grade II in 15.63% and Grade III was seen in 12.5% of the Young hypertensives.

## DISCUSSION

In the present study, The median age of the study participants was 30 years, majority were 26 - 33 years(37.5%). Similar observations were seen in studies by Muhammad Asif Iqbal et al<sup>17</sup> with  $29.62 \pm 6.55$  years, DeBeer et al<sup>18</sup> was  $24.6 \pm 2.98$ , Devi LS et al was  $30.6 \pm 3.8$ . Our study showed majority males similar to DeBeer et al<sup>18</sup> (51%), Devi LS et al(66.7%).<sup>19</sup> Majority of the patients were from rural area i.e., 42, 65.6%.

Majority of the study participants were diagnosed with Primary hypertension i.e., 58, 90.6%. Wang et al,<sup>20</sup> found that obstructive

sleep apnea accounted for 24.7% and primary aldosteronism (PA) 5.8% in young age HTN. In our study, Dizziness is the most common symptom in 38.5%. The young patients have been living with Hypertension mostly within one year i.e., 34, 53.1%. Muhammad Asif Iqbal et al, Newly diagnosed HTN was present in 34.4%, while 37.7% patients were having HTN of less than 2 years.<sup>17</sup>

In current study, 34.4% (22) patients were alcoholic. 28.1% (18) patients were having the habit of smoking currently and 25% (16) patients were having stress. 23.4% (15) patients were having sedentary lifestyle. In our study, 40.6% (26) patients had history of hypertension in their family, 31.2% (20) patients were already suffering with Diabetes mellitus.

In the study by Mousa M et al<sup>21</sup> 22% were smokers, 88% were nonsmokers. Devi LS et al<sup>19</sup> The 40% of were smokers. DeBeer et al,<sup>18</sup> 30% of the study population had history of smoking, Alcohol history was seen in 63%. In the study by Muhammad Asif Iqbal et al,<sup>17</sup> Family history was significant for HTN in 284 (59.2%) patients and Diabetes history was seen in 2.5% of the study population.

Mean Systolic blood pressure was 159 mm Hg (155, 163). Mean Diastolic blood pressure was 101 (98.8 – 103). In the study by Muhammad Asif Iqbal et al, Mean systolic blood pressure (SBP) was 159.30 mm Hg (130 – 250 mm Hg) and mean diastolic blood pressure (DBP) was 101.36 mm Hg (70 – 180 mm Hg).<sup>19</sup>

In the study by DeBeer et al,<sup>18</sup> Mean 24 hrs systolic blood pressure (SBP) was 132±7.29 mm Hg among hypertensives. hrs Dystolic blood pressure (DBP) was 77±5.49 mm Hg among hypertensives and 62±4.10 mm of Hg. Mousa M et al The baseline mean systolic BP was 149.5±24.9/ mean diastolic BP mean was 90.1±11.0.<sup>21</sup>

Chronic Kidney disease was seen in 4 patients (6.25%), stroke in 4 patients (6.25%). Devi LS et al hypertension-related target organ damage in the form of cardiac and renal involvement was seen in 33.3% and 26.7% of patients, respectively.<sup>19</sup>

Proteinuria was not seen in 87.5% of patients, Urine + proteinuria was seen in 7.8% of patients, ++ in 3.1% and +++ in one patient (1.6%). Macroscopic hematuria was seen in one patient (1.6%) and microscopic hematuria in 20.3% of patients. Mean Total cholesterol was 204 [199± 210]. Mean Triglycerides was 163 [159±168]. Mean High density lipoproteins was 43.1 [41± 45.1]. Mean low

density lipoprotein was 117 [112±122]. Mean very low density lipoprotein was 45.3 [42± 48.7].

In the study by Muhammad Asif Iqbal et al, Mean cholesterol was 169 ± 40.26 mg/dl.<sup>17</sup> DeBeer et al, Mean Total cholesterol was 3.63(1.99;5.82) mmol/L among hypertensives, Mean Triglycerides was 0.81(0.36;2.71, Mean LDLcholesterol was 2.27(0.98;4.32), Mean HDLcholesterol was 0.98(0.46;1.84).<sup>18</sup>

In present study, Abnormal ECG findings was seen in 35.9% i.e., 23 patients. Left ventricular hypertrophy was common i.e., 10 patients. In the study by Saito et al<sup>22</sup> 388 patients with hypertension had abnormal LV geometry (31% concentric LVH, 22% eccentric LVH, 47% concentric remodeling).

Mousa M et al<sup>21</sup> PACS ranged from 7 to 25 with a mean 17.38±4.67, E wave ranged from 0.4 m/s to 1.02 m/s with a mean 0.68±0.17, A wave ranged from 0.59 m/s to 1.08 m/s with a mean 0.82±0.12, E/A wave ranged from 0.57 to 1.19 with a mean 0.83±0.16, E/e' ranged from 6.21 to 10 with a mean 8.8±0.93.

## CONCLUSION

In the current study majority were males and belong to the age group of 26-33 years. Majority had primary hypertension and dizziness was the most common symptom. Among ECG findings Left ventricular hypertrophy was commonest followed by LBBB, Prolonged PR interval. Among Echocardiography findings Left Ventricular Hypertrophy was common followed by Diastolic dysfunction, Left atrial enlargement. Hypertensive retinopathy was seen in more than half of the study population.

## REFERENCES

1. Gupta R, Xavier D. Hypertension: The most important non communicable disease risk factor in India. Indian Heart J 2018;70:565-72.
2. Muntner P, He J, Cutler JA, Wildman RP, Whelton PK. Trends in blood pressure among children and adolescents. JAMA 2004;291:2107-13.
3. Anderssen N, Jacobs DR Jr., Sidney S, Bild DE, Sternfeld B, Slattery ML, et al. Change and secular trends in physical activity patterns in young adults: A seven-year longitudinal follow-up in the coronary artery risk development in young adults study (CARDIA). Am J Epidemiol 1996;143:351-62.
4. Rossi GP, Bisogni V, Rossitto G, Maiolino G, Cesari M, Zhu R, et al. Practice

- recommendations for diagnosis and treatment of the most common forms of secondary hypertension. *High Blood Press Cardiovasc Prev* 2020;27:547-60.
5. Rimoldi SF, Scherrer U, Messerli FH. Secondary arterial hypertension: When, who, and how to screen? *Eur Heart J* 2014;35:1245-54.
6. Gan SK, Loh CY, Seet B. Hypertension in young adults-an under-estimated problem. *Singapore Med J*. 2003;44:448-452.
7. Padmavati S. Prevention of heart disease in India in the 21st century: need for a concerted effort. *Indian Heart J*. 2002;54:99-102.
8. Ott C, Schneider MP, Schmieder RE. Ruling out secondary causes of hypertension. *EuroIntervention* 2013;9 Suppl R: R21-8.
9. Yadav S, Boddula R, Genitta G, et al. Prevalence & risk factors of prehypertension & hypertension in an affluent north Indian population. *Indian J Med Res*. 2008;128:712-720.
10. Kinra S, Bowen LJ, Lyngdoh T, et al. Sociodemographic patterning of noncommunicable disease risk factors in rural India: a cross sectional study. *BMJ*. 2010;341:c4974.
11. Lacruz ME, Kluttig A, Hartwig S, et al. Prevalence and incidence of hypertension in the general adult population: results of the CARLA-cohort study. *Med (Baltimore)*. 2015;94:e952.
12. Pereira M, Lunet N, Paulo C, Severo M, Azevedo A, Barros H. Incidence of hypertension in a prospective cohort study of adults from Porto, Portugal. *BMC Cardiovasc Disord*. 2012;12:114.
13. Sotonye Tamunobelema Dodiya Manuel & Ofori S (2022). Hypertension in the Young Adults. *Saudi J Med*, 7(11): 598-602.
14. Chobanian AV, Bakris GL, Black HR. The Seventh report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of high blood pressure; The JNC 7 report. *JAMA* 2003;289:2560-72.
15. WHO. (2024)Physical activity / Being physically active helps all people, no matter their age, lead healthier lives. <https://www.who.int/initiatives/behea/physical-activity>
16. Cohen, S., & Williamson, G. (1988). Perceived stress in a probability sample of the United States. In S. Spacapan & S. Oskamp (Eds.), *The social psychology of health: Claremont Symposium on applied social psychology*. Newbury Park, CA: Sage
17. Muhammad Asif Iqbal, Muhammad Adil, Ayesha Khalil, Zair Hassan, Noor Faraz, Marina Khan. Profile and etiology of hypertensive patients at young age in Pakistani Population. *Rawal Medical Journal: Vol. 47, No. 4, Oct-Dec 2022. Pg:872-875*
18. DeBeer, D., Mels, C. M. C., Schutte, A. E., Delles, C., Mary, S., Mullen, W., Latosinska, A., Mischak, H., & Kruger, R. (2023). Identifying a urinary peptidomics profile for hypertension in young adults: The African-PREDICT study. *Proteomics*, 23, e2200444. <https://doi.org/10.1002/pmic.202200444>
19. Devi LS, Bansal N, Singhal A, Shekhawat VS, Nachankar A. Cross-sectional study of hypertension in young: A tertiary care center experience. *J Mar Med Soc* 0;0:0.
20. Wang L, Li N, Yao X, Chang G, Zhang D, Heizhati M, Wang M, et al. Detection of Secondary Causes and Coexisting Diseases in Hypertensive Patients: OSA and PA Are the Common Causes Associated with Hypertension. *Biomed Res Intl* 2017;2017:8295010.
21. Mousa M, Salam ZA, ElSawye M, Omran A, Aly K. Effect of blood pressure control on left atrial function assessed by 2D Echocardiography in newly diagnosed patients with systemic hypertension. *Int J Cardiovasc Acad* 2024;10(4):102-114
22. Saito M, Khan F, Stoklosa T, Iannaccone A, Negishi K, Marwick TH. Prognostic implications of LV strain risk score in asymptomatic patients with hypertensive heart disease. *JACC Cardiovasc Imaging*. 2016;9(8):911-21. <https://doi.org/10.1016/j.jcmg.2015.09.027>.