

## Study of Prevalence of Left-Atrial Enlargement among the Patients with Hypertension

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### Abstract

### Original Research Article

**Background:** Previous studies have shown a link between Left atrial enlargement (LAE) with the increase in the risk of stroke and cardiovascular diseases (CVD). Indian data is lacking on the exact prevalence of LAE. **Aims and Objectives:** To study the prevalence of LAE and its associated risk factors. **Materials and Methods:** Hundred patients having were studied in the Department of Medicine, Gandhi Medical College and Hamidia Hospital, Bhopal. After a complete physical examination, echocardiogram was performed in all the patients. In present study LAE is defined if the LA diameter is more than 4.0 cm in men and 3.8 cm in women. We performed multivariable logistic regression analysis to identify risk factors for LAE. **Results:** Prevalence of LAE was 8%. The prevalence of LAE was higher in men (9.37%). On multivariable logistic regression analysis advancing age (OR:1.034), increased systolic blood pressure (SBP) (OR: 2.862), increased diastolic blood pressure (DBP) (OR: 1.32), abnormally high BMI (OR: 3.721), increased prevalence of diabetes (OR: 1.245), increased left ventricular myocardial index (LVMI) (OR: 1.023), and decreased left ventricular ejection fraction (LVEF), decreased heart rate (HR), and decreased estimated glomerular filtration rate (eGFR) were found to be the major risk factors of LAE. **Conclusion:** A significant number of patients had LAE. Among the risk factors advancing age, increased SBP, increased BMI, presence of diabetes mellitus, increased LVMI, decreased eGFR, decreased LVEF, and decreased HR were more common.

**Keywords:** Cardiovascular diseases, Left atrial enlargement, systolic blood pressure, regression analysis change in.

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## INTRODUCTION

Previous studies have proved that there is an increased risk of cardiovascular disease (CVD) with the left ventricular structure and function [1-3]. Recent studies have confirmed the association of left atrial enlargement (LAE) with stroke and CVD [4, 5]. Many studies have found LAE to be more sensitive indicator for the developing CVD [6, 7].

It becomes very important to evaluate the prevalence and associated risk factors for the LAE. In India there are limited studies evaluating the prevalence and associated risk factors of LAE.

Echocardiographically measurement of left atrial dimensions can provide the real prevalence of patients having LAE. As the left atrium enlarges equally in all diameters [8] any one diameter is a reliable reflection of left atrial enlargement. Several previous

studies have found a significant correlation between the left atrial size i.e. diameter, measured by echocardiography and angiography [9, 10].

Hence present study is planned to investigate the prevalence of LAE in our tertiary care centre using echocardiographic examination and to explore independent risk factors of LAE.

## MATERIALS AND METHODS

Present prospective study was performed on 100 patients who visited the Department of Medicine, Gandhi Medical Collage for the echocardiography for any cause.

After a detailed demography including age, sex, height, weight, diabetes mellitus and Current smoking and drinking habit, a detailed laboratory investigations were performed including SBP (mmHg),

DBP (mmHg), HR (bets /minuts), HDL-C (mg/dl), LDL-C (mg/dl), TG (mg/dl), TC (mg/dl), eGFR (mL/min/1.73 m<sup>2</sup>), Haemoglobin (g/L), LVDd (cm), IVST (cm), PWT (cm), LVMI (g/m<sup>2</sup>), LVEF (%) and E/A for all the patients.

All the data analysis was performed using IBM SPSS ver. 20 software. Quantitative data is expressed as mean and standard deviation whereas categorical data is expressed as percentage. Descriptive analysis was performed for the baseline details. Multivariable logistic regression analysis was performed to find out the odds ratio of each variables. P value of <0.05 is considered as significant.

## RESULTS

Patient baseline characteristics are shown in Table-1. A total of 100 participants (68 women and 32 men) were included in the study. The mean age was 56.54 years.

The overall prevalence of LAE was 8%. The prevalence of LAE was 7.53 % in women and 9.37 % in men.

**Table-1: Baseline characteristic of the patients**

Parameters	LAE (n=8)
Age (years)	56.54 ± 11.42
Current smoking	37.5%
Current drinking	25%
SBP (mmHg)	152.23 ± 22.43
DBP (mmHg)	82.68 ± 10.52
HR (bets /minuts)	72.23 ± 8.90
BMI (Kg/m <sup>2</sup> )	27.65 ± 2.45
Diabetes mellitus	25%
HDL-C (mg/dl)	48.34 ± 6.32
LDL-C (mg/dl)	119.34 ± 12.85
TG (mg/dl)	167.89 ± 21.42
TC (mg/dl)	208.04 ± 24.11
eGFR (mL/min/1.73 m <sup>2</sup> )	88.02 ± 18.51
Haemoglobin (g/L)	138.28 ± 24.50
LVDd (cm)	5.07 ± 0.55
IVST (cm)	1.01 ± 0.38
PWT (cm)	0.96 ± 0.36
LVMI (g/m <sup>2</sup> )	110.44 ± 87.80
LVEF (%)	61.33 ± 4.77
E/A	0.91 ± 0.74

**Table-2: Multivariable logistic regression analysis of risk factors related to left atrial enlargement**

Parameters	LAE	P value
Gender	1.348 (1.023–1.447)	0.049
Age (years)	1.034 (1.025–1.038)	0.002
Current smoking	0.861 (0.527–0.928)	0.001
Current drinking	1.264 (1.021–1.71)	0.036
SBP ≥140	2.862 (1.682–2.988)	<0.001
DBP ≥80	1.32 (1.068–1.623)	0.022
HR (bets /minuts)	0.998 (0.967–0.998)	<0.001
BMI ≥30	3.721 (3.216–4.678)	<0.001
Diabetes mellitus	1.245 (1.04–1.988)	<0.001
TG (mg/dl)	0.876 (0.867–1.281)	0.423
TC (mg/dl)	1.121 (0.989–1.683)	0.442
eGFR (mL/min/1.73 m <sup>2</sup> )	0.968 (0.946–0.998)	0.002
Anemia	1.124 (0.989–1.682)	0.058
LVMI	1.023 (1.001–1.043)	<0.001
LVEF	0.884 (0.786–0.946)	<0.001
E/A	0.882 (0.723–1.143)	0.228

## DISCUSSION

The overall prevalence of LAE was 8%. The prevalence of LAE was 7.53 % in women and 9.37 % in men. In agreement to present study a study from China including 11,956 subjects aged ≥35 years reported that the overall prevalence of LAE was 6.43 % for subjects aged over 35 years. The prevalence of LAE was 6.78 % in women and 6.02 % in men [11].

Another study from Poland reported the high prevalence (15.7 %) of LAE when cut off of LA diameter in an urban population of Poland was used. As for the indexed LA diameter, the prevalence was 8.8% [1].

In present study we found that advancing age and female sex were significantly associated with LAE

which is line with the previous studies [13, 14]. Possible reasons for increasing the prevalence with advancing age may be due to valvular degeneration, cardiac systolic or diastolic dysfunction, hypertension.

In our series, high SBP was significantly associated with LAE. In agreement to present study previous study by Stritzke *et al.*, also found that LA pressure load in hypertensive individuals resulted in an increase in LA size [15].

Furthermore, in our series it was found that presence of diabetes mellitus and lower eGFR were found to be significant predictor of LAE in the general population. This is in line with the previous study done by Cuspidi *et al.*, and Hirst *et al.*, [16, 17].

Previous studies confirmed that higher LVMI was associated with left atrial size [16, 18]. Present study is the affirmation for the findings of these studies. Appleton et al showed that increased LVMI was related to increased LV stiffness and increase in LV filling pressure, which leads to LA enlargement [13].

Small sample size and cross sectional nature are the main limitations of the present study. A large randomized clinical trial is needed to provide strength to present study findings.

## CONCLUSION

In our population we found that the prevalence of LAE not as high as that in European and American countries. No significance difference in prevalence was found between both the sexes. Advancing age, high SBP, high DBP, high BMI, high prevalence of diabetes, high LVMI, and lower LVEF, lower heart rate, and lower eGFR were found to be the major risk factors of LAE.

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