## Research Article

# Clinical and echo cardiographic profile of aortic valve stenosis in patients of north Kerala

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**ABSTRACT**

**Background:** An increase in the number of ageing population has led to a rise in the incidence of aortic stenosis. The study aims to analyze the clinical profile, echocardiographic features and common associations of aortic valve stenosis in patients of north Kerala.
**Methods:** This study included 73 adult patients with clinical manifestation and echocardiographic evidence of aortic stenosis, who attended the department of general medicine in a tertiary care centre, Kerala, south India over a period of one year.
**Results:** 63% of patients were males and 58% of patients were between 50 to 60 years. 85% had severe aortic stenosis, 43% were hypertensive and 20% were diabetic. 12% had ischemic heart disease. Rheumatic heart disease was seen in about 7% of patients. On analysing LV dimensions it was found that females have lower LV volumes when compared to males. Females had low ejection fraction and higher peak gradients. About 20% had bicuspid aortic valves.
**Conclusions:** Age, gender, smoking, hypertension and diabetes had no statistically significant association with severity of aortic stenosis in this population. Aortic stenosis due to Rheumatic etiology and that due to bicuspid valve presented at an early age. Adaptive mechanisms to aortic stenosis may be different in two sexes.

**Keywords:** Aortic stenosis, Atherosclerosis, Hypertension, Aortic sclerosis

## INTRODUCTION

Aortic stenosis is obstruction to outflow of blood from the left ventricle to aorta. Blood flow to the left ventricle is decreased in patients with stenotic aortic valves because the pressure in the left ventricle must be much higher than that in aorta to eject blood.

Consequently, the coronary vessels are severely compressed during systole. Patients with aortic stenosis are particularly prone to develop symptoms of myocardial ischemia, in part because of this compression and in part because myocardium requires more oxygen to expel blood through the stenotic aortic valve.[1]

An increase in the number of ageing population has led to a rise in the incidence of aortic stenosis. Calcific aortic valve disease is an active disease process akin to atherosclerosis with lipoprotein deposition, chronic inflammation and active leaflet calcification.[2] Natural history studies of aortic stenosis document low mortality rates in patients who remain symptom free.

Presence of symptoms is the strongest predictor of adverse outcome in patient with moderate to severe aortic stenosis. In a study of symptomatic patients with severe stenosis who refused surgery average survival was only 2 year and 5 year survival was less than 20%.

In another study of more than 2000 patients with aortic sclerosis the average time for progression of aortic sclerosis to diagnosis of severe aortic stenosis was 8 years.[3] Age related calcific bicuspid or trileaflet aortic stenosis is the most common cause of aortic stenosis in adults.

In a population based echo cardiographic study 2% of persons 65 years of age or older had frank calcific aortic stenosis and 29% had aortic sclerosis.

Aortic sclerosis is the initial stage of calcification and associated with a 50% increased risk of cardiovascular death and myocardial infarction.[4] Age corrected survival following aortic valve replacement in patients with true aortic stenosis is same as that of normal population.

Most of the studies about aortic stenosis are from western countries and extrapolation of these data to developing countries may be inappropriate. There are only few studies on etiological and Echocardiographic features of aortic stenosis from India.

## METHODS

Adult patients with clinical manifestations and echocardiographic evidence of aortic valve stenosis attending Department Of Medicine in a tertiary care centre at Kerala, South India over a period of one year were included in the study after informed consent.

All cases of aortic valve stenosis irrespective of etiology were studied. Those patients with more than mild involvement of other valves were excluded from this study.

Severe aortic stenosis was taken as peak systolic gradient exceeding 50 mmhg in the presence of normal cardiac output.

Left ventricular hypertrophy was determined by Sokolow-Lyon index, from ECG. Echo wise Left ventricular hypertrophy was determined by calculating relative wall thickness.

All the 73 patients were subjected to detailed history with special attention given to symptoms of aortic stenosis. A thorough clinical examination of the cardiovascular system to assess severity of aortic stenosis was done.

Routine lab investigations including lipid profile, blood sugar level, and ECG, ChestXray, echo cardiography were also done.

## RESULTS

Out of 73 patients 46 were males. The mean age of study group was 49. Most patients with severe aortic stenosis were between 50 and 60 years of age.

43% of patients were hypertensive. 20% had diabetes mellitus.7% of patients had rheumatic fever. 42% of patients were smokers. 5% of the patients had stroke.79% patients belonged to low socio-economic background. Only 4% of patients were vegetarians.

**Table 1: Age wise & gender wise distribution of patients with aortic stenosis.**

| Age | Males | | Females | | Total |
|-----|-------|---|---------|---|-------|
| | Number | % | Number | % | |
| <20 | 3 | 4.1 | 2 | 2.7 | 5 |
| 20-30 | 3 | 4.1 | 3 | 4.1 | 6 |
| 30-40 | 5 | 6.8 | 1 | 1.3 | 6 |
| 40-50 | 4 | 5.4 | 9 | 12.32 | 13 |
| 50-60 | 17 | 23.2 | 3 | 4.1 | 20 |
| 60-70 | 9 | 12.32 | 6 | 8.2 | 15 |
| >70 | 5 | 6.8 | 3 | 4.1 | 8 |
| Total | 46 | 63 | 27 | 37 | 73 |
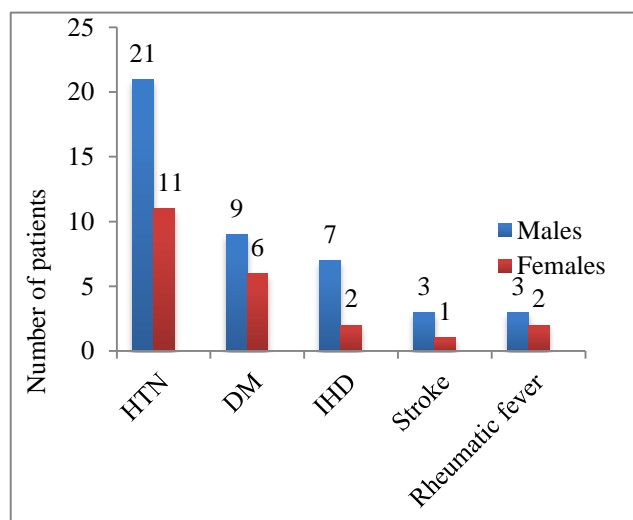


HTN – Hypertension; DM-Diabetes Mellitus; IHD-Ischemic Heart Disease

**Figure 1: Age wise & gender wise distribution of patients with aortic stenosis.**

Most common symptom was exertional fatigue in about84%. On physical examination most common finding was decreased carotid pulse amplitude.

**Table 2: Etiology of aortic stenosis in total study group echowise.**

| Etiology | Number | Male | Female |
|----------|--------|------|--------|
| Degenerative | 53 | 38 | 15 |
| Bicuspid | 14 | 8 | 6 |
| Rheumatic | 6 | 2 | 4 |

Most common ECG finding was LVH in 75% of patients. 10% had normal ECG. Most of the patients had

degenerative valve diseases. Bicuspid valve was seen in 19% patients.
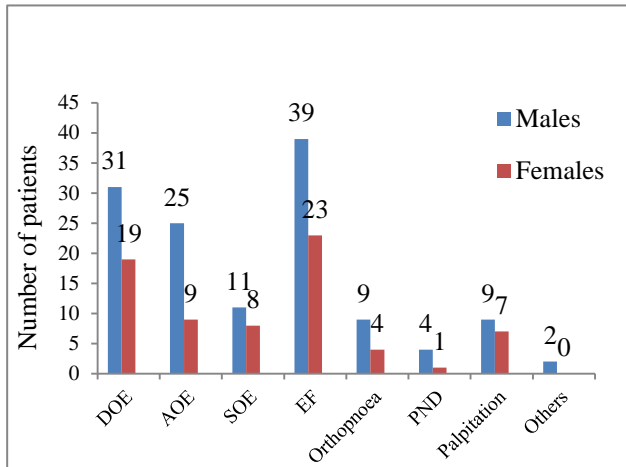


DOE - Dyspnoea on exertion; AOE - Angina on exertion; SOE - Syncope on exertion; EF-Exertional fatigue; PND - Paroxysmal nocturnal dyspnoea

**Figure 2: Etiology of aortic stenosis in total study group echowise.**

Mean total cholesterol in the study group was 187 mg/dl. Mean LDL was 120 mg/dl.

On analysing Left ventricular dimensions Left ventricular internal dimension in diastole was 46.9 mm in males and 42.4 mm in females, LV internal dimension in systole was 30.8 mm in males and 28.6 mm in females.

Interventricular septal dimension was 15.6 mm in males and 12.6 mm in females. Posterior wall dimension in diastole was 13.5 mm in males and 12.2 mm in females.

Ejection fraction was 67% in males and 70% in females. Peak gradient was 88.06 mmHg in males and 95.5 mmHg in females.

Peak velocity was found to be 4.5 m/sec in males were as in females it was 4.7 m/sec. Both ejection fraction and peak gradient was high in females.

Mean BMI of patients in this study was 22.7.

**DISCUSSION**

On analysing the clinical profile of the 73 patients included in this study 63% were males and 58% were above 50 years of age. Mean age in this study group was 49.7 years, in a study by Agozzino and Associates in 1992, of 612 patients mean age was 47 years.

Unlike the cardiovascular health study by Stewart BF et al where age and male sex were found to be independent predictors of aortic stenosis in this study no significant association was found between age or male sex on the severity of aortic stenosis.[6]

On analysing the association of co-morbid illness and aortic stenosis it was found that 43% had hypertension and 20% were diabetics, 12% had Ischemic heart disease and 6.8% had Rheumatic heart disease.

Unlike the cardiovascular health study there were no statistically significant association between hypertension and severity of aortic stenosis in this study.

Studies have shown that in hypertensive patients symptoms developed at an earlier stage of disease, so hypertension in such patients should be treated aggressively. In this study complete heart block and LBBB was found only in patient with hypertension.

In patients with rheumatic heart disease and aortic stenosis, the mean age of presentation was 32 years, which was consistent with the study by G. Vijayaraghavan et al, who observed that patients in India developing aortic stenosis after rheumatic fever do so early in the natural history of the disease.[7]

In this study diabetes had no significant association with severity of disease. 42% were smokers. In various studies including cardiovascular health study it was found that smoking is an independent risk factor and it increase the disease progression. But no significant association between smoking and severity of stenosis was found in this study.

Exertional fatigue was the most common presenting symptom in this study. 70% of patient with severe aortic stenosis had LVH with strain in ECG. Echo wise LVH was found in 53 where as it was found in 55 patients according to ECG criteria.

When peak gradient and LVH in ECG was compared it was found that LVH in ECG correlated with mean peak aortic gradient of 45mmHg, unlike the conclusion by Mohammed Hafizullah from PGI, were LVH correlated with mean peak gradient of 74mmHg.

Cholesterol levels had no statistically significant association with severe stenosis in this study, which was similar to the observation of Bellamy MF in 2002.[8]

There was no statistically significant association with age, gender, hypertension or diabetes mellitus with aortic stenosis in the study similar to the findings by Hoagland and colleagues.[9]

Mean body mass index of patient in this study was only 22.74. Studies by Mautner GC, and Gottdiener JS et al, had shown that BMI of >29 is an independent predictor of aortic stenosis.[10]

It was found that females with aortic stenosis had lower LV volumes and greater ejection fraction, suggests that adaptive mechanisms to aortic stenosis may be different in the two sexes.

Regarding type of valves 19% had Bicuspid valves and mean age of presentation of these patients were 30 years and in those with tricuspid valve was it 55.5 years.

## CONCLUSION

The present study of aortic stenosis shows that age, gender, hypertension, diabetes, high body mass index and dyslipidemia had no statistically significant association with severity of aortic stenosis.

Aortic stenosis of rheumatic etiology and that due to bicuspid valve presented at an early age. Exertional fatigue was the most common symptom and decreased carotid amplitude was the most common clinical finding in patients with severe aortic stenosis.

Females had lower LV dimensions. Ejection fraction and peak gradient were higher in females. Adaptive mechanism to aortic stenosis may be different in males and females according to the study.

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