

# An Observational Study Showing Incidence of Heart Disease in the Male Population from North India

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## ABSTRACT

**Background:** Structural Heart Disease (SHD) is a preventable cause of mortality. As age advances the morbidity rates due to SHD increases. SHD is more common in rural areas and lower socio-economic status because of poor hygiene and poor nutrition. The aim of this study was to find the incidence of heart disease in a male north Indian population. **Method:** A team consisting of three doctors examined all the candidates presenting over a period of one and a half years for enrollment at a particular Centre. The age group of this population was between 18 years to 22 years. All candidates underwent medical examination. Candidates having suspicion of SHD were referred to the physician/cardiologist. All those persons whose disability was within permissible limits were taken as fit and the others were taken as unfit. **Results:** Total 4223 candidates reported in the above period. 334 candidates who had disabilities were lost to follow-up and excluded, leaving a total of 3889 candidates. After specialist review, 1471 candidates were found unfit for various causes, out of which 283 were for cardiac murmurs. Many candidates were found to be suffering from multiples disabilities. **Conclusion:** Our study found an incidence rate of 72.7 per thousand which is much higher than that of other studies. The possible reasons for this could be that the persons are primarily from rural background and low socioeconomic strata which have a comparatively incidence of SHDs. Also contributing to the higher incidence may be the fact of stricter application of physical standards for enrollment in the army.

**Key Words:** Cardiac Murmurs, Socio-economic status, Structural Heart Disease.

## INTRODUCTION

It has been known from a long time that heart disease is a silent killer and Structural Heart Disease (SHD) is a preventable cause of mortality. As age advances the morbidity rates due to SHD increases as various studies have shown.

As far back as 1975 Griffiths RA & Sheldon MG<sup>[1]</sup> did a study on the clinical significance of systolic murmurs in the elderly to correlate the prevalence of systolic murmurs to age, sex, cardiac failure, ischaemic heart disease, dysrhythmias, hypertension, peripheral vascular disease and anaemia and they found that "The prevalence of systolic murmurs increased with age from 32 per cent at 60-64 years to 57 per cent over 85 years, and was greater in females (44 per cent) than in males (34 per cent). The presence of systolic murmurs was related to the presence of cardiac failure, ischaemic heart disease, dysrhythmias, hypertension, peripheral vascular disease and anemia.

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Only 8 per cent of patients with systolic murmurs had none of the above-mentioned six cardiovascular abnormalities compared with 36 per cent of patients

without such a murmur, while multiple cardiovascular abnormalities were also commoner in the former group. The mortality rate in hospital was similar for patients with or without a systolic murmur."

Many more studies have corroborated their findings. Dey DK, Sundh V, Steen B<sup>[2]</sup> in 2004 in a 15-year longitudinal population study of 70-year-olds have found that among subjects with systolic murmurs the prevalence of coronary heart disease (CHD) and hypertension was significantly higher in both sexes and congestive heart failure (CHF) in females only. They concluded that there is a significant positive association of cardiovascular diseases with systolic murmurs in the elderly. The increased risk for mortality due to the presence of systolic murmur at age 70 is mediated through cardiovascular diseases. A 35 year follow-up study by Bodegard J et al<sup>[3]</sup> on 2014 Norwegian men was done to determine whether a low-grade systolic murmur, found at heart auscultation, in middle-aged healthy men influences the long-term risk of aortic valve replacement (AVR) and death from cardiovascular disease (CVD). They have found that low-grade systolic murmur was detected at heart auscultation in 21.9% of apparently healthy middle-aged men. Men with low-grade murmur had an increased risk of AVR, but no increase in risk of CVD death. Only 1.6% of men had moderate-grade murmur; these men had a very high risk of AVR and a 1.5-fold albeit non-significant increase in risk of CVD death.

Moreover, structural heart disease is more common in rural population and in persons of lower socio-economic status because of poor hygiene and poor nutrition there is more incidence of structural heart disease.

Refat M et al<sup>[4]</sup> earlier in a 1994 study among Egyptian schoolchildren found the proportion of illiterate, unskilled, and heavy smoking fathers was higher in the patient groups with RHD and CHD. Family income was lowest in the RHD group, while increased crowding index and low whole social environment were significantly related to both RHD and CHD

More recently Ba-Saddik IA<sup>[5]</sup> et al in a study among schoolchildren in Yemen found that children with RHD were more likely to be from low-income families with poor housing and greater overcrowding (49.3%, 39.3% and 64.8%) than children with CHD (44.8%, 32.8% and 48.3%, respectively).

Since in India most of the persons reporting for recruitment as soldiers come from lower socio-economic class this observational study was done to see the incidence of SHD in them and compare the incidence with other populations. The aim of this study was to find the incidence of heart disease in a male north Indian population so as to create a sample database. The scope of this study was limited to heart disease.

## MATERIAL AND METHODS

All the candidates presenting over a period of one and a half years for enrollment in the defense forces were included for this study. The age group of this population was between 18 years to 22 years as this is the age limit for enrollment in the defense forces. This sample age group was considered ideal for this study as any incident of structural heart disease would have stabilized by this age.

A doctor subjected all the candidates to medical examination, and any disability noted. All candidates having any disability were referred to the concerned specialist for confirmation of the disability. Any candidate who did not report for review to the concerned specialist for confirmation of his disability was taken as absent and removed from the study. All those persons who disability was adjudged by the concerned specialist as being within permissible limits were taken as fit and the others whose disabilities were beyond permissible limits were taken as unfit.

## RESULTS

A total of 4223 candidates reported for medical examination in the above period. Out of this a total of 334 candidates who had disabilities did not report to the specialists concerned and were removed from the study, leaving a total of 3889 candidates. After specialist review, 1471 candidates were found unfit for various causes, out of which 283 were for cardiac murmurs. Many candidates were found to be suffering from multiples disabilities.

Total Candidates	3889
Unfit candidates	1471
Unfit candidates with cardiac murmurs	283
Percent of unfit candidates	37.82 %
Percent of unfit candidates with cardiac murmurs	7.27 %
Cardiac murmurs as percent of Total unfit	19.24 %

## DISCUSSION

Army personnel have to undergo a lot of physical and mental stress and strain during their routine duties, much more than in civil life. Army, therefore, conducts a very stringent medical examination for candidates who desire to join the armed forces firstly because they have to be physically fit in order to bear the stress and secondly because even comparatively minor disability may be exacerbated under the stress of army training.

Cardiac murmurs may be innocent or pathological. However even if 'innocent' they may be a marker for future problems as found by Gulati G & Bodegard J<sup>[6]</sup> at the Institutt for klinisk epidemiologi, Akershus universitetssykehus, in Norway had carried in a study on "(Long term prognosis in relation to the presence of systolic heart murmurs in healthy middle-aged men- Article in Norwegian)" They had studied during 1972-75, a cohort of 2014 apparently healthy men (40-59 years) in Oslo, Norway. They had undergone heart auscultation under standardized conditions. Systolic murmurs were graded from I to VI. The men were prospectively followed up for 21.5 years in order to study the frequency of aortic valve operations, myocardial infarctions and coronary bypass operations. Results: Modest systolic murmurs (grade I-II, n = 441) were associated with an unadjusted relative risk of 5.4 (95% CI 2.1-14.0), and moderate to strong murmurs (grade III-IV: n = 32) with a relative risk of 114.6 (95% CI 44.9-292.1) for

aortic valve operation over the course of 21.5 years. The incidence of myocardial infarctions did not show any significant relationship to murmurs. Among those who underwent aortic valve surgery and who had a baseline murmur  $>$  or  $=$  III, a fourfold increase in bypass operations was observed.

As seen above even apparently healthy individuals with cardiac murmurs leading more sedentary lives are at increased risk of cardiac problems later. Then physically more stressed life in armed forces may well increase such risks.

Many people have carried out studies on the incidence of cardiac disease over the years. In 2006 Periwal KL, Gupta BK, Panwar RB, Khatri PC, Raja S and Gupta R<sup>[7]</sup> at Department of Paediatrics, SP Medical College and Associated Group of Hospitals, Bikaner, India had carried out a study to determine prevalence of rheumatic heart disease (RHD) using clinical and echocardiographic criteria and to study influence of socio-economic status (SES). They studied 3292 school children, age range 5-14 years, in two private schools, ten middle SES government schools and six low SES government schools. 3002 (1837 boys, 1165 girls) were clinically examined (response 91%) of which 1042 were in private schools, 1002 in middle SES schools and 958 in low SES schools. They found a significant cardiac murmur in 55 subjects (18.3/1000) with similar prevalence in boys (20.7) and girls (14.6). The prevalence of murmur was significantly greater in children belonging to low SES schools (29.2/1000) as compared to middle SES (18.9) and higher SES schools (7.6). Conclusions: There is a low prevalence of RHD in school children in this region compared to previous Indian studies. Cardiac murmurs are more prevalent among low SES children.

In 2001-02, Jose VJ and Gomathi M<sup>[8]</sup> at the department of Cardiology, Christian Medical College and Hospital, Vellore had carried out a study to assess the prevalence of rheumatic heart disease in rural school children in India. A total of 229,829 children between 6 and 18 years of age were screened as part of a school health program. A total of 374 children were found to have heart disease. Of these, 157 children were found to have rheumatic heart disease, confirmed by echocardiogram. They reported the prevalence of rheumatic heart disease to be 0.68 per 1000 children. Their study suggests that there may have been a dramatic decline in the prevalence of rheumatic heart disease in India.

Their contention seems to be borne out by the results of various other researchers who have carried out studies into incidence of cardiac murmurs at various times.

Thakur JS, Negi PC, Ahluwalia SK, Sharma R<sup>[9]</sup> at Department of Community Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh had carried out a study in 1998 and had done screening for cardiovascular diseases in 15,080 schoolchildren aged 5-16 years. There were 45 cases of RF/RHD, 912 of functional murmur, and 34 of congenital heart disease, an incident rate of 2.9 per thousand for RHD.

In another study by the same authors in 1995<sup>[10]</sup> had found a prevalence of 2.25 per thousand. Atrial septal defect was the commonest lesion (38.2%) with a prevalence of 0.87 per thousand followed by ventricular septal defect (32.2%) with a prevalence of 0.73 per thousand. The prevalence of congenital heart disease was found to be significantly more in female (3.3 per thousand) than in male children (1.4 per thousand) ( $p < 0.05$ ). Three (8.8%) cases had a family history of congenital heart disease. Rheumatic fever/rheumatic heart disease was found to have a significant prevalence among cases with congenital heart disease (8.8%) as compared to children without congenital heart disease (0.3%) ( $p < 0.001$ ).

Kumar P, Garhwal S, Chaudhary V<sup>[11]</sup> at Medical and Health Department, Rajasthan had carried out a study in 1992 and had found a prevalence rate of 3.34/1000.

Abroad, in the Bogalusa Heart Study on a total population of children done in 1982 Akman D, Berenson GS, Blonde CV, Webber LS, Stopa AR<sup>[12]</sup> had found that of 4,074 children examined, 146 were thought to have significant cardiac murmurs, giving a prevalence rate of 3.6%. As per the authors, the prevalence of mitral valve prolapse was probably underestimated in this study.

However the contention of reduced rate of RHD by Jose VJ and Gomathi M<sup>[8]</sup> seemingly borne out by the studies of Thakur JS, Negi PC, Ahluwalia SK, Sharma R<sup>[9,10]</sup> and Kumar P, Garhwal S, Chaudhary V<sup>[11]</sup> is negated by Periwal KL, Gupta BK, Panwar RB, Khatri PC, Raja S and Gupta R<sup>[7]</sup> who in 2006 had found prevalence rates of 18.3/1000 with similar prevalence in boys (20.7) and girls (14.6). They had also found that the prevalence of murmur was significantly greater in children belonging to low SES schools (2.92%) as compared to middle SES (1.89%) and higher SES schools (0.76%).

Additionally there may be regional variations rather than chronological in prevalence rates as all these studies were carried out in different regions with the exception of the two studies of Thakur JS, Negi PC, Ahluwalia SK, Sharma R<sup>[9,10]</sup> and these showed quite a close correlation of prevalence rates.

Our study shows prevalence rates of 72.7 per thousand (7.27%) which is seemingly much more than the rates found by all other authors and double of the rate found in The Bogalusa Study Of 1982.

However this discrepancy can be reduced if it is taken into account that our study includes all cases of cardiac murmurs regardless of the aetiology, whether congenital heart disease or RHD or any other cause. In the study of Thakur JS, Negi PC, Ahluwalia SK, Sharma R<sup>[9]</sup> if all anomalous cases are taken into account the prevalence rate comes to 65.6 per thousand which is in close correlation with our findings. Additionally, the persons coming for recruiting in the army come from the lower SES which has a higher prevalence of cardiac murmurs as brought out by Periwal KL, Gupta BK, Panwar RB, Khatri PC, Raja S and Gupta R.<sup>[7]</sup>

Even Ba-Saddik IA et al<sup>[5]</sup> in their 2011 Egypt study in schoolchildren age 5- 16 years found prevalence of RHD was 36.5/1000 school-children, which was one of the highest reported among school echocardiography surveys in the world. RHD was more common in 10-16-year-old students. They also found that RHD was diagnosed in more than one member of the families of 53 (24.2%) of the children. Fifty-eight children were diagnosed with congenital heart disease (CHD), representing a prevalence of 9.7/1000.

Bodegard J et al<sup>3</sup> had said that men with low-grade murmurs had no increase in risk of CVD death but had a 4.7-fold [95% confidence interval (CI) 2.1-11.1] increased age-adjusted risk of AVR in older age. However, in case of military training, even that risk is not acceptable.

The higher incidence in our study may also be accounted for by this fact that the army physical health standards are more stringent and at the time of recruitment medical examination applied more strictly due to the fact that the individuals have to be physically fit in order to bear the stress and secondly because even comparatively minor disability may be exacerbated under the stress of army training.

## CONCLUSION

Our study found an incidence rate of 72.7 per thousand which is much higher than that of other studies. The possible reasons for this could be that the persons are primarily from rural background and low socioeconomic strata which have a comparatively incidence of SHDs. Also contributing to the higher incidence may be the fact of stricter

application of physical standards for enrollment in the army.

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