

Cardiovascular Risk Factor and Coronary Artery Disease Prevalence in Patients of Rheumatic and Nonrheumatic Valvular Heart Disease-A Study from Major Centre in North Eastern India

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Abstract

Introduction: Indian data about the prevalence of Coronary artery disease (CAD) in patients with valvular heart disease are limited. Prevalence of CAD in valvular heart disease is unknown in North Eastern India

AIM: To study the prevalence of Coronary artery disease in valvular heart disease and to compare the prevalence of cardiovascular risk factor and Coronary artery disease prevalence in rheumatic and non-rheumatic valvular heart disease

Materials And Methods: We prospectively collected data of valvular heart disease above 35 years who were scheduled for valve surgery from December 2011 to November 2013. A record was made of each patient's age, sex, history of prior cardiac ischemic events or myocardial infarction, diabetes, hypertension, dyslipidemia and smoking history and past or current drug treatment. Selective coronary arteriography was performed by the Judkins technique. The patients were divided into two groups based on etiology (rheumatic and nonrheumatic). A comparison of clinical parameters between two groups were obtained

Results: A total of 126 valvular disease cases were included in the study. Of the 126, 108 cases were rheumatic valvular heart disease (85.71%) and 18 were non-rheumatic valvular heart disease (14.29%). Mean age of patients were 50.59 years. Of 126 patients, 18 had significant coronary artery disease, giving overall prevalence 14.28% of coronary artery disease. Coronary artery disease was significantly more common among non-rheumatic valvular heart disease (44.44%) in comparison to rheumatic valvular heart disease (9.26%) patients ($p < 0.001$). Angina, diabetes mellitus, hypertension and dyslipidemia are significantly high among non-rheumatic ($p < 0.001$ for Angina, DM and HTN and $p = 0.001$ for dyslipidemia). Non-rheumatic group patients were insignificantly more smokers ($p = 0.081$). All atrial fibrillation patients were rheumatic

Conclusion: This data represents the first reported prevalence data of CAD in valvular heart disease in North Eastern India. We observed an overall prevalence 14.28% of coronary artery disease in valvular heart disease and also observed a higher prevalence of cardiovascular risk factor in non-rheumatic valvular heart disease, which suggests that cardiovascular risk factor play an important part in pathogenesis of non-rheumatic valvular heart disease.

Keywords: Cardiovascular Risk Factor, Coronary Artery Disease Rheumatic And Nonrheumatic Valvular Heart Disease

I. Introduction

Valvular heart disease is a growing problem particularly in developing countries. It is important to consider that spectrum of valve disease in developing world is different from west as the predominant aetiology for valve replacement in India is rheumatic valvular disease whereas degenerative valve diseases are commonest cause in the western countries,

Atherosclerosis of the coronary arteries is the commonest cardiac disorder in adults. Its incidence increases with age. Clinical evidence of this disorder occurs particularly after the age of 40 years, the age period when most patients are subjected to surgery for correction of valvular dysfunction. Therefore, it is not surprising that rheumatic heart disease and coronary artery disease may coexist.

Concomitant coronary artery disease has been implicated in the operative morbidity and mortality of patients undergoing valve replacement surgery. After successful aortic valve surgery ischemic heart disease was found to be the cause of left ventricular dysfunction in certain patients (1). Hence identifying coronary artery disease by selective coronary angiography before valve operation is of great importance.

American College of Cardiology (ACC)/ American Heart Association (AHA) also recommends that coronary angiography should be performed before valve surgery in men aged > 35 years, women aged > 35 years with coronary risk factors and postmenopausal women (2).

The overall prevalence of coronary artery disease with valvular heart disease in western world ranges from 4% to 56% (3,4), depending on the valvular lesion and aetiology. *Kruczan DD et al from Brazil* has shown the prevalence of Coronary artery disease among Rheumatic valvular heart disease patients is 4%, whereas it is 33.61% among Non-Rheumatic valvular heart disease patients (3). Yan T et al from China has shown 13.2% prevalence of significant coronary atherosclerosis among rheumatic aortic valve disease (5).

Indian data about the prevalence of CAD in patients with valvular heart disease are limited; they have shown less prevalence of CAD in valvular heart disease than in western countries ranging from 7% to 12.2% (6,7).

The north-east is one of the most ethnically and linguistically diverse region of India comprising seven sister states. Little is known about the prevalence of coronary artery disease in patients with valvular heart disease in this region.

So this study was conducted in Gauhati medical college, Guwahati with following aims and objective

1. To study the prevalence of Coronary artery disease in valvular heart disease
2. To compare the prevalence of cardiovascular risk factor and Coronary artery disease in rheumatic and non rheumatic valvular heart disease.

II. Materials And Methods

The Study Entitled "Cardiovascular Risk Factor And Coronary Artery Disease Prevalence In Patients Of Rheumatic And Nonrheumatic Valvular Heart Disease" has been conducted in Department Of Cardiology, Gauhati Medical College, Guwahati from December 2011 to November 2013.

All consecutive cases of valvular heart disease, who were scheduled for valve surgery were taken for the present study.

Inclusion Criteria :-

1. Men \geq 35 years
2. Women \geq 35 years with coronary risk factors
3. Postmenopausal women
4. Patients with chest pain, objective evidence of ischemia, decreased left ventricular systolic function, history of coronary artery disease and coronary risk factors. (ACC/AHA guideline of valvular heart disease ; 2008)(2)

Exclusion Criteria :-

1. Valvular heart disease resulting directly from ischaemic heart disease (for example papillary muscle dysfunction).
2. Patients undergoing emergency valve surgery for acute AR, aortic dissection, or endocarditis with hemodynamic instability.

(ACC/AHA guideline of valvular heart disease ; 2008)(2)

A record was made of each patient's age, sex, h/o prior cardiac ischemic events or myocardial infarction, diabetes (considered when fasting plasma glucose was \geq 126mg/dl or 2 hour plasma glucose \geq 200 mg/dl during oral glucose tolerance test or HbA1C $>$ 6.5 or random blood glucose \geq 200mg/dl with symptoms of diabetes), hypertension (considered systolic arterial pressure \geq 140mmHg or diastolic arterial pressure \geq 90mmHg or use of anti-hypertensive medication), dyslipidemia (considered when total cholesterol was \geq 200mg/dl, triglycerides \geq 150 mg/dl and HDL-C \leq 40 in men or \leq 50 in women), and smoking history and past or current drug treatment.

The clinical history was taken for evidence of angina pectoris. Episodes of typical anterior chest pain, with or without radiation, precipitated by exertion and relieved by rest or an oral nitrate, will be regarded as "typical angina". In addition, patients who have chest pain with some, but not all, of these features, classified as "atypical chest pain". Patients without pain classified as "no chest pain".

Routine haematological investigation obtained for all patients. The electrocardiogram was done for rhythm, evidence of cardiac ischemia, and previous myocardial infarction. Heart size assessed by the radiological cardiothoracic ratio.

All patients underwent 2D-Doppler echocardiography to assess morphology of valve, severity of lesion, pulmonary artery pressure and left ventricular function. The echocardiogram was used to define the criteria of rheumatic and non-rheumatic aetiology.

To define the rheumatic valvulocardiopathy, the following criteria were considered:

- 1) In the mitral valve: thickening of the free border of the leaflets with or without commissure fusion and of the subvalvular apparatus with reduced mobility and posterior leaflet fixation, and
- 2) In the aortic valve: cusp thickening, from the border to the base.

For the non-rheumatic valvulocardiopathy, the following degenerative disease criteria were considered:

- 1) In the mitral valve: leaflet thickening with preserved mobility in the free border;
- 2) In the aortic valve: fibro-calcific degeneration, characterized by calcification that started on the cusp bases and went towards their borders, and
- 3) In the bicuspid aortic valve: visualization of only two leaflets with cusp thickening.

The patients were divided into two groups based on aetiology (rheumatic and nonrheumatic). A comparison of clinical parameters between two groups was obtained. Informed consent was taken from all patients.

Selective coronary arteriography was performed by the Judkin technique. Coronary artery stenosis was assessed as the maximum percentage reduction in luminal diameter, seen in any one of at least three different projections, as compared with the diameter of the vessel proximal to the obstruction. Significant coronary artery disease was considered to be present if one or more coronaries showed 50% or more luminal stenosis.

Statistical analysis :-All data were analyzed using SPSS (17 version) software. Continuous variables were analyzed and expressed as mean \pm SD and differences in frequency distribution of risk factors were tested using chi-square analysis. A p-value <0.5 was considered significant.

III. Result

A total of 126 valvular disease cases were included in the study. Of the 126, 108 cases were rheumatic valvular heart disease (85.71%) and 18 were non-rheumatic valvular heart disease (14.29%). Mean age of patients were 50.59 years. (Table 1).

Of the 126 patients 68 (53.96%) were males and 58 (46.04%) were females with male to female ratio of 1.17:1. In rheumatic valvular heart disease males and females were equal with ratio of 1:1. In non-rheumatic valvular heart disease males outnumbered females, with the ratio of 3.5:1. (Table 1).

Of 126 patients, 18 had significant coronary artery disease, giving overall prevalence 14.28% of coronary artery disease. Coronary artery disease was significantly more common among non-rheumatic valvular heart disease (44.44%) in comparison to rheumatic valvular heart disease (9.26%) patients ($p<0.001$). Overall frequency of coronary artery disease among mitral, aortic, and combined mitral and aortic valve lesion is 3.13%, 33.33% and 21.05% respectively. In comparison to mitral valve disease, aortic valve disease and combined lesion having significantly high chances of coronary artery disease ($p=0.001$). (Table 1)

In this study, among total population, typical angina was noted in 29.36% of patients, while there were no angina in 62.69% of cases. Most of the rheumatic patients did not complain about angina; while typical and atypical angina were common complaint in non-rheumatic group. (Table 1).

In our study, diabetes mellitus were present in 9.52% of patients, 19.05% were hypertensive, dyslipidemia was found in 25.39% of cases and 47.61% of patients were current or ex-smoker. Atrial fibrillation was present in 39.68% of population. Diabetes mellitus, hypertension and dyslipidemia are significantly high among non-rheumatic ($p<0.001$ for DM and HTN and $p=0.001$ for dyslipidemia). Non-rheumatic group patients were insignificantly more smokers ($p=0.081$). All atrial fibrillation patients were rheumatic. (Table 1).

In our study, 50.79% had isolated mitral valve disease, 19.05% were isolated aortic valve disease, and combined mitral and aortic valve lesion were present in 30.16% of patients. Isolated mitral valve disease was more common in women ($p=0.002$); while isolated aortic valve disease in men ($p=0.001$). Combined mitral and aortic valve disease was almost equal in frequency in both group ($p=0.561$). Mitral valve was most commonly affected valve in rheumatic valvular heart disease; while all patients of non-rheumatic group had isolated aortic valve lesion. (Table /figure 2)

IV. Discussion

This study was carried out to find out the prevalence of significant coronary artery disease in patients with valvular heart disease undergoing valve surgery, and also compare the prevalence of cardiovascular risk factor and Coronary artery disease in rheumatic and non-rheumatic valvular heart disease in Gauhati Medical College, Guwahati

Our study included 126 patients of valvular heart disease. Most of the patients (56.34%) were in age group of 45 to 54 years with the mean age of 50.59 years. This mean age is quite similar to 52 years mean age in Baxter et al, 1978(8); 49.5 years in Gupta et al (6), 1990; 51.2 years of Jose et al, 2004(7); but is less in comparison to others study; 54.4 years in study by Sonmez et al, 2002(9); 54 years mean age in Krucznan et al, 2008.(3). Patients with non-rheumatic valvular heart disease (60.77 years) were older than patients with rheumatic (48.87 years) valvular heart disease. Similar observation has been made by Krucznan et al, 2008, where mean age of rheumatic (50.87 years) valvular heart disease patients were significantly lower than non-rheumatic valvular heart disease (63.66 years)(3).

In rheumatic valvular heart disease males and females were equal in numbers, while in non-rheumatic valvular heart disease males were significantly higher than females. Krucznan et al had similar observation in case of non-rheumatic aetiology but in their rheumatic study population female were more than double to males.(3).

In our study, the overall prevalence of coronary artery disease in patients with valvular heart disease is 14.28%. Of the total population, 85.71% had rheumatic heart disease and 14.29% were non-rheumatic heart disease. In our study, coronary artery disease is significantly more common among non-rheumatic valvular heart disease (44.44%) in comparison to rheumatic valvular heart disease (9.26%) patients. Overall frequency of coronary artery disease among mitral valve disease is 3.13%, among aortic valve disease 33.33% and among combined mitral and aortic valve lesion is 21.05%. In comparison to mitral valve disease; aortic valve disease and combined lesion having significantly high chances of coronary artery disease. Similar observation has been made in various other studies. In study of valvular heart disease patients, Bozbas H et al (2004) found 18.8% to have significant coronary artery disease(10). A landmark Indian study by Jose VJ et al(2004) found 12.2% patients of rheumatic heart disease had significant coronary artery disease; in patients with mitral valve disease the prevalence was 13.5% , while it was 15.3% in patients with aortic valve disease and 9% in those with combined mitral and aortic valve disease(7). In patients of valvular heart disease, Krucznan DD et al (2008) from Brazil had found 15.98% prevalence of significant coronary artery disease, with 4% prevalence among patients with rheumatic valvular heart disease compared to 33.61% with non-rheumatic valvular heart disease(3).

In our population, the overall prevalence of typical angina is in 29.36%, atypical angina 7.93%, and no angina in 62.69% of valvular heart disease patients. (%). Among non-rheumatic group of patients both typical (72.22%) and atypical (22.22%) angina was significantly more common than rheumatic (22.22% and 5.56% respectively) group of patients ($p=0.001$ for each). While no angina was significantly more found in rheumatic (72.22%) patients in comparison to non-rheumatic (5.56%) aetiology ($p=0.001$). Similar to our study, Morrison GW et al (1980) noticed typical angina in 31% , atypical chest pain in 14%, and no chest pain in 55% of valvular heart disease patients(11). A study by Jose VJ et al(2004) found 23.8% patients had typical chest pain, 30.6% patients had atypical chest pain and 45.5% patients had no chest pain(7). Krucznan DD et al (2008) from Brazil has seen typical angina was present in 23.46%, atypical in 19% and no angina in 57.48% of patients. Similar to our study, Krucznan DD et al has observed higher prevalence of typical and atypical angina in non-rheumatic aetiology. In their study, the prevalence of typical angina was (47.90% and 6.86%), atypical angina (18.49% and 19.43%) and no angina (33.61% and 73.71%) in non-rheumatic and rheumatic valvular heart disease respectively(3).

In our study, the overall prevalence of diabetes mellitus was 9.52%, hypertension 19.05%, dyslipidemia 25.39% and smoking 47.61%. If we compare from other study, Jose VJ et al, 2004 noted hypertension in 23.4% patients, diabetes in 17.3%, smoking in 26.1%, and dyslipidemia in 17.6%, patients in their study(7). A study by Krucznan et al, 2008, have found diabetes in 8.16%, hypertension in 41%, dyslipidemia in 11.9%, and smoking in 49% in patients.

While comparing presence of risk factors between non-rheumatic valvular disease and rheumatic valvular heart disease in our study, we observed that in non-rheumatic valvular disease patients prevalence of diabetes mellitus (33.33% and 5.56%), hypertension (55.56% and 12.96%) and dyslipidemia (55% and 20%) were significantly greater; while smoking (66.67% and 44.4%) was insignificantly higher than rheumatic valvular heart disease, respectively. Krucznan et al also had similar findings, in patients with non-rheumatic valvular disease prevalence of hypertension was (59% vs 30%; $p<0.00001$), diabetes mellitus (14% vs 4%; $p=0.003$, dyslipidemia (18% vs 8%; $p=0.02$), smoking (49% vs 50%; $p=0.789$) in comparison to rheumatic heart disease patients.(3).

V. Conclusion

This data represents the first reported prevalence data of CAD in valvular heart disease in North Eastern India. We observed a overall prevalence 14.28% of coronary artery disease in valvular heart disease and also observed a higher prevalence of cardiovascular risk factor in non-rheumatic valvular heart disease ,which suggest that cardiovascular risk factor play a important part in pathogenesis of non-rheumatic valvular heart disease.

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Table 1: Clinical Characteristic In Rheumatic And Non Rheumatic Valvular Heart Disease

	TOTAL(126)	RHD(108)	NR-VHD(18)	P VALUE
MEAN AGE	50.59 YEARS	48.87 YEARS	60.94 YEARS	0.001
MALES	68 (53.96%)	54 (50%)	14 (77.77%)	0.03
TYPICAL ANGINA	37 (29.36%)	24 (22.22%)	13 (72.22%)	0.001
ATYPICAL ANGINA	10 (7.93%)	6 (5.56%)	4 (22.22%)	0.01
DIABETES	12 (9.52%)	6 (5.56%)	6 (33.33%)	<0.001
HYPERTENSION	24 (19.05%)	14 (12.96%)	10 (55.56%)	<0.001
DYSLIPIDEMIA	32 (25.39%)	22 (20.37%)	10 (55.56%)	0.001
SMOKING	60 (47.61%)	48 (44.44%)	12 (66.67%)	0.081
ATRIAL FIBRILLATION	50(39.68%)	50(46.29%)	0	<0.001

Rhd-Rheumatic Heart Disease Nr-Vhd-Non Rheumatic Valvular Heart Disease

Table/Figure 2: Distribution Of Valvular Lesion Among Rheumatic And Non-Rheumatic Disease

