Prevalence of Coronary Artery Disease in Patients of Rheumatic Heart Disease

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Abstract: *Background*: Few studies have focused on the prevalence of CAD in RHD. Coronary angiography should be routinely done in patients of valvular heart disease prior to surgery, especially in patients above 40 years of age. Overlooking CAD can lead to complications and poor results in post-operative period of valvular surgery. Clinical symptoms are common in both CAD and RHD. Indian studies by V. Jacob Jose and Satya N Gupta have studied this aspect in detail and their results are quite different from Western literature.

Material & Methods: This study was conducted in all patients of valvular heart disease (RHD) above 40 years of age. Apart from basic investigations and echocardiography, coronary angiogram was done in all patients and were evaluated for presence of CAD (significant ≥ 50% or insignificant). They were also evaluated for SVD/DVD or TVD and risk factors (hypertension, diabetes mellitus, dyslipidemia) and symptoms especially angina were correlated to the presence of CAD.

Results: Out of the 100 patients of RHD from Jan 2008- June 2009 at PGIMER, Chandigarh, 38 were males and 62 were females. 12 had significant CAD, while 9 had non-significant CAD. Mean age for significant CAD was 52.58 years. Age distribution was statistically significant in the 51-60 year age group. 66 patients had mitral valve disease, 31 had combined mitral and aortic valve disease, while 3 had predominantly aortic valve disease. Angina was the only symptom which correlated with presence of CAD especially in aortic valve disease group, but p value was non-significant. In risk factor category, only hypertension and total cholesterol were statistically significant with CAD.

Conclusion: Prevalence of significant CAD was 12%. 5 patients had SVD, 4 had DVD & 3 had TVD. 2 patients with MS, 4 with MS/MR, 4 with MV+AV and 2 with predominant aortic valve group had significant CAD. Angina was not found to be a useful clinical symptom to predict CAD. Hypertension and total cholesterol were the only risk factors which could be correlated with CAD in RHD group.

Keywords: Coronary artery disease, valvular heart disease.

INTRODUCTION

Rheumatic fever is generally classified as a connective tissue disorder. Its anatomical hallmark is the damage to the collagen fibrils and connective tissue. Inflammatory reaction involves primarily the heart, joints and central nervous system. The manifestations of acute rheumatic fever follow group A streptococcal infection of the tonsillopharynx after a latent period of approximately 3 weeks.

Rheumatic fever (RF) is the most common cause of acquired heart disease in children and young adults worldwide. Although the incidence of RF has declined sharply in many developed countries, the disease remains a major problem in developing countries [1, 2]. The incidence and prevalence of RF/RHD are markedly variable in different countries [3, 4].

Coronary Artery Disease (CAD) is another leading cardiac problem in India. The prevalence of CAD in India has been recently estimated to be around 11%. The incidence of associated CAD in acquired valvular heart diseases has been studied in many trials, but the data regarding the prevalence of coronary atherosclerosis in rheumatic heart disease is limited [5]. In patients with valvular heart disease, the presence of significant CAD may interfere with adequate myocardial perfusion during valve surgery and affects post-operative morbidity and mortality.

Coronary angiography is done routinely in patients with valvular heart disease prior to their replacement surgery, or if there is a suspicion of CAD or if the patient is above 40 years of age. It is important to have certain guidelines regarding angiography in these patients as both CAD and RHD are on the rise in developing countries. There was a speculation that intramyocardial coronary arteries may be involved in the form of arteritis in rheumatic fever. On the other hand, clinical and autopsy findings suggest RHD to be quite rare in patients who died of myocardial infarction.

So the impact of CAD on or its relation to rheumatic valvular disease is not well established. Our aim of the study was to ascertain the prevalence of CAD in

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patients with RHD. Symptoms of CAD and RHD may be similar especially breathlessness, palpitation and pedal edema. If we focus on angina and analyze its significance, we find clinically that angina occurs commonly in valvular heart disease but does not necessarily signify the presence of CAD.

This is particularly true in patients of aortic stenosis. In addition, there are some patients without angina who are found to have coronary artery disease on coronary angiography.

Patients with coronary artery disease do less well after surgery, and this has led to increasing interest in the possibility of treating CAD at the time of valve surgery, so routine coronary arteriography on patients aged 40 years and above, should be a part of the pre-operative investigation.

Probability of CAD in patients of valvular heart disease is guided by same variables and clinical risk factors as seen in the general population. In the general population, in the middle age persons, chances of CAD are 90% in the presence of angina, 50% if atypical angina is present, 16% in non-anginal pain and 4% in asymptomatic patients. As mentioned above, in valvular heart disease, angina may be due to left ventricular hypertrophy leading to increased wall stress, pulmonary hypertension or right ventricular hypertrophy, so it is relatively less specific.

In young persons with AS (congenital or rheumatic), coronary arteries are normal even in the presence of angina, while in older patients, presence of angina increases the chances of CAD. CAD is less prevalent in AR than in AS (may be due to younger age of patients in AR). In MS, CAD is less common than aortic valve disease (due to differences in age and gender). The relationship between MR and CAD is unique. Neither angina, nor CHF are reliable markers of CAD in these patients. CAD is frequently the cause of MR. Those with chronic CAD and MR usually have low ejection fraction and more extensive CAD than those without MR.

Very few studies are available on the prevalence of CAD in RHD [6, 7]. Our study is aimed at looking for CAD in RHD.

MATERIAL AND METHODS

100 patients of RHD (more than 35 years of age) attending Cardiology OPD, Emergency, CCU and wards of PGIMER, Chandigarh were included in the study. Detailed history and clinical examination were carried out in all the patients. Clearance from the ethical committee was obtained.

Routine investigations including lipid profile were done in all the patients. ECG was done for rhythm, evidence of cardiac ischemia or previous myocardial infarction. Echocardiography was done to look for severity of valve disease, degree of pulmonary hypertension and severity of stenotic/regurgitant lesion. Coronary angiography was done in Cath lab by standard Judkin's technique and multiple views were recorded, to look for any evidence of CAD and the degree of coronary narrowing in the left main, left anterior descending, left circumflex and right coronary arteries.

All patients with rheumatic heart disease were divided into three main groups:

a. Isolated mitral valve disease (MS, MR or both).

b. Isolated aortic valve disease (AS, AR or both).

c. Combined mitral and aortic valve disease.

Significant CAD was defined as: 50% or more luminal narrowing of any of the major coronary arteries, i.e. LAD, LCx or RCA. Patients with coronary plaques or <50% stenosis were included as insignificant CAD.

Statistical Analysis

All statistical analysis was done using SPSS software. Data were represented as mean±SD. Statistical significance was assumed at p-value <0.05. t- Test and chi square test were used to compare various variables.

RESULTS

In our study, maximum number of patients (47 out of 100) was in the 41-50 years age group. Table **1** shows the age distribution of patients in the study group.

Table 1: Age Distribution of Patients in the Study Group

Age group	Frequency	Percentage
<40 years	15	15%
41-50 years	47	47%
51-60 years	33	33%
61-70 years	5	5%
Total	100	100%

Table 2: Showing Mean Age of CAD vs. Non-CAD Group

Group	Number	Mean age (yrs)	SD	P value
CAD	19	52.58	8.016	0.097
Non- CAD	81	49.35	7.465	

The male female ratio was 38/62 in 100 patients. Out of 100 patients, 19 patients had CAD, while 81were in non CAD group. 12 had significant CAD and 7 had insignificant CAD. Table **2** shows mean age of CAD vs. non- CAD group. The p-value was not found to be statistically significant.

Table **3** shows age and sex distribution in significant and insignificant CAD. In insignificant CAD, male: female ratio was 5:1, whereas in significant CAD group, it was 3:4.

Table 3: Showing Age and Sex Distribution in Significant and Insignificant CAD

CAD	Sex	Significant CAD	Insignificant CAD
<40 years	F	1	0
	M	0	0
41-50 years	F	1	1
	M	3	2
51-60 years	F	0	3
	M	6	1
61-70 years	F	1	0
	M	1	0

66 patients had combined mitral valve disease, 31 had combined mitral and aortic valve disease and only three had predominant aortic valve disease. Table **4** shows the distribution of valvular heart disease in the study population.

Among total 19 patients with CAD, 10 patients (52.6%) had angina, 19 (100%) had breathlessness, 14 (73.15%) had palpitation, 13 (68.4%) had pedal edema and 2 (10.5%) had syncope. Table **5** shows different symptoms in these patients.

Table 4: Showing Distribution of Valvular Heart Disease in the Study Group

MS (predominant)	32
MR(predominant)	6
MS & MR	28
AS & AR	3
MV & AV	31

Table 5: Distribution of Symptoms in 19 Patients of CAD

Angina	10
Breathlessness	19
Palpitation	14
Pedal Edema	13
Syncope	2

2 patients with MS (16.6%), 4 with MS and MR (33%), 4 with mitral and aortic valve group (33.3%) and 2 with predominant aortic valve group (66.6%) had significant CAD. 5 of the mitral valve disease group and one each from aortic valve group and combined group respectively had insignificant CAD (Table **6**).

Table 6: Showing Relationship of Valvular Heart Groups with Significant and Insignificant CAD

Valvular Lesion	Significant CAD	Insignificant CAD
MS	2	3
MR	0	0
MS & MR	4	2
AS & AR	2	1
MV & AV	4	1

Out of the 42 patients with angina, 10 had CAD: 6 had significant CAD while 4 had insignificant CAD. Out of 58 patients without angina, 9 had CAD: 6 had significant CAD and 3 had insignificant CAD. *P value was not significant for CAD in chest pain vs. non-chest pain groups.*

Table **7** shows the relationship of dyslipidemia components in significant vs. insignificant CAD, whereas Table **8** shows relationship of dyslipidemia components in CAD vs. non- CAD groups.

Except serum cholesterol, no other component of the lipid profile was statistically significant in both the groups.

None of the components of the lipid profile were found to be statistically significant in CAD and non-CAD groups.

Table 7:

Lipid	Group	Number	value	S.D	P value
Cholesterol	Sig CAD	12	191.92	25.939	0.044
	Insig CAD	7	170.00	5.686	
Triglycerides	Sig CAD	12	189.50	64.881	0.071
	Insig CAD	7	141.00	14.271	
LDL	Sig CAD	12	112.92	27.672	0.064
	Insig CAD	7	91.29	9.482	
HDL	Sig CAD	12	35.42	2.644	0.241
	Insig CAD	7	36.86	2.193	

Table 8:

Lipid	Group	Number	value	S.D	P value
Cholesterol	Sig CAD	19	183.84	23.236	0.844
	Insig CAD	81	182.68	23.023	
Triglycerides	Sig CAD	19	171.63	56.729	0.144
	Insig CAD	81	156.58	35.213	
LDL	Sig CAD	19	104.95	24.755	0.458
	Insig CAD	81	101.11	10.045	
HDL	Sig CAD	19	39.95	2.527	0.157
	Insig CAD	81	37.02	3.054	

Table **9** shows the distribution of risk factors in CAD and non- CAD groups. 1 patient was diabetic in both CAD and as well as non-CAD group. 5 patients were hypertensive in significant CAD group while none was hypertensive in CAD group. 5 were smokers in significant CAD group, while no smokers were there in insignificant CAD group. One patient had family history of CAD in insignificant group, while no patient had a positive family history of CAD in the significant CAD group.

Table 9: Showing Distribution of Risk Factors in Significant and Insignificant CAD Group

Risk Factors	Significant CAD	Insignificant CAD
Diabetes Mellitus	1	1
Hypertension	5	0
Smoking	5	0
Dyslipidemia	3	2
Family History of CAD	0	1
Past History of CAD	2	0

Table **11** shows the distribution of coronary vessel lesion in significant vs. non- significant CAD, whereas Table **12** shows the distribution of SVD/DVD/TVD in significant CAD. In significant CAD group, out of 12, 5 had single vessel disease (LAD), 4 had DVD (33.3%) and 3 had TVD (25%).

Table 10: Showing Distribution of Risk Factors in CAD vs. Non-CAD Group

Risk Factors	Significant CAD	Insignificant CAD
Diabetes Mellitus	2	12
Hypertension	5	17
Smoking	5	10
Dyslipidemia	5	11
Family History of CAD	1	0
Past History of CAD	2	0

DISCUSSION

In 100 patients of RHD that we studied, we found that the male: female ratio was 38:62. Significant CAD

Table 11: Showing the Distribution of Coronary Vessel Lesion in Significant vs. Non- Significant CAD

Coronary Vessel	Significant CAD	Insignificant CAD
LM	0	0
LAD	10	4
LCx	6	2
RI	0	0
DI	4	0
RCA	4	2

Table 12: Shownig the Distribution of SVD/DVD/TVD in Significant CAD

Category	Number	Percentage
SVD	5	41.6%
DVD	4	33.3%
TVD	3	25%

was present in 12 and insignificant CAD was present in 7 patients. CAD was said to be significant if coronary artery narrowing was more than 50%. Mean age in CAD group was 52.8 years and in non-CAD group, it was 49.35 years (p Value was not significant). In a study by Satyavan *et al.,* out of 326 patients, 200 (61%) belonged to 5^{th} decade, 103 (32%) belonged to 6^{th} decade, 20 (6%) belonged to 7^{th} decade and only 3% belonged to 8^{th} decade [8]. In yet another study by V Jacob Bose *et al.,* conducted on 376 patients above 40 years of age, the mean age was 51.2±8.2 years [9]. Of the total 376 patients, significant CAD was present in 46 (12.2%) patients. These findings are commensurate with our findings.

However, in western literature, the findings have been contradictory to our findings. In a study by Ramatizmal Kapak *et al.,* it was that out of record of 346 patients who had undergone rheumatic heart surgery, CART was performed in 218 (63%) patients, of whom 41 (81.8%) had CAD [10]. The mean age of patients with CAD and normal coronary arteries was 57.3 and 50.5 years respectively (p vale <0.001). Whereas, in our study, the p value was not significant in the CAD vs. non-CAD group. In yet another study by Dany David Kruckzan, almost similar results have been demonstrated, which were contradictory to our study [11].

In our study, rheumatic heart disease was distributed as follows: predominant MS in 32, MR in 6, MS and MR in 28 i.e. combined mitral valve disease group had 66 patients. 3 had predominant aortic valve disease while 31 had combined mitral and aortic valve disease. While in the study by Satyavan *et al.,* out of 326 patients, mitral valve disease was present in 125 (38%), aortic valve disease was present in 134 (41%) and combined aortic and mitral valve disease in 67 (21%) patients [8]. Out of 19 CAD patients in our study, 10 had angina (52.6%), breathlessness was present in all the 19 patients (100%), 14 (73.15%) had palpitations, 13 (68.4%) had pedal edema and 2 (10.5%) had history of syncope.

When we associated VHD with CAD, we found that 2 patients with MS (16.6%), 4 patients with MS and MR (33.3%), 4 patients with mitral and aortic valve disease (33.3%) and 2 patients with aortic valve disease out of 3 had significant CAD. While in insignificant CAD group of 7, 5 were from mitral valve disease group, 1 each from aortic valve disease group and combined aortic and mitral valve disease group. In mitral valve disease group, prevalence of CAD was 9.9%, combined mitral and aortic valve group it was 12.9% and in predominant aortic valve group, it was seen in 2 out of 3 patients.

However, in the study conducted by Jacob Bose *et al.,* prevalence was 13.5% in mitral valve disease group, 15.3% in aortic valve group and 9% in combined aortic and mitral valve disease group [9]. In the current study, high prevalence of CAD in aortic valve group was due to very patients in this category. Thus, we cannot comment on the prevalence of CAD in patients with aortic valve disease in the present study, as the number is very small.

In our study, CAD was found to be present in 10 out of 42 patients with angina i.e. 23.8% (6 had significant and 4 had insignificant CAD) and 9 out of 58 patients with n o chest pain had CAD i.e. 15.5%. 6 had significant and 3 had insignificant CAD (p-value not significant). This indicates that angina or chest pain may not provide a clue to the absence or presence of CAD as 15.5% patients in the absence of chest pain had CAD. This observation is supported by the study conducted by Morrison *et al.,* [12].

In a previous study by Satyavan *et al.,* overall prevalence of CAD was 7%, however, it was 3% in mitral, 10% in aortic and 6% in combined group [8]. In that study, 125 patients were from mitral valve group, 79 were from aortic valve group and 51 from combined group. In the current study, the prevalence of angina in

the combined group was found to be lower than that reported by others [13, 14]. These wide differences are due to difference in age, sex and definition of arteriographically significant CAD. It is possible that some reports deal with biased samples because angiography was performed only in patients with clinical suspicion of CAD and majority in aortic valve group was more than 50 years.

In risk factors for CAD, we could not find any risk factor to be of statistical significance between significant and insignificant CAD and also between CAD and non-CAD groups. This may be due to small number of risk factors present in each group and also because majority of patients of CAD were from 41 to 50, and 51-60 years of age and very few were from the elderly group.

In the study by Jacob Bose, hypertension was found in 23.4% patients, 65 (17.3%) had diabetes mellitus, 98 (26.1%) were smokers and 66 (17.6%) had dyslipidemia and 15 (4.0%) gave past history of CAD [9].

In the study by Satyavan *et al.,* out of 9% prevalence of CAD only 7% had significant lesions [8]. 2 patients had left main lesions, 4 had triple vessel disease, 9 had double vessel disease and 7 had single vessel disease. LAD was involved in 16 patients, LCx in 10 and RCA in 15 patients. While in the present study, single vessel disease was present in 5, double vessel disease in 4 and triple vessel disease in 3 patients.

LIMITATIONS OF THE STUDY

Patients with aortic valve disease were very few in the current study.

CONCLUSION

1. The prevalence of significant CAD in RHD was found to be 12%, while insignificant CAD was estimated to be 7% (Out of 12, 5 had SVD, 4 had DVD and 3 had TVD).

2. Two patients with MS (16.6%), 4 with MS & MR (13.3%), 4 with mitral and aortic valve disease (33.3%) and 2 with predominant aortic valve disease (66.6%) had significant CAD.

3. Angina was not found to be a useful guide to predict CAD in patients with RHD as there was no statistical difference in prevalence of CAD in patients with angina versus patients without angina.

REFERNCES

[1] Who-Rheumatic Fever and rheumatic heart disease. WHO technical reports series. 756. Geneva, WHO 1998

[2] Dajani AS. Current Status of non-suppurative complications of Group A Streptococci. Pediatrics Infect Disease J 1991; 10: 525. http://dx.doi.org/10.1097/00006454-199110001-00006

[3] Markus RH, Sareli P, Pocock WA, Barlow JB. The spectrum of severe rheumatic mitral valve disease in a developing country: Correlation among clinical presentation, surgical pathological findings and hemodynamic sequelae. Ann Intern Med 1994; 120: 177-83. http://dx.doi.org/10.7326/0003-4819-120-3-199402010-00001

[4] Lung B, Baron G, Butchart EG, *et al.* A prospective survey of patients with valvular heart disease in Europe. The Euro Heart Surgery on Valvular Heart Disease. Euro Heart J 2003; 24: 1231-43. http://dx.doi.org/10.1016/S0195-668X(03)00201-X

[5] Jose VJ, Gomathi M. Declining prevalence of rheumatic heart disease in rural school children in India. Indian Heart Hournal 2003; 55: 158-60.

[6] Mohan V, Deepa R, Rani SS, *et al.* Prevalence of coronary artery disease and its relation to lipids in a selected population in South India. The Chennai Urban population study (CUPS). J Am College Cardiol 2001; 38: 682-7. http://dx.doi.org/10.1016/S0735-1097(01)01415-2

[7] Boncheck LI, Anderson RP, Rosch J. Should coronary arteriography be routinely performed before valve replacement? Am J Cardiol 1973; 31: 462-6. http://dx.doi.org/10.1016/0002-9149(73)90295-6

[8] Gupta KG, Loya YS, Satyavan Sharma. Prevalence of significant CAD in valvular heart disease in Indian patients. IHJ 1990; 42(5): 357-9.

[9] Jacob Bose V, Gupta SN, Joseph G, *et al*. Prevalence of CAD in patients of RHD in current era. IHJ 2004; 56: 129-31.

[10] Kapak R, *et al*. Prevalence of CAD in patients undergoing valvular operation due to rheumatic involvement. Anadolu Kardiyol Derg 2004; 4: 223-6.

[11] Kruckzan DD, Broz W, *et al*. CAD in patients with rheumatic and non- rheumatic valvular heart disease treated at public hospital in Rio de Janeiro. Arg Bras Cardiol 2008; 90 (3): 197-203.

[12] Morrison GW, Thomas RD, *et al*. Incidence of CAD in patients with valvular heart disease. Br Heart J 1980; 44: 630-7. http://dx.doi.org/10.1136/hrt.44.6.630

[13] Merchant E, Pichard A, Casanegra P. Association of CAD with valvular heart disease in Chile. Clin Cardiol 1983; 6: 352. http://dx.doi.org/10.1002/clc.4960060709

[14] Coleman EH, Soloff LA. Incidence of significant CAD in rheumatic valvular heart disease. Am J Cardiol 1970; 25: 401. http://dx.doi.org/10.1016/0002-9149(70)90004-4

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