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ORIGINAL RESEARCH ARTICLE

A STUDY OF THE PREVALENCE AND CLINICAL PROFILE OF CORONARY ARTERY DISEASE IN PATIENTS WITH RHEUMATIC HEART DISEASE UNDERGOING CORONARY ANGIOGRAPHY

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ABSTRACT

BACKGROUND
This study aimed to assess the prevalence of coronary artery disease (CAD), atherosclerotic risk factors, and the clinical characteristics of patients with rheumatic heart disease (RHD) undergoing Coronary angiography.

METHOD
It was an observational, cross-sectional study involving 219 RHD patients who underwent coronary angiography (CAG) for various indications including pre-surgical valve repair/replacement, angina symptoms with suspicion of CAD and others at a tertiary care centre. Patients with significant CAD (≥50% stenosis) (Group A) were compared with RHD patients without CAD (Group B).

RESULTS
CAD prevalence in patients undergoing valve procedures was 12.78% (64.28% male, 35.72% female; mean age 50.65 ±8.66 years). CAD incidence was 12.84% in patients with mitral valve involvement, 11.36% in aortic valve involvement, and 11.45% in those with both. Tobacco use/Smoking (42.86% vs. 21.99%), diabetes (35.71% vs. 10.47%), hypertension (42.86 % vs. 14.66%) were significantly higher in Group A compared to Group B

CONCLUSION
The prevalence of CAD among Asian Indian patients with valvular heart disease is 12.78%. Coronary angiography should be recommended for patients with CAD risk factors, regardless of the type of valvular lesion.

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INTRODUCTION

Rheumatic heart disease (RHD) is a long-term complication of rheumatic fever, primarily affecting the heart valves and leading to irreversible damage over time.[1] Worldwide, RHD affects approximately 70 million people, with India recording a prevalence ranging from 0.2 to 1.1 per 1,000 individuals.[2,3] Earlier studies conducted by Berry[4] and Mathur [5] in urban regions like Chandigarh and Agra reported a prevalence of 1.87 and 1.8 per 1,000 individuals, respectively, in the 5-30 year age group. Although RHD has become less common in developed nations, it continues to be a significant public health issue in many developing countries.[3]

Recent research suggests a frequent association between RHD and coronary artery disease (CAD), which worsens patient outcomes.[6] For this reason, coronary angiography (CAG) is frequently recommended for individuals with suspected CAD, particularly in older patients or those being considered for valve surgery. Current guidelines from the American College of Cardiology (ACC) and the American Heart Association (AHA) recommend routine preoperative CAG for men over the age of 35, premenopausal women over 35 with CAD risk factors, and all postmenopausal women with valvular heart disease.[7,8]

Aim of the Study

The primary aim of this study was: to assess the prevalence of coronary atherosclerosis in RHD patients undergoing CAG and the secondary aim was to compare the demographic, clinical and echocardiographic profiles of those with and without CAD to identify key risk factors.

MATERIALS AND METHODS

This observational cross-sectional study involved 219 patients diagnosed with rheumatic heart disease (RHD) who underwent coronary angiography (CAG) for various clinical indications. These indications included preoperative evaluations before valve repair or replacement, as well as symptoms suggestive of coronary artery disease (CAD). The study was conducted at a tertiary care center in Western India, with the angiographies performed between June 2022 and May 2024. CAG procedures were carried out using either femoral or radial access, and significant CAD was defined as stenosis of 50% or more, quantified through quantitative coronary angiography.

Patients were divided into two groups: Group A, consisting of those with significant CAD, and Group B, which included patients with RHD but no evidence of CAD. Both groups were matched for age and sex to enable a fair comparison. Any critical coronary artery lesions in Group A were managed with grafting during valve surgery. Patients with minor CAD lesions received conservative treatment alongside necessary valve procedures.

The diagnosis of RHD was confirmed through echocardiographic findings, patient history, and clinical evaluations for prior rheumatic fever. Those with other conditions such as congenital heart disease, degenerative aortic valve disease, bicuspid aortic valve, constrictive pericarditis or ischemic mitral regurgitation were excluded. Demographic data, as well as information on clinical symptoms such as angina, hypertension, and diabetes, were collected from patient medical records.

Typical angina was defined as substernal chest pain or discomfort triggered by exertion or stress and relieved by rest, while atypical angina involved vague symptoms like shortness of breath, fatigue, nausea, back or neck pain, or indigestion. Hypertension (HTN)

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and diabetes (DM) were diagnosed according to established guidelines[9,10]. Atrial fibrillation was diagnosed on the basis of ECG.

Statistical Analysis

Data were analyzed using SPSS software version 20. Continuous variables were expressed as means with standard deviations, while categorical variables were presented as percentages. The chi-square test was utilized to compare proportions between groups, and the Student's t-test was applied for continuous variables. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Out of the 219 patients included in the study, 114 (52.05%) were male, and 105 (47.95%) were female, with an average age of 50.65 ± 8.66 years. Among these, 28 patients (12.78%) were diagnosed with significant coronary artery disease (CAD) and were classified as Group A. This group consisted of 18 males (64.3%) having an average age of 54.72±8.63 years and 10 females (35.7%), with an average age of 57.2 ±10.07 years. The remaining 191 patients, categorized as Group B, showed no signs of CAD. Group B consisted of 53.4% males with an average age of 51.23 ± 8.59 years, and 46.6% females with an average age of 50 ± 8.64 years.

Demographic, clinical and echocardiographic characteristics are summarized in Table 1.

Notably, a higher prevalence of traditional CAD risk factors was observed in Group A compared to Group B. Tobacco use, hypertension, and diabetes were significantly more common in Group A, with 42.86% of patients reporting tobacco use, 42.86% having hypertension, and 35.71% diagnosed with diabetes. In contrast, these risk factors were less prevalent in Group B, where 21.99% reported tobacco use, 14.66% had hypertension, and 10.47% had diabetes.

Angina symptoms were also markedly more frequent in patients with CAD (60.71%) than in those without (18.32%).

Sr. no	Variable	Total patients (219) N %	Group – A (28) N%	Group – B (191) N%	[a]p-value
1	Male	114 (52.05)	18(64.28)	96 (50.26)	0.16
2	Female	105 (47.95)	10 (35.72)	95(49.74)	
3	Age in years	50.65±8.66	51.17 ± 8.9	49.92 ± 8.3	0.074
6	Tobacco use/Smoking	54 (24.65)	12 (42.86)	42 (21.99)	0.016
23	Diabetes	30 (13.7)	10 (35.71)	20 (10.47)	<0.001
24	Hypertension	40 (18.26)	12 (42.86)	28 (14.66)	<0.001
12	Atrial fibrillation	124 (56.62)	12 (42.86)	112 (58.64)	0.11
	Angina	52 (23.74)	17 (60.71)	35 (18.32)	<0.0001
13	Mitral valve involvement	218 (99.5)	28 (100)	190 (99.47)	0.70
14	Aortic valve involvement	132 (60.27)	15 (53.57)	117 (61.25)	0.43
15	Both valve involvement	131 (59.81)	15 (53.57)	116(60.73)	0.47
16	LVDD on ECHO (mm)	44.87 ± 7.78	46.93± 7.6	44.57± 7.75	0.21
17	LVDS on ECHO (mm)	32.96 ± 7.11	34.28 ± 8.51	32.71 ± 6.81	0.26
18	EF % on ECHO	57.20 ± 7.88	57.08 ± 7.76	57.76 ± 6.96	0.005

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19	RWMA on Echo	5 (0.022)	5 (17.86)	0 (0)	<0.0001
20	Pulmonary hypertension				
	Mild	54 (24.66)	10 (35.710	44 (23.15)	0.24
	Moderate	50 (22.83)	5 (17.86)	45 (23.56)	0.003
	Severe	115 (52.51)	13 (46.43)	102 (53.4)	0.49
21	RV dysfunction	34 (15.52)	4 (14.28)	30 (15.7)	0.84
22	LAA clot	28 (12.75)	3 (10.71)	25 (13.09)	0.72

Table 1: Demographic, Clinical and Echocardiographic data of the study population

In addition, patients in Group A exhibited marginally lower ejection fraction (EF) (57.08± 7.76% vs. 57.76 ± 6.96%) compared to Group B. However, the involvement of both valves (60.73% vs. 53.57%) and atrial fibrillation (58.64% vs 42.86%) was more common in Group B. Proportion of patients with moderate or severe pulmonary hypertension was higher in the non-CAD group, with p value being significant for moderate PH. Patients with CAD exhibited RV dysfunction less commonly (14.28% vs 15.7%), and LAA clot was also seen more often in non-CAD group (13.09% vs 10.71%.)

		RHD with CAD (Group A) (N=28)
Coronaries Involved	LAD	20 (71.43%)
	LCX	11 (39.28%)
	RCA	08 (28.57%)
	LAD + LCX	04 (14.28%)
	LAD + RCA	05 (17.85%)
	LCX + RCA	03 (10.71%)
	All three	04 (14.28%)
LMCA	Present	0 (0%)

Table 2: Comparison of the Coronaries involved

	Mitral valve N%	**Aortic valve N%**	**Both N%**	**p-value**
RHD With CAD (N = 28)	28 (100.0)	15 (53.57)	15 (53.57)	0.79
RHD With no CAD (N = 191)	190 (99.47)	117 (61.25)	116 (60.73)	

Table 3: Comparison of CAD in various valve diseases

	Aortic Valve N%	**Mitral Valve N%**	**p-value**
LAD	12 (80)	20 (71.43)	0.69
LCx	07 (46.67)	11 (39.28)	0.64
RCA	03 (10.71)	08 (28.57)	0.53
All three	02 (7.14)	03 (10.71)	0.92

Table 4: Involvement of various coronaries according to the valvular disease

Coronary angiography findings in the RHD with CAD group revealed that 42.86 % had single vessel disease (SVD), 42.86% had double vessel disease (DVD), and 14.28 % had triple vessel disease (TVD). All three vessels were affected in 14.28 % of the patients. The affected vessels in RHD patients with CAD (Group A) were the left anterior descending artery (LAD) in 20 (71.43%) patients, the left circumflex artery (LCx) in 11 (39.28%) cases, and the right coronary artery (RCA) in 08 patients (28.57)% (Table 2). Valve involvement in both groups is shown in Table 3. Mitral valve involvement was equally prevalent in both

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groups with and without CAD, while the aortic valve involvement was seen more in group B. Combined valve defects were also more common in non-CAD patients. (Group B) (60.73% vs. 53.57%, p = 0.01).

The associations between specific coronary artery involvement—lesions in the LAD, RCA, or LCx—and valvular diseases are summarized in Table 4. The results showed that LAD & LCx involvement was higher in patients with aortic valve stenosis compared to those with mitral stenosis (p=0.69 & 0.64 respectively). While RCA involvement was seen more in patients with mitral valve disease (p = 0.53).

DISCUSSION

The findings of this study highlight a relatively low prevalence of coronary artery disease (CAD) among patients with rheumatic heart disease (RHD) undergoing coronary angiography (CAG). The 12.78% CAD prevalence observed in this cohort aligns with existing research, which reports a CAD prevalence in RHD patients ranging between 8% and 50%,[11-14] with lower rates typically found in Southeast Asian populations 8% to 31.3%[15,16] compared to Western countries.

In studies by Lin et al. and Lim et al., the prevalence of CAD was 19.3% and 36%, respectively[17] indicating that the incidence of CAD in RHD patients remains relatively low, potentially diminishing the predictive power of earlier risk factor analyses.

A study from India by Jose et al. showed a 12.2% prevalence of coronary artery disease (CAD) in RHD patients, lower than the previously reported rates in Western populations.[18] Although CAD is more common among Southeast Asians, often at an earlier age compared to Western populations, the prevalence of CAD in RHD patients is relatively low.[19-21] In this study, the incidence of arterial stenosis in valvular patients was found to be 12.78%, which may be attributed to the older age groups in Western countries and differences in demographics, clinical factors, and environmental characteristics such as race, diet, and physical activity.

The male-to-female ratio observed (1.8:1) was consistent with other studies, which reported ratios between 1.6:1 and 2.6:1.[22] A study from China reported a ratio of 3:1, indicating a higher susceptibility in males.[15,22] The average age of patients with CAD and RHD in this study was 50.65±8.66 years, slightly lower than the mean age of atherosclerotic CAD in India (57.5 years).[23] Studies from Western and Chinese populations also reported similar ages, around 55-60 years, comparable to findings from India and Pakistan.[14,22,24]

In terms of vessel involvement, single-vessel disease (SVD), double-vessel disease (DVD), and triple-vessel disease (TVD) were present in 42.86 %, 42.86 %, and 14.28% of cases, respectively. The left anterior descending (LAD) artery was the most commonly affected vessel (71.43% overall and 32.14% in isolated cases), followed by the LCx (39.28%) and RCA (28.57%). Other studies by Rangel et al. and Li BL et al. also found the LAD to be the most frequently involved artery, followed by the RCA and LCx.[15]

Smoking/Tobacco use, hypertension, and diabetes were identified as the most significant risk factors associated with CAD in this population. These results are consistent with previous studies indicating that patients with RHD and CAD are more likely to exhibit these traditional atherosclerotic risk factors. A prospective study by Jose et al[18] also highlighted the importance of CAD risk factors in rheumatic valve patients using a multimarker approach. Atalar et al., in a large cohort of 1,075 patients, identified that hypertension; smoking, DM, and dyslipidemia were significantly higher in RHD patients with CAD compared to those without CAD.[25] The male predominance (64.28%) and the

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mean age of 51.17 years in Group A are comparable to other studies conducted in both Indian and Western populations.

Interestingly, while angina was significantly more frequent in patients with CAD, a finding supported by other studies as a strong predictor of CAD in RHD patients[12,23,24] there was no significant difference in valvular involvement between groups. Mitral valve involvement was equally prevalent in both CAD and non-CAD groups, which can be attributed to high proportion of patients with mitral valve involvement in this study. Atrial fibrillation, while more prevalent in non-CAD group, the difference was not significant. Patients with combined aortic and mitral valve disease were more frequently without CAD.

In our study, the prevalence of significant CAD in rheumatic patients was found to be 12.78%, slightly higher than the findings of some researchers.[18,23,26] Single-vessel disease and double vessel disease was equally observed, similar to results from other studies.[27] The low prevalence of CAD could not be explained by the use of rheumatic fever-preventing antibiotics, as these patients rarely received such prophylaxis. Kruczan et al. suggested that this low prevalence might be due to demographic and clinical characteristics.[23]

Despite the relatively low prevalence of CAD in this cohort, the presence of CAD significantly impacts the management of RHD patients. Preoperative coronary angiography should be considered in RHD patients with risk factors for CAD, especially those who are older or exhibit symptoms such as angina.

CONCLUSION

This study found that 12.78% of RHD patients undergoing coronary angiography had significant coronary artery disease (CAD). The most prevalent risk factors in these patients were smoking/Tobacco use, hypertension, and diabetes. Given the association between CAD and RHD, coronary evaluation through angiography is recommended for patients with high-risk profiles, especially those with traditional atherosclerotic risk factors or symptomatic angina. Early detection and management of CAD in this patient population are crucial for improving surgical outcomes and long-term prognosis.

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