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Frequency & Pattern of Various Valvular Lesions Among Patients with Rheumatic Heart Disease Based on Echocardiographic Records at LRH Hospital Peshawar Pakistan

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Abstract

Background: Rheumatic heart disease (RHD) remains a major cause of valvular heart disease in low- and middle-income countries, where recurrent rheumatic fever leads to permanent valvular damage. Understanding the pattern of valvular involvement is essential for early diagnosis and appropriate management.

Objective: To determine the frequency and pattern of various valvular lesions among patients with rheumatic heart disease based on echocardiographic records at Lady Reading Hospital, Peshawar.

Methods: A descriptive cross-sectional, record-based study was conducted on 85 patients with echocardiographically confirmed rheumatic heart disease. Demographic and echocardiographic

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data were collected and analyzed using Microsoft Excel 2020. Categorical variables were expressed as frequencies and percentages, while age was presented as mean ± standard deviation.

Results: The mean age of the patients was 36.31 ± 8.98 years (range: 17–52 years). Females constituted 56.5% of the study population, and the majority of patients were aged 26–35 years (35.3%). Mitral stenosis was the most common valvular lesion (90.6%), followed by mitral regurgitation (85.9%), tricuspid regurgitation (54.1%), aortic regurgitation (52.9%), and aortic stenosis (34.1%). Mixed valvular lesions were observed in 96.5% of patients, whereas isolated valve involvement was present in only 3.5%. Severe mitral stenosis was identified in 52.9% of cases, moderate mitral regurgitation in 54.1%, mild aortic regurgitation in 37.6%, and mild tricuspid regurgitation in 41.2%.

Conclusion: Rheumatic heart disease predominantly affected young and middle-aged adults, with a higher prevalence among females. Mitral valve involvement, particularly mitral stenosis, was the most common echocardiographic finding, and mixed valvular disease was present in the majority of patients. Early echocardiographic evaluation and timely management are essential to reduce disease progression and improve clinical outcomes.

INTRODUCTION

Rheumatic heart disease (RHD) remains one of the leading causes of acquired valvular heart disease in low- and middle-income countries despite being largely preventable (1). It develops as a long-term complication of acute rheumatic fever following untreated or inadequately treated Group A β-hemolytic streptococcal pharyngitis (2). Recurrent inflammatory episodes result in progressive fibrosis, thickening, commissural fusion, and calcification of the heart valves, leading to valvular stenosis, regurgitation, or mixed lesions. Although the global burden of RHD has declined in high-income countries, it continues to be a major public health problem in South Asia, including Pakistan, where delayed diagnosis and limited access to healthcare contribute to disease progression (3).

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The mitral valve is the most frequently affected valve in RHD, followed by the aortic valve, while tricuspid and pulmonary valve involvement is comparatively uncommon (4). Patients often present with isolated or combined valvular lesions that gradually progress to heart failure, atrial fibrillation, pulmonary hypertension, thromboembolic events, and infective endocarditis (5). Identifying the frequency and pattern of these valvular lesions is essential for early diagnosis, timely intervention, and appropriate management (6). Echocardiography, particularly Doppler echocardiography, is the gold standard for diagnosing rheumatic valvular heart disease. It provides detailed assessment of valve morphology, severity of stenosis and regurgitation, chamber dimensions, and cardiac function. Furthermore, echocardiography facilitates early detection of asymptomatic disease, guides clinical decision-making, and assists in monitoring disease progression and surgical planning (7).

Despite the persistent burden of RHD in Pakistan, published data describing the distribution of individual valvular lesions remain limited, particularly from tertiary care hospitals in Khyber Pakhtunkhwa (8). Understanding local patterns of valve involvement can assist clinicians in planning management strategies, allocating healthcare resources, and developing preventive programs. Therefore, the present study aimed to determine the frequency and pattern of various valvular lesions among patients with rheumatic heart disease based on echocardiographic records at Lady Reading Hospital, Peshawar, Pakistan.

Aim

To determine the frequency and pattern of valvular lesions among patients with rheumatic heart disease using echocardiographic records at a tertiary care hospital in Peshawar, Pakistan.

Objectives

1. To determine the frequency of various valvular lesions in patients with rheumatic heart disease.
2. To identify the most common valvular lesion associated with rheumatic heart disease.

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MATERIAL AND MTHODS

This descriptive cross-sectional, record-based study was conducted in the Echocardiography Section of the Cardiology Department at Lady Reading Hospital (LRH), Peshawar, a tertiary care hospital serving patients from Peshawar and surrounding districts. A total of 85 echocardiographic records of patients diagnosed with rheumatic heart disease were included. The sample size was calculated using the standard formula for single-proportion studies based on an expected frequency of 15%, a 95% confidence level, an 8% margin of error, and an additional 10% allowance for incomplete records. Echocardiographic records of both male and female patients of all age groups with confirmed rheumatic heart disease were included. Patients with congenital heart disease, non-rheumatic valvular disease, previous mitral valve surgery, or incomplete echocardiographic records were excluded. Following approval from the institutional ethical committee, data were collected from 7 to 11 May 2026 using consecutive sampling. Demographic and clinical information, including age, gender, and the type of valvular lesion, was extracted from echocardiographic records using a structured data collection form. Data were entered and analyzed using Microsoft Excel 2020. Categorical variables were summarized as frequencies and percentages, while continuous variables were expressed as mean ± standard deviation. As the study was descriptive in nature, no inferential statistical analysis was performed.

RESULTS

A total of 85 patients diagnosed with rheumatic heart disease at LRH Hospital Peshawar. We collected and analyzed demographic and echocardiographic data using basic statistical methods. We calculated frequencies and percentages for categorical variables, and we presented age as mean ± standard deviation (SD). The average age of participants was 36.31 ± 8.98 years, with ages ranging from 17 to 52 years. Female patients made up 48 (56.5%) of the study group, while 37 (43.5%) were male. The largest group of patients fell within the 26 to 35 years age range (35.3%), followed by the 36 to 45 years group (34.1%). Among the different valvular lesions, mitral stenosis (MS) was the most common, found in 77 (90.6%) patients. This

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was followed by mitral regurgitation (MR) in 73 (85.9%) patients. Tricuspid regurgitation (TR) occurred in 46 (54.1%) patients, aortic regurgitation (AR) in 45 (52.9%), and aortic stenosis (AS) in 29 (34.1%) patients. Mixed valvular lesions were present in 82 (96.5%) patients, while isolated valvular lesions were seen in only 3 (3.5%) patients. The results indicated that rheumatic heart disease was more common in females and mainly affected young to middle-aged adults, with mitral valve issues being the most frequent. These findings may help improve patient management and early diagnosis of valvular lesions. Mitral stenosis was mainly severe in 52.9% of cases. Moderate mitral regurgitation was the most common finding, occurring in 54.1% of patients. Most patients had no aortic stenosis, at 65.9%. Mild aortic regurgitation was present in 37.6% of patients, while mild tricuspid regurgitation was noted in 41.2%. Overall, lesions of the mitral valve were more severe than those of the aortic and tricuspid valves findings show that more common in females and mainly affected young to middle-aged adults. Mitral valve involvement was the predominant finding, with mitral stenosis being the most frequently disease represented the majority of cases.

Table 4.1: Gender distribution of study population (n=85)

Gender	Frequency (n)	Percentage %
Male	37	43.3
female	48	56.5
Total	85	100

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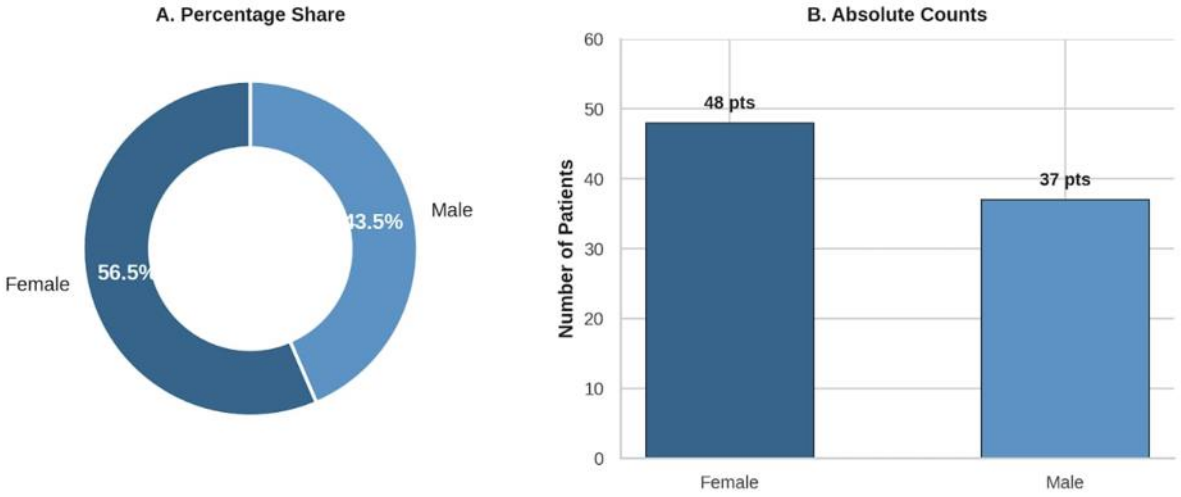
Figure 4.1: Gender distribution of study participants (n=85)



Among the total study participants, females were more frequently affected than males. Out of 85 patients, 48 (56.5%) were females while 37 (43.5%) were males. And in this new study males frequently closely affected by rheumatic heart disease (RHD) in 2026 at Peshawar Pakistan.

Table 4.2: Age group distribution of study population (n=85)

Variable	Value
Mean age ± SD	36.31 ± 8.98 year
Minimum age	17 year
Maximum age	52

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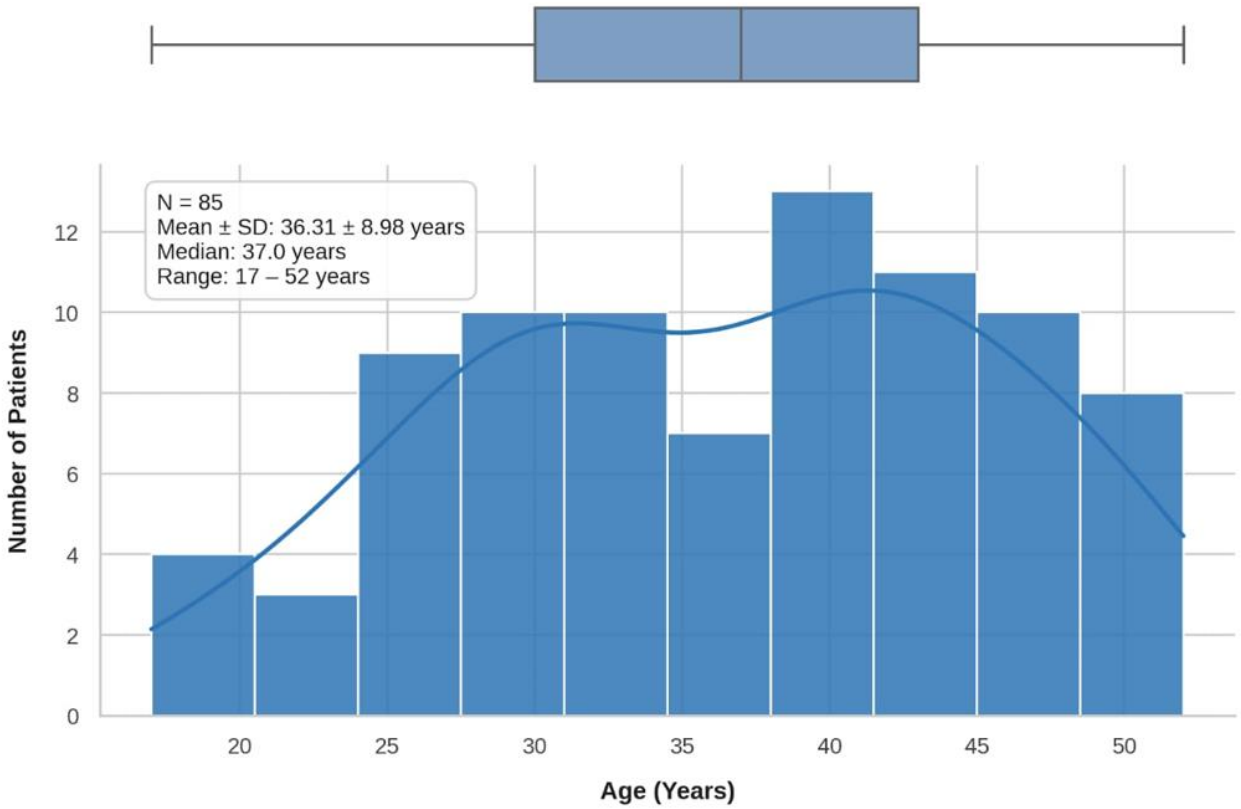
Figure 4.2: Age distribution of study participants



The mean age of patients included in the study was 36.32 ± 8.98 years, with an age range from 17 to 52 years

Table 4.3: Age group distribution of study population (n=85)

Age group (year)	Frequency (n)	Percentage (%)
17-25	9	10.6
26-35	30	35.3

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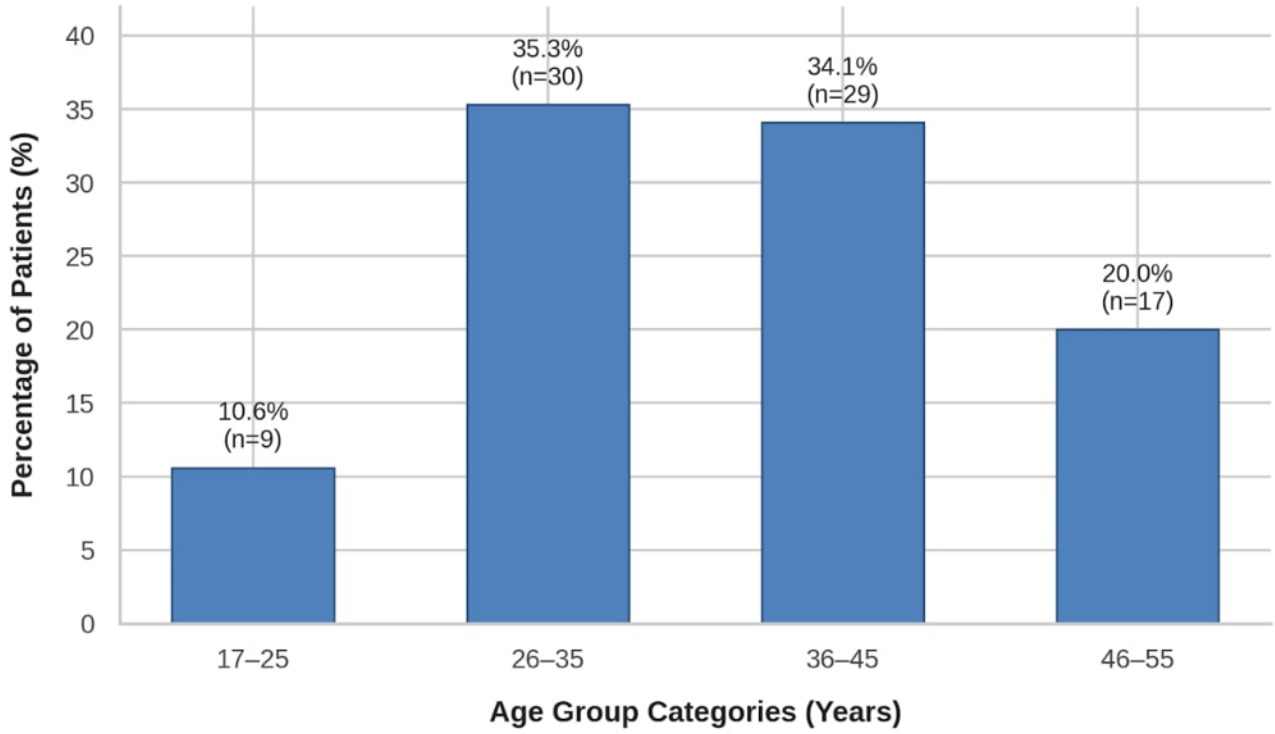
36-45	29	34.1
46-55	17	20.0
Total	85	100

Figure 4.3: Age group distribution of RHD patients (n=85)



Most patients belonged to the 26-35 years age group, accounting for 30 (35.3%) cases, followed by the 36-45 years group with 29 (34.1%) patients. The lowest number of patients was found in the 17-25 years age group.

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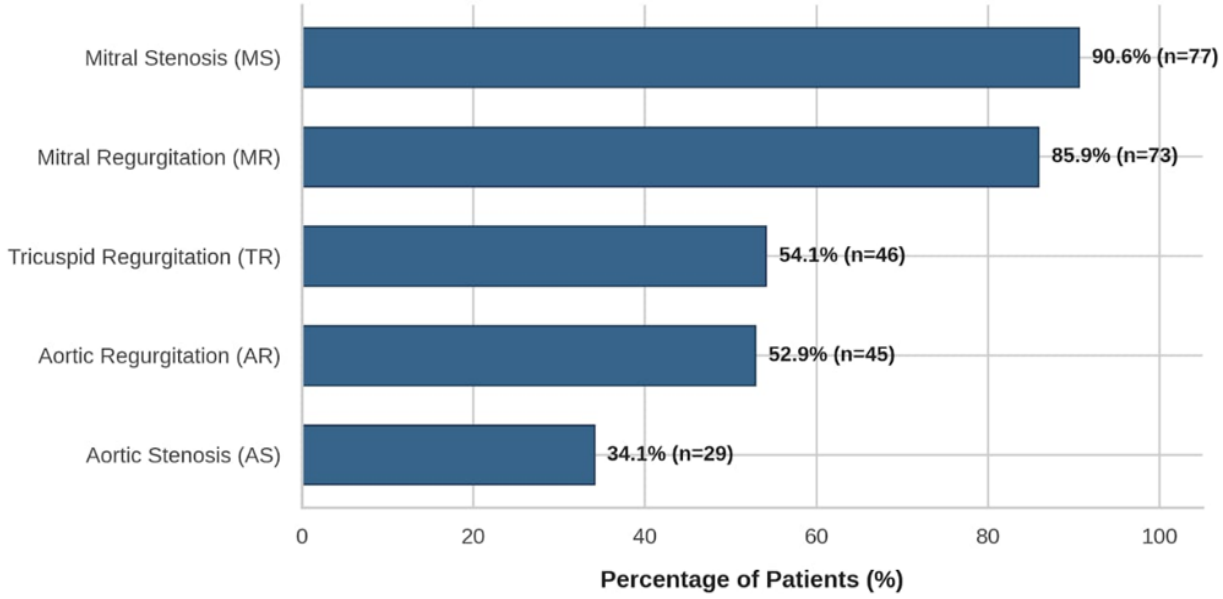
Table 4.4: Frequency of various valvular lesions among RHD patients (n=85)

Valvular lesion	Frequency (n)	Percentage
Mitral stenosis (MS)	77	90.6
Mitral regurgitation (MS)	73	85.5
Aortic stenosis (AS)	29	34.1
Aortic regurgitation (AR)	45	52.9
Tricuspid regurgitation (TR)	46	54.1
Pulmonary valve (PV)	0	0.0

Figure 4.4: Frequency of valvular lesions in RHD patients (n=85)



stenosis (MS) was the most common valvular lesion was present in 77 (90.6%) patients. Mitral regurgitation (MR) was the second most common lesion and was observed in 73 (85.9%) patients. Aortic stenosis (AS) showed the lowest frequency and was found in 29 (34.1%) patients. And Aortic

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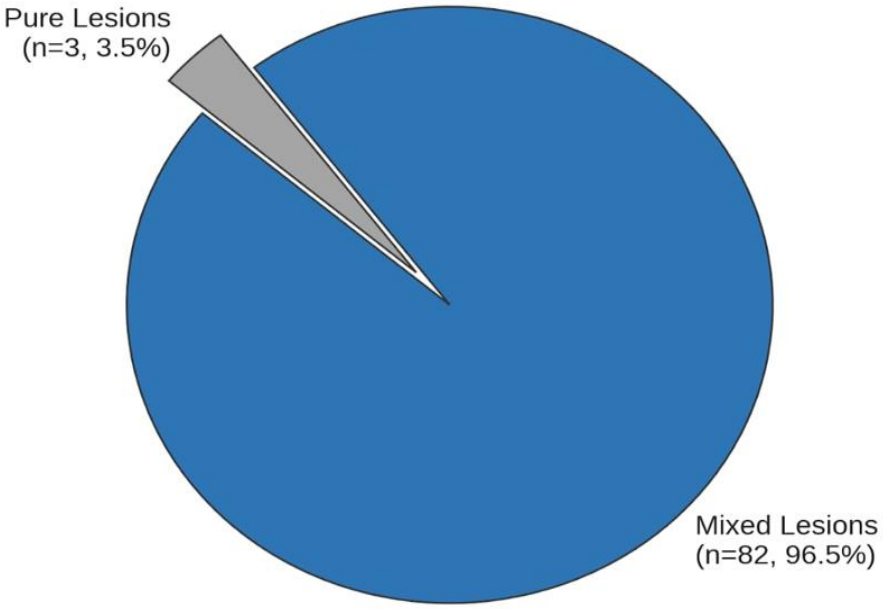
regurgitation (AR) third most common lesion was observed in 45 (52.9%) patients. And Pulmonary valve lesion was not seen any patient in this study PV is (0.0%) in 85 patients.

Table 4.5: Distribution of pure and mixed valvular lesions (n=85)

Types of lesions	Frequency (n)	Percentage (%)
Pure lesion	3	3.5
Mixed lesion	82	96.5
Total	85	100

Figure 4.5: Distribution of pure and mixed valvular lesions (n=85)



Mixed valvular lesions were much more common than isolated lesions. 82 (96.5%) patients had mixed valvular disease, while only 3 (3.5%) patients had pure lesions.

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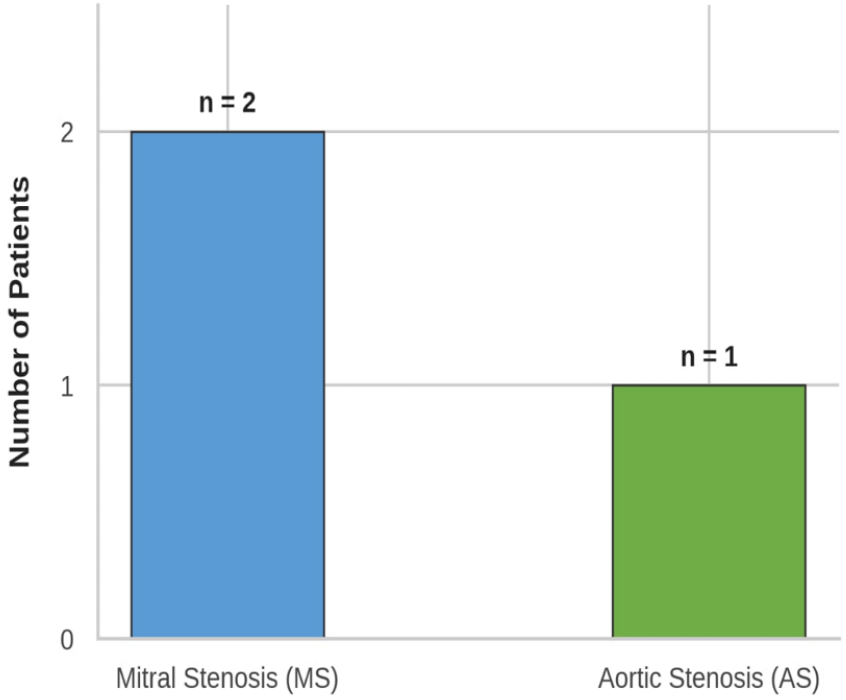
Table 4.6: Distribution of pure valvular lesion (n=3)

Pure lesion	Frequency (n)
Mitral stenosis (MS)	2
Aortic stenosis (AS)	1
Total	3

Figure 4.6: Distribution of pure valvular lesions (n=3)



Among pure valvular lesions, isolated mitral stenosis was more common and was present in 2 patients, while isolated aortic stenosis was found in 1 patient.

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Table 4.7: Severity Distribution of Different Valvular lesions among with RHD (n=85)

Severity	MS n (%)	MR n (%)	AS n (%)	AR n (%)	TR n(%)
No lesion	9 (10.6%)	12 (14.1%)	56 (65.9%)	40 (45.9%)	39 (45.9%)
Mild	9 (10.6%)	17 (20.0%)	10 (11.8%)	32 (37.6%)	35 (41.2%)
Moderate	23 (27.1%)	46 (54.1%)	8 (9.4%)	10 (11.8%)	9 (10.6%)
Severe	45 (52.9%)	10 (11.8%)	11 (12.9%)	3 (3-5%)	2 (2.4%)
Total	85 (100%)	85 (100%)	85 (100%)	85 (100%)	85 (100%)

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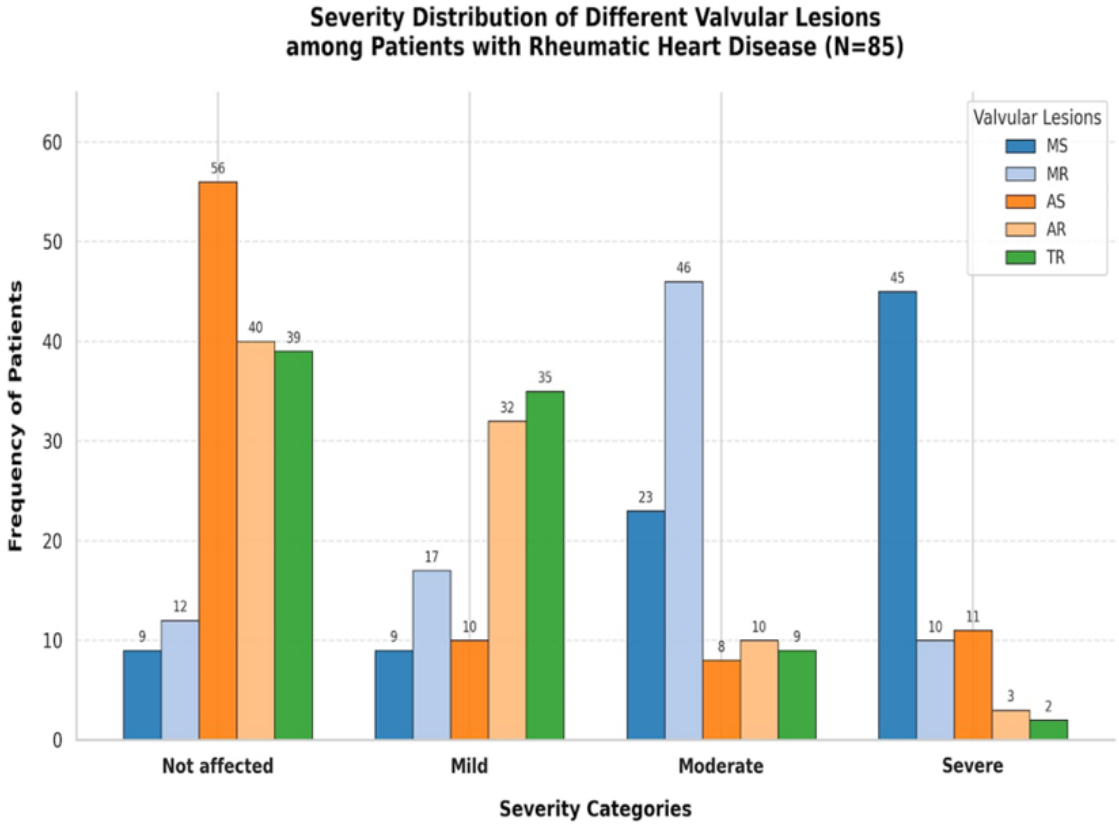

Severity analysis of various valvular lesions among patient with rheumatic heart disease showed variable patterns across different valves. For mitral stenosis (MS), sever disease was the most common category, observed in 45 (52.9%) patients, followed by moderate. Severity in 23 (27.1%) patients. Mild MS and non- affected lesion cases each accounted for 9 (10.6%) patients. For mitral regurgitation (MR), moderate severity was the predominant finding, affecting 46(54.1%) patients, while mild MR was present in 17 (20.0%), sever MR in 10 (11.8%), and 12 (14.1%) patients had no MR involvement. Among aortic stenosis (AS), the majority of patients 56 (65.9%) had no involvement, where sever AS in 8 (9.4%) patients. aortic regurgitation (AR), mild disease was the most frequent affected category, present in 32 (37.6%) patients. Followed by moderate disease in 10 (11.8%) and sever disease in 3 (3.5%) patients, followed by moderate disease in 3 (3.5%) patients. Similarly, tricuspid regurgitation (TR) showed predominantly mild involvement in 35

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(41.2%) patients' while moderate and sever disease were identified in 9 (10.6%) and 2 (2.4%) patients, respectively.

DISCUSSION

The present study was conducted to determine the frequency and pattern of various valvular lesions among patients with rheumatic heart disease (RHD) presenting at LRH Hospital Peshawar. Rheumatic heart disease remains an important public health problem in many developing countries and continues to cause significant morbidity, especially among young adults and economically productive age groups. Despite improvements in healthcare services, RHD still represents a considerable burden because of delayed diagnosis, limited access to healthcare facilities, recurrent rheumatic fever, and poor adherence to secondary prophylaxis. Echocardiography has become an essential diagnostic tool for the identification and assessment of valvular abnormalities and plays a major role in early diagnosis and management of these patients[1]. In the present study, the mean age of participants was 36.31 ± 8.98 years, with most patients belonging to the 26–35 years age group. These findings suggest that rheumatic heart disease commonly affects young and middle-aged adults and may lead to significant clinical and socioeconomic consequences because individuals in these age groups represent a productive segment of the population. Similar findings have been reported in previous studies where RHD predominantly affected younger age groups[2]. The current study showed a female predominance, with females accounting for 56.5% of cases compared to 43.5% in males. Similar observations have been reported in previous studies where females showed a higher frequency of rheumatic valvular disease. The exact reason for this gender difference is not fully understood; however, biological, hormonal, social, and healthcare-related factors may contribute to this pattern.[3] Among different valvular lesions observed in this study, mitral stenosis (MS) was the most frequent lesion and was present in 90.6% of patients, followed by mitral regurgitation (MR), tricuspid regurgitation (TR), aortic regurgitation (AR), and aortic stenosis (AS). These findings are consistent with previous studies that reported

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predominant involvement of the mitral valve in patients with rheumatic heart disease. The mitral valve is usually affected because rheumatic inflammation causes progressive leaflet thickening, fibrosis, commissural fusion, and calcification. Over time, these pathological changes can result in stenotic or regurgitant lesions and may progress to severe valvular dysfunction[4].

The predominance of mitral stenosis in the current study also agrees with findings from previous studies conducted in Pakistan and other developing countries, where mitral valve involvement represented the major proportion of valvular abnormalities among RHD patients[5]. Another important finding of the present study was the high frequency of mixed valvular lesions (96.5%) compared with isolated lesions (3.5%). This indicates that multiple valve involvement is common in long-standing rheumatic disease. Chronic inflammation and repeated episodes of rheumatic activity can progressively affect additional cardiac valves over time. multiple valve involvement often increases disease severity and may lead to worse clinical outcomes if diagnosis and intervention are delayed[6]. Patients with rheumatic valvular disease may develop several complications including atrial fibrillation, pulmonary hypertension, heart failure, thromboembolic events, infective endocarditis, and stroke. In particular, mitral stenosis may increase left atrial pressure and enlargement, thereby increasing the risk of atrial fibrillation and thromboembolic complications. Delayed diagnosis and inadequate treatment may further worsen prognosis and quality of life[7]. Early diagnosis and appropriate treatment are important in reducing complications associated with rheumatic heart disease. Medical treatment may include diuretics, anticoagulants in selected patients, and secondary prophylaxis against recurrent rheumatic fever. In severe cases, interventional and surgical procedures such as balloon mitral valvotomy, valve repair, or valve replacement may be required depending upon disease severity and valve involvement. Regular echocardiographic follow-up is also important for monitoring disease progression and improving patient outcomes[8]. The findings of the present study emphasize the importance of early screening, public awareness, timely

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diagnosis, and improved healthcare access in reducing the burden of rheumatic heart disease. Early identification of valvular lesions through echocardiographic assessment may help improve outcomes and decrease long-term complications among affected individuals[9].

CONCLUSION

Rheumatic heart disease remains a significant cause of valvular heart disease among patients presenting to a tertiary care hospital in Peshawar. The disease was more common in females and predominantly affected young and middle-aged individuals. Mitral valve lesions, particularly mitral stenosis, were the most frequent echocardiographic findings, while mixed valvular involvement was also common, reflecting advanced disease at presentation. These findings highlight the importance of early diagnosis, timely management, and regular echocardiographic follow-up to reduce disease progression and associated complications.

Recommendations

- Strengthen early detection and echocardiographic screening of individuals at high risk for rheumatic heart disease.
- Ensure prompt diagnosis and appropriate treatment of streptococcal throat infections to prevent acute rheumatic fever and subsequent valvular damage.
- Promote adherence to secondary prophylaxis with benzathine penicillin in patients with a history of rheumatic fever.
- Increase public awareness regarding rheumatic heart disease prevention and the importance of regular cardiology follow-up.
- Conduct larger multicenter studies to better define the epidemiology and valvular patterns of rheumatic heart disease in Pakistan.

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