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FREQUENCY OF MITRAL STENOSIS IN RHEUMATIC HEART DISEASE PATIENT AMONG MALE AND FEMALE PRESENT AT TERTIARY CARE HOSPITAL

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Abstract

Background: Rheumatic Heart Disease (RHD) remains a major public health problem in developing countries and is a leading cause of valvular heart disease among young and middle-aged individuals. Mitral stenosis (MS) is the most common valvular lesion associated with RHD and may vary in frequency and severity between males and females. Objective: To determine the frequency of mitral stenosis among patients with rheumatic heart disease and compare its occurrence and severity between male and female patients presenting to a tertiary care hospital. Methodology:

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A descriptive cross-sectional study was conducted in the Department of Cardiology, Lady Reading Hospital, Peshawar. A total of 142 patients aged 15–60 years with confirmed rheumatic heart disease were included using non-probability consecutive sampling. Data were collected from hospital records and echocardiography reports and analyzed using SPSS version 25. The Chi-square test was applied to assess gender-based differences, with a p-value ⩽0.05 considered statistically significant. Results: Among 142 patients, 80 (56.3%) were females and 62 (43.7%) were males, indicating a higher prevalence of rheumatic mitral stenosis among females. Mild mitral stenosis was observed in 47 (33.1%) patients, moderate in 50 (35.2%), and severe in 45 (31.7%). Females demonstrated a slightly higher frequency of both mild and severe mitral stenosis compared to males. The most common age group affected was 50–60 years (22.5%). Shortness of breath (64.8%) and fatigue (57.0%) were the most frequently reported symptoms. Overcrowding (57.7%) and previous streptococcal infection (54.9%) were the leading risk factors identified. Conclusion: Mitral stenosis is a common manifestation of rheumatic heart disease and occurs more frequently in females than males. Female patients also showed a slightly greater burden of severe disease. Early detection, timely treatment of streptococcal infections, and improved access to healthcare may help reduce the burden of rheumatic mitral stenosis and its complications.

Keywords: Rheumatic Heart Disease, Mitral Stenosis, Echocardiography, Valvular Heart Disease, Gender Distribution,

Introduction

Rheumatic heart disease (RHD) remains one of the leading causes of acquired cardiovascular disease in low- and middle-income countries despite being largely preventable. It develops as a chronic sequela of acute rheumatic fever following untreated or inadequately treated infection with Group A β-hemolytic Streptococcus. The inflammatory process causes progressive fibrosis, leaflet thickening, commissural fusion, and calcification of the heart valves, eventually leading to permanent valvular dysfunction (Otto et al., 2021). Although the global burden of RHD has declined in many developed countries, it continues to pose a significant public health challenge in South

Asia, Sub-Saharan Africa, and other resource-limited regions where overcrowding, poverty, and limited access to healthcare remain common (Watkins et al., 2023).

Among the valvular lesions associated with rheumatic heart disease, mitral stenosis (MS) is the most frequent and clinically significant manifestation. Rheumatic mitral stenosis results from progressive narrowing of the mitral valve orifice due to chronic inflammation and fibrosis, leading to obstruction of left ventricular filling. As the disease progresses, elevated left atrial pressure causes pulmonary venous hypertension, pulmonary arterial hypertension, atrial enlargement, atrial fibrillation, thromboembolic events, and eventually right-sided heart failure (Otto et al., 2021). Patients commonly present with exertional dyspnea, fatigue, palpitations, hemoptysis, and reduced exercise tolerance, particularly during advanced stages of the disease.

Globally, rheumatic heart disease affects more than 39 million people and accounts for over 300,000 deaths annually, with the highest burden occurring in low- and middle-income countries (Watkins et al., 2023). Despite improvements in antibiotic therapy and preventive strategies, rheumatic valvular disease continues to cause substantial morbidity among adolescents and young adults in developing nations. Pakistan remains among the countries where rheumatic heart disease continues to be frequently encountered, particularly among populations with limited access to early diagnosis and treatment of streptococcal pharyngitis.

Echocardiography is considered the gold standard for diagnosing mitral stenosis because it accurately evaluates valve morphology, leaflet mobility, commissural fusion, transmitral pressure gradients, valve area, and associated valvular lesions. Current international guidelines recommend echocardiography as the primary diagnostic tool for confirming rheumatic mitral stenosis, assessing disease severity, and guiding therapeutic interventions such as percutaneous mitral balloon commissurotomy or valve replacement (Otto et al., 2021; Vahanian et al., 2022).

Several studies have demonstrated that rheumatic mitral stenosis occurs more frequently in females than males. The exact mechanism remains uncertain but may involve sex-related differences in immune response, hormonal influences, genetic susceptibility, and healthcare-seeking behavior. Female predominance has consistently been reported across different populations, with women often presenting at younger

ages and with more advanced valvular involvement compared with men (Watkins et al., 2023). However, the frequency and gender distribution vary considerably between countries because of differences in socioeconomic conditions, healthcare accessibility, and implementation of rheumatic fever prevention programs.

In Pakistan, rheumatic heart disease remains an important cause of valvular heart disease encountered in tertiary care hospitals. Delayed diagnosis, inadequate secondary prophylaxis, and poor access to specialized cardiac services contribute to disease progression and late presentation. Although several local studies have evaluated the prevalence of rheumatic heart disease, limited evidence is available regarding the gender-specific frequency of mitral stenosis among patients presenting to tertiary healthcare centers. Understanding these differences is important because early diagnosis and timely intervention can significantly reduce complications such as atrial fibrillation, stroke, pulmonary hypertension, heart failure, and premature mortality.

Identification of gender-based differences in mitral stenosis may also assist clinicians in improving risk stratification and planning individualized management strategies. Furthermore, local epidemiological data are essential for healthcare planning, allocation of resources, and implementation of preventive programs aimed at reducing the burden of rheumatic heart disease.

Therefore, the present study aims to determine the frequency of mitral stenosis among patients with rheumatic heart disease presenting to a tertiary care hospital and to compare its occurrence between male and female patients. The findings will provide valuable local evidence regarding the epidemiology of rheumatic mitral stenosis and may contribute to improving early diagnosis, clinical management, and preventive strategies in Pakistan.

Methodology

This descriptive cross-sectional study was conducted in the Department of Cardiology at Lady Reading Hospital over a period of six months to determine the frequency of mitral stenosis among patients with rheumatic heart disease (RHD). The hospital was selected because it is a major tertiary care center in Khyber Pakhtunkhwa, receiving a large number of RHD patients from across the province and providing comprehensive echocardiographic services.

A total of 142 patients were included in the study. The sample size was calculated using the OpenEpi sample size calculator with a population of 7,500, an estimated prevalence of 12.4%, a 95% confidence level, and a 5% margin of error. A non-probability consecutive sampling technique was employed, whereby all eligible patients presenting during the study period were enrolled until the required sample size was achieved.

The study included male and female patients aged 15–60 years with echocardiography-confirmed rheumatic heart disease and mitral stenosis, defined as a mitral valve area (MVA) of <2.0 cm^2 according to the World Heart Federation criteria. Patients with incomplete medical records, non-rheumatic causes of mitral stenosis, or poor-quality echocardiographic images that prevented accurate assessment were excluded.

Data were collected retrospectively from hospital records, including cardiology registers and echocardiography reports, after obtaining ethical approval. Information on age, gender, and echocardiographic findings, particularly the presence and severity of mitral stenosis, was extracted using a structured proforma. As all diagnoses had already been established by consultant cardiologists, no additional clinical examination or diagnostic testing was performed. The collected data were entered and analyzed using SPSS version 27. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. A p-value of <0.05 was considered statistically significant.

RESULT

Overall Gender Distribution

A total of 142 patients diagnosed with Rheumatic Heart Disease and confirmed Mitral Stenosis were included in this study. Out of these 142 patients, 62 (43.7%) were male, while 80 (56.3%) were female. This shows that Mitral Stenosis in the setting of Rheumatic Heart Disease was more frequently observed among female patients as compared to male patients in this study population, which is consistent with the generally recognized higher predisposition of females toward rheumatic mitral valve involvement.

Severity of Mitral Stenosis according to Gender (N = 142)

Among the 62 male patients, 17 (12.0% of the total sample) had Mild Mitral Stenosis, 25 (17.6%) had Moderate Mitral Stenosis, and 20 (14.1%) had Severe Mitral Stenosis. Among the 80 female patients, 30 (21.1% of the total sample) had Mild Mitral Stenosis, 25 (17.6%) had Moderate Mitral Stenosis, and 25 (17.6%) had Severe Mitral Stenosis. Overall, Mild Mitral Stenosis was the most common grade observed among female patients, accounting for the largest single subgroup in the entire study population, while Moderate Mitral Stenosis was found in equal proportion among both genders (17.6% each). Severe Mitral Stenosis was slightly more common in females (17.6%) compared to males (14.1%), suggesting a marginally higher burden of advanced disease among female patients in this cohort.

Age Wise Distribution:

The total sample size was 142 patient of RHD and this is the age wise distribution of male and female out of which different ages patients are present

Total Sample: N = 142 | Age Range: 10–70 Years

Table 1: Age Group Distribution by Gender (N = 142)

Age Group	Male (n=62)		Female (n=80)		Total (N=142)	
	n	%	n	%	n	%
10–20 years	6	9.7%	2	2.5%	8	5.6%
20–30 years	13	21.0%	16	20.0%	29	20.4%
30–40 years	10	16.1%	17	21.3%	27	19.0%
40–50 years	11	17.7%	17	21.3%	28	19.7%
50–60 years	14	22.6%	18	22.5%	32	22.5%
60–70 years	8	12.9%	10	12.5%	18	12.7%
Total	**62**	**100.0%**	**80**	**100.0%**	**142**	**100.0%**

Note: n = frequency; % = column percentage within gender subgroup. Row % (of total N) shown in Total column.

This study shows that in age wise distribution of patient from age 10-20 years have an overall frequency in male and female is 5.6%. And age 20-30 shows a frequency of about 20.4% in both genders. Age 30-40 patient shows a frequency of about 19.0% in both genders. Age 40-50 shows frequency of about 19.7% in both genders. While the patients from age 50-60 have the highest frequency among these about 22.5% in both genders. And age 60-70 patient shows a frequency of about 12.7% in both genders.

Figure 1: Age Group Distribution by Gender

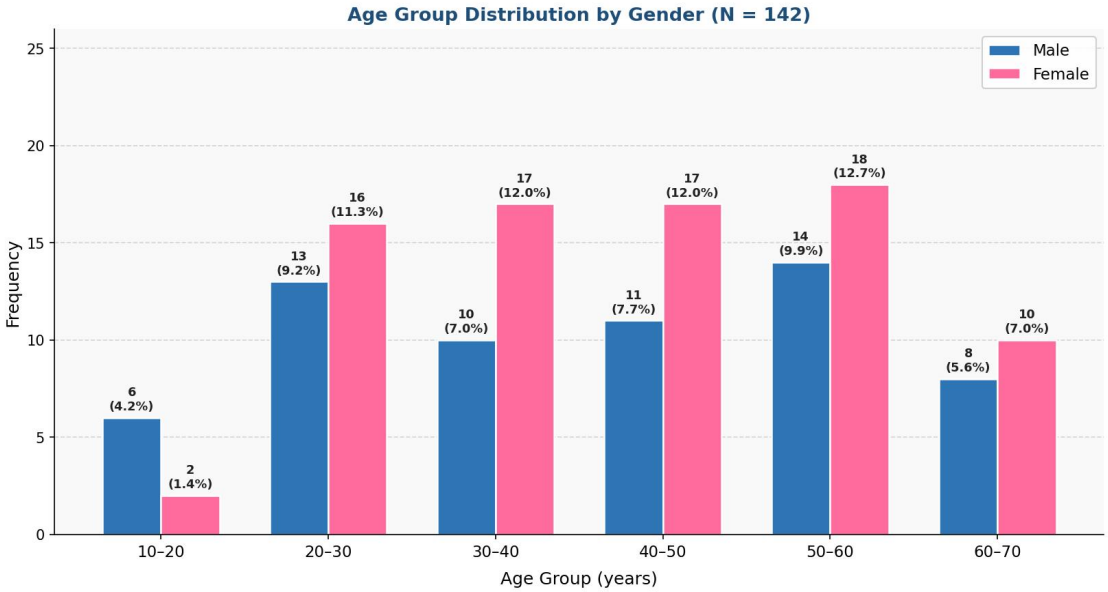
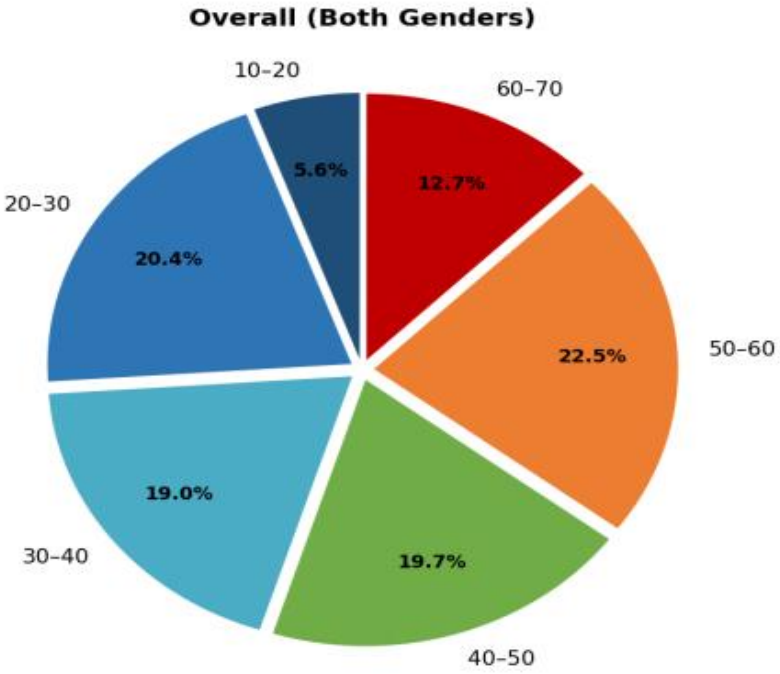


Figure 4.1.1: Grouped Bar Chart – Age Group Distribution by Gender (n and % of N=142 labelled)

Figure 4.1.2 Age Distribution:



2. Overall Gender Distribution

A total of 142 patients were enrolled. And the Table 1 shows the frequency and percentage of male and female patients thar are included in the sample in which the male patient is about 62 and female patient is dominant with a frequency of 80 patient in sample.

Table 2: *Gender Distribution of the Study Sample (N = 142)*

Gender	Frequency (n)	Percent (%)
Male	62	43.7%
Female	80	56.3%
Total	142	100.0%

Figure 1. Gender Distribution

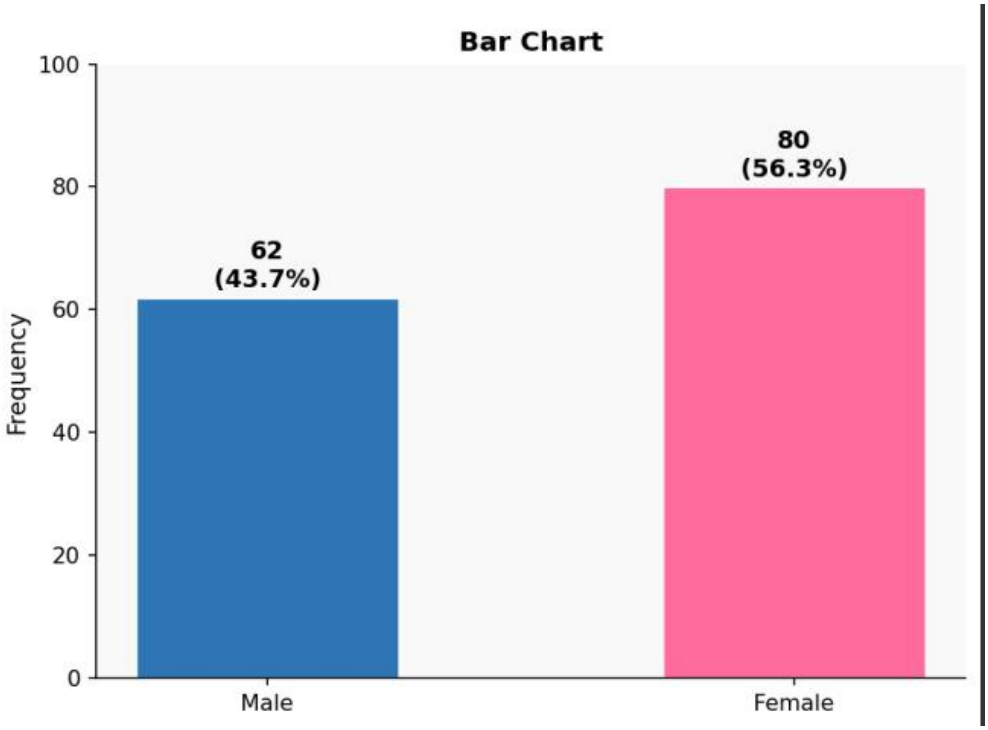
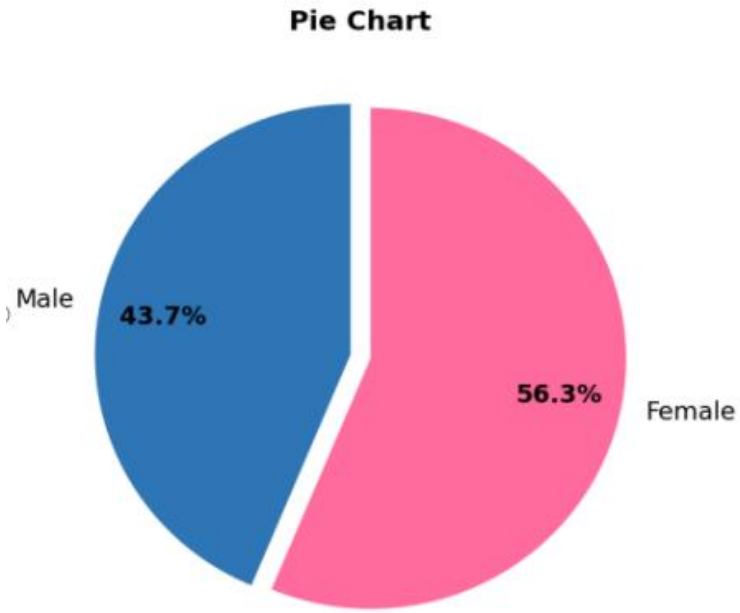


Figure 4.2.2 Gender Wise Distribution



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3. ARF (Acute Rheumatic Fever) History by Gender

This table represent the distribution of rheumatic fever history among male and female patient. And it is categorized on the basis of weather the patient have diagnosed with the rheumatic fever previously or in present or not and some of the patient history is unknown. This sample include the male patient diagnosed with ARF is about 25 out of 62 and 21 are not present with ARF history. While in female out of 80 patients 32 was diagnosed with ARF history and about 38 was absent with ARF history at time of sampling.

Table 3: *ARF History Distribution by Gender (N = 142)*

ARF History	Male (n=62)		Female (n=80)		Total (N=142)	
	n	%	n	%	N	%
Yes	25	40.3%	32	40.0%	57	40.1%
No	21	33.9%	38	47.5%	59	41.5%
Unknown	16	25.8%	9	11.3%	25	17.6%
Missing	0	0.0%	1	1.3%	1	0.7%
Total	62	100%	80	100%	142	100%

Figure 1. Arf History:

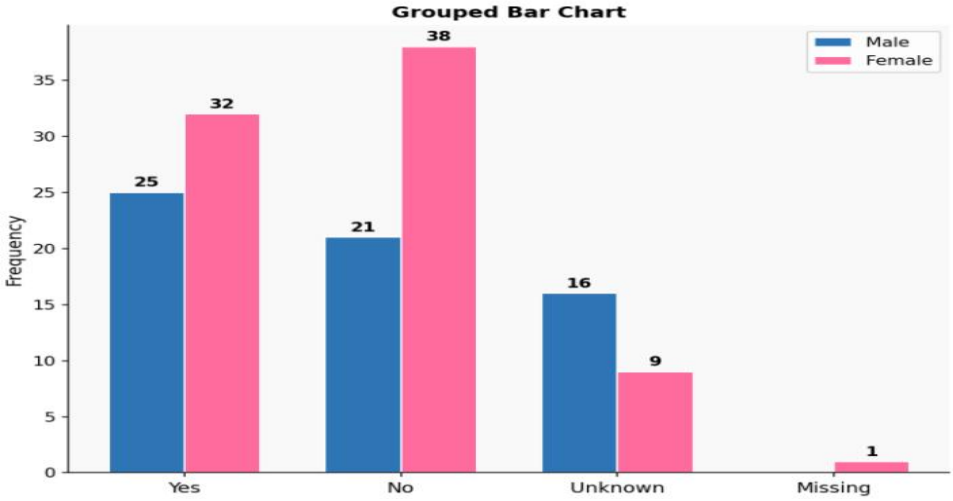
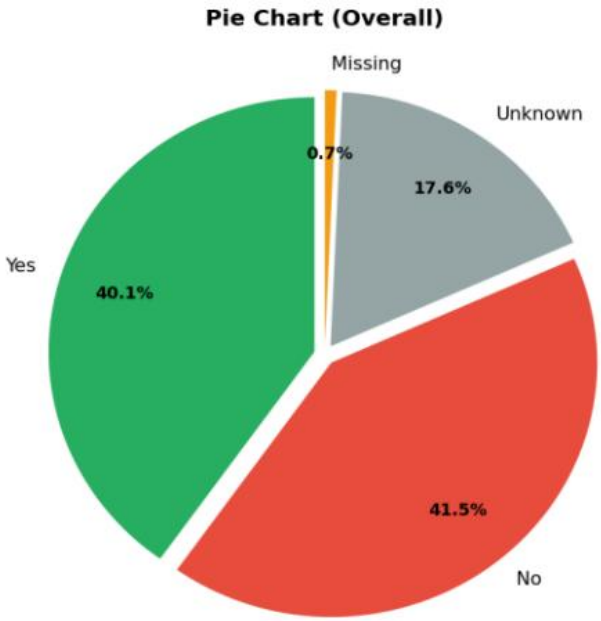


Figure 4.3.2. Arf History



RISK FACTORS:

This table shows the frequency distribution of risk factors among male and female patients varies differently according to this table the patients that are affected by the untreated strep infection on both gender is 78 patient. And the patient that are affected by the overcrowding areas is about 82 patient in both genders . and poor hygiene patient is about 65 in both gender while the patient with limited health care access is about 64 and among all the major risk factor is overcrowding which affect about 57.7% patients in both genders.

Table 4: *Frequency distribution of risk factors(N=142)*

Risk Factor	Yes (n)	No (n)	% Yes	% No	Cumulative % (Yes)
Strep Infection	78	64	54.9%	45.1%	54.9%
Overcrowding	82	60	57.7%	42.3%	57.7%
Poor Hygiene	65	77	45.8%	54.2%	45.8%
Limited Health Care Access	64	78	45.1%	54.9%	45.1%

Note: N = 142; Missing = 1 per variable. Values represent frequency of "Yes" response.

Figure 4.1. Risk Factors

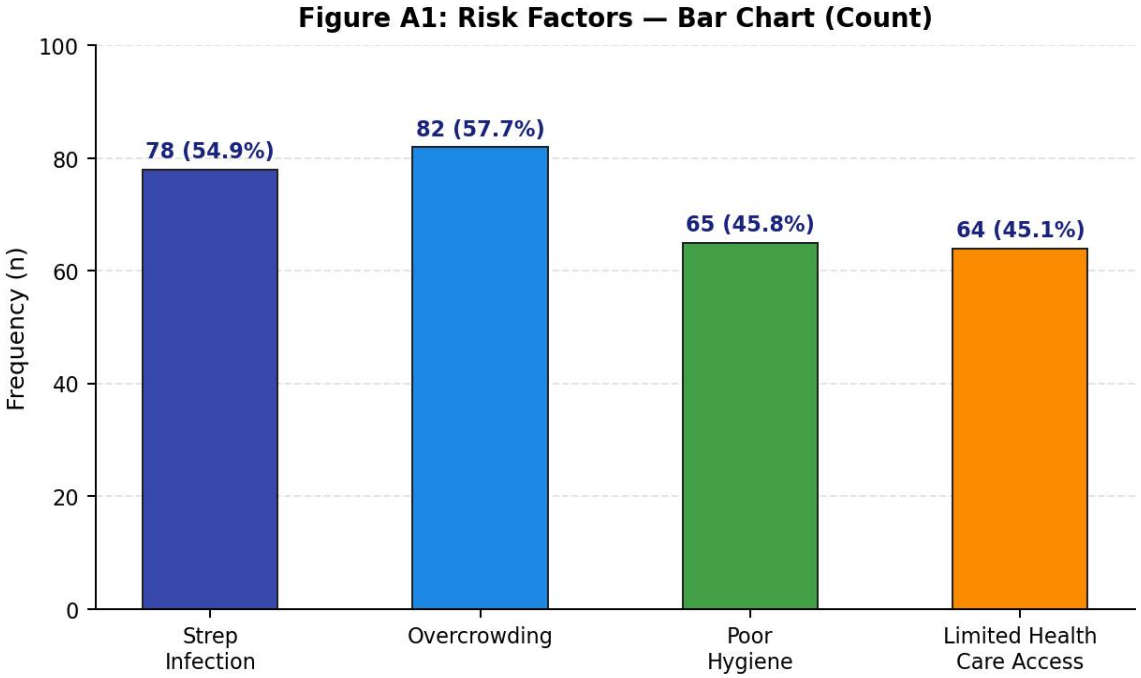
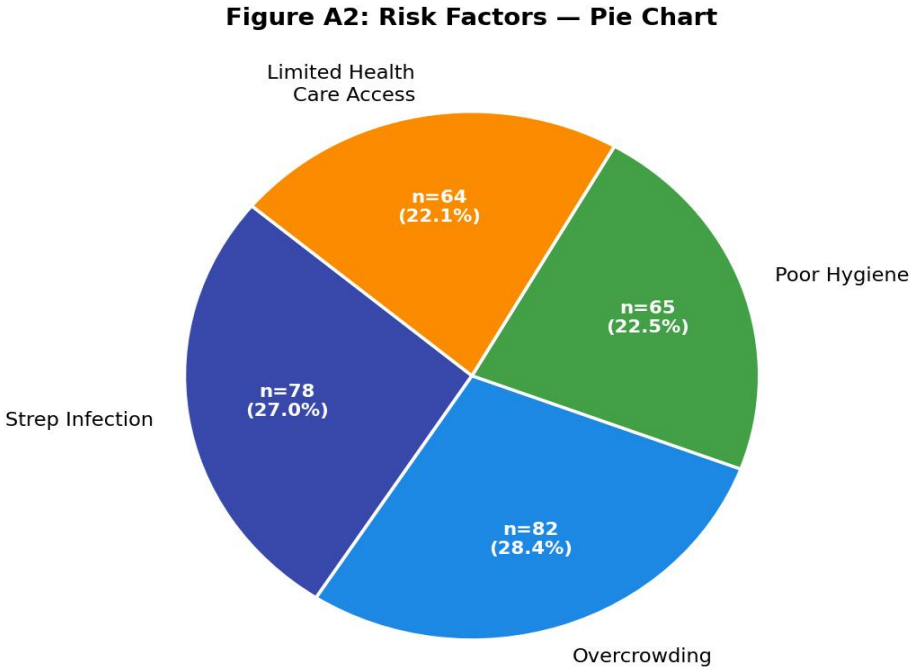


Figure 4.4.2. Risk Factors



4. SYMPTOMS OF RHD:

the sign and symptoms that are shown in this table of RHD is for both genders male and female overall ratio. In which SOB's patients are about 92 which is the major symptoms among all these. And chest pain are present in about 38 patients. While fatigue patients is about 81 the second major symptoms after SOBS. While about 43 patients in both genders are present with swelling in legs and feet. And least amount of patients about 12 in bith genders are present with coughing or coughing up blood. And in the last about 65 patients in both genders faces palpitation.

Table 5: *Frequency Distribution of Symptoms (N = 142)*

Symptom	Yes (n)	No (n)	% Yes	% No	Cumulative % (Yes)
Shortness of Breath	92	50	64.8%	35.2%	64.8%
Chest Pain	38	104	26.8%	73.2%	26.8%
Fatigue	81	61	57.0%	43.0%	57.0%
Swelling (Legs/Feet)	43	99	30.3%	69.7%	30.3%
Coughing / Coughing up Blood	12	130	8.5%	91.5%	8.5%
Palpitation	65	77	45.8%	54.2%	45.8%

Figure 5.1. For Symptoms

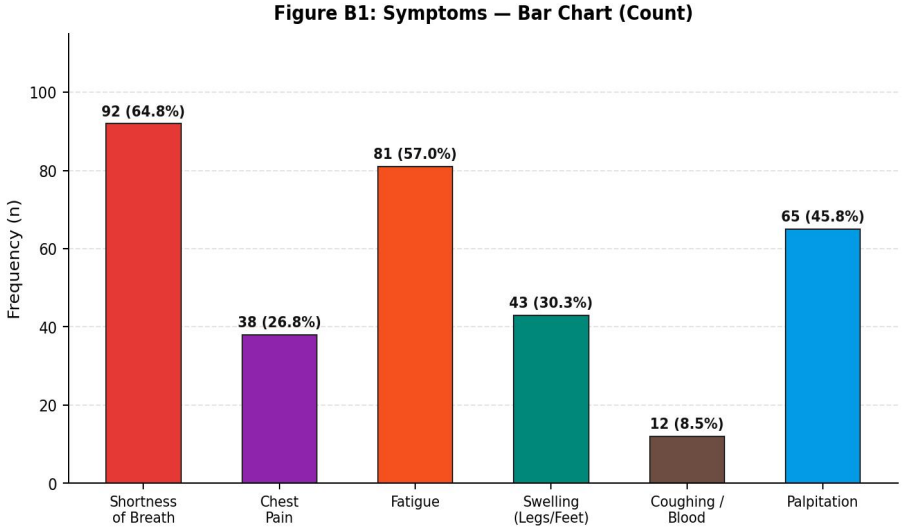
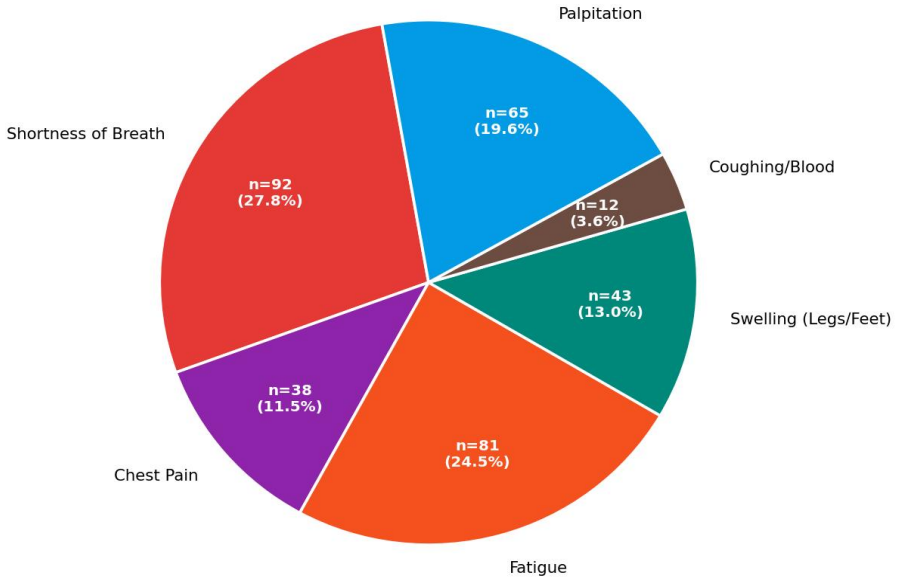


Figure 4.5.2. For Symptoms:



5. MITRAL STENOSIS SEVERITY:

This table represent the severity of mitral stenosis among male and female ratio which are already diagnosed with RHD and having mitral stenosis. And the severity of mitral stenosis is categorized into 3 in which about 17 patient of male is affected by mild MS and about 30 patients of female present with mild MS. While the majority of cases are of moderate mitral stenosis in which 25 male patient was affected and about the same 25 female patient was also present with moderate MS which make the moderate category is the major in both male and female genders. While small amount of patients about 20 in male was present with severe MS and followed by 25 female patients present with severe MS. So this make that female ratio is dominant or affected more by MS in RHD disease as compared to male.

Table 6: *MS Severity Grade Distribution by Gender (N = 142*

Symptom	Yes (n)	No (n)	% Yes	% No	Cumulative % (Yes)
Shortness of Breath	92	50	64.8%	35.2%	64.8%
Chest Pain	38	104	26.8%	73.2%	26.8%
Fatigue	81	61	57.0%	43.0%	57.0%

Symptom	Yes (n)	No (n)	% Yes	% No	Cumulative % (Yes)
Swelling (Legs/Feet)	43	99	30.3%	69.7%	30.3%
Coughing / Coughing up Blood	12	130	8.5%	91.5%	8.5%
Palpitation	65	77	45.8%	54.2%	45.8%

Figure 6.1. For Mitral Stenosis:

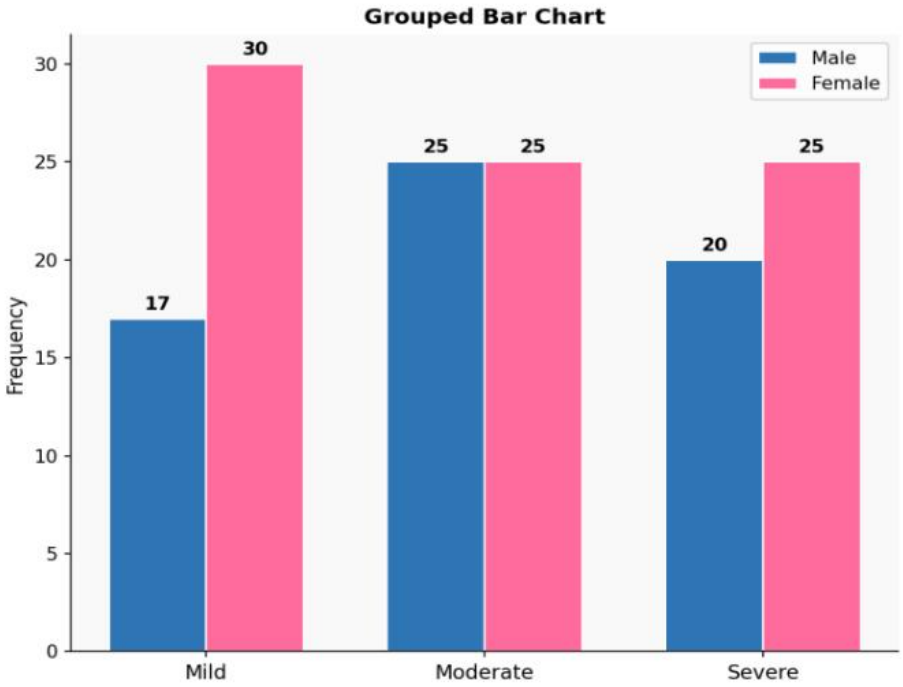
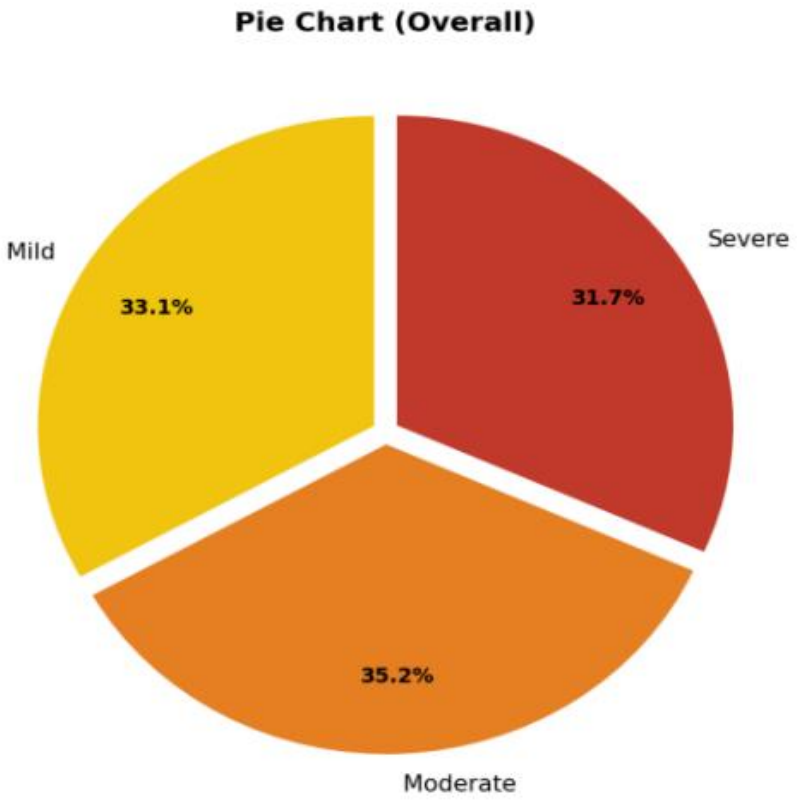


Figure 4.6.2. For Mitral Stenosis:



Discussion

The present study was conducted to determine the frequency and severity of mitral stenosis among patients with Rheumatic Heart Disease (RHD) and to compare its distribution between male and female patients presenting at Lady Reading Hospital, Peshawar. A total of 142 patients were included in the study, among whom females constituted 56.3% and males 43.7%, indicating that RHD-associated mitral stenosis was more common among female patients.

The findings of this study are consistent with the work of Antonio Mutarelli et al. (2025), who reported that rheumatic heart disease is more prevalent in females and that this gender difference becomes apparent even during the early stages of the disease. Similarly, Shushu Jiang et al. (2025) found that women consistently bear a higher burden of RHD globally compared to men. These observations suggest that biological, hormonal, and socioeconomic factors may contribute to the increased susceptibility of females to rheumatic valvular disease.

Regarding the severity of mitral stenosis, moderate mitral stenosis was the most common category observed in the study population (35.2%), followed by mild (33.1%) and severe disease (31.7%). Female patients demonstrated slightly higher frequencies of both mild and severe mitral stenosis compared with males. These findings are in agreement with the study conducted by Areeba Akram et al. (2025), which also reported a higher prevalence of rheumatic mitral stenosis among women and emphasized the importance of echocardiographic screening for early detection in high-risk populations.

The age-wise distribution showed that the highest frequency of disease was observed in the 50–60 years age group (22.5%), followed by the 20–30 years and 40–50 years age groups. This finding indicates that the consequences of rheumatic fever often become clinically significant later in life due to progressive valvular damage occurring over several years. Similar observations have been reported in previous studies where chronic rheumatic valvular lesions manifested predominantly during adulthood despite the initial infection occurring during childhood.

Analysis of risk factors revealed that overcrowding (57.7%) and previous streptococcal infection (54.9%) were the most common contributors to disease development. These findings support the established understanding that poor living conditions, inadequate healthcare access, and untreated Group A Streptococcal infections remain major determinants of rheumatic fever and subsequent RHD, particularly in developing countries.

Among clinical manifestations, shortness of breath was the most common symptom (64.8%), followed by fatigue (57.0%) and palpitations (45.8%). These symptoms reflect the hemodynamic consequences of mitral stenosis, including elevated left atrial pressure, pulmonary congestion, and reduced cardiac output. Similar symptom patterns have been described in previous literature on rheumatic mitral valve disease. Overall, the results of this study reinforce the evidence that rheumatic mitral stenosis remains a significant cardiovascular problem in Pakistan and other developing countries. The higher frequency among females highlights the need for gender-sensitive healthcare strategies and early echocardiographic screening programs.

Furthermore, public health measures focusing on early diagnosis and treatment of streptococcal throat infections, improvement of living conditions, and increased

healthcare accessibility are essential to reduce the burden of Rheumatic Heart Disease and its complications.

Recommendations:

Early Screening Programs: Routine echocardiographic screening should be implemented, especially for high-risk populations and female patients, to detect mitral valve involvement at an early stage. Prompt Treatment of Streptococcal Infections: Early diagnosis and adequate antibiotic treatment of streptococcal throat infections should be promoted to prevent Acute Rheumatic Fever and subsequent RHD.

Health Education and Awareness: Community-based awareness programs should be conducted to educate the public regarding the prevention, symptoms, and complications of Rheumatic Heart Disease. Improvement of Living Conditions: Efforts should be made to reduce overcrowding and improve sanitation, particularly in low-income communities where the disease is more prevalent.

Regular Follow-Up of RHD Patients: Patients diagnosed with Rheumatic Heart Disease should undergo regular clinical and echocardiographic follow-up to monitor disease progression and initiate timely intervention. Strengthening Primary Healthcare Services: Healthcare facilities should ensure availability of antibiotics, diagnostic tools, and trained healthcare professionals for effective management of streptococcal infections and RHD.

Further Research: Larger multicenter studies should be conducted to better understand gender-related differences and disease progression among RHD patients.

Limitations of the Study

The study was conducted at a single tertiary care hospital, which may limit the generalizability of the findings to the wider population. The sample size of 142 patients was relatively small and may not fully represent all RHD patients in the region. The study used a cross-sectional design, which does not allow assessment of disease progression over time or establishment of cause-and-effect relationships. Data were collected from hospital records and echocardiography reports, making the study dependent on the accuracy and completeness of existing documentation. Some variables, such as history of Acute Rheumatic Fever, contained unknown or missing information, which may have influenced the results.

Potential confounding factors such as socioeconomic status, nutritional status, educational level, and treatment adherence were not analyzed in detail

Conclusion

This study was conducted to determine the frequency of mitral stenosis among patients with Rheumatic Heart Disease (RHD) and to compare its occurrence between male and female patients presenting at Lady Reading Hospital, Peshawar. The findings revealed that females were more commonly affected than males, accounting for 56.3% of the study population. Moderate mitral stenosis was the most frequent severity grade, followed by mild and severe disease. The highest frequency of cases was observed in the 50–60 years age group. Overcrowding and previous streptococcal infection were identified as the most common risk factors, while shortness of breath and fatigue were the most frequently reported symptoms. These findings highlight that rheumatic mitral stenosis remains a significant public health problem and emphasize the need for early diagnosis, preventive measures, and improved healthcare services to reduce disease burden and complications.

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