

ORIGINAL ARTICLE

DEMOGRAPHIC PROFILE AND CLINICAL HISTORY OF NEWLY DIAGNOSED MITRAL STENOSIS PATIENTS

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Objectives: The objective of this study was to determine the demographic profile and clinical characteristics of newly diagnosed mitral stenosis (MS) patients.

Methodology: In this descriptive cross-sectional study, patients between 15 to 65 years of age newly diagnosed with MS were included. Data regarding demographic characteristics, clinical presentation, risk factors, predisposing factors, and echocardiographic findings were obtained.

Results: A total of 125 patients were included, overall mean age was 34.12±12.33 years, 61.6% (77) were from rural areas, and 66.4% (83) were females. Only 18.4% (23) confirmed history of rheumatic fever. The most common presenting complaint was dyspnea, 91.2% (114), followed by palpitation, 60.8% (76). Severity of MS was very severe in 8.8% (11), severe in 74.4% (93), and progressive in remaining 16.8% (21). Left atrial thrombus was seen in 8% (10), left atrial smoke in 9.6% (12), and vegetation were seen in 3.2% (4) of the patients. Mean ejection fraction was 54.06±9.5% and 28% (35) of the patients had left ventricular dysfunction. Most common associated valve pathology was aortic stenosis, 75.2% (94), followed by aortic regurgitation, 48.8% (61), and mitral regurgitation, 28.8% (36).

Conclusion: In conclusion, patients newly diagnosed with MS are predominantly females and rural residents with a majority having severe disease. Common clinical manifestation is dyspnea followed by palpitations. History of rheumatic fever was lesser known, hence, mass level screening and awareness programs are needed for the eradication of rheumatic heart disease from our population.

Keywords: mitral stenosis, rheumatic heart diseases, rheumatic fever, Pakistan

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INTRODUCTION

Rheumatic fever (RF) once prevalent in the developed countries of the Northern Hemisphere in the mid of 20th century, is now virtually eradicated, on the other hand, it remained a prevalent condition in the Southern Hemisphere, especially in underdeveloped and developing countries. Acute RF is still an important cause with significant contribution to the premature death in our part of the world.¹ Children of age 5 to 14 years are at increased risk of ARF, but recurrent episodes can be commonly observed in adults up to the age of 40 years. It is a neglected disease entity which mostly remained underdiagnosed, therefore, its true prevalence and incidence is unknown.¹ Mitral regurgitation (MR), valvulitis, and pancarditis are the commonly observed valvular abnormalities in the early stage of diseases.² From the second decade of life mixed aortic and mitral valve diseases start emerging and rheumatic mitral stenosis (MS) increases in prevalence.³ In general rheumatic heart disease (RHD) comes to clinical attention much later in life of a patient in the west but due to rapid progression of

disease, RHD onset occurs in the 2nd or 3rd decades of life in developing countries.⁴ Global statistics for RHD are 15.6 million cases with around 470,000 new ARF cases every year, out of which around 60% are expected to develop RHD and 1.5% are expected to die from complications.⁴

Clinical course of rheumatic MS greatly varies from patient to patient depending on the individual risk, a decrease of about 0.1 to 0.3 cm² in mitral valve area (MVA) is expected with every passing year after acute RF.² Researchers have identified three main risk factors for progression of disease to chronic disease, namely low socioeconomic level, recurrences of RF, and severity of carditis along with the impairment of the mitral valve anatomy.⁵ However, clinically noticeable symptoms starts to appear when there is an obligate increase in cardiac output due to various reasons such as infection, fever, thyrotoxicosis, arrhythmias, pregnancy, or even exercise.² Heart failure and thromboembolic complications are the two key causes of death in patients with rheumatic MS and account for approximately 60% and 20% of the

patients, respectively.² Presence of arrhythmias such as atrial fibrillation (AF), in MS patients increases the risk of thromboembolic events by 18-fold and it is estimated that around 80% of the strokes among RHD patients occurs in MS patients with AF.⁶

There is a dearth of regional as well as local data regarding demographic characteristics and clinical history of newly diagnosed MS patients. Therefore, this study was designed to explore the demographic profile and clinical characteristics of newly diagnosed MS patients in our setting.

METHODOLOGY

This descriptive cross-sectional study was conducted at the National Institute of Cardiovascular Diseases (NICVD), a public sector tertiary care cardiac hospital of Karachi, Pakistan. We have included consecutive patients, both in- and out-patient, between 15 to 65 years of age, newly diagnosed with MS on transthoracic echocardiography (TTE) between July 2019 and December 2019. Patients with prior cardiac related surgery or intervention or on anticoagulation were excluded. Study was approved by the ethical review board of the National Institute of Cardiovascular Diseases (NICVD), Karachi, Pakistan and informed consent was obtained from all the newly diagnosed MS patients.

As a routine, TTE was performed for all suspected patients referred to echocardiography department, from wards and outpatient department (OPD), for the diagnosis MS and all the confirmed cases of MS on TTE were included in this study. Diagnosis of MS on TTE was done using planimetry method. The severity of MS was classified as very severe if $MVA \leq 1.0 \text{ cm}^2$, severe if $MVA \leq 1.5 \text{ cm}^2$ and progressive if $MVA > 1.5 \text{ cm}^2$. Rheumatic etiology was considered when commissural fusion and diastolic doming of the mitral valve leaflets was seen.

Data for the study was collected using structured questionnaire covering demographic characteristics (age, gender, and urban/rural residence), clinical presentation (signs and symptoms), risk factors, predisposing factors, associated complications (arrhythmias, systemic embolism, and infective endocarditis), and TTE findings in terms of associated lesions and echocardiographic parameters. Collected data were analyzed on IBM SPSS version 19, appropriate descriptive statistics such as mean \pm standard deviation (SD) or frequency (%) distribution were used for the presentation of data.

RESULTS

A total of 125 patients were included in this study, overall mean age was 34.12 ± 12.33 years. A majority

were, 61.6% (77), from rural areas and females, 66.4% (83). History of rheumatic fever was confirmed by 18.4% (23) of the patients and remaining were either unaware of it or did not experience any episode. Median duration of RF was documented to be 3 [1 to 3] years and 87% (20/23) took prophylaxis. The most common presenting complaint was dyspnea, 91.2% (114) followed by palpitation, 60.8% (76). Detailed clinical characteristics and manifestation are presented in Table 1.

Table 1: Clinical characteristics and manifestation of newly diagnosed rheumatic mitral stenosis

	Summary
Total (N)	125
Co-morbid conditions	
Family history of VHD	5.6% (7)
Diabetes mellitus	6.4% (8)
Hypertension	12% (15)
Dyslipidemia	0.8% (1)
Chronic kidney disease	1.6% (2)
Smoking	5.6% (7)
Clinical presentation	
Chest pain	44.8% (56)
Dyspnea	91.2% (114)
Palpitation	60.8% (76)
Fever	20% (25)
Easy fatigue	44% (55)
Acute pulmonary edema	24% (30)
Stroke	0.8% (1)
Pedal edema	17.6% (22)
Dizziness	24% (30)
NYHA Class	
I	1.6% (2)
II	13.6% (17)
III	58.4% (73)
IV	26.4% (33)
Systolic blood pressure (mmHg)	108.1 \pm 13.86
Diastolic blood pressure (mmHg)	67.06 \pm 11.06
Pulse Rate (bpm)	78.58 \pm 16.1
History of rheumatic fever	18.4% (23)
Rhythm at presentation	
Normal Sinus	51.2% (64)
Atrial fibrillation	21.6% (27)
Tachycardia	11.2% (14)
ECG not available	16% (20)
Fever	2.4% (3)
Anemia	4% (5)
Active infection	28% (35)
Systemic embolism	1.6% (2)
Infective endocarditis	3.2% (4)

VHD= valvular heart disease, SOB=shortness of breath, NYHA=New York Heart Association

Severity of MS was very severe in 8.8% (11), severe in 74.4% (93), and progressive in remaining 16.8% (21). On TTE left atrial thrombus was seen in 8% (10), left atrial smoke in 9.6% (12), and vegetation were seen in 3.2% (4) of the patients. Mean ejection fraction was $54.06 \pm 9.5\%$ and 28% (35) of the patients had left ventricular dysfunction. An atrial septal defect (ASD)

was documented in two (1.6%) patients. Echocardiographic parameters and associated valve pathology are presented in Table 2.

Table 2: Echocardiographic parameters and associated valve pathology of newly diagnosed rheumatic mitral stenosis patients

	Summary
Total (N)	125
ECHO Parameters	
LA size (mm)	50.45 ± 13.69
LV diastolic dimension (mm)	44.73 ± 9.77
LV systolic dimension (mm)	31.96 ± 8.84
Aorta (mm)	26.63 ± 3.66
RV size (mm)	24.46 ± 7.8
Mean pressure gradient (mmHg)	13.64 ± 7.11
MVA by Pressure half-time (mm)	1.04 ± 0.37
MVA by planimetry (mm)	0.61 ± 0.8
Associated valve pathology	
Mitral regurgitation	
None	28.8% (36)
Mild	34.4% (43)
Moderate	20% (25)
Severe	16.8% (21)
Aortic regurgitation	
None	48.8% (61)
Mild	33.6% (42)
Moderate	11.2% (14)
Severe	6.4% (8)
Aortic stenosis	
None	75.2% (94)
Mild	5.6% (7)
Moderate	11.2% (14)
Severe	8% (10)
Tricuspid regurgitation	
None	11.2% (14)
Mild	33.6% (42)
Moderate	31.2% (39)
Severe	24% (30)
Right ventricular dysfunction	
None	68.8% (86)
Mild	12% (15)
Moderate	16.8% (21)
Severe	2.4% (3)

LA=left atrial, LV=left ventricle, RV=right ventricle

A total of 19.2% (24) patients were managed medically, while remaining patients required surgical or interventional management with ratio of surgical management as 36.8% (46) and interventional management as 44.0% (55).

DISCUSSION

The contribution of rheumatic heart diseases to the premature death rate is still significant in underdeveloped and developing countries as a result of poverty and household overcrowding.^{1,7} It is one of the neglected and most underdiagnosed disease in our part of the world, therefore, regional as well as local data are lacking. Therefore, in this study we aimed to explore the demographic profile and clinical

characteristics of newly diagnosed MS patients in our population. Demographic profile of the newly diagnosed MS patients in our population is as following; predominately females, mostly in 3rd decades of life, and residents of rural areas. When evaluating predisposing factors, less than 1/5th reported history of rheumatic fever in a median duration of 3 [1 to 3] years and more than 80% took RF prophylaxis. Clinical manifestation was dyspnea in more than 90% of the cases with a side by side palpitation and more than 1/4th of the patients in the New York Heart Association (NYHA) functional classification IV. A significant number of patients (>30%) also had arrhythmias such as atrial fibrillation or sinus tachycardia. Echocardiography revealed aortic stenosis as the most common associated valve pathology (nearly 3/4th), followed by aortic regurgitation (nearly half), 48.8% (61), and mitral regurgitation (more than 1/4th).

Our observations regarding the demographic and clinical characteristics of MS patients were similar to that of study conducted by Zühlke L et al.⁸ based on the Global Rheumatic Heart Disease Registry and concluded rheumatic heart disease patients were young, predominantly females, and had high prevalence of major cardiovascular complications. There is suboptimal utilization of secondary antibiotic prophylaxis, oral anti-coagulation, and contraception, and variations in the use of percutaneous and surgical interventions by country income level. Study further reported, the majority (63.9%) had moderate-to-severe multivalvular disease complicated by congestive heart failure (33.4%), pulmonary hypertension (28.8%), atrial fibrillation (21.8%), stroke (7.1%), infective endocarditis (4%), and major bleeding (2.7%).⁸

Rizvi SF et al.⁹ conducted a population based screening of RHD in a rural population of Pakistan. Of the 9430 individuals screened 54 cases of RHD were found making the incidence rate of around 0.57% among rural population. In this study incidence of RHD was found to be associated with female gender, while, there was no relationship between the incidence of RHD and socioeconomic status, crowding, and education status of the individual. Similar to these findings, in our study the distribution of female gender was higher (66.4%) as compared to male gender. Further Rizvi SF et al.⁸ reported that most (more than 80%) of the patients with RHD were not aware of their condition and only 8% of those were taking rheumatic prophylaxis. In our study nearly 16% (20/125) of the patients were taking prophylaxis. Similarly, various studies reported varying rate of RHD in our population depending on region and social segment under study.¹⁰⁻¹²

The management recommendations as well as timing of management are mostly dependent on individual risk profile of patient, anatomical factors of mitral valve, functional status of the patients, associated valve pathology, and surgical risk of individual, hence all come to play when deciding management strategy.^{13,14} In our study only 19.2% of the patients were managed medically, while remaining patients required either surgical or interventional management. Strategies for the control and reduction of RHD seem less effective due to scarcity of accurate data regarding prevalence of disease, and effective diagnostic, preventive, and treatment approaches.¹⁵ In the year 2012 New Zealand government initiated Rheumatic Fever Prevention Programme (RFPP) for the reduction of incidence of ARF. One of the largest component of program was school-based sore throat service to detect and treat group A streptococcal (GAS) pharyngitis among primary schools going children in low socioeconomic areas. The national incidence rate ARF in New Zealand was reported to decline by 28% with the implementation of RFPP.¹⁶

Even though, study was conducted at the largest public sector cardiac hospital, but single center coverage along with small sample size remained the major limitations. Secondly, screening data was not available for analysis hence ratio of new diagnosed patients in clinically suspected patients cannot reported. Finally, some of demographic variables such as socioeconomic status, and household structure were not available for analysis. Considering the importance of subject matter nationwide, multicenter studies or large scale population based screening studies are needed to know the true prevalence of RHD in our population.

CONCLUSION

In conclusion, patients newly diagnosed with MS are predominantly females and rural residents with a majority having severe disease on presentation. Common clinical manifestations are dyspnea and palpitation. History of rheumatic fever was lesser known, hence, mass level screening and awareness programs are needed for the eradication of rheumatic heart disease from our population.

AUTHORS' CONTRIBUTION

RA, MF, HKR and SK: Concept and design, data acquisition, interpretation, drafting, final approval, and agree to be accountable for all aspects of the work. SKJ, SA, and SZJ: Data acquisition, interpretation, drafting, final approval and agree to be accountable for all aspects of the work.

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