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Original Research Article

Spectrum of valvular lesions in newly diagnosed rheumatic heart disease

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ABSTRACT

Background: Rheumatic heart disease (RHD) is the most common acquired heart disease among young adults and an important health problem in developing countries. There is much scarcity of information about echocardiographic evaluation of valvular involvement of RHD in Bangladesh. Objective of this study was to analyze the clinical spectrum and pattern of cardiac valvular lesions in newly diagnosed RHD patients.
Methods: This cross-sectional study was conducted from April 2019 to May 2021 in National Center for Control of Rheumatic Fever and Heart Diseases (NCCRF and HD), Dhaka, Bangladesh. Newly diagnosed 160 RHD patients irrespective of age and sex were enrolled. Medical history was obtained, physical examination was carried out, several investigations were done and standard color Doppler echocardiography was performed. Diagnosis of RHD was made following 2012 World Heart Federation criteria.
Results: More than 60% of newly diagnosed patients of RHD were female; mean age of patients was 24.29±9.17 years and 77.5% of patients were between 15-34 years of age. Detected valvular lesions were mostly isolated (65%) and mitral valve involvement was 88.7%. Isolated mitral regurgitation was detected among 56.3% patients and was higher in female. Combination of mitral regurgitation and mitral stenosis were reported in 12.5% cases whereas mitral regurgitation with aortic regurgitation was present in 10.6% cases. Overall, 14 (6.4%) of the newly diagnosed patients were detected with severe forms of cardiac valvular lesion.
Conclusions: RHD were common in young adults. Mitral valve was predominantly involved, particularly presenting as isolated mitral regurgitation.

Keywords: Aortic regurgitation, Echocardiography, Mitral regurgitation, Rheumatic heart disease, Valvular lesions

INTRODUCTION

Rheumatic heart disease (RHD) is an inflammatory heart valve condition which is the chronic sequel of acute rheumatic fever (ARF).[1] The inflammation initially leads to clinically silent valvular disease and ultimately severe permanent cardiac damage.

Rheumatic heart disease is the most common cardiovascular disease worldwide in young adults especially in developing countries.[2] RHD affects about 40 million people and each year it claims more than 300,000 lives, which is nearly 2% of all deaths from cardiovascular diseases.[3] Highest prevalence of RHD is reported in south Asia (12.17 million) and it is an important cause of death and disability in regions like Pacific islands and Sub-Saharan Africa.[4-6] Prevalence of RF and RHD (data combined) in Bangladesh was reported to be 0.9 per 1000 children.[7]

World Heart Federation (WHF) has set an ambitious goal to achieve 25% reduction in premature deaths from ARF and RHD by 2025.[8] To achieve this goal, comprehensive and effective national programs should be developed. One of the most important obstacles for success of these programs is the limitation of "true" disease burden estimation that can be used for implementing the existing evidence-based approaches to prevent RHD.[8]

Bangladesh has most of the recognized risk factors making her very vulnerable for RF and RHD. Apart from some prevalence survey there are very few systemic studies done in Bangladesh to find out the clinical spectrum of RHD. Objective of our study was to analyze the clinical spectrum and pattern of cardiac valvular involvement in newly diagnosed RHD patients attending an outdoor based specialized center in Bangladesh.

METHODS

This cross-sectional study was conducted from April 2019 to March 2021 in National Center for Control of Rheumatic Fever and Heart Diseases (NCCRF and HD), Dhaka, Bangladesh.

Inclusion criteria

Consecutive 160 patients irrespective of age and sex with newly diagnosed RHD were enrolled in this study. For this study, we purposefully included newly diagnosed patients with RHD.

Exclusion criteria

a) Patients with pregnancy; b) Patients with uncontrolled DM; and c) Patients with any history of acute illness (e.g., renal or pancreatic diseases) were excluded.

Study procedure

The patients' medical history was obtained, including history of acute rheumatic fever and physical examination. Venous blood was collected and complete blood count with ESR, anti-streptolysin O (ASO) titer, C-reactive protein (CRP) was done in automated analyzer machine (ERBA Automated XL 200). Standard color Doppler echocardiography (Philips, Affinity 30, Taiwan) was performed. Diagnosis of rheumatic heart disease by echocardiography was done following 2012 World Heart Federation criteria.[9]

Definite rheumatic heart disease

Subcategory A: pathological MR and at least two morphological features of RHD of MV. Subcategory B: MS mean gradient ≥4 mmHg and at least two morphological changes of RHD of MV. Subcategory C: pathological AR and at least two morphological features of RHD of AV; and subcategory D: borderline disease of both AV and MV.

Borderline rheumatic heart disease

Subcategory A: at least two morphological features of RHD of the MV without pathological MR or MS; subcategory B: pathological MR; and subcategory C: pathological AR.

Criteria for pathological mitral regurgitation

a) Seen in 2 views; b) in at least 1 view, jet length ≥2 cm; c) velocity ≥3 m/s for 1 complete envelope; and d) pan-systolic jet in at least 1 envelope (all four Doppler echocardiographic criteria must be met).

Morphological features of RHD

Features in mitral valve (MV)- a) MV leaflet thickening ≥3 mm (age specific); b) chordal thickening; c) restricted leaflet motion; and d) Excessive leaflet tip motion during systole.

Pathological aortic regurgitation

a) Seen in 2 views; b) in at least 1 view, jet length ≥1 cm; c) velocity ≥3 m/s in early diastole; d) pan-diastolic jet in at least 1 envelope (all four Doppler echocardiographic criteria must be met).

Features in aortic valve (AV)

a) Irregular or focal thickening; b) coaptation defect; c) restricted leaflet motion; and d) prolapse.

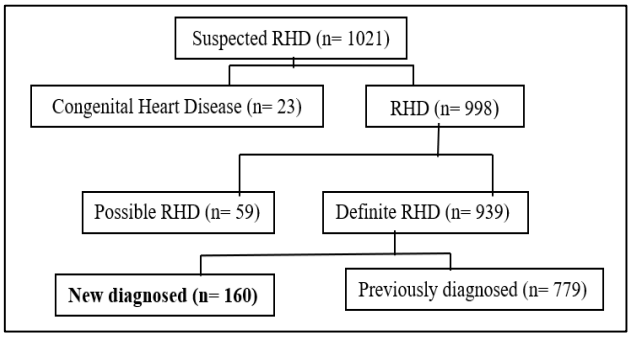

Figure 1: Flowchart of enrollment of the study population.

Statistical analysis

All data were recorded systematically in preformed data collection form and quantitative data was expressed as mean and standard deviation and qualitative data was expressed as frequency distribution and percentage. Statistical analysis was performed by using SPSS 21 (Statistical Package for Social Sciences). Probability value <0.05 was considered as level of significance. The study was approved by Ethical Review Committee of National Center for Control of Rheumatic Fever and Heart Diseases, Dhaka, Bangladesh.

RESULTS

A total of 160 patients with newly diagnosed rheumatic heart disease were enrolled in this study. Mean age of patients was 24.29± 9.17 years. Seventy-seven percent of patients of RHD were between 15-44 years of age with maximum 45.6% diagnosed in 15-24 years followed by 25-34 years (31.9%) (Figure 2).

More than 60% of newly diagnosed patients of RHD were female and 39% were male. History of clinically diagnosed acute rheumatic fever was present in 35.6% patients (Figure 3).

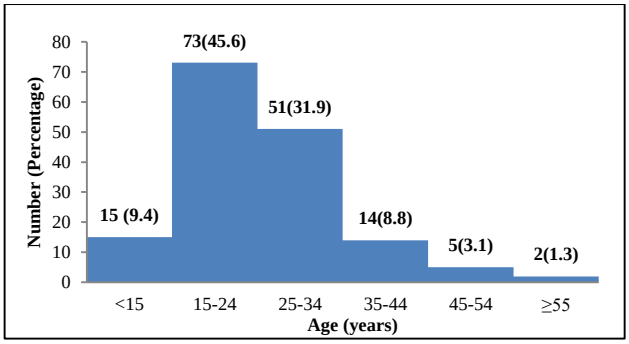

Figure 2: Distribution of patients with rheumatic heart diseases according to age (n-160).

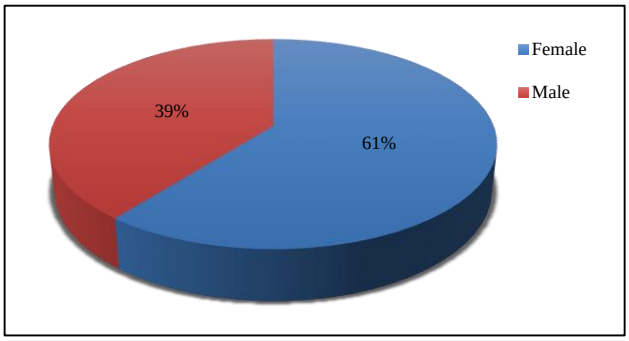

Figure 3: Gender distribution among our study subjects.

Table 1: Type of cardiac valve lesions according to gender in patients with rheumatic heart diseases (n-160).

Valular lesion	Male (n=63) N (%)	Female (n=97) N (%)	Total N (%)
Isolated			
Mitral regurgitation	32 (50.8)	58 (59.8)	90 (56.3)
Mitral stenosis	4 (6.3)	2 (2.1)	6 (3.8)
Aortic regurgitation	4 (6.3)	3 (3.1)	7 (4.4)
Aortic stenosis	0 (0.0)	1 (1.0)	1 (0.6)
Combined			54 (35)
Mitral regurgitation +mitral stenosis	7 (11.1)	13 (13.4)	20 (12.5)
Mitral regurgitation +aortic regurgitation	8 (12.7)	9 (9.3)	17 (10.6)
Aortic regurgitation +aortic stenosis	3 (4.8)	4 (4.1)	7 (4.4)
Mitral regurgitation +mitral stenosis +aortic regurgitation	4 (6.3)	5 (5.2)	9 (5.6)
Others	1 (1.6)	2 (2.1)	3 (1.9)

Table 2: Pattern of valvular lesions in rheumatic heart disease patients (n=160).

Valve lesions	Isolated n (%)	Combined n (%)	Total n (%)
Mitral regurgitation	90 (66.2)	46 (33.8)	136 (100)
Aortic regurgitation	7 (17.5)	33 (82.5)	40 (100)
Mitral stenosis	6 (17.1)	29 (82.9)	35 (100)
Aortic stenosis	1 (12.5)	7 (87.5)	8 (100)

Isolated mitral regurgitation was detected among 56.3% overall patients; 59.8% females and 50.8% male. Combination of mitral regurgitation and mitral stenosis were reported in 12.5% patients whereas mitral regurgitation with aortic regurgitation was present in 10.6% patients (Table 1).

Among mitral regurgitation 66.2% were isolated and 33.8% were combined or multivalvular. Majority of other valvular lesions (82.5% aortic regurgitation, 82.9% mitral

stenosis and 87.5% aortic stenosis) were combined (Table 2).

According to severity, 7 (5.1%) of mitral regurgitation and 4 (10%) of aortic regurgitation were detected as grade III; whereas 2 (5.7%) of mitral stenosis and 1 (12.5%) of aortic stenosis were found as severe (Table 3).

Table 3: Severity of cardiac valvular lesions in patients with newly diagnosed rheumatic heart diseases (N-160).

Valve lesions	Isolated n (%)	Combined n (%)	Total n (%)
Mitral regurgitation			
Grade I	76 (84.4)	26 (56.5)	102 (75.0)
Grade II	12 (13.3)	15 (32.6)	27 (19.9)
Grade III	2 (2.22)	5 (10.9)	7 (5.1)
Aortic regurgitation			
Grade I	6 (85.7)	20 (60.6)	26 (65.0)
Grade II	1 (14.3)	9 (27.3)	10 (25.0)
Grade III	0 (0)	4 (12.1)	4 (10.0)
Mitral stenosis			
Mild	5 (83.3)	21 (72.4)	26 (74.3)
Moderate	1 (16.7)	6 (20.7)	7 (20.0)
Severe	0 (0)	2 (6.9)	2 (5.7)
Aortic stenosis			
Mild	0 (0)	5 (71.4)	5 (62.5)
Moderate	0 (0)	2 (28.6)	2 (25.0)
Severe	1 (100)	0 (0)	1 (12.5)

DISCUSSION

Among this cohort of newly diagnosed patients with rheumatic heart disease mitral valve was affected in most of the cases with isolated mitral regurgitation as the major valvular lesion.

Our study found that RHD is disease of children and young adult. More than three-fourths of the cases (77.5%) of RHD were diagnosed in younger age group between age of 15 to 34 years which is consistent with reports of other studies.[4,10] Lawrence et al reported that RHD occurs in children, its prevalence peaks in adulthood, usually between the age of 25 and 45 years.[11] The reason may be due to the fact that acute rheumatic fever caused by group A streptococcal infection are common in younger children and RHD is the sequel of ARF.

In the present study females were more affected than male patients (60.6% versus 39.4%) that coincide with other studies.[12] Predominance of involvement in females may be partially because of some social stigmata and disparity among the genders still prevailing in our society. Worldwide, females have 1.6 to 2 greater relative risk of development of RHD compared with males.[13]

In this study population, only 65% gave history of ARF that means rest 35% presented with established RHD rather than ARF. This finding is quite common especially in regions with resource-poor settings and is consistence with Sliwa et al who mentioned that in developing countries, more than half of RHD patients may present without prior symptoms of ARF.[14] Okello et al reported that none of 309 late-stage RHD patients in Uganda had a previous history of ARF.[15]

Mitral valve was affected among nine out of ten cases of RHD in this study which is in accordance with a study that reported mitral valve involvement in 98.4% children.[16] Predominance of mitral valve involvement ranging from 60% to 92.8% had been reported in several previous studies in other developing countries like India, Nepal and Indonesia.[17-19] We found 87.6% of mitral valve involvement of which 60.1% were isolated and 27.5% were combined. Similarly, Laudari et al and Alkhalifa et al reported that isolated mitral valve lesion in 46.8% and 60% patients respectively.[10,20] Mitral regurgitation is the major valvular lesion in early stage of RHD and isolated mitral regurgitation is often the most common presentation.[21,22] In this cohort of patients, mitral regurgitation was slightly higher in females than male (59.8% versus 50.8%) whereas atrial regurgitation was found almost double in male patients (6.3% versus 3.1%) which is in accordance with findings of Baro et al in India.[23] Isolated aortic valve disease was found in about 5% of patients and the data matched with Zühlke, et al who stated that pure aortic valve disease is uncommon and also with report of a large series study in India, where the rate was less than 4.5%.[24,25]

In this study, majority of the patients had isolated valvular lesions, provably showing the early stage of RHD. Combined valvular lesions were detected among 35% (56 of 160) patients which is much lower than of study of Lilyasari et al who reported multivalve lesion in 80.6% children and 72.52% adults.[19] Faheem et al in Pakistan also found multivalvular lesions in 56.3% of cases.[26] The reason may be due to the fact that both of them were tertiary care hospital based retrospective studies that dealt with advanced stage of disease.

Overall 14 (6.4%) of the patients were detected with severe forms of cardiac valvular lesion which is comparatively lower than some other studies.[15,23] Baro et al and Okello et al reported that 53.3% and 52% of mitral regurgitation of their study respectively were severe whereas we have found it only 5.1%.[15,23] Usually severity increases with advancement of the disease and cardiovascular symptoms are found when valvular lesions become severe.[27] Proportion of severity was found higher in studies done among admitted hospitalized patients. Maximum milder forms of valvular lesions may also indicate that awareness and treatment seeking behavior of Bangladeshi people are increasing.

There are few limitations of our study. Our study was an outdoor based single center study, so the results did not represent general population with RHD of Bangladesh. This might also have under-represented the number of patients with advanced stages of disease, which were usually referred to healthcare centers with admission and intervention facilities.

Yet the result may provide some basic information of RHD that will help to plan a program for reduction of burden of RHD in this country.

CONCLUSION

RHD remains the major acquired valvular heart disease among children and young adults. Mitral valve lesion was the predominant lesion, particularly presenting as isolated mitral regurgitation.

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