

Original Research Article

Pattern of rheumatic heart disease in Western Rajasthan- an echocardiographic study: a single centre experience

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ABSTRACT

Background: Rheumatic heart disease (RHD) is a common form of heart valve disease associated with episodes of rheumatic fever. Despite the developments achieved in the field of cardiology, the consequences of acute rheumatic fever remain significantly high in developing countries like India. Objectives of current study aims to evaluate the pattern of valvular involvement in patients of RHD in Western Rajasthan assessed by echocardiography.

Methods: This is an observational study conducted at the department of Cardiology, Dr. S. N. Medical College, Jodhpur, India between September 2015 and February 2019. The study includes analysis of echocardiograms of RHD patients performed during this period.

Results: Total 502 echocardiograms of RHD patients between 4 and 75 years of age with mean age of 35.6 ± 11.6 years were evaluated, in which the most common age group was 21-40 years. There were 191 (38.04%) males, and 311 (61.95%) females. Mitral valve was most commonly involved in which mitral stenosis (MS) was seen in 345 (68.72%) and mitral regurgitation (MR) was seen in 350 (69.72%) patients. Aortic stenosis (AS) was seen in 61 (12.15%) and aortic regurgitation (AR) was found in 224 (44.62%) cases. Organic tricuspid valve (TV) disease was seen in 18 (3.58%). In combined valvular involvement MS+MR was seen in 234 (46.61%) cases; followed by MR+AR in 171 (34.06%); MS+AR in 161 (32.07%); AS+AR in 62 (12.35%); MR+AS in 46 (9.16%) and MS+AS in 42 (8.36%) subjects.

Conclusion: The echocardiographic pattern of RHD patients of Western Rajasthan showed a predominant involvement of mitral valve, followed by aortic and tricuspid valves. Further amongst multi-valvular involvement the sequence was predominantly MS+MR followed by MR+AR, MS+AR, AS+AR, MR+AS, and MS+AS.

Keywords: Echocardiography, Rheumatic heart disease, Valvular heart disease

INTRODUCTION

Inflammation of the heart valves are an important reason for cardiovascular morbidity and mortality worldwide having a huge impact on social aspects. Rheumatic heart disease (RHD) remains the overwhelming type of heart valve disease in developing countries like India.¹ Little information exists on the pattern of valvular heart disease as documented by echocardiography, although several

autopsy studies and surgical pathology series have been published on valvular heart disease.²⁻⁹

Acute rheumatic fever (ARF) and its sequelae RHD is a medical issue in both children as well as adults.⁹ In spite of the huge advancement made in cardiology, the problem of mortality and morbidity because of ARF and its outcomes stay high in India.¹⁰ The absence of explicit criteria had prompted symptomatic disarray until the

Jones criteria in 1944.¹¹ In spite of the Jones criteria and four corrections and modifications, ARF is either under diagnosed prompting about half of RHD patients not receiving prophylaxis or being over diagnosed by relying upon customary auscultatory findings for diagnosing carditis.¹²⁻¹⁴ It was in the year 2001, when the World Health Organization (WHO) Expert Committee built up an accord for the echocardiographic analysis of subclinical RHD.¹⁵

METHODS

This present observational study was conducted between September 2015 and February 2019 in the department of cardiology, Dr. S. N. Medical College, Jodhpur, India, which incorporated all echocardiograms of RHD patients performed during this period for analysis.

Inclusion criteria

All echocardiograms of RHD patients performed between September 2015 to February 2019 (n=502) in the

department of cardiology, Dr. S. N. Medical College, Jodhpur, India were considered for the present observational study.

Exclusion criteria

- All non-rheumatic valvular involvement
- Trivial or functional mitral regurgitation (MR)
- Trivial or mild aortic regurgitation (AR) due to sclerotic aortic valve or unspecified causes
- Trivial or functional tricuspid regurgitation (TR).

RESULTS

Total 502 echocardiograms of RHD patients of age ranging from 4 to 75 years with mean age of 35.6±11.6 years were divided into four groups as shown in Table 1.

Group A (0-20 years) included 70(13.94%) patients, Group B (21-40 years) included 252(50.19%) patients, Group C (41-60 years) included 149(29.68%) patients and Group D (61-80 years) included 31(6.17%) patients.

Table 1: Age distribution of 502 Echocardiograms of RHD patients.

Groups	Age(years)	Total no of patients(n=502)			Percentage (%)
		Males	Females	Total	
Group A	0-20 years	31	39	70	13.94%
Group B	21-40 years	95	157	252	50.19%
Group C	41-60 years	52	97	149	29.68%
Group D	61-80 years	13	18	31	6.17%

Sex distribution of 502 echocardiograms of RHD patients were analyzed, which composed of 191 (38.04%) males, and 311(61.95%) females as shown in Table 2.

Mitral stenosis (MS) was seen in 345(68.72%) cases of which, 129(37.39%) were males, and 216(62.61%) were females.

Mitral Regurgitation (MR) was diagnosed in 350(69.72%) patients out of which 140(40.00%) were males and 210(60.00%) were females.

Aortic stenosis (AS) was seen in 61(12.15%) cases; out of which 32 (52.45%) were males and 29(47.55%) were females.

Aortic regurgitation (AR) was found in 224(44.62%) cases, of which 95(42.40%) were males and 129(57.60%) were females. Organic tricuspid valve (TV) disease was seen in 18(3.58%); cases of which 6(33.33%) were males and 12(66.67%) females. The frequency of isolated and mixed valvular lesions in a total of 502 RHD patients were shown in Table 3.

Table 2: Frequency of individual valve lesion according to sex distribution.

Valve lesion	Total=502(100%)	Males=191 (38.04%)	Females=311 (61.95%)
MR	350(69.72%)	140(40.00%)	210(60.00 %)
MS	345(68.72%)	129(37.39%)	216(62.61%)
AR	224(44.62%)	95(42.4%)	129(57.6 %)
AS	61(12.15%)	32(52.45%)	29(47.55%)
Organic TV disease	18(3.58%)	6(33.33%)	12(66.67%)

Isolated MS was found in 36(7.17%) patients, and mixed valvular lesions were found in 309(61.55%) patients. Isolated MR was found in 39(7.76%) patients, and mixed valvular lesions were found in 311(61.95%) patients. Isolated AS was found in 0(0.0%) patients and mixed valvular lesions were found in 61(12.15%) patients. Isolated AR was found in 8(1.59%) patients, and mixed valvular lesions were found in 216(43.02%) patients.

Table 3: Frequency of isolated and mixed valvular lesions.

Valve lesion	Total	Isolated	Mixed
MR	350(69.72%)	39(7.76%)	311(61.95%)
MS	345(68.72%)	36(7.17%)	309(61.55%)
AR	224(44.62%)	8(1.59%)	216(43.02%)
AS	61(12.15%)	0(0.0%)	61(12.15%)

Amongst combined valvular involvement- MS+MR was most frequently observed in 234(46.61%) patients; followed by MR+AR in 171(34.06%); MS+AR in 161(32.07%); AS+AR in 62(12.35%); MR+AS in 46(9.16%) and MS+AS in 42(8.36%) patients as shown in Table 4.

Table 4: Frequency of combined valvular involvement.

Combined valve lesion	Frequency (n=502)	Percentage (%)
MS+MR	234	46.61%
MR+AR	171	34.06%
MS+AR	161	32.07%
AS+AR	62	12.35%
MR+AS	46	9.16%
MS+AS	42	8.36%

DISCUSSION

The present study was done in a tertiary cardiac centre in Western Rajasthan, India, with the goal of efficiently assessing large volume of echocardiographic data on RHD patients which was captured in the echocardiographic laboratory.

Echocardiography currently plays a dominant role in the assessment of the anatomic and hemodynamic consequences caused by valvular lesions. Echocardiography is presently the absolute method for investigating and follow up of patients with valvular RHD.

The benefits of echocardiogram over clinical investigations in distinguishing subclinical RHD has been distinctively proven by different school reviews done across India.^{16,17} It may lead to more youngsters receiving prophylaxis for rheumatic fever hence decreasing the burden of RHD.

RHD was most common in age group 21-40 years and females were more commonly involved than males. These finding correlated with observations of Manjunath et al. and Kafle et al.^{18,19}

Manjunath et al. observed that majority of patients of valvular heart disease (64.3%) were due to RHD.¹⁸ The pattern of association of valve involvement in RHD was mitral followed by aortic, tricuspid, and pulmonary. Another study by Chandrashekhar et al, proved the pathologic involvement of the heart valves in ARF which is similar to the previous study in which mitral valve is most commonly involved and pulmonary, the least.²⁰ In the present study, the pattern of valve lesions in RHD were similar to previous study as mitral, aortic, tricuspid, and no pulmonary valve lesions detected.

In another survey held at Cambodia and Mozambique, on young children showed that the cases of RHD as identified by echocardiography were several times more than those accomplished by clinical examinations.²¹

Recurrences of rheumatic fever happen more in RHD patients, and each spell of ARF causes deterioration of the valves.²²

The rheumatic association as depicted in the surgical series is practically 99% of excised stenotic valves.^{5,23}

In a surgical series from Mayo clinic, RHD was the most common cause of isolated AR, however in the recent series, it is the aortic dilatation and degenerative changes implicated in more than half of the cases of AR.^{24,25} In present study aortic valve was the second most affected valve (AR-44.62% and AS-12.15% patients).

In present study organic TV disease was found in 3.58% of patients whereas in the necropsy series of Roberts et al. tricuspid valve stenosis was depicted in only 2% and was only seen when MS and AS coexisted.⁴

The study by Manjunath et al. demonstrated combined valvular involvement in RHD patients was following according to the order of involvement: MS + MR (46.6%) >MS+AR (26.5%) >MR+AR (23.3%) >MS+AS (2.4%) >MR+AS(0.9%) >AS+AR(0.3%).¹⁸ However, the present study concluded, pattern in the following order: MS+MR (46.61%) >MR+AR (34.06%) >MS+AR (32.07%) >AS+AR (12.35%) >MR+AS (9.16%) >MS+AS (8.36%).

The present study has limitations as follow:

- The study has a small sample size.
- The study limited to a single centre hence the results cannot be projected for the population.
- Because this study was hospital based study, we cannot comment upon incidence and prevalence of ARF/RHD in the population.

CONCLUSION

The echocardiographic pattern of RHD patients in Western Rajasthan establishes a predominant involvement of mitral valve, followed by aortic and tricuspid valves. The valvular involvement among females had a typically predominant MS, followed by MR, AR, AS, and organic TV disease. Whereas, in males MR led the valvular lesions followed by MS, AR, AS, and organic TV disease. Further amongst multi-valvular involvement the sequence was predominantly MS+MR followed by MR+AR, MS+AR, AS+AR, MR+AS, and MS+AS.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- Carapetis JR. Rheumatic heart disease in developing countries. *N Engl J Med.* 2007;357(5):439-41.
- Roberts WC. Morphologic features of the normal and abnormal mitral valve. *Am J Cardiol.* 1983; 51(6):1005-28.
- Roberts WC. The congenitally bicuspid aortic valve: a study of 85 autopsy cases. *Am J Cardiol.* 1970;26(1):72-83.
- Roberts WC, Virmani R. Aschoff bodies at necropsy in valvular heart disease. *Circulation* 1977; 57(4):803-7.
- Olson LJ, Subramanian R, Ackermann DM, Orszulak TA, Edwards WD. Surgical pathology of the mitral valve: a study of 712 cases spanning 21 years. *Mayo Clin Proc.* 1987;62(1):22-34.
- Dare AJ, Harrity PJ, Tazelaar HD, Edwards WD, Mullany CJ. Evaluation of surgically excised mitral valves: revised recommendations based on changing operative procedures in the 1990s. *Hum Pathol.* 1993;24(12):1286-93.
- Duren DR, Becker AE, Dunning AJ. Long-term follow-up of idiopathic mitral valve prolapse in 300 patients: a prospective study. *J Am Coll Cardiol.* 1988;11(1):42-7.
- Hauck AJ, Freeman DP, Ackermann DM, Denielson GK, Edwards WD. Surgical pathology of the tricuspid valve: a study of 363 cases spanning 25 years. *Mayo Clin Proc.* 1988;63(9):851-63.
- Sanyal SK, Thapar MK, Ahmed SH, Hooja V, Tewari P. The initial attack of acute rheumatic fever during childhood in North India; a prospective study of the clinical profile. *Circulation.* 1974;49(1):7-12.
- Sanyal SK, Berry AM, Duggal S, Hooja V, Ghosh S. Squeal of the initial attack of acute rheumatic fever in children from north India. A prospective 5-year follow-up study. *Circulation* 1982;65(2):375-9.
- Jones TD. Diagnosis of rheumatic fever. *JAMA* 1944;126(8):481-4.
- Stollerman GH, Markowitz M, Taranta A, Wannamaker LW, Whittemore R. Report of the Ad hoc committee on Rheumatic Fever and Bacterial Endocarditis of the American Heart Association. Jones criteria (revised) for guidance in the diagnosis of Rheumatic Fever. *Circulation* 1965;32:664-8.
- Committee on Rheumatic Fever and Bacterial Endocarditis of the American Heart Association. Jones criteria (revised) for guidance in the diagnosis of rheumatic fever. *Circulation.* 1984;69:203A-8A.
- Special writing group of the Committee on Rheumatic fever, Endocarditis and Kawasaki disease of the Council of Cardiovascular disease in the young of the American Heart Association. Guidelines for the diagnosis of rheumatic fever: Jones criteria: 1992 update. *JAMA.* 1992;268: 2069-73.
- WHO. Rheumatic Fever and Rheumatic Heart Disease: Report of a WHO Expert Consultation, Geneva, 29 October–1 November 2001. Geneva, Switzerland: World Health Organization; 2004.
- Bhaya M, Panwar S, Beniwal R, Panwar RB. High prevalence of rheumatic heart disease detected by echocardiography in school children. *Echocardiogr* 2010;27(4):448-53.
- Saxena A, Ramakrishnan S, Roy A, Seth S, Krishnan A, Misra P, et al. Prevalence and outcome of subclinical rheumatic heart disease in India: the RHEUMATIC (Rheumatic Heart Echo Utilisation and Monitoring Actuarial Trends in Indian Children) study. *Heart.* 2011;97(24):2018-22.
- Manjunath CN, Srinivas P, Ravindranath KS, Dhanalakshmi C. Incidence and patterns of valvular heart disease in a tertiary care high-volume cardiac center: a single center experience. *Indian heart J.* 2014 May 1;66(3):320-6.
- Kafle R, Alurkar VM, Paudel N, Jha GS. Pattern of Valvular involvement in RHD Patients in a Tertiary Care Hospital of western Nepal, *Nepalese Heart J.* 2016; 13(2): 29-31.
- Chandrashekar Y, Narula J. Rheumatic fever In: Alpert Joseph S. *Valvular Heart Disease.* Springer, London. 3rd ed. 2007;431-441.
- Marijon E, Ou P, Celermajer DS, Ferreira B, Mocumbi AO, Jani D, Paquet C, Jacob S, Sidi D, Jouven X. Prevalence of rheumatic heart disease detected by echocardiographic screening. *New Eng J Med.* 2007 Aug 2;357(5):470-6.
- Mason T, Fisher M, Kujala G. Acute rheumatic fever in West Virginia: not just a disease of children. *Arch Inter Med.* 1991 Jan 1;151(1):133-6.
- Hanson TP, Edwards BS, Edwards JE. Pathology of surgically excised mitral valves: one hundred consecutive cases. *Arch Pathol Lab Med.* 1985; 109:823-8.
- Olson LJ, Subramanian R, Edwards WD. Surgical pathology of pure aortic regurgitation: a study of 225 cases. *Mayo Clin Proc.* 1984;5(11-12):835-41.

25. Dare AJ, Veinot JP, Edwards WD, Tazelaar HD, Schaff HV. New observations on the etiology of aortic valve disease: a surgical pathologic study of 236 cases from 1990. *Hum Pathol.* 1993;24(12):1330-8.

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