PREVALENCE OF RHEUMATIC FEVER AND RHEUMATIC HEART DISEASE AS DETECTED BY 2D ECHOCARDIOGRAPHY

Shrawan Kumar¹, V.D. Charan², Neha Agrawal³, Manish Kumar Singh⁴, Pranjal Pankaj⁵, Ishan Parasher⁶

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ABSTRACT: INTRODUCTION: Acute rheumatic fever is an auto-immune response to bacterial infection with group A streptococcus (GAS). Despite the dramatic nature of the acute episode, acute rheumatic fever leaves no lasting damage to the brain, joints or skin. Recurrences of acute rheumatic fever may cause further valve damage, leading to steady worsening of rheumatic heart disease. **AIMS AND OBJECTIVE:** To study prevalence of acute rheumatic fever and rheumatic heart disease as detected by 2D ECHOCARDIOGRAPHY in patients 05 years to 40 years of age attending OPD and IPD of medicine and pediatrics department Rama Medical College, Kanpur. **MATERIAL AND METHODS:** The present study was conducted on patients of 05 to 40 years of age. All patients were examined clinically and relevant investigations including 2D ECHOCARDIOGRAPHY was done in all patients. **RESULTS:** A total of 734 patients belonging to age group 05 to 40 years & attending the OPD & IPD of Medicine & pediatrics Department of Rama Medical College, Kanpur, were studied, Out of 734 patients, 42 patients (5.72%) had findings of RF & RHD on 2D ECHO. RF were present in 10 patients (1.36%), RHD in 28 patients (3.81%), and 04 patients (0.54%) had evidence of both RF & RHD, 38.09% had findings of RF & RHD, were >25 years of age, Out of 42 patients 61.90% were females & 38.09% were males, RF & RHD occurred more frequently (57.14%) in rural population as compared to urban population (42.86%). Among the Jones Minor Criteria, the most common manifestation (57.14%) was Arthralgia followed by Fever (50%). ESR was raised in 28.57%, CRP was elevated in 28.57% and PR-interval prolongation was seen in 14.28%. Clinically 04 patients had evidence of carditis. All these patients also had ECHO findings suggesting carditis. Other than that ECHO also identified 10 more patients with carditis. Mitral valve was most commonly involved. Isolated mitral stenosis was present in 25% of patients, isolated mitral regurgitation in 18.75% of patients, while combined mitral valve stenosis & regurgitation was present in 37.50% of patients. Multi valvular lesions were present in 18.25% of patients. **CONCLUSION:** Our study shows prevalence of RF to be 19.07 per 1000 patients and prevalence of RHD to be 43.59 per 1000 patients, there is higher sensitivity and positive predictive value of 2D ECHO in detecting RF and RHD. Maximum number of patients of RF and RHD belong to the >25 years age group, followed by 20-25 years, 15-20 years and 05-10 years with prevalence is higher in females than male, Polyarthrititis was the most common manifestation among the Jones major criteria seen in 35.71% patients. 2D ECHO had a sensitivity and positive predictive value of 100% in identifying carditis as compared to clinical methods of detecting carditis with sensitivity of 28.57%.

KEYWORDS: Acute rheumatic fever, Rheumatic heart disease, 2D ECHOCARDIOGRAPHY

INTRODUCTION: Acute rheumatic fever is an auto-immune response to bacterial infection with group A streptococcus (GAS). Despite the dramatic nature of the acute episode, acute rheumatic fever leaves no lasting damage to the brain, joints or skin. Recurrences of acute rheumatic fever may cause further valve damage, leading to steady worsening of rheumatic heart disease. Although the exact casual pathway is unknown, it seems that some strains (1, 3, 5, 14, 18 and 24) of GAS are “rheumatogenic” and that a small proportion of people in any population (3-5%) have an inherent susceptibility to acute rheumatic fever. Acute rheumatic fever is predominantly a disease of children aged 05-14 years (Carpetis et al, 2005)¹ although people can have recurrent episodes well into forties. The prevalence of rheumatic heart disease peaks in the third and fourth decades ^[1, 2]. Therefore, although acute rheumatic fever is a disease with its roots in childhood, its effects are felt throughout adulthood, especially in the young adult years when people might otherwise be at their most productive. Rheumatic fever is a systemic disease affecting the peri-arteriolar connective tissue and can occur after an untreated Group A Beta hemolytic streptococcal pharyngeal infection. It is believed to be caused by antibody cross reactivity. This crossed reactivity is a type II hypersensitivity reaction and is termed molecular mimicry. Usually, self-reactive B cells remain anergic in the periphery without T cell co-stimulation. During a streptococcus infection, mature antigen presenting cell such as B cell present the bacterial antigen to CD4-T cells which differentiate in to helper T₂ cells. Helper T₂ cells subsequently activate the B cell to become plasma cell and induce the production of antibody against the cell wall of streptococcus. However, the antibody may also react against the myocardium and joint, producing the symptoms of rheumatic fever³. In acute rheumatic fever, lesions can be found in any layer of the heart and is hence called pancarditis. The inflammation may cause a serofibrinous pericardial exudates described as “bread-and-butter” pericarditis, which usually resolves without sequelae. Involvement of the endocardium typically results in fibrinoid necrosis and verrucae formation along the lines of closure of the left-sided heart valves. Warty projections arise from the deposition, while sub-endothelial lesions may induce irregular thickenings called MacCallum plaques. Chronic rheumatic heart disease is characterized by repeated inflammation with fibrinous resolution. The cardinal anatomic changes of the valve include leaflet thickening, commissural fusion and shortening and thickening of the tendinous cords.

AIMS AND OBJECTIVES: To study prevalence of acute rheumatic fever and rheumatic heart disease as detected by 2D ECHOCARDIOGRAPHY in patients 05 years to 40 years of age attending OPD and IPD of medicine and pediatrics department of Rama Medical College Kanpur.

MATERIALS AND METHODS:

STUDY POPULATION: The present study was conducted on patients of 05 to 40 years of age. All patients were examined clinically and relevant investigations were done, 2D ECHOCARDIOGRAPHY was done in all patients.

Inclusion criteria: Patients of 05 to 40 years of age,

Exclusion criteria: Patients less than 05 years and greater than 40 years of age were excluded from the study.

METHODS: Detailed relevant history, negative history, detailed general and systemic physical examination including 2D ECHOCARDIOGRAPHY was done in all the cases.

OBSERVATIONS: A total of 734 patients belonging to age group 05 to 40 years & attending the OPD & IPD of Medicine & paediatrics Department of Rama Medical College, Kanpur, were studied. 2D ECHOCARDIOGRAPHY of all the patients was performed to detect patients with Rheumatic fever and Rheumatic heart disease. Hence, prevalence of Rheumatic fever and rheumatic heart disease was calculated.

	NO. OF PATIENTS	% OF PATIENTS
RF & RHD	42	5.72
NORMAL	692	94.28
TOTAL	734	100

TABLE-1: PRESENCE OF FINDINGS OF RHD & RF ON 2D ECHOCARDIOGRAPHY

Out of 734 patients enrolled in the study 42 patients (5.72%) had findings of RF on RHD on 2D ECHOCARDIOGRAPHY.

FINDINGS	NO. OF PATIENTS	PERCENTAGE (%)
RFR	10	1.36
RHD	28	3.81
RHD & RF	04	0.54
TOTAL	734	100

TABLE-2: DISTRIBUTION OF PATIENTS ACCORDING TO PRESENCE OF 2D ECHOCARDIOGRAPHY FINDINGS

Out of 734 patients, 2D Echocardiographic findings suggestive of RF were present in 10 patients (1.36%), of RHD in 28 patients (3.81%), and 04 patients (0.54%) had evidence of both RF & RHD. This shows prevalence of RF is 19.07 per 1000 patients & that of RHD is 43.59 per 1000 patients as detected by 2D ECHOCARDIOGRAPHY.

AGE GROUP (YEARS)	NO. OF PATIENTS WITH RF/RHD	PERCENTAGE (%)
05-10	04	09.52
10-15	06	14.28
15-20	07	16.66
20-25	09	21.42
>25	16	38.09
TOTAL	42	100.00

TABLE-3: AGE DISTRIBUTION OF PATIENTS WITH RF/RHD

Maximum no. of patients (38.09%) having 2D Echocardiographic findings of RF & RHD were >25 years of age & least no. of patients (09.52%) belonged to age group 05-10 years.

SEX	NO. OF PATIENTS	PERCENTAGE (%)
MALE	16	38.09
FEMALE	26	61.90
TOTAL	42	100.00

TABLE-4: SEX DISTRIBUTION OF PATIENTS WITH RF & RHD

Out of 42 patients majority (61.90%) were females & rest (38.09%) were males.

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RESIDENCE	NO. OF PATIENTS	PERCENTAGE (%)
RURAL	24	57.14
URBAN	18	42.86
TOTAL	42	100.00

TABLE-5: DISTRIBUTION OF PATIENTS BASED ON RESIDENCE

RF & RHD occurred more frequently (57.14%) in rural population as compared to urban population (42.86%).

MANIFESTATIONS	NO. OF PATIENTS WITH RF	PERCENTAGE (%)
CARDITIS	04	28.57
ARTHRITIS	05	35.71
SUBCUTANEOUS NODULES	0	0
ERYTHEMA MARGINATUM	0	0
CHOREA	0	0
TOTAL PATIENTS WITH RF	14	100.00

TABLE-6: DISTRIBUTION OF PATIENTS ON BASIS OF DIFFERENT MANIFESTATIONS OF RF (JONES MAJOR CRITERIA)

Among the Jones major criteria, polyarthritis was seen most commonly (37.71%) followed by clinical carditis (28.57%). Sydenham's chorea, erythema marginatum & subcutaneous nodules were not seen in any of the patients.

NO. OF PATIENTS WITH RF	EVIDENCE OF PRECEEDING STREPTOCOCCAL INFECTION (ASO or Rapid Antigen Test or Positive throat culture for GAS)	PERCENTAGE OF PATIENTS
14	07	50.0

TABLE-7: EVIDENCE OF PRECEEDING STREPTOCOCCAL INFECTION

Evidence of preceding streptococcal infection was seen in 50% of patients.

2D ECHO	FULFILLING JONES CRITERIA	NOT FULFILLING JONES CRITERIA	TOTAL
+	07	07	14
-	00	00	00

TABLE-8: PATIENTS FULFILLING JONES CRITERIA AMONGST PATIENTS WITH RF

Out of 14 patients, only 07 (50%) were fulfilling Jones Criteria.

2D ECHO FINDINGS	CLINICAL EVIDENCE OF CARDITIS PRESENT	CLINICAL EVIDENCE OF CARDITIS ABSENT	TOTAL
PRESENT	04	10	14
ABSENT	00	720	720
TOTAL	04	730	734

TABLE-9: PRESENCE OF 2D ECHO & DOOPLER FINDINGS & CLINICAL CARDITIS IN PATIENTS WITH RF

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Clinically 04 patients had evidence of carditis. All these patients also had ECHO findings suggesting carditis. Other than that ECHO also identified 10 more patients with carditis. 2D ECHO had a sensitivity and positive predictive value of 100% in identifying carditis as compared to clinical methods of detecting carditis (sensitivity 28.57%).

LESION	NO. OF PATIENTS	PERCENTAGE (%)
ISOLATED MS	08	25.00
ISOLATED MR	06	18.75
MS + MR	12	37.75
ISOLATED AORTIC VALVE INVOLVEMENT	00	00
MULTI VALVULAR INVOLVEMENT	06	18.75
TOTAL	32	100.00

TABLE-10: PATTERN OF VALVULAR INVOLVEMENT IN PATIENTS WITH RHD

Mitral valve was most commonly involved. Isolated mitral stenosis was present in 25% of patients, isolated mitral regurgitation in 18.75% of patients, while combined mitral valve stenosis & regurgitation was present in 37.50% of patients. Multi valvular lesions were present in 18.25% of patients.

DISCUSSION: Our study shows prevalence of rheumatic fever to be 19.07 per 1000 patients and prevalence of rheumatic heart disease to be 43.59 per 1000 patients as detected by 2D ECHOCARDIOGRAPHY in patients attending OPD & IPD of Medicine & Paediatrics department of Rama medical college Kanpur.

Study also shows prevalence of clinically detected carditis was just 05.45 per 1000 patients while prevalence of patients having rheumatic fever on the basis of Jones Criteria was 09.53 per 1000 patients.

This study shows higher sensitivity and positive predictive value of 2D ECHO in detecting rheumatic carditis and rheumatic heart disease. Findings are consistent with Saxena et al (2012)^[4] and Figueroa et al^[5] which also conclude that prevalence of RHD is several folds higher using ECHO screening as compared to clinical examination, prevalence of RF was more among patients between 05 to 15 years of age which was consistent with Regmi PR (1997)^[6,7].

Prevalence of rheumatic heart disease was more among patients with low socio economic status, female sex and in rural areas.

Out of 734 patients 2D ECHOCARDIOGRAPHIC findings suggestive of RF were present in 10 patients (1.36%), of RHD in 28 patients (3.81%), and 04 patients (0.54%) had evidence of both RF & RHD. This shows prevalence of RF is 19.07 per 1000 patients & that of RHD is 43.59 per 1000 patients as detected by 2D ECHOCARDIOGRAPHY.

Out of 14 patients detected to have carditis on ECHO, only 04 patients had clinical carditis while all the patients who were not having ECHO evidence of carditis, did not have clinical carditis. This shows higher sensitivity & positive predictive value of 2D ECHO in identifying carditis. Carpentier JR suggested that universal echocardiography would uncover 10 subclinical rheumatic heart disease cases for every clinical case.

Among the Jones major criteria, in my study, polyarthritis was seen most commonly (37.71%) followed by clinical carditis (28.57%), Sydenham's chorea; erythema marginatum &

subcutaneous nodules were not seen in any of the patients. It was in accordance with Chockalingam et al^[8] who showed that arthritis was found in 75%, carditis in 50%, chorea in 04% and there were no instances of erythema marginatum or subcutaneous nodules.

Among the Jones minor criteria, in my study the most common manifestation (57.14%) was arthralgia followed by fever (50%). ESR was raised in 28.57%, CRP was elevated in 28.57% and PR interval prolongation was seen in 14.28%.

Our study shows mitral valve was most commonly involved. Isolated mitral stenosis was present in 25% of patients, isolated mitral regurgitation in 18.75% of patients, while combined mitral valve stenosis & regurgitation was present in 37.50% of patients. Multi valvular lesions were present in 18.75% of patients. These findings were similar to those seen in a study conducted in Pakistan, which showed presence of isolated mitral stenosis in 33.98%, isolated mitral regurgitation in 08%, isolated aortic valve involvement in 01.69% and mixed lesions in 56.30% patients (MdFaheem et al, 2007)^[9].

RF & RHD occurred more frequently (57.14%) in rural population as compared to urban population (42.86%).

CONCLUSION: The following conclusions can be drawn from this study and its observation:

1. Our study shows prevalence of rheumatic fever to be 19.07 per 1000 patients and prevalence of rheumatic heart disease to be 43.59 per 1000 patients as detected by 2D ECHOCARDIOGRAPHY in patients attending OPD & IPD of Medicine & paediatrics department of Rama medical college Kanpur.
Study also shows prevalence of clinically detected carditis was just 05.45 per 1000 patients while prevalence of patients having rheumatic fever on the basis of Jones Criteria was 09.53 per 1000 patients.
2. Our study shows higher sensitivity and positive predictive value of 2D ECHO in detecting rheumatic fever and rheumatic heart disease.
3. Maximum number of patients of RF and RHD belong to the >25 years age group, followed by 20-25 years, 15-20 years and 05-10 years.
4. RF and RHD occurred with a greater frequency in females.
5. Rural population was more commonly affected than the urban population probably due to poor living conditions.
6. Polyarthritis was the most common manifestation among the Jones major criteria seen in 35.71% patients. Clinical carditis was next seen in 28.57% patients. Sydenham's chorea, subcutaneous nodules and erythema marginatum were not seen in any of the patients.
7. Among the Jones criteria, arthralgia was seen most commonly in 57.14% patients, followed by fever, elevated CRP, elevated ESR and lastly, prolonged PR interval on ECG.
8. Application of full Jones Criteria is cumbersome and also less sensitive and specific than using only arthritis, carditis and 2D Doppler as the criteria for diagnosis of RF.
9. Mitral valve was most commonly involved. Isolated mitral stenosis was present in 25% of patients and isolated mitral regurgitation was present in 18.75% of patients. Combined mitral stenosis with mitral regurgitation was seen in 37.50% of patients and this was the commonest valvular lesion. Isolated aortic valve involvement was not present in any of the patients. Multi valvular lesions were present in 18.75% patients.

10. Clinically, 04 patients had evidence of carditis. All these patients also had ECHO findings suggesting carditis. Other than that, ECHO also identified 10 more patients with carditis. 2D ECHO had a sensitivity and positive predictive value of 100% in identifying carditis as compared to clinical methods of detecting carditis with sensitivity of 28.57%.
11. Clinically, 26 patients had evidence of rheumatic heart disease. All these patients also had 2D ECHO findings suggesting rheumatic heart disease. Other than that, ECHO also identified 06 more patients with rheumatic valvular lesions. 2D ECHO had a sensitivity and positive predictive value of 100% in identifying rheumatic heart disease as compared to clinical methods of diagnosing rheumatic heart disease with sensitivity of 81.25%.

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AUTHORS:

1. Shrawan Kumar
2. V.D. Charan
3. Neha Agrawal
4. Manish Kumar Singh
5. Pranjal Pankaj
6. Ishan Parasher

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Medicine, Rama Medical College Hospital & Research Centre, Mandhana, Kanpur, Uttar Pradesh.
2. Professor, Department of Medicine, Rama Medical College Hospital & Research Centre, Mandhana, Kanpur, Uttar Pradesh.
3. Assistant Professor, Department of Medicine, Rama Medical College Hospital & Research Centre, Mandhana, Kanpur, Uttar Pradesh.
4. Assistant Professor, Department of Medicine, Rama Medical College Hospital & Research Centre, Mandhana, Kanpur, Uttar Pradesh.

5. Assistant Professor, Department of Medicine, Rama Medical College Hospital & Research Centre, Mandhana, Kanpur, Uttar Pradesh.

6. Junior Resident, Department of Biochemistry, Rama Medical College Hospital & Research Centre, Mandhana, Kanpur, Uttar Pradesh.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Shrawan Kumar,
Associate Professor,
Department of Medicine,
Rama Medical College, Mandhana,
Kanpur, Uttar Pradesh – 209217.
Email- drshrawanknp@gmail.com

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