



**ASO TITRE IN ACUTE RHEUMATIC FEVER/RHEUMATIC
HEART DISEASE IN PEDIATRIC AGE GROUP**

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ABSTRACT

Rheumatic fever and rheumatic heart disease remain significant causes of cardiovascular disease and mortality, particularly in the developing countries. The identification of the first attack of rheumatic fever/carditis is of paramount importance to prevent further episodes and residual cardiac damage. In the present study, we report the significance of antistreptolysin-O (ASO) test in the diagnosis of RF and RHD. The study aimed to determine ASO titre in normal children & in those with rheumatic fever. Blood samples of 200 children clinically diagnosed as ARF/RHD and of 100 normal children aged 5-15 years were screened for ASO antibodies by latex agglutination test. Seropositivity of ASO antibodies was 77% in ARF/ RHD cases and 21% in control children. A total of 41% ARF/RHD cases and 14% of control children showed an ASO titre of 200IU/ml. Seropositivity of ASO antibodies was slightly more in females than males in cases as well as control. It can be suggested from our study that ASO titre of >200IU/ml or above should be taken as a diagnostic titre in the pediatric age group of our geographic area.

KEYWORDS: ASO, ARF, RHD, Pediatrics

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INTRODUCTION

Rheumatic fever (RF) and rheumatic heart disease (RHD) are non-suppurative complications of group A streptococcal pharyngitis due to delayed immune response. RF & RHD pose a serious public health problem as it represents the main cause of morbidity among school age children and one of the commonest types of cardio-vascular disease in adults.¹ RF & RHD is widely prevalent in India. Given a prevalence rate of 4-6 per 1000 children per year, there are approximately 1 to 1.25 million cases of RF and RHD in India today.^{2,3} The identification of the first attack of rheumatic fever / carditis is of paramount importance, because with anti-streptococcal antibiotic therapy and prophylaxis, further episodes or residual cardiac damage can be prevented if diagnosis and treatment are prompt. The control of RF & RHD is a priority in India.^{4,5} Diagnosis of RF has been often presumptive based on suggestive clinical pattern backed by the proof of antecedent streptococcal infection. The role of laboratory in the diagnosis of RF is mainly confirmatory when it reveals the existence of a recent streptococcal infection.⁶ Anti-streptolysin-O (ASO) is the commonest, best standardized & practical test for detecting a preceding streptococcal infection. It can be detected in about 80% of cases of ARF because it remains elevated for longer than other signs.^{7,8} In the present study, we report the significance of ASO test in the diagnosis of RF & RHD. The variation of ASO by age and sex was also studied. Such a study is important because control of recurrences and the prevention of residual cardiac damage are based on identification of first attack and secondary prophylaxis. The study also helps in finding out the cut-off value of ASO in pediatric age group in RF patients and compares it with normal children, which will serve as a baseline titre in healthy population.

MATERIALS & METHODS

The study was conducted on 200 children aged 5 to 15 years, clinically diagnosed as ARF/RHD at pediatric department, S.R.T.R.M.C. & Hospital, Ambajogai. Modified Jones's criterion was strictly followed in diagnosing all these cases. Blood samples of 100 school going children aged 5-15 years without any apparent throat or respiratory infection were also collected, who served as a control group. All the blood samples collected by venipuncture were screened for ASO antibodies by the latex slide agglutination test using commercial kits manufactured by Star Diagnostics Pvt. Ltd.(Mumbai). This is a rapid, qualitative & semi-quantitative determination of ASO titre in serum. ASO titres for this study were determined semiquantitatively. Complete history of the patient regarding age, sex, socio-economic status, over-crowding, family history, past history, the exact mode of onset, presenting complaints & treatment received if any was taken. Subjects who have received antibiotics 2-5 days prior to sample collection were excluded from the study. Thorough physical examination was done.

STATISTICAL METHODS

The results were analyzed by applying appropriate statistics whenever needed.

RESULTS

Out of 200 ARF/RHD cases studied, 104(52%) were male and 96 (40%) were female. Among 100 control children, 53 were male & 47 were female. Seropositivity of ASO antibodies was 39.5 % in female & 37.5 % in male among 200 ARF/RHD cases, while in control group it was 12 % in female & 9 % in male. (Table- 1) Out of 200 patients, 154(77%) were positive for ASO antibodies, amongst which 82(41%) had shown a titre of 200 IU/ml, 68(34%) had shown a titre of 400 IU/ml & 4(2%) had shown a titre of 800 IU/ml. In the control group, a total of 21% were positive for ASO antibodies, amongst which

14% had shown a titre of 200IU/ml & 7% had shown a titre of 400IU/ml. (Table-2) Majority of children showing ASO titre of 200IU/ml or above were observed in the school going age of 5-15 years in cases as well as control.

(Table-3) Seropositivity of ASO was higher (60%) in children with low socio-economic status than children with high socio-economic status (17%). The difference was statistically significant. (Table-4)

Table 1
Sexwise distribution of ASO positivity in ARF/RHD cases and in control children

	Total	Positive	Total	Positive	
ARF/RHD Cases	200	154(77%)	Control	100	21
Male	104	75(37.5%)	Male	53	9 (9%)
Female	96	79(39.5%)	Female	47	12(12%)

Table 2
ASO antibody titres in ARF/RHD cases and in control.
ARF/RHD cases = 200; Control children= 100

ASO titre (IU/ml)	ARF/RHD cases	Control
≥200	82(41%)	14(14%)
≥400	68(34%)	7(7%)
≥800	4(2%)	0
≥1600	0	0
	154(77%)	21(21%)

Table 3
Agewise distribution of ASO titre in ARF/RHD cases

Age in years	No. of cases	ASO titre ≥200 IU/ml	ASO titre ≥400 IU/ml	ASO titre ≥800 IU/ml	Total
5	4	1	-	-	1
6	9	3	1	-	4
7	14	6	4	-	10
8	17	9	5	-	14
9	29	13	10	-	23
10	42	19	16	1	36
11	33	15	12	1	28
12	37	11	12	2	25
13	7	3	4	-	7
14	5	1	3	-	4
15	3	1	1	-	2
Total	200	82	68	4	154

Table 4
Positivity of ASO antibodies according to socioeconomic status

Socioeconomic status	ASO titre(IU/ml) in ARF/RHD cases			ASO titre(IU/ml) in control children		
	Total	Positive	Negative	Total	Positive	Negative
Low	143 (71.5%)	120 (60%)	23 (11.5%)	76 (76%)	14 (14%)	62 (62%)
High	57 (28.5%)	34 (17%)	23 (11.5%)	24 (24%)	7 (7%)	17 (17%)

DISCUSSION

The diagnosis of acute rheumatic fever requires evidence of prior streptococcal infections and rise in ASO antibody titre is indicative of preceding group A Streptococcal infection. Streptococcal antibody titers are crucial in confirming a diagnosis of ARF. ASO titre needs to be considered in the context of an existing epidemiological pattern in a particular geographical area. Since ASO antibodies persist for 4-6 months, it is likely that healthy individuals in an endemic area may have persistently high titre due to repeated exposure. Also, the average ASO titre may vary for different population by age, socio-economic status, geographic area & other factors related to the frequency of streptococcal infections. It is thus necessary to collect data in our own population for any meaningful interpretation. In the present study, the seropositivity rate of ASO antibodies in ARF/RHD cases was 77%. This is in close accordance with other reports from India.^{9,10,11} Our study reports that a substantial number of normal children (21/100) in the vulnerable age group harbor ASO antibodies without any apparent evidence of recent streptococcal infection. This is obviously due to frequent subclinical infections prevalent in our community. Similar findings were reported by other workers.^{6,10,12} The age and sex distribution tends to differ among various studies. Our study demonstrated maximum cases of ARF/RHD in the age group of 7-12 years. In the control group, maximum children showing ASO antibodies in a titre of 200IU/ml or above were observed in the age group of 5-12 years. Similar age incidence was given by other workers.^{9,10,12,13} Seropositivity of ASO was slightly more in female than male, in cases as well as control. But the difference was not statistically significant. This is in close similarity with other workers.^{14,15} The effects of socio-economic factors on the positivity of ASO are well born out in our study. Children from low socio-economic status showed higher percentage of positivity as compared to high socio-economic status. This is found in other studies as well.^{9,10,12,15} The high incidence in a low socio-economic group is attributed to overall low standards of living associated with poorly

ventilated, over-crowded houses and poor nutritional status. Western studies have considered ASO titre of 200IU/ml as diagnostic of recent infection & have used it as a cut-off point to screen patients. A serum antibody is judged to be elevated if the titre exceeds the upper limit of the normal (ULN) titre ranged for a community, where ULN represents titre exceeded by 20% of a normal population. Any ASO titre above these cut-off values will indicate a group A streptococcal infection. It is essential to evaluate ULN of ASO levels in age & sex matched normal population before using these for the detection of patients. In the present study, 14% of the normal children and 41% of the ARF/RHD cases showed an ASO titre of >200IU/ml. So it can be said that an ASO titre of 200IU/ml should be taken as diagnostic for the pediatric age group in our area. As all these 41% of cases might have been reported as negative, although they were diagnosed as ARF/RHD, had we consider the higher ASO titre of only 400 IU/ml as diagnostic. No doubt, a higher ASO titer of 400 IU/ml or above is definitely diagnostic of ARH/RHD, but a titre of 200 IU/ml should also be regarded as diagnostic. Sixteen percent of normal children showed a positive ASO titre of >200 IU/ml. This shows that even though asymptomatic they had subclinical infections. These children need not have rheumatic fever at present but there is possibility that with recurrent subclinical infections, they are prone to develop rheumatic fever if primary prophylaxis is not given.

CONCLUSION

Early detection and proper prophylaxis against streptococcal infection can prevent subsequent attacks of carditis & thereby morbidity and mortality related to rheumatic fever can be significantly reduced. A rapid & reliable estimation of ASO antibodies is of significance in early diagnosis and treatment of ARF/RHD. From our study it can be suggested that an ASO titre of ≥ 200 IU/ml or above should be taken as diagnostic in the pediatric age group in our geographic area.

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