

# EVALUATION OF ANTI-STREPTOLYSIN O TITERS IN RHEUMATIC HEART DISEASE PATIENTS

Abdul Sattar,<sup>1</sup> Shaukat Ali,<sup>2</sup> Abdul Wadood,<sup>1</sup> Nida Ali,<sup>1</sup> Shamila Afshan<sup>1</sup>

## ABSTRACT

**Background:** Antistreptolysin O titer is related to rheumatic heart disease. **Objective:** To assess antistreptolysin O titer in rheumatic heart disease patients at Punjab Institute of Cardiology Lahore. **Methodology:** It was a cross-sectional study, 130 consecutive patients of rheumatic heart disease admitted at Punjab Institute of Cardiology Lahore between 1st January to 31st December, 2014, fulfilling the inclusion and exclusion criteria were enrolled. Their laboratory findings were taken; CRP and ESR levels were measured. ASO titer was measured by latex agglutination test. ASO Titer more than 200IU/ml was taken as significant. **Results:** It was found that 81(62.31%) patients of rheumatic heart disease has ASO levels more than 200IU/ml and 49(37.69%) patients has ASO less than 200IU/ml. Fifty two percent study subjects were female and 60% were between 4-15 years of age. **Conclusion:** Majority of the patients admitted with RHD has raised level of ASOT.

**Key Words :** Rheumatic Heart Disease, Rheumatic fever, Anti-streptolysin O titer.

JSZMC 2015;6(2):808-810

## INTRODUCTION

Rheumatic fever develops in children and adolescents following pharyngitis with group A beta-hemolytic streptococcus (i.e. streptococcus pyogenes). The organisms attach to the epithelial cells of the upper respiratory tract and produce enzymes allowing them to damage and invade human tissues. After an incubation period of 2-4 days, the invading organisms elicit an acute inflammatory response with 3-5 days of sore throat, fever, malaise, headache and an elevated leukocyte count. In 3% of cases, infection leads to rheumatic fever. Rheumatic heart disease is the most serious complication of rheumatic fever. As many as 39% of patients with acute rheumatic fever may develop varying degrees of pancarditis with associated valve insufficiency, heart failure, pericarditis and even death.<sup>1</sup>

Rheumatic fever and rheumatic heart disease cannot be separated from each other from epidemiological point of view. Recent studies in the field of pediatric rheumatology have addressed the clinical features of acute rheumatic fever, emphasizing its high prevalence in our country, as well as growing diagnostic difficulties.<sup>2</sup> Recent data from Pakistan have shown a very high prevalence of rheumatic heart disease in both urban and rural population. In a large cross-sectional survey, conducted on more than 25000 urban school going children from inner Lahore

using echocardiography to confirm the cardiac lesion, has estimated a prevalence of 22/1000.<sup>3</sup> The objective of this study was to assess antistreptolysin o level in rheumatic heart disease patients.

## METHODOLOGY

Sample size of 130 cases was calculated by 95% confidence interval, 5% margin of error with the expected population proportion of the critical level of ASO titer among rheumatic heart disease patients of 6%. Subjects of both sexes with age between 4-55 years were included in this study. The data was collected using a questionnaire. The questionnaire contained the demographic data information about the disease symptoms and laboratory findings. The patients of rheumatic heart disease admitted in Punjab Institute of cardiology Lahore during the time period from 1<sup>st</sup> January to 31<sup>st</sup> December 2014 for evaluation of ASO titer. Clinical information was obtained from all patients by reviewing medical records. Patients with incomplete data were excluded. All expected factors were included in the questionnaire. Their laboratory findings were taken, CRP and ESR levels were measured. Anti-streptolysin O titer was measured by screening slide agglutination method according to manufacturer's instructions. Data collected was entered and analyzed in the SPSS version 20. Mean± standard deviation was calculated for quantitative variables like age and ESR, CRP, WBC and ASO titer > or ≤

Correspondence: Dr. Shaukat Ali, Associate Professor of Cardiology, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan.

Email:shaukat404@yahoo.com Phone: +923009674404

Received: 21-03-2015

Accepted: 02-06-2015

1. Punjab Institute of Cardiology Lahore, University of Health Sciences Lahore, Pakistan.

2. Department of Cardiology, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan, University of Health Sciences Lahore, Pakistan.

200IU/ml. Qualitative variables like gender and age groups, area, ASO titer (IU/ml) and ASO Latex slide positive were expressed in frequency and percentage.

## RESULTS

In this study, total 130 patients were enrolled. The table 1 shows demographic characteristics of patients and the result of ASO titer. The age range the patient was 4 to 55 years. The highest frequency of patients (60%) was the age group of 4-15 years, 62 (47.69%) were male and 68 (52.31%) were female patients. 83 (63.85%) patients were from rural area and 47 (36.15%) patients were from urban area. P-value= 0.002. ASO test was positive in 81 (62.31%) patients and negative in 49 (37.69%) patients P-value= 0.001.

**Table I: Demographic characteristics of the patients and results of ASO Titer**

Variables		Frequency (%)
Gender	Male	62(47.69%)
	Female	68(52.31%)
Age( Mean ±Std. deviation).		16.18±10.609
Age groups (years)	4-15	78(60%)
	16-25	26(20%)
	>25	26(20%)
Area	Rural	83(63.85%)
	Urban	47(36.15%)
ESR (mm/hr)		45.57±32.103
CRP (g/dl)		16.29±13.243
WBCs (10 <sup>9</sup> /L)		12.69±4.769
ASOT IU/ml (Mean+ Std. deviation)		387.69±198.840
ASOT IU/ml (category).	>200	81(62.31%)
	≤200	49(37.69%)

**Table II: Level of ASO titer in ASO Latex slide positive Patients**

ASO Test	ASO Titer (IU/ml)			Total	P.value
	400	600	800		
Positive	59 (45.38%)	3 (2.31%)	19 (14.62%)	81 (62.31%)	0.043

Table II shows the level of Anti-streptolysin O titer in ASO slide +ve patients. 59 (45.38%) patients have 400IU/ml ASO titer, 3(2.31%) patients have 600IU/ml titer and 19(14.62%) patients have

800IU/ml titer. The total frequency of ASO positive patients were 81 (62.31%). P-value≤0.043).

Table III: Shows the ASO titer of patients which have either single, double or multiple valve affected. 63 (48.46%) patients have single valve affected in which 44(74.58) patients has 400IU/ml ASO titer, 2 patients have 600IU/ml ASO titer and 17 patients have 800IU/ml ASO titer. 14 (10.77%) patients have double valve affected in which 12 patients have 400IU/ml ASO titer, 1 patient has 600IU/ml and 1 patient has 800IU/ml. 4 (3.08%) patients have multiple valve affected, in which 3 patients have 400IU/ml ASOT and 1 patient has 800IU/ml ASOT. (P-value= 0.001).

**Table III: ASO Titers (IU/ml) in Rheumatic Heart Disease Patients**

Affected valves	ASO titer (IU/ml)			Total	P-value
	400	600	800		
Single valve affected	44	02	17	63 (48.46%)	0.001
Double valve affected	12	01	01	14 (10.77%)	
Multiple valve affected	03	0	01	04 (3.08%)	
Total	59	03	19	81	

## DISCUSSION

In the developing countries of the world, rheumatic fever and rheumatic heart disease remain significant medical and public health problems.<sup>4</sup> The prevalence of rheumatic fever and rheumatic heart disease per 1000 school children was 1.3% and 1.2% respectively. It is very rare to diagnose rheumatic fever in patients under 3 years of age.<sup>5</sup>

The laboratory tests used in rheumatic fever fall into 2 general groups,(1) the acute phase reactants and (2) bacteriologic and immunologic studies confirmatory of a preceding streptococcal infection. Each of these groups yields information relevant to a different facet of the disease process.<sup>6</sup> The acute phase reactants, which include the erythrocyte sedimentation rate and the C - reactive protein, are positive in a wide variety of other inflammatory diseases as well as acute rheumatic fever.<sup>7</sup>

Within the past several decades, antibody to streptolysin O (anti-streptolysin O, sometimes designated simply as anti-streptolysin or commonly abbreviated ASO) has replaced antibody to erythrotoxic toxin as the classic antibody for

studying the response to streptococcal infections in man. This antibody is easily quantitated and standardized, and has been extensively studied and widely used.<sup>8</sup>

The ASO test is performed by the latex agglutination test using a commercial ASO latex test kit. The test is performed both by qualitative and semi-quantitative methods. The diagnostic criteria of rheumatic heart disease are ASOT levels greater than 200IU/ml. Anti-Streptolysin O (ASO) serum titer in excess of 200 units is considered abnormally high and suggests either recent infection with Streptococci or persistently high antibody levels due to an earlier exposure in a hypersensitive persons.<sup>9</sup> In our study total 130 patients of rheumatic heart disease were included. 81 patients were positive in Anti-streptolysin O slide agglutination test which have ASO titer greater than 200IU/ml. 59 patients has 400IU/ml ASO titer, 3 patients have 600IU/ml ASO titer and 19 patients has 800IU/ml ASO titer. 49 patients were negative which have ASO titer less than 200IU/ml. 63 (48.46%) patients has single valve affected, 14 (10.77%) patients has double valve affected and 4 (3.07%) patients has multiple valve affected. The greatest frequency of rheumatic heart disease patients lie in age group from 4-15 years. 83 patients of RHD were from rural areas and 47 patients belong to urban areas. This shows that RHD most commonly occur in rural areas possibly due to poor sanitation and poor nutrition or it may be related to higher percentage of total population in rural areas. The correlation coefficient is higher than between ASOT and CRP. Similarly, correlation coefficient between ASO and CRP, and ASO and WBCs were also positive but not significant. So, we conclude that Anti-streptolysin O titer was high in RHD patients but the correlation with no of valves affected, WBCs count and ESR was poor. There was a significant correlation between socioeconomic level and the prevalence of rheumatic fever and RHD. The high prevalence of RHD in low socioeconomic group could be attributed largely to a low standard of living. The decline in the prevalence of RHD in industrialized countries has been attributed mainly to improvement in living standards and areas in which it persists, it is associated with low social circumstances and poverty.<sup>10</sup>

## CONCLUSION

In patients admitted with RHD, most of the patients have recent streptococcal infection as evident by raised ASO titer. Moreover, patients with raised ASO titer have severe rheumatic heart disease.

## REFERENCES

1. Cilliers AM .Rheumatic fever and its management .BMJ.2006;333:1153-1156
2. Stollerman GH. Rheumatic fever in the 21<sup>st</sup> century. Clin Infect Dis.2001;33 : 806-814
3. Akhter N, Sadiq M, Chagani H, Hafeez A, Rizvi FH, Mehboob M.Guidelines for prevention of rheumatic fever and rheumatic heart disease.Pak J Cardiol. 2004; 15(3):136-148
4. Kaplan EL, Rothermel CD, Johnson DR. Anti-streptolysin O and anti deoxyribonuclease B titers: Normal values for children ages 2 to 12.Pediatrics 1998; 101: 86-88
5. Paar JA, Berrios NM, Rose JD, et al. Prevalence of rheumatic heart disease in children and young adults in Nicaragua .Am J Cardiol.2010; 105:1809.
6. Shet A, Kaplan EL. Clinical use and interpretation of group A streptococcal antibody tests. A practical approach for the pediatrician or primary care physician. Pediatr Infect Dis J .2002; 21: 420-430
7. Ricardo G. Hahn, Lynda M. Knox, Todd A. Forman. Evaluation of post streptococcal illness. Am Fam Physician. 2005 May 15; 71(10) : 1949-1954
8. Danchin M, Carlin J, Devenish W, Nolan T, Carapetis J. "New normal Ranges of antistreptolysin O and antideoxyribonucleases B titers for Australian children". J Pediatr child Health.2005; 41(11) : 583-586.
9. B.L. Dewasy, Y.I. Singh, B.K. Jha, J.Kapil.A rapid screening test by the latex antistreptolysin O test for streptococcal infections in CMS Teaching Hospital, Bharatpur, Nepal. Journal of college of medical sciences Nepal 2010;Vol , NO.2; 24-28.
10. Dajani AS. Rheumatic fever. In: Braunwald E, ed. Heart disease: A Text book of Cardiovascular Medicine.7<sup>th</sup> ed. Philadelphia, PA: WB Saunders; 2005:2093-2100.