

Seroprevalence of anti-streptolysin O antibodies in different age groups in tertiary health care centre in Haryana, India: A hospital based study

Dr. Priyanka Soni¹, Dr. Kiran Bala², Dr. Aparna Yadav³, Dr. Aditya Griwan⁴

¹Demonstrator, Dept. of Microbiology, PGIMS, Rohtak

²Professor, Dept. of Microbiology, PGIMS, Rohtak

³Senior Professor, Dept. of Microbiology, PGIMS, Rohtak

⁴Intern, Dept. of Microbiology, PGIMS, Rohtak

Corresponding Author:- Dr priyanka Soni, Email:-priyankasoni021@gmail.com

ABSTRACT

Background: Detection of anti-streptolysin O antibodies in a patient's serum is the most relevant evidence of recent infection of any organ by group A *Streptococcus* (GAS). This occurs less commonly when the infection occurs by group C or G *Streptococcus*. ASO titre of more than 200 IU/ml is considered as a significant raised value.

Methods: A retrospective study was done on the sera samples received in the Department of Microbiology, PGIMS Rohtak, Haryana for the detection of ASO, over a period of two years. The test was carried out by latex agglutination rapid test kit by Aspen.

Result : A total of 4411 samples were received in the laboratory during the study period. Of these 885 (20.06%) were found to be positive for the presence of ASO having titre of >200 IU/mL

Conclusions: The prevalence of ASO was found to be highest in the age group (10-20yrs). The presence of elevated streptococcal antibody titres in such a population reflects a high background prevalence of streptococcal infections. Thus, determination of ASO antibodies should be taken into consideration when evaluating group A streptococcus non-purulent complications.

INTRODUCTION

Streptococcus pyogenes, or group A *Streptococcus* (GAS), causes a number of acute, common pyogenic infections, including pharyngitis and skin infections. In addition, the organism is responsible for certain non-suppurative diseases, such as acute rheumatic fever and post streptococcal glomerulonephritis, which occur weeks after the acute infectious process. Streptolysin O is one of the two haemolytic exotoxins liberated during the infections which stimulates the production of ASO antibodies in the serum. Rheumatic Fever (RF) is an autoimmune consequence of infection of the throat (pharyngitis) with GAS which causes an acute generalized inflammatory response and an illness that selectively affects the heart, joints, brain and skin. The sequelae are thought to be autoimmune-mediated diseases; that is, the damage is due to the host's immune response. Although the pyogenic infections are best diagnosed by isolation of the organism in culture, the non-suppurative diseases occur at a time when the organism may no longer be present. Thus serologic diagnosis is usually performed.¹

In addition, it may be necessary to diagnose infections by serology after antimicrobial therapy has been initiated. The ASO antibody test is commonly used to demonstrate serologic response to *S. pyogenes*.² The assay for ASO is widely used (Alyaa, 2012) although it has been shown to be non-specific. This is because antibodies to streptolysin are produced by both group A and non-group A streptococci particularly the C and G group. ASO titre has been shown to vary with age, geographical location, season and site of infection. This stimulates the production of anti-streptolysin O (ASO) antibodies in the human serum.³ Hence a single specimen when available requires to be compared with a predetermined baseline value or upper limit of normal (ULN) in a particular geographical area.⁴ Present study conducted this study to determine the seroprevalence of anti-streptolysin O antibodies in a tertiary care health facility of Haryana.

METHODS

A retrospective study was done on the blood samples received in the Department of Microbiology, PGIMS Rohtak, Haryana, India for the detection of ASO, over a period of TWO years (Aug 2018-Dec 2020). Serum was separated by centrifuging the samples at a speed of 1500 rpm for 10 minutes. The test was carried out by latex agglutination rapid test kit by Aspen. This test method is based on an immunological reaction between exo-enzymes bound to biologically inert latex particles and streptococcal antibodies in the test sample. Positive and negative controls, provided along with the kit, were put up with every run of the test process. A positive test is indicated by the presence of agglutination in the sera sample, within 2 minutes of adding the latex reagent. The sensitivity of the latex reagent has been adjusted to yield agglutination when the level of ASO is greater than 200 IU/ml. This cut off has been determined by epidemiological and clinical studies.

RESULTS

A total of 4411 samples were received in the Laboratory during the study period of August 2018 to December 2020. Of these, 885 (20.06%) were found to be positive for the presence of ASO having titre of >200 IU/ml. Maximum seropositivity, with ASO titre >200 IU/ml were seen in 10-20 years of age group (27.83%). The ratio of Females to Males was 3:2. Majority of the samples were from the OPD (45.6%).

Table 1: Age wise distribution of the patients.

| Age | No. of patient | ASO | % |
|-------|----------------|-----|-------|
| 0-10 | 1412 | 94 | 6.65 |
| 10-20 | 2687 | 748 | 27.83 |
| 20-30 | 245 | 36 | 14.69 |
| >30 | 67 | 7 | 10.44 |
| Total | 4411 | 885 | 20.06 |

DISCUSSION

Streptococcal antibodies tests are used for the diagnosis of antecedent infections caused by the group A streptococcus (GAS) and are particularly useful for the diagnosis of acute rheumatic fever and acute post-streptococcal glomerulonephritis. Acute rheumatic fever is an autoimmune disease that follows infection with GAS; however, the isolation of GAS is uncommon (<15%), and so confirmation of the diagnosis often relies on streptococcal antibody tests.⁵ While a number of tests utilize different antigens of GAS, the most frequently performed tests are those that determine the anti-streptolysin O (ASO) titre and the anti-DNase B (ADB) titre. Ideally, it is recommended that the titre be determined in the acute phase and then determined in the convalescent phase 14 to 28 days later, with a positive result defined as a rise in titre of twofold or more.

However, it is not always practicable to obtain a second sample for titre determination, particularly in developing countries, where acute rheumatic fever is the most common. Therefore, it is generally accepted that if only a single specimen is available, a titre greater than the upper limit of normal at the initial testing can be considered presumptive evidence of a preceding streptococcal infection.⁶ Anti-streptolysin-O (ASO) is the commonest, best standardized & practical test for detecting a preceding streptococcal infection.⁷ The appearance of ASO in serum of a patient or an increase in the ASO titre is usually indicative for a recent streptococcal infection. This is especially true when considering the diagnosis of nonsuppurative sequelae of GAS infection. Although ASO titre has provided a useful guideline to physicians, but this has been shown to vary with age, geographical location and site of infection.⁸

ASO titre has a utilitarian role in the diagnosis of Acute Rheumatic Fever. Even a single ASO titre is a useful investigative tool aiding in the confirmation of the diagnosis. The ASO titre are elevated in the acute phase and show a subsequent lower titre levels as the disease progresses.⁹

The estimation of ASO antibodies is a simple, cost-effective way for detecting antecedent streptococcal infection. However, the results should be interpreted judiciously keeping the upper normal limits of ASO titre, for the given geographical area, in mind. Increased ASO titre support but do not prove the diagnosis of rheumatic fever.

Falsely high titre of ASO may be seen in conditions associated with hyperlipidaemias such as hepatic, biliary obstruction and nephrosis and myeloma due to monoclonal immunoglobulins.¹⁰ In most situations standardization of ULN is not done and laboratories resort to cut-off values given in the kit insert. This is not desirable because such cut-off values are based on ULN standardized in western countries where prevalence of GAS infections is much less.

CONCLUSION

The present study was done to estimate the seroprevalence of ASO antibodies. However, since this was a retrospective study, correlation with the socio-economic status, clinical outcome and follow-up could not be done, which is a drawback of the study.

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