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# Anti Streptolysin O Titre In Children Aged Between 5-15 Years Attending A Tertiary Care Centre In Greater Noida, Western U.P.: A Hospital Based Study

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***Abstract:*** ***Background***: Group A Streptococcal (GAS) infections remain a significant cause of preventable morbidity in children, particularly in developing countries, where they can lead to acute rheumatic fever (ARF) and rheumatic heart disease (RHD). The Anti-Streptolysin O (ASO) titre is a key serological marker for recent GAS exposure, but its interpretation requires locally defined reference ranges due to wide geographical and demographic variation. ***Aim and Objective:*** To determine the seroprevalence of Anti-Streptolysin O (ASO) antibodies and evaluate clinical correlates in children aged between 5-15 years attending a tertiary care centre in Greater Noida, Western U.P. ***Materials and Methods:*** A cross-sectional study was conducted over 12 months at the Department of Microbiology, Sharda Hospital. A total of 140 blood samples were collected from children aged 5-15 years. Quantitative determination of ASO titres was performed using the ichroma™ II fluorescence immunoassay, with a cut-off of >200 IU/mL considered positive. C-Reactive Protein (CRP) levels were also analyzed to assess clinical correlation. ***Results:*** Among the 140 children, 34 (24.3%) exhibited elevated ASO titres (>200 IU/mL). The majority of the study population (55%) belonged to the 10-15year age group. Positivity rates were nearly identical between males (24.42%) and females (24.07%). Although not statistically significant, children from rural areas showed a higher positivity rate (27.59%) compared to those from urban areas (21.95%). A strong clinical correlation was observed, with 58.8% of ASO-positive cases also testing positive for CRP. ***Conclusion:*** The study demonstrates a high background of streptococcal exposure (24.3%) in the paediatric population of Greater Noida. The findings emphasize the importance of interpreting ASO titres within the local epidemiological context to diagnose post-streptococcal sequelae accurately.

***Keywords:*** Anti-Streptolysin O (ASO), Group A Streptococcus, Seroprevalence, Rheumatic Heart Disease, streptococcal infection.

## INTRODUCTION

Group A Streptococcus (GAS) infections remain a major cause of preventable childhood morbidity and mortality in low and middle income countries, particularly due to their role in triggering acute rheumatic fever (ARF) and rheumatic heart disease (RHD) [1]. In India, RHD continues to be the most common acquired heart disease among children and young adults, accounting for a significant cardiovascular burden [2]. Diagnosis of post streptococcal non suppurative sequelae relies heavily on serological evidence of a preceding GAS infection, with the Anti Streptolysin O (ASO) titre being the most widely used biomarker [3]. However, ASO levels vary substantially with age, geography, socioeconomic conditions, and the site of infection, making universal cut offs clinically misleading [4]. For instance, Upper Limits of Normal (ULN) for healthy children in high endemicity regions such as Egypt and Bangladesh have been reported to exceed 300 400 IU/mL, far above the 200 IU/mL cut off often supplied with commercial kits [5,6]. Within India itself, studies from Delhi, Bengaluru, and Chandigarh report ULNs ranging from 239 to 262 IU/mL,

highlighting significant intra national heterogeneity [7,8]. Despite available data from other Indian cities, no population specific ASO reference values exist for the paediatric population of Greater Noida, Western Uttar Pradesh. This lack of local baseline data forces clinicians to rely on inappropriate, generalized cut offs, risking both over diagnosis and under diagnosis of ARF and other post streptococcal complications [9]. Therefore, this study was conducted to determine the seroprevalence of ASO antibodies and its clinical correlates in children aged 5–15 years attending a tertiary care hospital in Greater Noida, with the aim of providing locally relevant data to guide accurate diagnosis and management.

## MATERIALS AND METHODS

This cross-sectional study was conducted over a period of 12months (Aug2024–July2025) at the Department of Microbiology, Sharda Hospital, Greater Noida. A total of 140 blood samples from children aged between 5 to 15 years were analyzed to determine the levels ofAnti-Streptolysin O (ASO) antibodies in Central Lab serology section by using ichroma™ machine. The instrument calculates the test result automatically and displays ASO concentration of the test sample in terms of IU/mL. CRP value was also determined by ichroma™ (Boditech Med Inc.; Republic of Korea).

## RESULTS

Total sample collected were 140 in which 34 were detected raised ASO levels [Table01]. The statistical analysis demonstrated insignificant association between residence and ASO positivity ($\chi^2$=0.320, p=0.571) [Table 02]**.** This indicates that the prevalence of elevated ASO titres does not differ meaningfully between children residing in urban and rural areas in this study population. To determine clinical correlates, ASO results were compared with CRP positivity. Out of the 34 ASO Positive cases, 20(58.8%) were also positive for CRP, indicating active inflammation or infection. Conversely, 14(41.2%) ASO positive cases were CRP negative. There were 14(13.2%) cases that were CRP positive but ASO negative, suggesting inflammatory etiology other than Streptococcal infection [Table 04]. The Pearson correlation coefficient obtained was r = 0.456, indicating a moderate positive correlation between ASO seropositivity and CRP elevation. This suggests that individuals who tested positive for ASO were more likely to have a positive CRP result, reflecting a possible association between recent streptococcal infection and systemic inflammatory response.

**Table01. Prevalence of ASO Positivity in the study population(n=140)**

| ASO Status | Frequency | Percentage | Mean Titre(IU/mL) |
|---|---|---|---|
| Positive(>200 IU/mL) | 34 | 24.3% | 417.21 |
| Negative(upto200IU/mL) | 106 | 75.7% | 67.65 |
| Total | 140 | 100% | 152.54 |

**Table02.Comparison of ASO Positivity between Urban and Rural Regions**

| Region | TotalSamples | ASOPositive | Positivity Percentage (%) | Mean ASO Titre (Positive) | p-value | ($\chi^2$) |
|---|---|---|---|---|---|---|
| Rural | 58 | 16 | 27.59% | 370.0 IU/mL | 0.571 | 0.320 |
| Urban | 82 | 18 | 21.95% | 459.2 IU/mL | | |

**Table03.Association of ASO Positivity with Gender**

| Gender | Total Samples | ASO Positive(n) | Positivity Rate within Gender (%) | Mean ASO Titre (Positive) | p-value | ($\chi^2$) |
|---|---|---|---|---|---|---|
| Male | 86 | 21 | 24.42% | 430.81 IU/mL | 1.000 | 0.000 |
| Female | 54 | 13 | 24.07% | 395.23 IU/mL | | |

**Table 04: Distribution of ASO Positivity by Demographic and Clinical Characteristics**

| Demographic Characteristics | ASO Positive | Percentage | ASO Negative | Percentage | Total |
|---|---|---|---|---|---|
| **Gender** | | | | | |
| Male | 21 | 24.42% | 65 | 75.58% | 86 |
| Female | 13 | 24.07% | 41 | 75.93% | 54 |
| **Age Group** | | | | | |
| 5-9 years | 17 | 26.98% | 46 | 73.02% | 63 |
| 10-15 years | 17 | 22.07% | 60 | 77.93% | 77 |
| **Ward** | | | | | |
| OPD | 20 | 23.52% | 65 | 76.48% | 85 |
| IPD | 14 | 25.45% | 41 | 74.55% | 55 |
| **Region** | | | | | |
| Rural | 16 | 27.59% | 42 | 72.41% | 58 |
| Urban | 18 | 21.95% | 64 | 78.05% | 82 |
| **CRP Level** | | | | | |
| CRP Positive | 20 | 58.82% | 14 | 13.21% | 34 |
| CRP Negative | 14 | 41.18% | 92 | 86.79% | 106 |

## DISCUSSION

In the present study, the overall seroprevalence of elevated Anti-Streptolysin O (ASO) titres (>200IU/mL) was found to be 24.3% among children aged 5-15 years in Greater Noida. This prevalence highlights a significant background of streptococcal exposure in the region, which is a critical precursor for non-suppurative sequelae such as Acute Rheumatic Fever (ARF). The study observed that the highest number of participants belonged to the 10-15year age group (55%). This peak in late childhood and early adolescence is consistent with global epidemiological trends, as school-aged children are the primary reservoir for Streptococcus pyogenes transmission [10]. Regarding gender, our findings showed a marginal difference, with males at 24.42% and females at 24.07%. This symmetry suggests that biological sex does not play a determining role in streptococcal susceptibility in this region, echoing findings from recent North Indian surveys where environmental exposure was the dominant risk factor [11].A notable trend was the higher positivity rate in rural participants (27.59%) compared to urban participants (21.95%). Although the association was not statistically significant (p=0.571), the higher rural prevalence likely reflects challenges related to overcrowding and limited access to primary healthcare for acute pharyngitis [12]. Recent studies in similar Indian demographics suggest that rural settings often lack the early antibiotic intervention necessary to truncate the immune response, leading to higher sustained ASO titres in the community [13].A significant finding was that 58.8% of ASOpositive cases were also positive for C-Reactive Protein (CRP). This dual positivity is a strong indicator of an active inflammatory state rather than a chronic carrier state or residual antibodies from a distant infection [14]. Conversely, the 13.2% of cases that were CRP-positive but ASO-negative likely represent other common paediatric inflammatory conditions, such as viral infections or other bacterial etiologies, underscoring the need for a multi-marker diagnostic approach in suspected ARF cases [15].The use of the standard 200IU/mLcut-off remains a point of contention in clinical microbiology. While this study utilized the standard kit threshold, recent evidence suggests that the Upper Limit of Normal (ULN) for the Indian paediatric population may be higher due to endemicity [16]. Establishing a region-specific ULN is vital; failing to do so may lead to the over-diagnosis of streptococcal sequelae and unnecessary long-term penicillin prophylaxis [17]. Our data provides a foundational baseline for Greater Noida, advocating for a shift toward localized diagnostic benchmarks in Western Uttar Pradesh [18].

The prevention and treatment of Rheumatic Heart disease is hinged on antibiotic administration in children with Group A Streptococcal (GAS) pharyngitis and Acute Rheumatic Fever (ARF). The Upper Limit of Normal (ULN) for serum Anti-streptolysin O titre (ASOT) has been employed as proof of antecedent GAS pharyngitis to fulfil the Jones' criteria for diagnosis of ARF [19].

## CONCLUSION

The present study establishes that nearly one-fourth (24.3%) of the paediatric population aged 5–15 years in Greater Noida exhibits elevated Anti-Streptolysin O (ASO) titres (>200IU/mL), indicating a significant burden of recent Group A Streptococcal exposure. This seropositivity was observed to be independent of gender, with comparable rates in males and females, and showed a notable, though not statistically significant, trend toward higher prevalence in rural settings compared to urban areas. The peak

prevalence was identified in the 10–15year age group, reflecting the high transmission dynamics typical of school environments where social mixing is frequent.

Furthermore, the strong correlation between ASO positivity and elevated C-Reactive Protein (CRP) in 58.8% of cases underscores the clinical utility of combining these markers to distinguish active inflammatory sequelae from baseline background immunity. However, the reliance on a fixed commercial kit cut-off may limit diagnostic precision in this high-endemicity setting. Therefore, these findings highlight the critical need to establish population-specific reference ranges (Upper Limit of Normal) for Western Uttar Pradesh to prevent over-diagnosis and support the effective management of post-streptococcal complications like Acute Rheumatic Fever.

**DECLARATIONS**

**Conflicts of interest**: There is no any conflict of interest associated with this study

**Consent to participate**: There is consent to participate.

**Consent for publication**: There is consent for the publication of this paper.

**Authors' contributions**: Author equally contributed the work.

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