

Tonsillectomy and its Effect on ASO Titre - A Hospital Based StudySweta Kumari¹, Manoj Kumar², Md Ozair³, Rani Rashmi Priya⁴¹Senior Resident, Department of ENT, DMCH Laheriasarai, Darbhanga, Bihar, India²Assistant Professor, Department of ENT, DMCH Laheriasarai, Darbhanga, Bihar, India³Associate Professor, Department of ENT, DMCH Laheriasarai, Darbhanga, Bihar, India⁴Junior Resident, Department of ENT, DMCH Laheriasarai, Darbhanga, Bihar, India

Received: 01-01-2026 / Revised: 15-02-2026 / Accepted: 21-03-2026

Corresponding author: Dr. Sweta Kumari

Conflict of interest: Nil

Abstract

Background: Acute tonsillitis is one of the most common manifestations of the upper respiratory tract infections. It is common in children and accounts for an incidence of about 32 per 1000 patients per year. The objective of this study is to determine the effect of tonsillectomy on ASO titre and to evaluate the sensitivity and specificity of throat swab culture.

Methods: Present study performed a prospective study, a total number of 50 children were screened, out of which 25 patients under the age of 15 years (16 male and 9 female), were included in the study, who were having chronic tonsillitis with raised anti-streptolysin O titre (>200IU/ml). All the patient underwent tonsillectomy and serological estimation of ASO titre was done at the end of first, second and third month post-surgery. Throat swab culture was performed prior to tonsillectomy and at the third month of follow up.

Results: Twelve children (48%), twenty children (80%) and twenty-two children (88%) became serologically negative for ASO antibody at the end of first, second and third month respectively, with a statistically significant p value of 0.0001. The sensitivity and specificity of throat swab culture was 16% and 100% respectively.

Conclusions: Tonsillectomy has a significant role in reducing the serological levels of anti-streptolysin O antibody and its reactivation, thereby decreasing the rate of complications associated with Group A-beta haemolytic streptococci.

Keywords: ASO Titre, Tonsillectomy, Throat Swab Culture.**DOI:** 10.25258/ijcpr.18.4.16

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Acute tonsillitis is one of the most common manifestations of the upper respiratory tract infections. It is common in children and accounts for an incidence of about 32 per 1000 patients per year. The highest incidence occurs between 3 months to 5 years; while the school going children between the age of 6 and 12 years are highly predisposed. [1]

Group A beta - haemolytic streptococci (GABHS) are the most common causative organisms associated with bacterial pharyngitis. It accounts for 37% of cases of acute pharyngitis in children older than 5 years. [2]

Other bacterial causes of pharyngitis include Group C Streptococcus (5% of total cases), C. pneumoniae (1%), M. pneumoniae (1%) and anaerobic species (1%). Among virus Rhinovirus, Coronavirus and Adenovirus account for about 30% of the total cases, Epstein Barr virus accounts for 1%, and Influenza and Parainfluenza virus for

about 4% of total cases. [3] Complications of the GABHS infection can be distinguished into suppurative and non-suppurative. Suppurative complications are due to the spread of GABHS to adjacent tissues, including cervical lymphadenitis, peritonsillar abscess, retropharyngeal abscess, otitis media, mastoiditis and sinusitis. The use of antibiotics has reduced the incidence of this group of complications.

Non- suppurative, immune-mediated sequelae are acute rheumatic fever (ARF), acute post-streptococcal glomerulonephritis, Sydenham chorea, reactive arthritis, psoriasis, Behcet's disease and paediatric autoimmune neuropsychiatric disorders associated with Streptococcus pyogenes (PANDAS).

Anti-streptolysin O (ASO) is the antibody response most often examined in serological tests to confirm antecedent streptococcal infection. Todd developed the assay for ASO antibodies. [5] According to

Read SE and Zabriniskie an increase in ASO titre warns of the possible development of rheumatic fever. [6] A single titre of more than 200 IU/ml is considered as a raised value. [7] Approximately 80% of the patients will have an elevated ASO titre (>200 Todd units) at two months after onset of disease. [8]

Tonsillectomy is the most frequently performed otolaryngological procedure, especially in young children; it is effective in reducing the number and duration of episodes of sore throat in children, the gain being more marked in those most severely affected. [9,10] However, pediatricians prefer to treat children having tonsillitis with long-acting penicillin.

The failure of penicillin to treat severe invasive streptococcal infections successfully is attributed to the phenomenon in which a large inoculum reaches stationary phase quickly and penicillin is not very effective against slow-growing bacteria. [12]

Treatment failures are frequent and attributed mainly to poor compliance, antibiotic resistance, untreated close contacts, carrier state and antibiotic related or co- pathogenic suppression of host immunity and the necessary flora and therefore tonsillectomy has a significant role in preventing the recurrent streptococcal infections.

The objective of this study was to determine the effect of tonsillectomy on the ASO titre and to evaluate the sensitivity and specificity of throat swab culture compared to the raised ASO titre.

Methods

This study is a prospective randomised interventional study conducted in the department of ENT, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar India. The study was done for a period of 1 year (duration from Feb 2025 to Jan 2026, after the approval of Institutional Research and Ethics Committee of DMCH Laheriasarai, Darbhanga, Bihar. The study was aimed at assessing the effect of tonsillectomy on the serum ASO titre in patients of chronic tonsillitis.

A total number of 50 patients were screened, out of which 25 patients admitted indoors were subjected to anti-streptolysin O titration and throat swab culture, were included in this study after taking prior written informed consent.

Inclusion Criteria

1. Age of 4 - 15 years.
2. Children suffering from recurrent tonsillitis with signs of chronic tonsillitis
 - Hypertrophy of the tonsils
 - Enlarged cervical lymph nodes

- Pus in the tonsillar crypts
- Flushed anterior pillar

3. Severe attacks of tonsillitis: seven times in 1 year or five times each year for 2 years, or three times each year for 3 year

4. According to the guidelines of the American Academy of Otolaryngology - Head and Neck Surgery, tonsillectomy is indicated if:

- The patient contracts three or more attacks of sore throat per year, despite medical therapy
- The attack of tonsillitis is severe enough to cause an abscess, or an area of pus and swelling, behind the tonsils
- The tonsillitis did not improve by antibiotics
- The child's swollen tonsils and adenoids impair normal breathing
- An ASO Titre of greater than 200 IU/ml and an ESR of greater than 30 ml/h at ½ hour.

Exclusion Criteria

1. The child has bleeding diathesis, cardiac disease, anaemia, acute infection, poor anaesthetic risk or an uncontrolled medical illness that prevents tonsillectomy
2. Presence of Jones criteria fulfilling the diagnosis of rheumatic heart disease and rheumatic fever.

Then under all aseptically condition blood and throat swab samples were taken for ASO titre, routine blood investigations and throat swab culture.

The procedure for the determination of ASO titre is based on the inhibitory effect of patient's serum on the hemolytic power of the pre-titrated and reduced streptolysin O. The antigen and the antibody reactions occurs independently of the hemolytic activity of the streptolysin O. This property determines ASO titre qualitative and quantitative test by agglutination of latex particles on a slide.

All the patient underwent tonsillectomy under general anaesthesia and were followed up for next three consecutive months, estimation of ASO titre was done at first, second and third month post-surgery.

Statistical Analysis: The statistical analysis was done using SPSS (Statistical Package for Social Sciences) for Windows 15.0 program. ASO Titre were analyzed as categorical variables using Chi-square test and Fisher's exact test. Z-score and t-test were used for analysis of population proportions and means. Level of significance (α) was set at 5%. Hence, a p-value

< 0.05 was accepted as statistically significant.

Results

A total number of 50 patients of tonsillitis were screened for this study out of which 25 patients,

who were ASO (anti-streptolysin O) positive, were finally included in this study (Table 1, Figure 1). Overall 16 patients were male (64%) and 9 were females (36%). The incidence of tonsillitis was higher in males compared to females but it was not statistically significant (chi squared p-value = 0.05; level of significance = 5%). The overall mean age

of patients under this study was 9.24 years (range was 4 to 15 years and standard deviation was 3.39 years). There was no statistically significant difference in the incidence of tonsillitis between the children aged 9 years or below and those aged above 9 years (two tailed p-value = 0.16).

Table 1: Demographic profile of patients under study.

ASO Titre positive (>200 iu/ml)	
Total number (n)	25
Male (%)	16 (64)
Female (%)	9 (36)
P-value	0.05
Mean age (years)	9.24
SD (years)	3.39
Range (years)	4 - 15

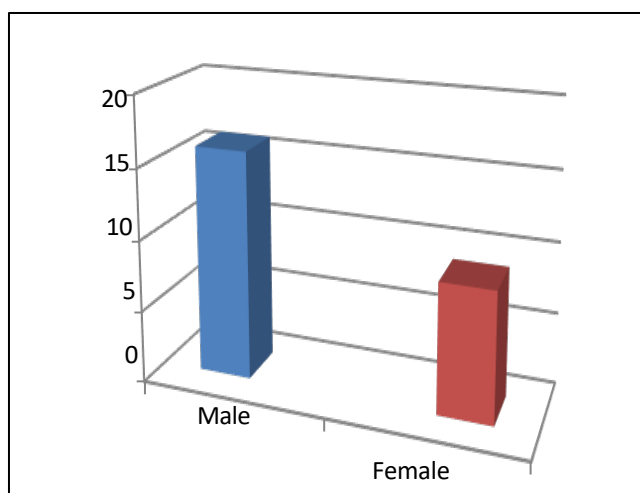


Figure 1: Gender distribution in tonsillitis

It was observed that there was a reduction in ASO titres to levels <200 IU/ml at the end of first follow up (1 month after surgery) 12 (48%) out of 25 patients showed ASO titre < 200 IU/ml; two tailed p-value = 0.0001 (statistically significant).

Table 2: Contingency table (Fisher exact test) at first follow up.

Groups	ASO titre > 200 IU/ml	ASO titre < 200 IU/ml
Before surgery	25	0
1 month after surgery	13	12

Two tailed p-value = 0.0001

At the end of second follow up (2 months after surgery); 20 (80%) out of 25 patients showed ASO titre < 200 IU/ml; two tailed p-value = 0.0001 (statistically significant).

Table 3: Contingency table at second follow up (2 months after surgery).

Groups	ASO titre > 200 IU/ml	ASO titre < 200 IU/ml
Before surgery	25	0
2 months after surgery	5	20

Two tailed p-value = 0.0001

At the end of third follow up (3 months after surgery) 22 (88%) out of 25 patients showed ASO titre < 200 IU/ml; p value = 0.0001 (statistically significant).

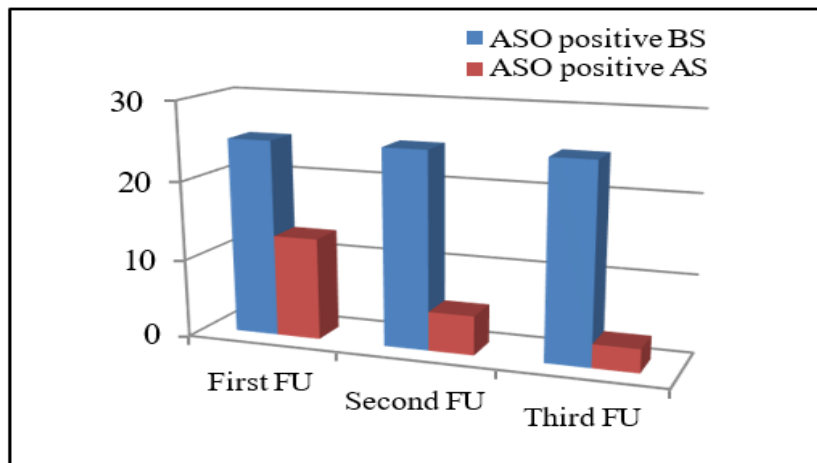


Figure 2: Reduction in ASO titres after tonsillectomy

Table 4: Contingency table at third follow up (3 months after surgery).

Groups	ASO titre > 200 IU/ml	ASO titre < 200 IU/ml
Before surgery	25	0
3 month after surgery	3	22

Two tailed p- value = 0.0001

Sensitivity of Superficial throat swab culture = $\frac{\text{true positive}}{\text{true positive} + \text{false negative}} \times 100 = \frac{4}{4+21} \times 100 = 16\%$

Specificity of Superficial throat swab culture = $\frac{\text{true negative}}{\text{true negative} + \text{false positive}} \times 100 = \frac{25}{25+0} \times 100 = 100\%$

Discussion

Recurrent tonsillitis is common in children. The highest incidence occurs between 4-5years. About 34 to 80% of all cases of tonsillo-pharyngitis have been attributed to bacterial etiology. [14-16] The commonest pathogenic bacteria being the Group A Beta Haemolytic Streptococcus, accounting for 24 to 65% of the cases. [17] About one in four children with acute sore throat has serologically confirmed GABHS pharyngitis. GABHS are associated with both suppurative and non suppurative complications. Non suppurative are based on molecular mimicry and cross antigen reactions and therefore difficult to treat. [18]

A positive throat culture for GABHS makes the diagnosis of streptococcal sore throat likely but a negative culture does not rule out the diagnosis. There are cases where streptococcus is isolated from sore throats but there is no serological evidence of infection. [19] The asymptomatic carrier rate for GABHS is up to 40%. [19,20] The flora of bacteria recovered from the surface of the tonsil correlates poorly with that of those deep in the tonsillar crypts which are most likely to be causing the infection. [21,22] Symptoms also correlate poorly with results of throat swab culture. [23] ASO titre remains the most sensitive serological indices of antecedent Group A beta-haemolytic streptococcal infection. [24] In present study it was observed that there was a reduction in

ASO titres to levels <200 IU/ml post tonsillectomy. At the end of first follow up (1 month after surgery) 12 (48%) out of 25 patients showed ASO titre <

200 IU/ml; two tailed p-value = 0.0001, which was statistically significant. At the end of second follow up (2 months after surgery); 20 (80%) out of 25 patients showed ASO titre < 200 IU/ml; two tailed p-value = 0.0001, which was statistically significant. At the end of third follow up (3 months after surgery) 22 (88%) out of 25 patients showed ASO titre < 200 IU/ml; p value = 0.0001, which was statistically significant. Our study was in concordance with Viswanathan N et al, who observed a marked reduction in the ASO titre level from third month onwards after tonsillectomy and ASO continued to remain negative at six months and one year in a statistically significant level, in 88% of patients. [25]

Azza Mohamed et al also confirm our study results. The mean ASO Titre readings for the tonsillectomy group were 518.29, 253.28, and 117.13 IU/ml, respectively (P-value 0.004), whereas for the penicillin group, they were 526.70, 413.39, and 262.98 IU/ml, respectively (P-value of 0.072).26 He concluded that that the first line of treatment of recurrent chronic tonsillitis is tonsillectomy, as it is both clinically effective and cost-effective for children and that the second line of treatment is long- acting penicillin which requires a long-term follow-up, it can be given in patients who are have contraindications for surgery such as bleeding diathesis. A high ASO titre indicates the presence of a recent streptococcal infection. A rise of ASO antibody generally takes place from one to four weeks after streptococcal infection and after that the titre returns to the previous level within two or three months, by this time patient can develop

suppurative and non-suppurative complications of GABHS. Throat swab culture is positive in 80% of streptococcal infections but may be negative in cases of chronic infection. Antigen detection test is very sensitive, but it is very costly and not available in all the centers. ASO titre test is the most widely used test. It is more popular because of its availability in our country, less cost and reasonable sensitivity. Very few studies have been reported regarding the value of ASO titre as an indicator of tonsillectomy and in reducing the non suppurative complications of GABHS.

Conclusion

Tonsillectomy led to significant decrease in the levels of raised ASO titre in chronic tonsillitis patients. About 88% of the patients turned negative at the end of study. It also reduces the chances of recurrence of disease. The levels of ASO titre are reduced and therefore, humoral and cellular-mediated immune responses resulting in non-suppurative complications of GABHS is also reduced. As the streptococcal proteins exhibit molecular mimicry with heart valves, neurons and other tissues the risk of rheumatic fever and rheumatic reactivation can be reduced by preventing streptococcal infection.

References

- Nussinovitch M, Finkelstein Y, Amir J, Varsano I. Group A beta-hemolytic streptococcal pharyngitis in preschool children aged 3 months to 5 years. *Clin Pediatr (Phila)*. 1999;38(6):357-60.
- Shaikh N, Leonard E, Martin JM. Prevalence of streptococcal pharyngitis and streptococcal carriage in children: a meta-analysis. *Pediatr*. 2010;126:e557-64.
- Bisno AL. Acute pharyngitis. *N Engl J Med*. 2001;344:205-11.
- Gerber MA, Nelson, Textbook of pediatrics, International editions. 18. Vol. 182. Group A Streptococcus; 2007:1135-1139.
- Todd EW. Antigenic streptococcal hemolysin. *J Exp Med*. 1932;55:267-80.
- Read SE, Zabriskie JB. Streptococcal disease and immune response. New York: Academic Press; 1980.
- Kaplan EL, Rothermal CD, Johnson DR. Antistreptolysin O and anti-deoxyribonuclease B titres: normal values for children ages 2 to 12 in the United States. *Pediatr*. 1998;101(1 Pt1):86-8.
- Bisno AL. Non-suppurative poststreptococcal sequelae: rheumatic fever and glomerulonephritis. In: Mandell GL, Bennett JE, Dolin R, editors. Principles and practice of infectious diseases. Vol. 2. New York, N.Y: Churchill Livingstone; 1995:1799-1810.
- Burton MJ, Glasziou PP. Tonsillectomy or adenotonsillectomy versus nonsurgical treatment for chronic/recurrent acute tonsillitis. *Cochrane Database Syst Rev*. 2009;CD001802.
- Awad Z, Al-Yaghchi C, Anwar M, Georgalas C, Narula A. Does tonsillectomy help children with recurrent tonsillitis? *Otolaryngol Head Neck Surg*. 2010;143(Suppl):113-6.
- Dajani A, Taubert K, Ferrieri P, Peter G, Shulman S, Bayer A, et al. Treatment of acute streptococcal pharyngitis and prevention of rheumatic fever: a statement for health professionals. *Pediatr*. 1995;96(Pt 1):758-64.
- Stevens DL, Yan S, Bryant AE. Penicillin binding protein expression at different growth stages determines penicillin efficacy in vitro and in vivo: an explanation of the inoculum effect. *J Infect Dis*. 1993;167:1401-5.
- Paradise JL, Bluestone CD, Bachman RZ. Efficacy of tonsillectomy for recurrent throat infection in severely affected children. Results of parallel randomized and nonrandomized clinical trials. *N Engl J Med*. 1984;310(11):674-83.
- Meland E, Digranes A, Skjaerven R. Assessment of clinical features predicting streptococcal pharyngitis. *Scand J Infect Dis*. 1993;25:177-83.
- Mlynarczyk G, Mlynarczyk A, Jeljaszewicz J. Epidemiological aspects of antibiotic resistance in respiratory pathogens. *Int J Antimicrob Agents*. 2001;18:497-502.
- Rosen G, Samuel J, Vered I. Surface tonsillar microflora versus deep tonsillar microflora in recurrent acute tonsillitis. *J Laryngol Otol*. 1977;91:911-3.
- TO TREAT (Tonsillitis Outcomes Toward Reaching Evidence in Adults and Tots). Quality of life after tonsillectomy in children with recurrent tonsillitis. *Otolaryngol Head Neck Surg*. 2008;138:S9-S16.
- Regoli M, Chiappini E, Bonsignori F, Galli L, de Martino M. Update on the management of acute pharyngitis in children. *Italian J Pediatr*. 2011;37:10.
- Eggertsen S, Schneeweiss R, Bergman J. A case against the use of the throat culture in the management of streptococcal pharyngitis. *J Fam Pract*. 1979;9(4):572-6.
- Feery BJ, Forsell P, Gulasekharan M. Streptococcal sore throat in general practice: a controlled study. *Med J Aust*. 1976;1(26):989-91.
- Brook I, Yocum P, Shah K. Surface vs core-tonsillar aerobic and anaerobic flora in recurrent tonsillitis. *JAMA*. 1980;244(15):1696-8.

24. Uppal K, Bais AS. Tonsillar microflora-superficial surface vs deep. *J Laryngol Otol.* 1989;103(2):175- 7.
25. Schachtel BP, Fillingim JM, Beiter DJ, Lane AC, Schwartz LA. Subjective and objective features of sore throat. *Arch Intern Med.* 1984;144(3):497-500.
26. Hembrom R, Roychaudhuri BK, Saha AK. Evaluation of the validity of high serum antistreptolysin O titre only, as an indication for tonsillectomy. *Indian J Otolaryngol Head Neck Surg.* 2014;66(3):232-6.
27. Viswanathan N, Nair SK, Thulseedharan S, effect of tonsillectomy on aso-titre. *Indian J Otolaryngol Head and Neck Surg.* 2000;52(4).
28. 26. Mohamed A, Tabbakh ME, Zeitoun A, Hennawi D. Acute phase reactants in children with recurrent tonsillitis treated by tonsillectomy versus long- acting penicillin. *Egypt J Otolaryngol.* 2013;29:99- 103.