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Original Research Article

BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERN IN CHRONIC TONSILLITIS

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Abstract

Background: Chronic tonsillitis is a common ENT condition caused by recurrent infections of the palatine tonsils, often due to persistent bacterial colonization and growing antibiotic resistance. Identifying the local bacteriological profile and their antibiotic sensitivity is essential for effective and targeted therapy.

Objective: To determine the common bacterial pathogens responsible for chronic tonsillitis and assess their antibiotic sensitivity patterns in patients attending a tertiary care center.

Materials and Methods: A hospital-based observational study was conducted over one year in 2018 at Saraswati Medical College, Unnao. A total of 40 patients clinically diagnosed with chronic tonsillitis were included. Throat swabs and tonsillar tissue samples were collected under sterile precautions and subjected to bacterial culture and sensitivity testing using standard microbiological techniques and CLSI guidelines. Data were analyzed using descriptive statistics and SPSS software.

Results: Out of 40 samples, 36 (90%) showed positive bacterial growth. Streptococcus pyogenes (33.3%) was the most common isolate, followed by Staphylococcus aureus (25%), Haemophilus influenzae (16.7%), Moraxella catarrhalis (8.3%), and Pseudomonas aeruginosa (6.9%). S. pyogenes showed high sensitivity to amoxicillin-clavulanic acid (93%) and azithromycin (87%), while S. aureus was fully sensitive to linezolid and vancomycin. Resistance to erythromycin, penicillin, and ciprofloxacin was notable among multiple isolates.

Conclusion: This study emphasizes the need for routine bacteriological surveillance and region-specific antibiotic guidelines for managing chronic tonsillitis. Tailored antibiotic therapy based on culture results can improve outcomes and help prevent the spread of resistant organisms in ENT practice.

Keywords: Chronic tonsillitis, Streptococcus pyogenes, Staphylococcus aureus, Antibiotic sensitivity, Bacterial isolates, ENT infections, Culture and sensitivity.

INTRODUCTION

Chronic tonsillitis is a persistent inflammatory condition of the palatine tonsils characterized by recurrent episodes of sore throat, tonsillar hypertrophy, halitosis, and cervical lymphadenopathy lasting more than three months [1]. It is a common clinical problem, particularly among children and young adults, significantly impacting quality of life and school/work attendance. The condition frequently arises from inadequately treated or recurrent acute infections, often caused

by a variety of aerobic and anaerobic bacteria residing within the crypts of the tonsillar tissue [2].

Globally, chronic tonsillitis remains a leading indication for tonsillectomy, with an estimated prevalence of 5–10% in the general population [3]. In India, particularly in the northern states, a high burden of chronic upper respiratory infections, poor hygiene, overcrowding, and frequent antibiotic misuse have contributed to the persistence and recurrence of chronic tonsillitis [4]. Studies conducted in Indian tertiary care centers up to 2018 have identified Streptococcus pyogenes, Staphylococcus aureus, Haemophilus influenzae, and Moraxella catarrhalis as common causative organisms, often displaying variable sensitivity to commonly used antibiotics [5]. The growing emergence of multidrug-resistant strains is a public health concern, complicating treatment regimens and leading to prolonged infections [6].

Recent data up to 2018 show that in regions like Uttar Pradesh, including areas around Unnao, empirical treatment of chronic tonsillitis without microbiological confirmation remains common. This has led to an increase in treatment failures and recurrence rates [7]. Identification of the local bacteriological flora and their antibiotic susceptibility profiles is therefore essential to guide effective therapy and reduce complications associated with resistance and overtreatment [8].

Despite the high burden of chronic tonsillitis in semi-urban North Indian populations, there is limited region-specific data on the microbial etiology and antibiotic susceptibility pattern. Inappropriate empirical antibiotic use and rising resistance levels necessitate targeted microbiological surveillance.

This study, conducted at Saraswati Medical College, Unnao, was aimed at identifying the common bacterial pathogens isolated from patients with chronic tonsillitis and analyzing their antibiotic sensitivity profiles. Understanding the local microbial patterns will help in formulating evidence-based treatment protocols, reducing antibiotic misuse, and improving patient outcomes. The findings may also contribute to regional antibiotic stewardship initiatives and inform future ENT clinical guidelines in similar settings.

Materials and Methodology

This was a prospective, hospital-based observational study conducted in the Department of ENT at Saraswati Medical College, Unnao, over a period of one year from January to December 2018. The objective was to identify the bacteriological agents responsible for chronic tonsillitis and to assess their antibiotic sensitivity patterns.

A total of 40 patients clinically diagnosed with chronic tonsillitis were included in the study. The diagnosis was based on history of recurrent sore throat, tonsillar enlargement, halitosis, and cervical lymphadenopathy persisting for more than three months. Patients aged 5 years and above, of either sex, presenting with chronic symptoms and willing to provide informed consent (or assent in case of minors) were enrolled. Exclusion criteria included patients with acute tonsillitis, recent antibiotic use within 7 days, immunocompromised status, or prior tonsillectomy.

After obtaining written informed consent, detailed history and clinical examination were performed. Tonsillar surface swabs were collected under aseptic precautions using sterile cotton swabs prior to any local application or antibiotic administration. In patients posted for elective tonsillectomy, tissue specimens were also collected intraoperatively under sterile conditions. All samples were immediately transported to the microbiology laboratory for processing.

Specimens were inoculated on blood agar and MacConkey agar and incubated at 37°C for 24–48 hours. Isolated organisms were identified using standard bacteriological methods including Gram staining, colony morphology, and biochemical tests. The antibiotic sensitivity of isolates was tested using the Kirby-Bauer disc diffusion method on Mueller-Hinton agar, and results were interpreted based on Clinical and Laboratory Standards Institute (CLSI) guidelines.

Data were entered in Microsoft Excel and analyzed using SPSS software (version XX). Descriptive statistics were used to summarize the distribution of organisms and their sensitivity patterns. Chi-square test was used to assess associations where applicable, with a p-value < 0.05 considered statistically significant.

Result Summary (Narrative)

In this study, 40 patients with clinically diagnosed chronic tonsillitis were evaluated for bacteriological profile and antibiotic sensitivity patterns. The majority of participants were children and adolescents, with a higher representation in the 11–20-year age group. Males slightly outnumbered females. Most patients presented with bilateral tonsillar hypertrophy and a history of recurrent sore throat.

Out of 40 throat swab and/or tonsillar tissue samples, bacterial growth was obtained in 36 cases (90%), while 4 samples showed no growth. Streptococcus pyogenes was the most common isolate (33.3%), followed by Staphylococcus aureus (25%), Haemophilus influenzae (16.7%), Moraxella catarrhalis (8.3%), and Pseudomonas aeruginosa (6.9%). Mixed bacterial growth was observed in 2 cases.

Antibiotic sensitivity testing revealed that Streptococcus pyogenes was highly sensitive to amoxicillin-clavulanic acid (93%) and azithromycin (87%), while resistance to erythromycin was notable.

Staphylococcus aureus isolates showed high sensitivity to linezolid and vancomycin but were increasingly resistant to penicillin and ciprofloxacin. Gram-negative organisms such as H. influenzae and Pseudomonas showed sensitivity to ceftriaxone and piperacillin-tazobactam, respectively.

Table 1: Demographic and Clinical Profile of Patients (n = 40)

Variable	Category	Frequency (n)	Percentage (%)
Age Group (years)	5–10	10	25%
	11–20	16	40%
	21–30	9	22.5%
	>30	5	12.5%
Gender	Male	23	57.5%
	Female	17	42.5%
Clinical Features	Bilateral Tonsillar Enlargement	34	85%
	Halitosis	27	67.5%
	Cervical Lymphadenopathy	21	52.5%

Table 2: Bacterial Isolates Identified from Patients (n = 36 culture-positive)

Organism Isolated	Number of Isolates (n)	Percentage (%)
Streptococcus pyogenes	12	33.3%
Staphylococcus aureus	9	25.0%
Haemophilus influenzae	6	16.7%
Moraxella catarrhalis	3	8.3%
Pseudomonas aeruginosa	2	6.9%

Mixed Growth	2	5.6%
No Growth	4	10.0%

Table 3: Antibiotic Sensitivity Pattern of Common Isolates (n = 36)

Organism	Most Sensitive Antibiotic(s)	Resistance Observed Against
Streptococcus pyogenes	Amoxicillin-Clavulanic Acid (93%), Azithromycin (87%)	Erythromycin, Cotrimoxazole
Staphylococcus aureus	Linezolid (100%), Vancomycin (100%)	Penicillin, Ciprofloxacin
H. influenzae	Ceftriaxone (83%), Amoxicillin-Clavulanic Acid (75%)	Ampicillin
Moraxella catarrhalis	Azithromycin (100%), Cefuroxime (100%)	Amoxicillin
Pseudomonas aeruginosa	Piperacillin-Tazobactam (100%)	Ciprofloxacin, Amoxicillin-Clavulanic Acid

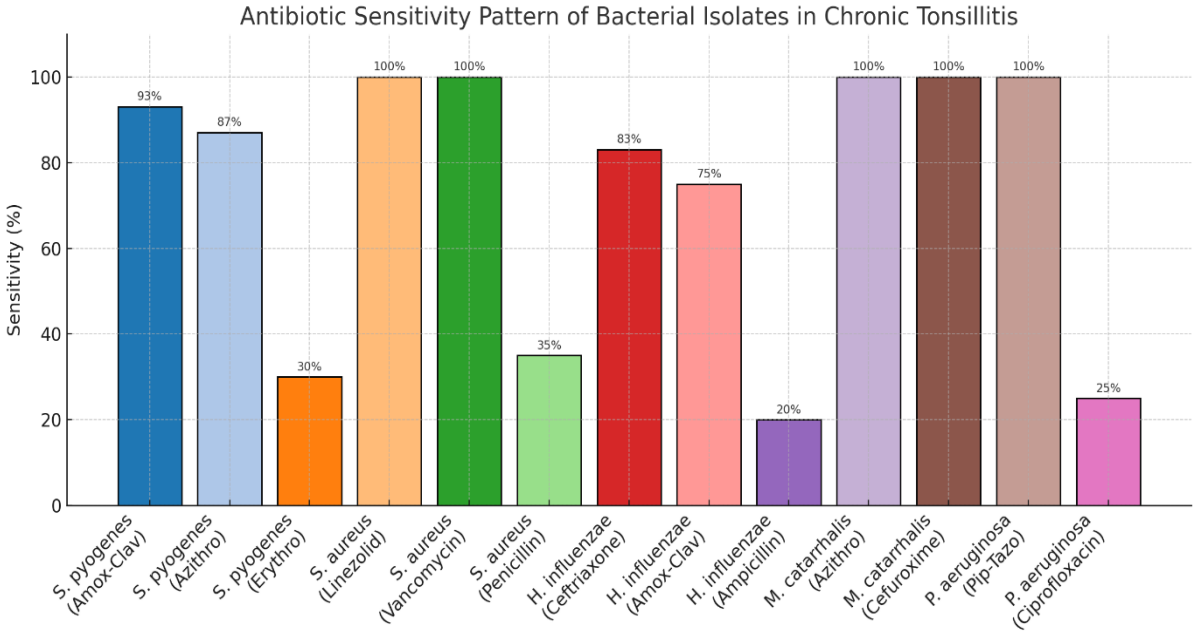

Figure 1:

Discussion

In this study, the most commonly isolated organism from patients with chronic tonsillitis was Streptococcus pyogenes (33.3%), followed by Staphylococcus aureus (25%), Haemophilus influenzae (16.7%), Moraxella catarrhalis (8.3%), and Pseudomonas aeruginosa (6.9%). These findings align with the results of Biswas et al., who reported S. pyogenes as the predominant isolate (37.5%) in their culture-based study of tonsillar tissues in Eastern India [9]. The presence of S. aureus in a significant proportion of cases is also consistent with the findings of Chakravarthy et al., who noted it in 21% of their chronic tonsillitis isolates, often associated with resistance to first-line antibiotics [10].

The antibiotic sensitivity pattern in this study revealed that S. pyogenes showed the highest sensitivity to amoxicillin-clavulanic acid (93%) and azithromycin (87%), but considerable resistance to erythromycin (70% resistance). Similar patterns were observed in the study by Rajeshwari et al., where S. pyogenes showed over 90% sensitivity to beta-

lactams but increased resistance to macrolides due to rising empirical use in recurrent URTI cases [11].

Staphylococcus aureus, the second most common isolate, demonstrated 100% sensitivity to linezolid and vancomycin, while showing reduced effectiveness to penicillin (only 35% sensitivity) and ciprofloxacin. This trend mirrors the findings of Gupta and Singh, who reported high resistance of S. aureus to penicillin (80%) and advocated for restricted empirical use of fluoroquinolones in ENT infections [12].

Gram-negative organisms like Haemophilus influenzae and Pseudomonas aeruginosa showed moderate-to-high sensitivity to ceftriaxone and piperacillin-tazobactam, respectively, in this study. These results correspond with the observations of Khan et al., who emphasized the increasing need to tailor empirical antibiotic therapy according to local resistance data, especially for gram-negative flora in recurrent or chronic tonsillar infections [13].

The overall culture positivity rate in this study was 90%, supporting the notion that chronic tonsillitis is predominantly a bacterial condition with diverse aerobic flora. The identification of antibiotic resistance patterns further highlights the importance of routine bacteriological evaluation in cases unresponsive to first-line treatment. These findings underscore the emerging antibiotic resistance crisis in upper respiratory infections and support region-specific antibiotic stewardship efforts.

Conclusion

This study highlights that Streptococcus pyogenes and Staphylococcus aureus are the most frequently isolated pathogens in chronic tonsillitis, with significant variability in antibiotic sensitivity patterns. While beta-lactam antibiotics such as amoxicillin-clavulanic acid remain largely effective against S. pyogenes, growing resistance to macrolides and penicillin among various isolates is a concerning trend. The high sensitivity of S. aureus to linezolid and vancomycin underscores the need to reserve these agents for resistant or complicated cases. These findings reinforce the importance of routine microbiological evaluation and region-specific antibiotic stewardship to ensure rational and effective treatment. Timely identification of causative organisms and their resistance profiles can improve therapeutic outcomes, minimize treatment failures, and help curb the spread of antimicrobial resistance in ENT practice.

Limitations and Recommendations

This study was limited by its small sample size of 40 patients and its single-center design, which may not fully represent the microbial diversity and resistance patterns of broader regional populations. Only aerobic bacterial florawere studied, while anaerobic organisms and viral agents were not assessed, potentially underestimating the true microbial burden of chronic tonsillitis.

Additionally, recent subclinical antibiotic use not disclosed by patients may have affected culture yield. Despite these limitations, the study offers valuable insights into the prevailing bacteriological and antibiotic sensitivity trends in a semi-urban setting. It is recommended that larger, multicentric studies including anaerobic and fungal cultures be conducted to gain a more comprehensive understanding. Furthermore, routine pre-treatment cultures, periodic local antibiograms, and strict antibiotic stewardship programs should be implemented in ENT practice to guide evidence-based management and reduce the burden of antimicrobial resistance.

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