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Bacteriological Evaluation and Their Antibiotic Sensitivity Pattern in Tonsillitis

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Abstract: *The Study Was Carried Out On 140 Patients With Signs And Symptoms Of Tonsillitis.Tonsillar Swabs Were Taken And Final Evaluation Was Done On The Basis Of Standard Biochemical Test. The Antimicrobial Susceptibility Test Was Done As Per Guidelines Of CLSI.*
Out Of 140 Tonsillar Surface Swab Cultures, 135 Cultures Showed Bacterial Isolates.
Staphylococcus Aureus Was The Commonest Isolate From 16 Swabs (11.43%), Followed By Streptococcus Pneumoniae In 7 Swabs (5.00%). The Other Isolated Bacteria Includes Pseudomonas Species, E. Coli, Beta Haemolyticstreptococci And Proteus Vulgaris.
Out Of 35 Bacterial Isolates, 30 Strains Were Found Sensitive To Netilmycin. Staphylococcus Species Showed Susceptibility Of 81.25% With Netilmycin, 68.75% With Gentamicin. Amoung 16 Staphylococcus Species 6 Were MRSA Which Were 100% Sensitive To Vancomycin. Pneumococcus Species Were 100.00% Resistant With Cefaclor, 85.71% With Gentamicin, And 71.43% With Tobramycin.
Keywords: *Antimicrobial, Bacteriology, Tonsillitis,*

I. Introduction

The tonsils are subepithelial lymphoid collection occupied within the triangular fossa (sinus) between the palatoglossalpillar anteriorly and palatopharangeal pillar posteriorly. It is a disease of childhood but also frequently seen in adults. These contain various types of lymphocytes (mainly B types) and secrete antibodies. The neutrophils are initial active participant in bacterial infection and inflammation. The infection may occur primarily or secondarily as a result of upper respiratory tract infection, usually preceded by viral infection.

The tonsils are located particularly in areas where microorganisms are most abundantly found. They are known to permit the passage of organisms through the epithelium which may be deficient at places, into the lymphatic tissues and bear the brunt of all individual attacks of disease. Hence it is the first and foremost duty to identify the individual pathogenic organisms causing tonsillitis and in turn producing other constitutional dreadful diseases, affecting joints, heart and kidneys.

Common causative organisms isolated include Alpha-haemolytic*Streptococci, Staphylococcus aureus,* non-pathogenic *Neisseria* species, *Haemophylus influenza, Pneumococcus, Enterococcus, Bacteroidsfragilis* group and *Corynebacterium* species [1]. No anaerobes were identified. Bacterial isolates from the tonsil and adenoid were similar in number and frequency of occurrence. Three fourth patients share common pathogens in tonsil and adenoid tissue [2]

In the past, chronic tonsillitis was largely a clinical concept but today bacteriological and patho-anatomical considerations are getting more attention [3].The reason why the patients of recurrent and chronic tonsillitis patients do not respond to antibiotics therapy is not clear. Possible reason could be due to low concentration of antibiotics in tonsillar core tissue because of scarring as a result of recurrent infection leading to less diffusion of antibiotics [4].Recurrent tonsillitis refractory to penicillin therapy poses a major medical problem in all age group. This has been attributed to the penicillin resistant strains among the pharyngeal flora.

Aims & Objective

To find out the common bacterial isolates which are prevalent in the patients of tonsillitis and their antimicrobial sensitivity pattern.

II. Materials & Methods

The study was carried out on 140 patients referred from ENT OPD with signs and symptoms of tonsillitis (sore throat, fever, and difficulty in swallowing, malaise and history of recurrent upper respiratory tract infection) and submitted for bacteriological evaluation and their sensitivity to Microbiology Department at Darbhanga Medical College, Darbhanga from July 2007 to June 2008.

Two tonsillar swabs were taken under aseptic precautions from each patient. Gram staining was performed on first swab and second swab was placed on blood agar, and MacConkeys agar. The final evaluation was done on the basis of standard biochemical tests.

Antibacterial susceptibility test was performed on Muller Hinton Agar by the Kirby Bauer disc diffusion method as per guidelines of CLSI.

III. Results

The commonest age group of tonsillitis is between 11-20 years where the maximum number of 57 cases (40.72%) occurred and the minimum 12 cases (8.57%) in age group beyond 30 years.(TABLE 1)

Overall there is male predominance in 80 cases (57.14%) over 60 females (42.86%). (TABLE 2)

A total of 140 throat (tonsillar surface) swabs were cultured, out of which 135 cultures (96.43%) were positive, 3 swabs (2.14%) showed no growth and 2 swabs (1.43%) showed contamination.

More than one bacterial strains were isolated from 135 positive culture swabs suggesting polymicrobial nature of bacterial flora in patients of tonsillitis. *Streptococcus viridians* (SV) group and *Branhmellacatarrhalis* (BC) were isolated from 100 swabs (71.43 %) which are considered as the normal bacterial flora of the throat.

Along with *Streptococcus viridians* (SV) group and *Branhmellacatarrhalis* (BC) in decreasing order of frequency *Staphylococcus aureus* was isolated from 16 swabs (11.43%), followed by *Streptococcus pneumoniae* from 7 swabs (5.00%), *Pseudomonas* and *E. coli* from 4 swabs (2.86%) each, beta haemolytic*Streptococci* 3 swabs (2.14%) and *Proteus vulgaris* 1 swab (0.71%). (TABLE 3)

Antibiotic sensitivity pattern

A total of 11 types of antibiotics were selected to test the susceptibility of the isolated bacteria which are ampicillin, erythromycin, ciprofloxacin, cotrimoxazole, tetracycline, chloramphenicol, cefaclor, gentamicin, tobramycin, netilmycin and vancomycin.

Analyzing sensitivity pattern of 16 isolates of *Staphylococcus*species, sensitivity of 81.25% with netilmycin, 68.75% with gentamicin and 62.50% with erythromycin and ciprofloxacin was observed. 100% resistance with chloramphenicol and cefeclor , 81.25% with tetracycline and tobramycin and 68.75% with ampicilline and cotrimoxazole was found against *Staphylococcus* spp. Out of the 16 isolates, 6 (37.50%) were methicillin resistant *Staphylococcus aureus* (MRSA). which were found 100% sensitive to Vancomycin.

Beta haemolytic*streptococci* were found 100% sensitive with netilmycin, chloramphenicol, gentamicin, tobramycin, tetracycline and erythromycin. 66.67% strains of beta haemolytic*streptococci* were resistant to cotrimoxazole&cefaclor while 33.33% were resistant to ampicilline& ciprofloxacin.

Proteus species were found 100.00% sensitive to netilmycin and resistant with all other antibiotics.

E. coli were 100.00% sensitive with netilmycin and gentamicin and 50.00% with cefaclor and ciprofloxacin. It was 100.00% resistant with ampicilline while 75.00% resistance with cotrimoxazole, tetracycline, tobramycin and chloramphenicol was observed.

Pseudomonas species were found 100.00% sensitive with netilmycin and ciprofloxacin and 50.00% sensitive with gentamicin. It was 100.00% resistant with ampicilline, cotrimoxazole while 75.00% resistance with chloramphenicol, tetracycline and tobramycin was observed.

Pneumococcus species were found 100.00% resistant with cefaclor, 85.71% with gentamicin, and 71.43% with tobramycin. This was 57.14% resistant with erythromycin, ampicilline, cotrimoxazole and tetracycline. 71.43% sensitivity with netilmycin and chloramphenicol and 57.14% with ciprofloxacin was found in this study.

IV. Discussions

Tonsillitis is a common disease in children and it is not uncommon for a child to have at least one or more episodes of acute tonsillitis each year, particularly in pre-school or primary school age group. The child may present with sore throat, difficulty in swallowing, fever, general malaise and history of upper respiratory tract infection.

In our study, the commonest age group of tonsillitis is between 11-20 years, where the maximum number of 57 cases (40.71%) occurred. In a study patient's age group having tonsillitis was 2.5 to 17 years (mean 6 years)[5].

Streptococcus viridians and*Branhmellacatarrhalis* were isolated in 71.43% in our study, which are considered as the normal flora in pharynx. Gaffeny et al (1991)[6] reported that in core swabs mixed pathogens were isolated in most cases (48.0%) with commonest mixture being alpha haemolytic*Streptococci*, *H. influenza* and *S. aureus*. Brooke et al (1981)[5] found the polymicrobial anaerobic and aerobic nature of deep tonsillar flora in children with recurrent tonsillitis and demonstrated the presence of many beta-lactamase-producing organisms in 74% of the patients. In our study 57.14% organisms causing tonsillitis were beta lactamase producing organisms.

Isolation of beta haemolytic*streptococci* was less in our study (2.22%) as compare to 48.72% in the study by Sadoh et al (2008)[7], 23% in the study by Loganthan et al (2006)[8] and 30% in study by Ozek et al (1967) [9].

Opposed to our present findings in which incidence of *Staphylococcus aureus* (11.85%) and *Streptococcuspneumoniae* (5.18%), in study by Loganathan et al (2006)[8]*Staphylococcus aureus* (40.9%) was the commonest bacterial isolate in recurrent tonsillitis and 26% S. aureus were the commonest isolate on throat swab culture in another study by Jha et al (2008)[10].

Gaffeny et al (1991) [6] reported that *Haemophillusinfluenza* was most common isolate from the tonsillar core followed by *S. aureus*, which is contrary to our finding in which *H. influenza* was not isolated.

It is known that the chronically inflamed tonsillar tissue contains more scar tissue after each infection causing an impairment of antibiotic penetrability into their core and more resistance (Brook et al, 1984)[11]. Antibiotic resistance among bacteria varies between different geographical areas even within the same country (Lim, 2003)[12].

Staphylococcus aureus showed 62.50% susceptibility to ciprofloxacin which is in concordance with the finding of 64.1% sensitivity in study by Hawan (2000)[13]while sensitivity of 98.98% was in study by Eldeeb et al (2006)[14]. Sensitivity of 81.25% with netilmycin makes it better choice in S. aureus infection.

Beta haemolytic*Streptpcocci* were 100.00% sensitive to netilmycin, erythromycin, chloramphenicol, tetracycline. El-Daly et al (1990) [15]observed that beta haemolytic*streptococci* showed 25% sensitivity to erythromycin, chloramphenicol and tetracycline respectively. Higher activity of 73% for erythromycin and 90% for ciprofloxacin was reported by Baquero et al (1999)[16].

E. coli were 100.00% sensitive with netilmycin and gentamicin and 50.00% with cefaclor and ciprofloxacin.Oteo et al (2002) [17]reported 82.81% sensitivity for ciprofloxacin and 93.61% sensitivity for gentamicin which was similar with finding of 85.71% and 78.57% sensitivity for ciprofloxacin and gentamicin respectively in study of Eldeeb et al (2006)[14].

Pseudomonas species were found 100.00% sensitive with netilmycin and ciprofloxacin and 50.00% sensitive with gentamicin. 100.00% sensitivity with ciprofloxacin is in agreement with the finding by Gebreel et al (2000) [18]and Eldeeb et al (2006)[14]. 100.00% resistant with ampicilline, cotrimoxazole and 75.00% resistance with chloramphenicol, tetracycline and tobramycin was observed in our study. Higher sensitivity of 94.28% with gentamicin and lower sensitivity of 17.14% with tetracycline and 11.43% with chloramphenicol was reported in the study by Eldeeb et al (2006)[14].

Streptococcus pneumoniae showed 71.43% sensitivity with netilmycine and chloramphenicol and 57.14% with ciprofloxacin in this study. Higher sensitivity of 90% and 94.74% with ciprofloxacin was reported by Eldeeb et al(2006) [14]and Hawan et al (2000)[13].

V. Figures And Tables

Table 1: Age distribution of Tonsillitis Patients

S.No.	Age group (years)	No of Cases	Percentage
1	0-10	26	18.57
2	11-20	57	40.72
3	21-30	45	32.14
4	>30	12	8.57
	TOTAL	140	100

Table 2: Sex- wise prevalence of Tonsillitis

Sex	Number (140)	Percentage
Male	80	57.14
Female	60	42.86

Table 3: Bacterial isolates from tonsillar swabs

S.No.	Bacterial isolates	No of Isolates	%
1	*Streptococcus viridans (SV), Branhamellacatarrhalis (BC)*	100	71.43
2	*Streptococcus viridans (SV), Branhamellacatarrhalis(BC) Staphylococcus* species	16	11.43
3	*Streptococcus viridans (SV), Brahamellacatarrhalis (BC) Streptococcus pneumoniae (SP)*	7	5.00
4	*Streptococcus viridans (SV), Branhamellacatarrhalis (BC) Pseudomonas aeruginosa*	4	2.86
5	*Streptococcus viridans (SV), Branhamellacatarrhalis (BC)*	4	2.86

	E.Coli		
6	*Streptococcus viridans (SV), Branhamellacatarrhalis (BC) Beta hemolytic Streptococcus*	3	2.14
7	*Streptococcus viridans (SV), Branhamellacatarrhalis (BC) Proteus* species	1	0.71
8	Sterile/Contaminated	5	3.57
Total		140	100

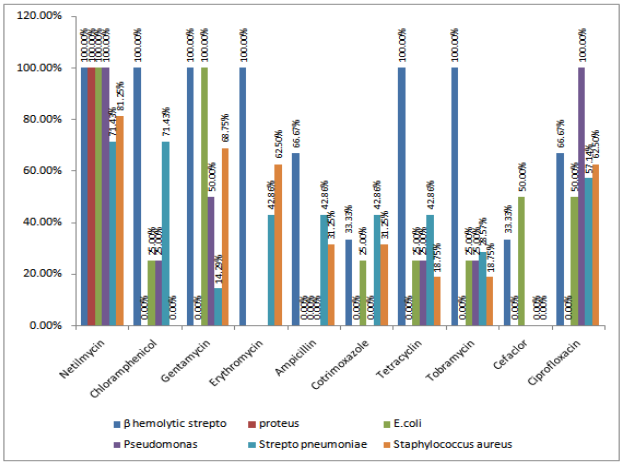

Fig 1: Antibiotic sensitivity pattern of different bacterial isolates

VI. Conclusion

The commonest age group of tonsillitis is between 11-20 years and the minimum beyond 30 years.

Bacterial isolates from throat swabs showed *Streptococcus viridians* (SV) and *Branhamellacatarrhalis*(BC) as the part of polymicrobial flora in the throat. Along with them Staphylococcus aureus was commonest isolate followed by *Streptococcus pneumonae, Pseudomonas, E coli*, beta haemolytic *Streptococci* and *Proteus vulgaris.*

Antibiotic sensitivity pattern of pathogens from throat swab revealed that the antibiotic to which most organisms were sensitive was netilmycin 30 strains (85.71%), ciprofloxacin 22 strains(62.86%), gentamicin 21 strains (60%), erythromycin 16 strains (45.71%), tetracyclines 11 strain (31.43%), chloramphenicol 10 strains (28.57%), cotrimoxazole 10 strains (28.57%), ampicillin 10 strains (28.57%), tobramycin 10 strains (28.57%), and cefaclor 3 strains (8.57%).

Identification of bacterial isolates in tonsillitis and their antibiotic sensitivity pattern could revolutionize the management of chronic tonsillitis.

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