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BACTERIOLOGICAL ANALYSIS AND ITS ANTIBIOGRAM PROFILE OF PHARYNGITIS CASES FROM THE PATIENTS ATTENDING REFERRAL HOSPITAL, SIKKIM, INDIA

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Objective: Infections of throat have a tremendous impact on public health. This present study aims to find out the bacterial load in throat infections as well as their susceptibility pattern in patients attending Central Referral Hospital, Tadong, Sikkim. **Method**: A total of 55 symptomatic patients having throat infections attended Central Referral Hospital Sikkim, among which 28 were males and 27 were females. A total of 55 throat swabs were collected from the patients with symptoms of pharyngitis. **Results**: Out of 55 samples, culture was positive in 37 samples. Twenty one strains of *Staphylococcus aureus*, 13 strains of *Streptococcus pyogenes*, 1 strain of *Pseudomonas aeruginosa* and 2 strains of *Proteus spp*. were isolated. The isolation rate of *Staph.aureus* was found to be statistically significant when compared between the isolation rate of *Ps.aeruginosa*, *Stp. pyogenes* and *Proteus spp*. 3 isolates of *Staph. aureus* were sensitive to penicillin, 1 isolate was moderately sensitive and 17 isolates were resistant. 12 strains of *Staph.aureus* were sensitive to methicillin. Methicillin resistant was seen in 9 strains of *Staph. aureus*. The strains of *Stp. pyogenes* isolated were either moderately sensitive or resistant to the used antibiotics, it was not sensitive to any of the used antibiotics. It was moderately sensitive to amoxiclave, clarithromycin, erythromycin and resistant to clindamycin and cefuroxime. 100% strains of *Ps. aeruginosa* were resistant to ciprofloxacin, gentamicin, piperacillin, ticarcillin, tobramycin and the strains were sensitive only to imipenem (100%). Further 100% strains of *Proteus spp*.were sensitive to cefuroxime, azithromycin, amoxicillin and cephalexin. **Conclusion:** Our study showed a high rate of monomicrobial infection. The control of throat infections demands the availability of primary care and appropriate treatment.

Keywords: Pharyngitis, Staphylococcus aureus, Streptococcus pyogenes, Pseudomonas aeruginosa, Proteus spp.

INTRODUCTION

Infections of throat have a tremendous impact on public health. It is one of the reasons for the patients to visit the primary care providers. Upper respiratory tract infection is caused by either viruses or bacteria and bacterial infection may be primary or secondary to viral infection [1].Bacterial causes are more important because of the non-suppurative sequelae like rheumatic fever and rheumatic heart disease in group A haemolytic Streptococcus (GABHS) infection.[1,2] The common bacteria isolated from patients having throat infections are Staphylococcus aureus, *Streptococcus pyogenes*, *Proteus spp*. *Klebsiella spp*., *Pseudomonas aeruginosa etc*. The primary pathogen of oropharynx is *Stp.pyogenes* where *Staph.aureus* is a secondary pathogen.[3]

The prevalence of beta-haemolytic strepto-coccal sore throat was 13.6% in a rural area in Varanasi, India whereas in Europe at 1984 it was estimated that the prevalence rate was 7.2%.[4] The sensitivity pattern of most of the beta haemolytic organisms show increasingly more resistant to the common and routine antibiotics used in ENT department.[5,6] The prevalence of antibiotic resistant Group A Streptococci has emerged rapidly in northern India.

Therefore, the present study had been aimed to find out the bacterial load in throat infections as well as their susceptibility pattern in patients attending Central Referral Hospital, Tadong, Sikkim.

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MATERIALS AND METHOD

The study was conducted in the Department of Microbiology, Sikkim Manipal Institute of Medical Sciences, Gangtok. The study population included the patients who visited Central Referral Hospital with signs and symptoms of pharyngitis. A total of 55 throat swabs were collected from symptomatic cases. The specimen were processed

with the help of direct microscopy, culture and antibiotic susceptibility test. Direct microscopy was done by Gram's method and smears were examined for the type and number of bacteria, pus cells and relationship of bacteria to pus cells. The specimens were inoculated on blood agar and MacConkey agar plates. The plates were examined for the growth of bacteria and the pathogenic colonies were identified by conventional methods. Antibiotic susceptibility tests were performed by Kirby Bauer disc diffusion method.[7] Commercially procured antibiotic disc (Hi Media) used for *Staph.aureus* were:cefotaxime (30µg), ciproflo xacin (30µg), cotrimoxazole (25µg), erythromycin (15µg), gentamicin (10µg), oxacillin (1µg) and penicillin (10µg). The antibiotics used for *S. pyogenes* were amoxicillin (20µg), cefuroxime (30µg), clarithro-mycin (15µg), clindamycin (2µg), erythromycin (15µg) and penicillin (10µg).The antibiotic discs used for *Ps.aeruginosa*were: ciprofloxacin (30µg), gentamycin (10µg), imipenem (10µg), piperacillin (100µg), ticarcillin (75µg) and tobramycin (10µg). The antibiotics used for *Proteus spp.* were cefuroxime (30µg), azithromycin (15µg), amoxicillin (20µg), and cephalexin (30µg).

Statistical analysis: The difference in proportions was tested for statistical significance using chi square and *p* value of <0.05 was considered to be statistically significant.

RESULTS

A total of 55 throat swabs were collected from the patients attending CRH with symptoms of pharyngitis. Out of 55 samples, culture was positive in 37 (67.27%) samples. Table 1 shows bacteria isolated from the pharyngitis patients.21 stains of *Staph. aureus*(56.75%),13 strains of *Stp. pyogenes* (35.15%),1 strain of *Ps. aeruginosa* (2.70%) and 2 strain of *Proteus spp* (5.40%) were isolated.

Table 1
Bacteria isolated from the throat swab culture

Specimen	Name of organisms	Number of isolates
Throat swab	*Staph.aureus*	21
	Stp.pyogenes	13
	Ps.aeruginosa	01
	Proteus spp.	02

Table 2 shows the antibiotic susceptibility pattern for *Staph.aureus*.3 isolates of *Staph. aureus* were sensitive to penicillin, 1 isolates were moderately sensitive and 17 isolates were resistant. Twelve strains of *S. aureus* were sensitive to methicillin. Methicillin resistant was seen in 9 strains of S. *aureus.* The strains resistant to methicillin were also resistant to penicillin.

Table 2
Antibiotic susceptibility pattern for *S. aureus*

Sl. No.	Antibiotics	Susceptibility pattern		
		Sensitive (%)	Moderate (%)	Resistant (%)
1.	Cephotaxime	15(71)	1(5)	5(23)
2.	Ciprofloxacin	10(48)	2(10)	9(43)
3.	Cotrimoxazole	15(71)	0(0)	6(29)
4.	Erythromycin	1(5)	0(0)	20(95)
5.	Gentamycin	13(62)	1(5)	7(33)
6.	Oxacillin	12(57)	0(0)	9(43)
7.	Penicillin	3(14)	1(5)	17(81)

Table 3 shows the antibiotic susceptibility pattern for *S. pyogenes*. A number of 13 strains of *S. Pyogenes* isolated were moderately sensitive to amoxiclave, clarythromycin, erythromycin and was resistant to clindamycin, cefuroxime and penicillin.

Table 3
Antibiotic susceptibility pattern for *Stp. Pyogenes*

Sl.No.	Antibiotics	Susceptibility pattern		
		Sensitive (%)	Moderate (%)	Resistant (%)
1.	Amoxiclav	0(0)	13(100)	0 (0)
2.	Clarythromycin	0(0)	13(100)	0 (0)
3.	Clindamycin	0(0)	0 (0)	13(100)
4.	Cefuroxime	0(0)	0 (0)	13(100)
5.	Erythromycin	0(0)	13(100)	0(0)
6.	Penicillin	0(0)	0 (0)	13 (0)

Table 4 shows the antibiotic susceptibility pattern for *P. aeruginosa*. Both the strains of *P. aeruginosa* (100%) were resistant to ciprofloxacin, gentamycin, piperacillin, ticarcillin, tobramycin and were sensitive only to imipenam.

Table 5 shows the antibiotic susceptibility pattern for *Proteus spp.* 100% strains of *Proteus spp*. were sensitive to cefuroxime, azithromycin, amoxicillin and cephalexin.

Table 4
Antibiotic susceptibility pattern for *P. aeruginosa*

Sl. No.	Antibiotics	Susceptibility pattern		
		Sensitive (%)	Moderate (%)	Resistant (%)
1.	Ciprofloxacin	0(0)	0(0)	1(100)
2.	Gentamicin	0(0)	0(0)	1(100)
3.	Imipenem	1(100)	0(0)	0(0)
4.	Piperacillin	0(0)	0(0)	1(100)
5.	Ticarcillin	0(0)	0(0)	1(100)
6.	Tobramycin	0(0)	0(0)	1(100)

Table 5
Antibiotic susceptibility pattern for *Proteus spp.*

Sl. No.	Antibiotics	Susceptibility pattern		
		Sensitive (%)	Moderate (%)	Resistant (%)
1.	Cefuroxime	2(100)	0(0)	0(0)
2.	Azithromycin	2(0)	0(0)	0(0)
3.	Amoxicillin	2(100)	0(0)	0(0)
4.	Cephalexin	2(100)	0(0)	0(0)

DISCUSSION

A total of 55 symptomatic patients attended Central Referral Hospital among which 12 (21.82%) were children and 43 (78.18%) were adults. The male female ratio was 1:0.96.55 throat swabs were collected for culture/sensitivity. Symptomatic throat infections were seen more in adults (78.18%) and it was found to be statistically significant.Out of 55 samples, culture was positive in 37 (67.27%) samples. 21 strains of *Staph. aureus*(56.75%), 13 strains of *Stp. pyogenes* (35.15%), 1 strain of *Ps.aeruginosa*(2.70%) and 2 strains of *Proteus spp*.(5.40%)were isolated. The isolation rate of *Staph.aureus* was found to be statistically significant when compared between the isolation rate of *Staph.aureus* and *Ps.aeruginosa* (X^2= 22.28; p= <0.001), isolation rate of *Staph.aureus* and *Stp. pyogenes* (X^2=16.44;p=<0.001) and isolation rate of *Staph.aureus*and *Proteus spp*(X^2=11.94; p=<0.001). In children throat swab culture was positive in 6 cases (16.22%), whereas in adult it was positive in 31 cases (83.78%). Culture positive was seen in 18 male patients (48.64%) and 19 female patients (51.36%). Sobhan Nandi et al reported no significant difference in the incidence of sore throat as well as Group A *streptococcal*sore throat among males and females [4]. Our study also shows no significant difference in throat swab positive culture between male and female (X^2 = 0.027). Sobhan Nandi et al showed that the prevalence of beta haemolytic streptococcal sore throat was 13.6% in rural area of Varanasi, India [4]. Whereas in our study we found *Staph.aureus* (56.75%) to be the most common cause of pharyngitis followed by *Stp. pyogenes* (35.15%) and it was statistically significant (X^2 = 16.44, P< 0.001). Similar to our study, P.T. Wakodel et al also reported *Staph.aureus* (25.25%) to be the predominant pathogenic organism in throat followed by *Stp. pyogenes* (1.05%)[8].

3(14%) isolates of *Staph. aureus* were sensitive to penicillin, 1(5%) isolate was moderately sensitive and 17(81%) isolates were resistant. 12(57%) strains of *Staph.aureus* were sensitive to methicillin. Methicillin resistant was seen in 9(43%) strains of *Staph. aureus*. The strains of *Stp.pyogenes* isolated were either moderately sensitive or resistant to the used antibiotics, it was not sensitive to any of the used antibiotics.It was moderately sensitive to amoxiclave, clarithromycin, erythromycin and resistant to clindamycin and cefuroxime. 100% strains of *Ps. aeruginosa* were resistant to ciprofloxacin, gentamicin, piperacillin, ticarcillin, tobramycin and the strains were sensitive only to imipenem (100%). Further 100% strains of *Proteus spp*.were sensitive to cefuroxime, azithromycin, amoxicillin, streptomycin and cephalexin.

Kaplan et al showed that all strains of *Stp. pyogenes* were sensitive to penicillin, clindamycin, ceftriazone but were resistant to erythromycin and azithromycin [9]. Whereas in our study, 13 strains of *Stp. pyogenes* isolated was either moderately

sensitive or resistant to the used antibiotics, it was not sensitive to any of the used antibiotics.It was moderately sensitive to amoxiclave, clarithromycin, erythromycin and resistant to clindamycin and cefuroxime.

CONCLUSION

Our study showed a high rate of monomicrobial infection. The control of throat infections demands the availability of primary care and appropriate treatment. Empirical antibiotic therapy should be based on the local knowledge of the most likely infecting micro organisms and their sensitivities so that the disease process can be reversed and thereby prevents the long-term sequelae.

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