

Original Research Article

Study of drug sensitivity profile of patients with throat infections in lower Himalayan region

Manjeet Singh*

Department of ENT, Regional Hospital, Bilaspur, Himachal Pradesh, India

Received: 22 February 2020

Revised: 06 March 2020

Accepted: 09 March 2020

***Correspondence:**

Dr. Manjeet Singh,

E-mail: manjeetst@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Infections of throat is a major health problem in developing countries. It can cause significant complications and morbidity if not addressed on time. The aim of the study was to study the drug sensitivity profile of patients with throat infections in lower Himalayan region.

Methods: 100 patients with throat infections or sore throat were included in the study. Throat samples collected through a sterile culture sensitivity tube and sent to microbiological lab in the Regional Hospital Bilaspur (SRL diagnostics).

Results: Gram positive organisms were resistant to benzyl penicillin or ampicillin, clindamycin, ciprofloxacin or levofloxacin, trimethoprim or sulphamethoxazole and sensitive to tetracycline, gentamicin and linezolid. Gram negative organisms were resistant to ampicillin, amoxycylav and sensitive to piperacillin or tazobactam, cefoperazone, amikacin, gentamicin, imipenem, cefepime, ciprofloxacin and trimethoprim or sulphamethoxazole.

Conclusions: Throat infections along with emerging drug resistance are still a major health in developing countries.

Keywords: Throat infections, Infective organisms, Throat swab, Sore throat, Resistance, Sensitivity

INTRODUCTION

An infectious-related pharyngitis is just one of the many possible causes of sore throat in adults. Pharyngitis in adults is caused by a bacterial infection in approximately 5% to 10% of patients. This is different than in children, in whom bacterial pharyngitis accounts for 30% to 40% of cases.¹ Approximately 75% of adults presenting with a sore throat are prescribed antibiotics for a presumed bacterial pharyngitis even though this practice will only help a minority of patients. Pharyngitis may occur in different grades of severity. Milder infections present with discomfort in the throat, some malaise and low grade fever. Pharynx in these cases is congested but there is no lymphadenopathy. Moderate and severe infections present with pain in throat, dysphagia, headache, malaise and high fever. Pharynx in these cases shows erythema,

exudate and enlargement of tonsils and lymphoid follicles on the posterior pharyngeal wall.²

Aims and objectives

The aims and objectives of the study were to study the drug sensitivity or resistance profile of patients with throat infections.

METHODS

The study was conducted as a prospective study in the department of otorhinolaryngology and head and neck surgery, Regional Hospital Bilaspur, Himachal Pradesh, India from June 2019 to December 2019. During this period 100 patients with throat infections were included in the study.

Study population

Study group include general population presenting in Outpatient Department of Regional Hospital Bilaspur fulfilling inclusion and exclusion criteria in both sexes as given below.

Inclusion criteria

Inclusion criteria were patients with complaints of throat pain, throat irritation, throat itching, foreign body sensation throat; patients giving consent for study; patients below age 100 years; patients above the age of 1 year.

Exclusion criteria

Exclusion criteria were age >100 years or <1 year, patients without throat complaints.

The enrolled patients are explained about the complete study procedure in their language. The procedure were detailed history obtained from study participants regarding; clinical examination of patient is done including general physical examination and systemic examination for assessing the general condition of participants, a thorough ENT examination is done including throat examination, ear examination, nasal examination; throat swab samples collected through a sterile culture sensitivity tube and sent to microbiological lab in the Regional Hospital Bilaspur (SRL diagnostics) and culture sensitivity reports collected from the patients during follow up visits.

Statistical analysis

Data were entered in Microsoft Excel sheet. The continuous variables were presented using mean or median. For categorical variables proportions were used. The statistical analysis was done using Epi Info v7 software.

RESULTS

This prospective study aimed at studying the infective profile of patients with throat infections and to study the drug sensitivity profile in these patients in lower Himalayan population. A total of 100 patients of either sex with complaint of throat ache were included in the study and their demographic profile, clinical presentation studied followed by microbiological culture and sensitivity testing of throat swab samples. Thirteen (13%) patients were aged 0 to 20 years, twenty eight (28%) patients were in the age group 21 to 40 years, thirty six (36%) patients were in the age group 41 to 60 years, nineteen (19%) patients were in the age group 61 to 80 years and four (04%) patients were in the age group 81 to 100 years.

Table 1: Age wise frequency distribution of the patients presenting with throat infections.

Age group (in years)	Frequency	%
0-20	13	13
21-40	28	28
41-60	36	36
61-80	19	19
81-100	04	04
Total	100	100

Thirty four (34%) patients were female adults, fifty six (56%) patients were male adults, six (06%) patients were male child, four (04%) patients were female child. Sixty two (62%) patients were diagnosed as acute pharyngitis, thirty eight (38%) patients were diagnosed as chronic pharyngitis.

Acinetobacter baumani was present in three (03%) patients, *Aeromonas hydrophilla* in two (02%) patient, *Citrobacter koseri* in one (01%) patients, *Citrobacter youngae* in two (02%) patient, *Enterobacter aerogenes* in four (04%) patients, *Enterobacter cloacae* was present in four (04%) patient, *Enterobacter faecalis* in one (01%) patient, *Escherichia coli* in nine (09%) patients, *Klebsiella pneumoniae* in fifteen (15%) patients, *Klebsiella oxytoca* in three (03%) patients, *Morgenella morgani* in two (02%) patient, *Pseudomonas putida* in two (02%) patients, *Pseudomonas aeruginosa* in twenty one (21%) patients, *Staphylococcus aureus* in sixteen (16%) patients, *Staphylococcus epidermidis* in one (01%) patient, *Serratia marcescens* in one (01%) patients, *Routella ornitholytica* in one (01%) patient, and no growth seen in twelve (12%) patients.

Table 2: Frequency distribution of infective organisms in the patients presenting with throat infections.

Infective organism	Frequency	%
<i>Acinetobacter baumani</i>	03	03
<i>Aeromonas hydrophilla</i>	02	02
<i>Citrobacter koseri</i>	01	01
<i>Citrobacter youngae</i>	02	02
<i>Enterobacter aerogenes</i>	04	04
<i>Enterobacter cloacae</i>	04	04
<i>Enterobacter faecalis</i>	01	01
<i>Escherichia coli</i>	09	09
<i>Klebsiella pneumoniae</i>	15	15
<i>Klebsiella oxytoca</i>	03	03
<i>Morgenella morgani</i>	02	02
<i>Pseudomonas putida</i>	02	02
<i>Pseudomonas aeruginosa</i>	21	21
<i>Staphylococcus aureus</i>	16	16
<i>Staphylococcus epidermidis</i>	01	01
<i>Serratia marcescens</i>	01	01
<i>Routella ornitholytica</i>	01	01
No growth seen	12	12

Gram positive organisms are detected in eighteen (18%), Gram negative organisms detected in seventy (70%), and no organism detected in twelve (12%) of the throat swab samples.

Benzyl penicillin or ampicillin was found to be sensitive in none of patients and resistant in 14 out of 14 (100%) patients. Tetracyclin was found to be sensitive in 13/14 (92.85%) patients and resistant in 01 out of 14 (7.15%) patients. Gentamycin was found to be sensitive in 12/15 (80%) patients, resistant in 2 out of 15 (13.33%) patients and intermediate sensitive in 1 out of 15 (6.66%) patients. Clindamycin was found to be sensitive in 3 out of 13 (23.07%) patients and resistant in 10 out of 13 (76.92%) patients. Trimethoprim or sulphamethoxazole was found to be sensitive in 6 out of 15 (40%) patients and resistant in 9 out of 15 (60%) patients. Ciprofloxacin or levofloxacin was found to be sensitive in 2 out of 15 (13.33%) patients and resistant in 13 out of 15 (86.66%) patients. Linezolid was found to be sensitive in all 14 out of 14 (100%) patients throat swab samples tested.

Table 3: Frequency distribution of infective organisms on the basis of gram staining in the patients presenting with throat infections.

Gram positive organisms	Gram negative organisms
	<i>Pseudomonas aeruginosa</i> (21%)
	<i>Pseudomonas putida</i> (2%)
	<i>Klebsiella pneumoniae</i> (15%)
	<i>Klebsiella oxytoca</i> (3%)
	<i>Escherichia coli</i> (9%)
<i>Staphylococcus aureus</i> (16%)	<i>Enterobacter cloacae</i> (4%)
<i>Staphylococcus epidermidis</i> (1%)	<i>Enterobacter aerogenes</i> (4%)
<i>Enterobacter faecalis</i> (1%)	<i>Acinetobacter baumannii</i> (3%)
Total: 18 (18%)	<i>Aeromonas hydrophilla</i> (2%)
	<i>Citrobacter koseri</i> (1%)
	<i>Citrobacter youngae</i> (2%)
	<i>Morgenella morgani</i> (2%)
	<i>Serratia marcescens</i> (1%)
	<i>Roultella ornitholytica</i> (1%)
	Total: 70 (70%)
No growth seen:	12 (12%)

Table 4: Drug sensitivity profile of gram positive organisms in the patients presenting with throat infections.

Name of drug	Benzyl penicillin/ ampicillin	Tetracycline	Gentamicin	Clindamycin	Tmp/smx	Ciprofloxacin/ levofloxacin	linezolid
Sensitive/tested	0	13 /14	12 /15	03 /13	06 /15	02 /15	14 /14
Resistant/tested	14/14	01/14	02 /15	10 /13	09 /15	13 /15	0
Intermediate	0	0	01 /15	0	0	0	0

Table 5: Drug sensitivity profile of gram negative organisms in the patients presenting with throat infections.

Name of drug	Ampicillin	Pipracillin / tazobactam	Cefoper azone	Amikacin	Gentamicin	Imipenem	Cefepime	Ciprofloxacin	Tmp/ Smx	Amoxyclav
Sensitive/ tested	0	57/61	59/66	65/65	65/67	66/68	54/57	64/68	35/39	18/42
Resistant/ tested	19/22	02/61	05/66	0	01/67	01/68	03/57	04/68	04/39	18/42
Intermediate	03/22	02/61	02/66	0	01/67	01/68	0	0	0	06/42

Ampicillin was found to be resistant in 19 out of 22 (86.36%) and intermediate sensitive in 3 out of 22 (13.63%). Pipracillin or tazobactam was found to be sensitive in 57 out of 61 (93.44%) patients, resistant in 02 out of 61 (3.27%) patients and intermediate sensitive in 02 out of 61 (3.27%) patients. Cefoperazone was found to be sensitive in 59 out of 66 (89.39%) patients, resistant in 05 out of 66 (7.57%) patients and intermediate sensitive in 02 out of 66 (3.03%) patients. Amikacin was found sensitive in all the 65 out of 65 (100%) patients tested. Gentamycin was found to be sensitive in 65 out of 67 (97.01%) patients, resistant in 1 out of 67 (1.49%) patients and intermediate sensitive in 01 out of 67 (1.49%). Imipenem was found to be sensitive in 66 out of 68 (97.05%) patients, resistant in 1 out of 68 (1.47%) patients and intermediate in 01 out of 68 (1.47%)

patients. Cefepime was found to be sensitive in 54 out of 57 (94.73%) patients and resistant in 3 out of 57 (5.26%) patients. Ciprofloxacin was found to be sensitive in 64 out of 68 (94.11%) patients and resistant in 04 out of 68 (5.88%) patients. Trimethoprim or sulpha-methoxazole was found to be sensitive in 35 out of 39 (89.74%) patients and resistant in 04 out of 39 (10.29%) patients. Amoxyclav was found to be sensitive in 18 out of 22 (42.85%), resistant in 18 out of 42 (42.85%) patients and intermediate sensitive in 06 out of 42 (14.28%) patients.

DISCUSSION

Acute pharyngitis is very common and occurs due to varied aetiological factors like viral, bacterial, fungal or others. Viral causes are more common. Acute

streptococcal pharyngitis (due to group A beta haemolytic *streptococci*) has received more importance because of its aetiology in rheumatic fever and post-streptococcal glomerulonephritis. Chronic pharyngitis develops when infection of pharynx persists for more than 4 weeks. Respiratory tract infection³ is considered as one of the major public health problems and a leading cause of morbidity & mortality in many developing countries. *Streptococcus pyogenes* is one of the commonest bacterial pathogens that causes acute pharyngitis among school-aged children living in lower socio-economic conditions. These Gram positive cocci are distributed worldwide and have been associated with a variety of sequelae such as impetigo, otitis media, necrotizing fasciitis, glomerulonephritis, acute rheumatic fever or rheumatic heart disease.⁴

Antibiotic resistance is rising to dangerously high levels in all parts of the world. New resistance mechanisms are emerging and spreading globally, threatening our ability to treat common infectious diseases. Throat infections are one of the major causes of antibiotic resistance as over the counter use of medications in patients with ear discharge is prevalent in the area of study. In our study gram positive (18%) organisms Benzyl penicillin or ampicillin was found to be sensitive in none of patients and resistant in 14 out of 14 (100%) patients. Tetracyclin was found to be sensitive in 13 out of 14 (92.85%) patients and resistant in 01 out of 14 (7.15%) patients. Gentamycin was found to be sensitive in 12 out of 15 (80%) patients, resistant in 2 out of 15 (13.33%) patients and intermediate sensitive in 1 out of 15 (6.66%) patients. Clindamycin was found to be sensitive in 3/13 (23.07%) patients and resistant in 10 out of 13 (76.92%) patients. Trimethoprim or sulphamethoxazole was found to be sensitive in 6 out of 15 (40%) patients and resistant in 9 out of 15 (60%) patients. Ciprofloxacin or levofloxacin was found to be sensitive in 2 out of 15 (13.33%) patients and resistant in 13 out of 15 (86.66%) patients. Linezolid was found to be sensitive in all 14 out of 14 (100%) patients throat swab samples tested. Moirangthem et al studied bacteriological analysis and its antibiogram profile of pharyngitis cases from the patients attending referral hospital Sikkim India and found that 3 isolates of *S. aureus* were sensitive to penicillin, 1 isolate was moderately sensitive and 17 isolates were resistant.⁵ 12 strains of *S. aureus* were sensitive to methicillin. *Methicillin* resistant was seen in 9 strains of *Staph. aureus*. The strains of *S. 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 amoxycylave, clarithromycin, erythromycin and resistant to clindamycin and cefuroxime. 100% strains of *P. aeruginosa* were resistant to ciprofloxacin, gentamycin, piperacillin, ticarcillin, tobramycin and the strains were sensitive only to Imipenem (100%). Further 100% strains of *Proteus sp.* were sensitive to cefuroxime, azithromycin, amoxicillin and cephalixin. These results were slightly different from our study.

In our study Gram positive (70%) organisms shows Ampicillin was found to be resistant in 19 out of 22 (86.36%) and intermediate sensitive in 3 out of 22 (13.63%). Piperacillin out of tazobactam was found to be sensitive in 57/61 (93.44%) patients, resistant in 02/61 (3.27%) patients and intermediate sensitive in 02/61 (3.27%) patients. Cefoperazone was found to be sensitive in 59 out of 66 (89.39%) patients, resistant in 05 out of 66 (7.57%) patients and intermediate sensitive in 02 out of 66 (3.03%) patients. Amikacin was found sensitive in all the 65 out of 65 (100%) patients tested. Gentamycin was found to be sensitive in 65 out of 67 (97.01%) patients, resistant in 01 out of 67 (1.49%) patients and intermediate sensitive in 01 out of 67 (1.49%). Imipenem was found to be sensitive in 66 out of 68 (97.05%) patients, resistant in 01 out of 68 (1.47%) patients and intermediate in 01 out of 68 (1.47%) patients. Cefepime was found to be sensitive in 54 out of 57 (94.73%) patients and resistant in 03 out of 57 (5.26%) patients. Ciprofloxacin was found to be sensitive in 64 out of 68 (94.11%) patients and resistant in 04/68 (5.88%) patients. Trimethoprim or sulphamethoxazole was found to be sensitive in 35 out of 39 (89.74%) patients and resistant in 04 out of 39 (10.29%) patients. Amoxycylav was found to be sensitive in 18/22 (42.85%), resistant in 18/42 (42.85%) patients and intermediate sensitive in 06/42 (14.28%) patients. Similar results were observed in a study by Sridevi et al while studying the prevalence of various microorganisms from throat swab specimens in patients attending a tertiary care hospital at Chinakani, which shows that the susceptibility patterns varied depending on the drugs, but most of the organisms were susceptible to penicillin, erythromycin and vancomycin.⁶

In a similar study Wakode et al studied 305 throat swab reports and found that isolated bacteria in throat swabs were found to be sensitive with cefotaxime, tetracycline, penicillin and gentamicin.⁷ These results were in line with the results in our study.

Sadoh et al carried out a prospective study to determine the pattern of bacterial isolates and their antibiotic sensitivity amongst children with tonsillo-pharyngitis observed that beta haemolytic *streptococcus* (BHS) and *Staph. aureus* showed 100% sensitivity to cefuroxime, azithromycin, ceftazidime and gentamicin. All the isolates had little or no sensitivity to ampicillin and cotrimoxazole.⁸ BHS is a significant cause of pharyngitis and tonsillitis in our environment and therefore poses a potential danger of rheumatic fever and rheumatic heart disease, a non-suppurative sequelae of BHS. Ampicillin and cotrimoxazole two affordable and commonly available drugs are ineffective in tonsillitis and pharyngitis. These were similar to the results in our study.

CONCLUSION

To concluded gram positive organisms were resistant to benzyl penicillin or ampicillin, clindamycin, ciprofloxacin or levofloxacin, trimethoprim or sulpham-

ethoxazole and sensitive to tetracycline, gentamicin, linezolid, gram negative organisms were resistant to ampicillin, amoxycylav and sensitive to piperacillin or tazobactam, cefoperazone, amikacin, gentamicin, imipenem, cefepime, ciprofloxacin and trimethoprim or sulphamethoxazole.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Flint PW, Haughey BH, Lund VJ, Niparko JK, Richardson MA, Robbins KT et al. Pharyngitis in adults. In: Gaertner RS, Halpine R, editors. Cummings Otolaryngology Head and Neck Surgery, 5th ed. Philadelphia: Mosby Elsevier; 2010: 191.
2. Dhingra PL, Dhingra S, Dhingra D. Assessment of hearing. In: Dutta S, editor. Diseases of Ear Nose and Throat, 5th ed. Gurgaon: Elsevier; 2010: 30.
3. Mustaq NA. In: Bacteriology and antibacterial susceptibility of tonsillitis and chronic suppurative otitis media cross sectional study in Al. Habobi Hospital, Thi-Qar: Thi-Qar Medical J. 2011;5(1):118-25.
4. Cauwenberje PBV, Mijnsbrugge AV: Pharyngitis : a survey of the microbiologic etiology. *Pediatrics Infectious Dis J.* 1991; 10. P. 39-42.
5. Moirangthem A, Gurung K. Bacteriological analysis and its antibiogram profile of pharyngitis cases from the patients attending referral hospital Sikkim, India. *Bali Med J.* 2013;2(1):2302-19.
6. Sridevi R, Sunita T, Ramarao KS, Babu MR. Microbiological study of pharyngitis at a teaching hospital Chinakakani, India. *Int M J Health.* 2016;2(8):10-3.
7. Wakode PT, Gawarle SH, Joshi SV, Bajoria R. Throat swab culture and sensitivity reports: An Overview. *Ind J Otorhinolaryngol Head Neck Surg.* 2003; 55(2):76-80.
8. Sadoh WE, Sadoh AE, Oladipo AO, Okunola OO. Bacterial isolates of tonsillitis and pharyngitis in a pediatric casualty setting. *J Med Biomed Res.* 2008;7(1&2):37-44.

Cite this article as: Singh M. Study of drug sensitivity profile of patients with throat infections in lower Himalayan region. *Int J Otorhinolaryngol Head Neck Surg* 2020;6:754-8.