

## Study of Infective Profile of Patients with Throat Infections in Lower Himalayan Region.

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### Abstract

**Background:** 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.

**Aim:** To study the infective profile of patients with throat infections in lower himalayan region.

**Material and Methods:** 100 patients with throat infections/ 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:** Out of total 100 throat swab samples examined *Pseudomonas Aeruginosa* (23%) was the commonest infecting organism followed by *Staphylococcus Aureus* (14%), *Klebsiella pneumoniae* (11%), *Escherichia coli* (07%) and *Enterobacter cloacae* (07%) patients.

**Conclusion:** Throat infections are still a major health in developing countries and throat swab culture is routinely used for diagnosis of bacterial pathogens.

**Keywords:** Throat infections, Infective organisms, throat swab, sore throat.

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### I. 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. Pharyngitis<sup>1</sup> is defined as inflammation of the pharynx. The anatomic region of the pharynx invariably affected in adults is the oropharynx. The predominant symptom is sore throat, which overall is the third most common chief complaint to physicians in an office-based practice. Culture of throat swab<sup>2</sup> is helpful in the diagnosis of bacterial pharyngitis. It can detect 90% of Group A Streptococci. Diphtheria is cultured on special media. Swab from a suspected case of gonococcal pharyngitis should be cultured immediately without delay. Failure to get any bacterial growth suggests a viral aetiology. Upper respiratory tract infection is caused by either viruses or bacteria and bacterial infection may be primary or secondary to viral infection. Bacterial causes are more important because of the non suppurative sequeli like rheumatic fever and rheumatic heart disease in group A haemolytic Streptococcus infection. Respiratory tract infection (RTI) is considered as one of the major public health problems and a leading cause of morbidity & mortality in many developing countries.

### II. Aims And Objectives

1. To study the infective profile of patients with throat infections.
2. To study the drug sensitivity profile of patients with throat infections.

### III. Materials And 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 November 2019. During this period 100 patients with throat infections were included in the study.

#### Study Population

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

#### Inclusion criteria:

- 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:**

- Age >100 years or <1year.
- Patients without throat complaints.

METHODOLOGY- The enrolled patients are explained about the complete study procedure in their language.

1. Detailed history obtained from study participants regarding
2. Clinical examination of patient is done including general physical examination and systemic examination for assessing the general condition of participants.
3. A thorough ENT examination is done including throat examination, ear examination, nasal examination.
4. 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 / median. For categorical variables proportions were used. Means were tested using student t test and proportions using chi square and z test. Level of significance was set at  $p < 0.05$ . The statistical analysis was done using Epi Info v7 software.

**ETHICAL JUSTIFICATION**

The investigator and supervisors are aware of the Ethics in Biomedical Research Policy of Regional Hospital Bilaspur Himachal Pradesh and Ethics Guidelines by ICMR and the Declaration of Helsinki. Written informed consent of all participants is obtained before gathering any information. The information collected will be kept strictly confidential and individual identity will not be disclosed under any circumstances. The study involves no risk to the patient and involves no financial burden. The patient shall not be subjected to any unnecessary investigations. Result of the study will only be used for academic purposes and for framing recommendations for the improvement in services and for no other purpose. If during the course of the study any untoward incident takes place, appropriate specialised services shall be provided for the management of the same.

**CONFLICT OF INTEREST**

None declared

**FINANCIAL DISCLOSURE**

The facilities for the study including laboratory investigations are available in the institute. No financial charges will accrue to the study subject. The study is not funded by any agency.

**IV. 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. Sixteen (16%) patients were aged 0-20 years, twenty nine (29%) patients were in the age group 21-40 years, thirty (30%) patients were in the age group 41-60 years, twenty three (23%) patients were in the age group 61-80 years and two (02%) patients were in the age group 81-100 years.

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

Age group	Frequency	Percentage (%)
0-20 years	16	16
21-40 years	29	29
41-60 years	30	30
61-80 years	23	23
81-100 years	02	02
Total	100	100

Thirty six (36%) patients were female adults, fifty two (52%) patients were male adults, six (06%) patients were male child, six (06%) patients were female child. Sixty one (61%) patients were diagnosed as acute pharyngitis, thirty nine (39%) patients were diagnosed as chronic pharyngitis.

Acinetobacter baumani was present in two (02%) patients, Aeromonas hydrophilla in one (01%) patient, Citrobacter koseri in two (02%) patients, Citrobacter youngae in one (01%) patient, Enterobacter aerogenes in four (04%) patients, Enterobacter cloacae was present in seven (07%) patient, Enterobacter faecalis in one (01%) patient, Escherichia coli in seven (07%) patients, Klebsiella pneumoniae in eleven (11%) patients, Klebsiella oxytoca in four (04%) patients, Morgenella morganii in one (01%) patient, Pseudomonas putida in two (02%) patients, Pseudomonas aeruginosa in twenty three (23%) patients, Staphylococcus aureus in fourteen (14%) patients, Staphylococcus epidermidis in one (01%) patient, Serratia marcescenes in two (02%) patients, Roulletella ornitholytica in one (01%) patient, and no growth seen in sixteen (16%) patients.

**Table 3: Frequency distribution of infective organisms in the patients presenting with throat infections.**

Infective organism	Frequency	Percentage
Acinetobacter baumani	02	02
Aeromonas hydrophilla	01	01
Citrobacter koseri	02	02
Citrobacter youngae	01	01
Enterobacter aerogenes	04	04
Enterobacter cloacae	07	07
Enterobacter faecalis	01	01
Escherichia coli	07	07
Klebsiella pneumoniae	11	11
Klebsiella oxytoca	04	04
Morgenella morganii	01	01
Pseudomonas putida	02	02
Pseudomonas aeruginosa	23	23
Staphylococcus aureus	14	14
Staphylococcus epidermidis	01	01
Serratia marcescens	02	02
Roulletella ornitholytica	01	01
No growth seen	16	16

Gram positive organisms are detected in sixteen (16%), Gram negative organisms detected in sixty eight (68%), and no organism detected in sixteen (16%) of the throat swab samples.

**Table 4: Frequency distribution of infective organisms on the basis of gram staining in the patients presenting with throat infections.**

Gram positive organisms	Gram negative organisms
Staphylococcus aureus ( 14%)	Pseudomonas aeruginosa (23%)
Staphylococcus epidermidis ( 01%)	Pseudomonas putida (02%)
Enterobacter faecalis (01%)	Klebsiella pneumoniae ( 11%)
	Klebsiella oxytoca (04%)
	Escherichia coli ( 07%)
	Enterobacter cloacae ( 07%)
	Enterobacter aerogenes (04%)
	Acinetobacter baumannii( 02%)
	Aeromonas hydrophilla (01%)
	Citrobacter koseri (02%)
	Citrobacter youngae (01%)
	Morgenella morganii (01%)
	Serratia marcescens (02%)
	Roulletella ornitholytica (01%)
<b>Total :</b> 16 (16%)	<b>Total :</b> 68 (68%)
<b>No growth seen :</b> 16 (16%)	

## V. Discussion

Acute pharyngitis is characterized by the rapid onset of sore throat and pharyngeal inflammation (with or without exudates). Absence of cough, nasal congestion, and nasal discharge distinguishes bacterial from viral etiologies. It can be caused by a variety of viral and bacterial pathogens, including group A Streptococcus, as well as fungal pathogens (Candida). Bacterial pharyngitis is more common in winter (or early spring), while enteroviral infection is more common in the summer and fall. Chronic Pharyngitis is chronic inflammation of the pharynx that involves the mucous membrane and throat tissues. It often occurs due to infection caused by viruses & micro-organisms. Infections of throat have a tremendous impact on public health. Respiratory tract infection<sup>3</sup> 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<sup>4</sup> are distributed worldwide and have been associated with a variety of sequelae such as impetigo, otitis media, necrotizing fasciitis, glomerulonephritis, acute rheumatic fever / rheumatic heart disease.

Moirangthem A<sup>5</sup> et al studied bacteriological analysis and its antibiogram profile of pharyngitis cases from the patients attending referral hospital Sikkim India. 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. 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 *Staphylococcus aureus* was found to be statistically significant when compared between the isolation rate of *Pseudomonas aeruginosa*, *Streptococcus pyogenes* and *Proteus* species. The above results were found in line to our study as out of 100 patients with throat infections sixteen (16%) patients were aged 0-20 years, twenty nine (29%) patients were in the age group 21-40 years, thirty (30%) patients were in the age group 41-60 years, twenty three (23%) patients were in the age group 61-80 years and two (02%) patients were in the age group 81-100 years. Thirty six (36%) patients were female adults, fifty two (52%) patients were male adults, six (06%) patients were male child, six (06%) patients were female child. Sixty one (61%) patients were diagnosed as acute pharyngitis, thirty nine (39%) patients were diagnosed as chronic pharyngitis. While bacteriological profile in our study was different as *Pseudomonas aeruginosa* (23%) was the most common organism detected in our study followed by *Staphylococcus aureus* (14%) and *Klebsiella Pneumoniae* (11%).

Sridevi R et al<sup>6</sup> studied the prevalence of various microorganisms from throat swab specimens in patients attending a tertiary care hospital at Chinakakani, Guntur. Throat swab specimens were collected aseptically from 100 patients and cultured on appropriate bacteriological media. Isolates were identified by biochemical tests & antimicrobial susceptibility performed by standard methods. Out of 100 Samples, culture was positive in 25 samples. So bacterial infection was found in 25% of Pharyngitis. *Streptococcus pyogenes* was the commonest isolate, followed by *Staphylococcus aureus* and *Candida albicans*. Majority of bacteria were *Streptococcus pyogenes*, *Staphylococcus aureus* and *Candida albicans*. In 60% it was mixed infection. Our study shows results different from above study as throat swab samples were found positive in eighty four (84%) patients and all results show single organism.

Esposito S et al<sup>7</sup> while studying to establish the role of atypical bacteria and compare characteristics of different infectious agents in acute pharyngitis, 127 patients with acute pharyngitis (66 males; median age, 5.33 years; range, 6 months to 14 years) and 130 healthy subjects of similar sex and age were studied. Serology with paired samples and PCR on nasopharyngeal aspirates and throat cultures were used to identify bacteria and viruses. Viruses were identified in 43 patients (33.8%) and five controls (3.8%; P, 0.0001), potential bacterial pathogens in 34 patients (26.8%) and 26 controls (20 %; P ¼ 0.256) and mixed viral/bacterial pathogens in 26 patients (20.5%) and none of the controls (P, 0.0001). The main aetiological agents were adenovirus, respiratory syncytial virus (RSV), *Mycoplasma pneumoniae*, *Streptococcus pyogenes* and *Chlamydia pneumoniae*. *M. Pneumoniae* was the agent found most frequently as a single pathogen. Above results were slightly different from our study as bacterial infections were found predominant in our study.

In a similar study Wakode PT et al<sup>8</sup> studied 305 throat swab reports. Age of the patients ranged from 1.5 years to 71 years. Sex distribution showed 167 male and 138 female patients. Out of the 305 reports 77 showed that the pathogenic organism grown was coagulase positive staphylococcus, 32 cultures revealed group A beta haemolytic streptococcus, *pseudomonas aeruginosa* were grown in 7 cases and *Klebsiella pneumoniae* too in 7 reports. *Klebsiella loeffler's bacillus* was seen in 6 cultures, *Escherichia coli* was grown in only 1 culture and *candida* was grown in 4 cases. In 126 cases no pathogenic organisms were grown and no growth was observed in 45 cases. Results obtained in our study were slightly different from above study as *Pseudomonas aeruginosa* (23%) was the most common organism detected in our study followed by *Staphylococcus aureus* (14%) and *Klebsiella Pneumoniae* (11%).

Wilson E et al<sup>9</sup> carried out a prospective study to determine the pattern of bacterial isolates and their antibiotic sensitivity amongst children with tonsillo-pharyngitis. Consecutive children presenting with sore throat, difficulty with swallowing, fever and or evidence of inflamed pharynx and or tonsils at the pediatric casualty of the University of Benin Teaching Hospital, Benin City, between February and October 2006 were recruited for the study. The patient's bio data were obtained and socioeconomic status was determined. Throat swabs were taken for microbiologic analysis. Seventy three throat swabs were analysed. Bacteria were isolated from 39 patients. Of which 19 (48.72%) were  $\beta$  haemolytic *Streptococcus* (BHS). others were *S. aureus* five (12.83%), seven (17.95%) were *Klebsiella mirabilis* and three (7.69%) each of *Pseudomonas aeruginosa* and *Proteus mirabilis*. Above results were also slightly different from our study as bacteria were grown in 86% of throat swab samples tested in our study.

## **VI. Conclusion**

To conclude throat infections are still a major health in developing countries and throat swab culture is routinely used for diagnosis of bacterial pathogens. *Pseudomonas aeruginosa* (23%) was the most common organism detected in our study followed by *Staphylococcus aureus* (14%) and *Klebsiella Pneumoniae* (11%).

**Conflict of Interest: None to declare**

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