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# A COMPARATIVE STUDY OF INFECTIVE PROFILE OF PATIENTS WITH THROAT INFECTIONS IN CHILDREN VS ADULTS

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## ABSTRACT

**INTRODUCTION:** Acute pharyngitis is defined as an infection of the pharynx and/or tonsils. Clinical manifestations include sore throat and fever with sudden onset, red pharynx, enlarged tonsils covered with a yellow, blood-tinged exudate. Headache and gastrointestinal symptoms (vomiting and abdominal pain) are frequent.

**AIMS AND OBJECTIVE:** To study the acute/chronic pharyngitis in children vs adults.

**MATERIALS AND METHOD:** A total of 40 subjects with acute/chronic infection and age group 1–17 years and 19–33 years were included in the study. Physicians prescribed antibiotic treatment in patients with a positive throat culture.

**RESULTS:** In children the most frequent bacterial isolates were staphylococcus aureus in 8 (40%). In adults the most frequent bacterial isolate was pseudomonas aeruginosa in 9 (45%). Acute pharyngitis was present in 16 (80%) children and 13 (65%) adults. Chronic pharyngitis was present in 4 (20%) children and 7 (35%) adults.

**CONCLUSION:** In most of the throat swab of children staphylococcus aureus was observed, while in adult's isolates of pseudomonas aeruginosa was observed in most of the samples.

## KEYWORDS :

## INTRODUCTION:

Acute pharyngitis is defined as an infection of the pharynx and/or tonsils. It is a very common pathology among children and adolescents. Although viruses cause most acute phar yngitis episodes, group A Streptococcus (GABHS) causes 37% of cases of acute pharyngitis in children older than 5 years [1]. Other bacterial causes of pharyngitis are Group C *Streptococcus* (5% of total cases), *C. pneumoniae* (1%), *M. pneumoniae* (1%) and anaerobic species (1%). Between viruses Rhinovirus, Coronavirus and Adenovirus account for the 30% of the total cases, Epstein Barr virus for 1%, Influenza and Parainfluenza virus for about 4% [2].

The incidence of Acute pharyngitis peaks in childhood and adolescence with approximately 50 percent of all cases occurring before age 18 [3,4]. Among adults, most cases of acute pharyngitis occur by age 40 and incidence declines thereafter [3].

Approximately 5% to 15% of adult cases are caused by GABHS (group A β hemolytic streptococcus). In some patients, it can be important to identify an infectious cause other than GABHS (for example, gonococcal pharyngitis, Epstein– Barr virus, and acute HIV infection), but in the vast majority of cases, acute pharyngitis in an otherwise healthy adult is self-limited and rarely produces significant sequelae [5].

Clinical manifestations include sore throat and fever with sudden onset, red pharynx, enlarged tonsils covered with a yellow, blood-tinged exudate. There may be petechiae on the soft palate and posterior pharynx. The anterior cervical nodes are enlarged and swollen. Headache and gastrointestinal symptoms (vomiting and abdominal pain) are frequent. This study was initiated to analyse the infective profile of patients with throat infections children vs adults.

## MATERIALS AND METHOD:

Patients with throat infections coming to regional hospital Bilaspur from surrounding rural areas of Bilaspur, Solan, Hamirpur and Mandi Districts, constituted the study subjects. A total of 40 subjects with acute/chronic infection and age group 1–17 years and 19–33 years were included in the study.

For each included patient, a physician obtained a history, performed a clinical examination, throat swabs from all the patients were collected for culture. Throat cultures were incubated on 2 blood agar plates in anaerobia without inhibitor and were read after 48 hours. Physicians prescribed antibiotic treatment within 48 hours in patients with a positive throat culture.

## RESULTS:

A total of 40 patients from clinically chronic or acute throat infection were tested and analyzed. Of them, 20 were children with age group 1-17 yrs and 20 were adult with 19-33 yrs of age. Out of 20 children 8(40%) were male and 12 (60%) were female. Out of 22 adult patients 9(45%) male and 11(55%). All 20 (100%) children had microbial growth and out of 20 adult patients 18 (90%) had microbial growth (no growth was present in 2 female patients). (Table 1).

In children (Figure-1), The most frequent bacterial isolates were staphylococcus aureus in 8 (40%), followed by pseudomonas aeruginosa in 6 (30%), enterococcus faecalis, klebsiella pneumonia, and citrobacter koseri in 1 (5%) patient each. In adults (Figure-2), The most frequent bacterial isolate was pseudomonas aeruginosa in 9 (45%), followed by klebsiella pneumonia in 3 (15%), staphylococcus aureus in 2 (10%), serratia marcescens, escherichia coli, aeromonas hydrophila and morganella morganii in 1 (5%) patient each.

Acute pharyngitis was present in 16 (80%) children and 13 (65%) adults. Out of 16 children with acute pharyngitis growth of staphylococcus aureus was observed in 7 (43.7%), pseudomonas aeruginosa in 5 (31.2%) followed by staphylococcus epidermidis in 2 (12.5%), enterococcus fae calis and klebsiella pneumonia in 1 (6.25%) patient each. Out of 13 adults with acute pharyngitis growth of pseudomonas aeruginosa was observed in 5 (38.5%), klebsiella pneumonia in 2 (15.4%) followed by staphylococcus aureus, serratia marcescens, escherichia coli and morganella morganii in 1(7.7%) patient each [no growth in 2 (15.4%) patients] (Figure 3).

Chronic pharyngitis was present in 4 (20%) children and 7 (35%) adults. Out of 4 children with chronic pharyngitis growth of staphylococcus aureus, staphylococcus epidermidis, pseudomonas aeruginosa and citrobacter koseri was present

in 1 (25%) patient each. Out of 7 adults with chronic pharyngitis growth of pseudomonas aeruginosa was observed in 4 (57.2%), followed by staphylococcus aureus, klebsiella pneumonia and aeromonas hydrophila in 1 (14.3%) patient each (Figure 4)

In children out of 8 S. aureus isolates, 7 (87.5%) were resistant to penicillin, 5 (62.5%) each to tmp/smx and clindamycin, 6 (75%) each for ciprofloxacin and levofloxacin, 1 (12.5%) to amoxy/clav. Out of 3 staphylococcus epidermidis, 3 (100%) each were resistant to penicillin and tmp/smx, 1(33.3%) each were resistant to ciprofloxacin, levofloxacin, clindamycin and tetracyclin. Out of 6 isolates of pseudomonas aeruginosa 1 (16.6%) each were resistant to ciprofloxacin, levofloxacin, ticar/clav, ceftazidime, cefopera/sul, and amoxy/clav. enterococcus faecalis was observed in 1 isolate, 1(100%) each were resistant to penicillin and ciprofloxacin. klebsiella pneumonia was observed in 1 isolate, 1(100%) was resistant to ampicillin (Table 1).

In adults out of 8 S. aureus isolates 2 (100%) each were resistant to penicillin and ciprofloxacin, and 1 (50 %) each were resistant to tmp/smx, levofloxacin, and clindamycin. out of 9 isolates of pseudomonas aeruginosa 2 (22.2%) each were resistant to ticar/clav and imipenem, 1 (16.6%) each were resistant to ceftazidime, cefopera/sul and cefepime. Out of 3 isolates of klebsiella pneumonia all the 3 (100%) were resistant to ampicillin, 1 (33.3%) each were resistant to pip/taz, cefopera/sul, and amoxy/clav. Serratia marcescens, was observed in 1 isolate, 1(100%) was resistant to amoxy/clav. escherichia coli was observed in 1 isolate, 1(100%) each were resistant to ampicillin, ciprofloxacin and levofloxacin. 1 isolate morganella morganii was observed, 1(100%) each were resistant to ampicillin and amoxy/clav (Table 2).

## DISCUSSION:

Acute pharyngitis is common in adults and children, accounting for ~5% of medical visits [6]. Most cases are viral, benign, and self-limited. Group A -hemolytic streptococci (GABHS) is the most common bacterial etiology. Among children of all ages who present with sore throat, the prevalence of GABHS has been estimated to be 37% (95% CI, 32– 43). Streptococcal pharyngitis occurs at all ages but is most common among school-aged children and adolescents. It is rare in children younger than 3 years.

In our study a total of 40 patients from clinically chronic or acute throat infection were tested and analyzed. Of them, 20 were children with age group 1-17 yrs and 20 were adult with 19-33 yrs of age. Out of 20 children 8(40%) were male and 12 (60%) were female. Jeffrey A. Linder et al [7]., included visits by children aged 3 to 17 years (because children younger than 3 years are unlikely to have GABHS pharyngitis) with a primary reason for visit of "symptoms referable to the throat" (Reason for Visit Classification code 1455; 96% reported "soreness" or "pain" in the throat).

Culture of a throat swab on a sheep-blood agar plate remains the standard for the documentation of the presence of group A streptococci in the upper respiratory tract and for the confirmation of the clinical diagnosis of acute streptococcal pharyngitis [8] (A-II). If done correctly, culture of a single throat swab on a blood agar plate has a sensitivity of 90%–95% for the detection of the presence of group A β-hemolytic streptococci in the pharynx [9] (A-II).

In our study E. coli was present in 1 (5%) adult, klebsiella pneumonia was present in 1 (5%) child. According to the study by Livermore et al [10], in 2012 Antibiotic resistance of E. coli and Klebsiella spp. is highest in Asia (≥60%), with rates of 10–30% in Southern Europe, and 5–10% in Northern Europe, Australasia and North America. The antibiotic of choice for pharyngitis caused by GABHS is penicillin, which is narrow-spectrum, inexpensive, and to which GABHS is universally susceptible.

Linder et al [7] including a total number of 4158 children with pharyngitis aged 3-17 years shows that physicians performed a GABHS test only in 63% of children with sore throat and prescribed antibiotics to 53% of children, exceeding the maximum expected prevalence of GABHS. There was a significant difference in antibiotic prescriptions between children who had a GABHS test performed and those who did not: GABHS testing is associated with a lower rate of antibiotic prescribing.

All the authors and national guidelines agree in suggesting penicillin as first choice treatment, since GABHS remains universally susceptible to penicillin [11]. Although penicillin V is the drug of choice, ampicillin or amoxicillin equally are effective and, due to the good taste, represent a suitable option in children [12].

Amoxicillin is often used in place of penicillin V as oral therapy for young children; the efficacy appears to be equal. This choice is primarily related to acceptance of the taste of the suspension. Erythromycin is a suitable alternative for patients allergic to penicillin. First generation cephalosporins are also acceptable for patients allergic to penicillin who do not manifest immediate-type hypersensitivity to b-lactam antibiotics. For the rare patient infected with an erythromycin-resistant strain of group A Streptococcus who is unable to tolerate b-lactam antibiotics, clindamycin is an appropriate alternative.

## CONCLUSION:

In most of the throat swab of children staphylococcus aureus was observed, while in adults isolates of pseudomonas aeruginosa was observed in most of the samples. Correct diagnosis and treatment of pharyngitis are the key points to attain a judicious use of antibiotics, and to prevent suppurative and non suppurative sequelae. Thus, prudentially, we believe that paediatricians should perform at least one microbiological test (RADT or throat culture) in pharyngitis suspected for etiology, in order to make the correct diagnosis.

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## TABLES AND FIGURES:

**Figure 1: bacterial isolates in children**

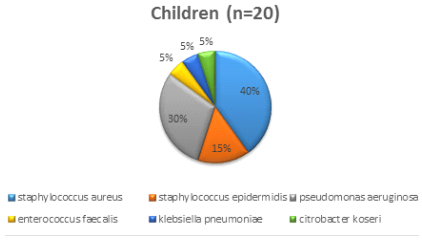


**Figure 2 : bacterial isolates in adults**

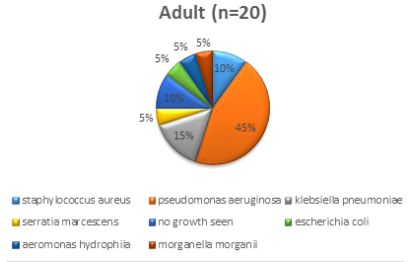

**Figure 3: Bacterial isolates in children vs adults with acute pharyngitis**

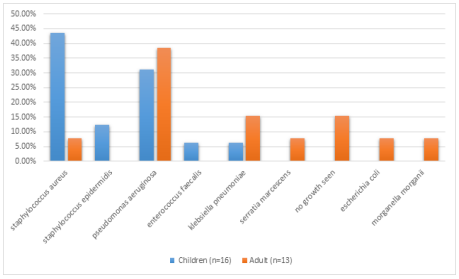


**Figure 4: Bacterial isolates in children vs adults with chronic pharyngitis**

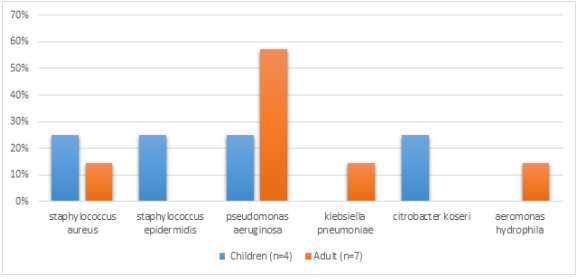


**Table 1: Resistance pattern of antimicrobial agents (%) in children**

| | P | A | T/S | Cf | L | T/C | Cfz | C/S | Cp | A/C | Cd | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| staphylococcus aureus (n=8) | 7 (87.5%) | | 5 (62.5%) | 6 (75%) | 6 (75%) | | | | | 1 (12.5%) | 5 (62.5%) | |
| staphylococcus epidermidis (n=3) | 3 (100%) | | 3(100%) | 1(33.3%) | 1(33.3%) | | | | | | 1(33.3%) | 1(33.3%) |
| pseudomonas aeruginosa (n=6) | | | | 1 (16.6%) | 1 (16.6%) | 1 (16.6%) | 1 (16.6%) | 1 (16.6%) | 1 (16.6%) | 1 (16.6%) | | |
| enterococcus faecalis (n=1) | 1(100%) | | | 1(100%) | | | | | | | | |
| klebsiella pneumonia (n=1) | | 1(100%) | | | | | | | | | | |

P: penicillin, A : ampicillin, T/S: tmp/smx, G: gentamycin, Cf: ciprofloxacin, L: levofloxacin, P/T: pip/taz, T/C: ticar/clav, Cfz: ceftazidime, C/S: cefopera/sul, Ak: amikacin, Ip: imipenem, Cp: cefepime, A/C: amoxy/clav, Lz:linezolid, Cd: clindamycin, T : tetracyclin

**Table 2: Resistance pattern of antimicrobial agents (%) in children**

| | P | A | T/S | Cf | L | P/T | T/C | Cfz | C/S | Ip | Cp | A/C | Cd |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| staphylococcus aureus(n=2) | 2(100%) | | 1(50 %) | 2(100%) | 1 (50 %) | | | | | | | | 1 (50 %) |
| pseudomonas aeruginosa (n=9) | | | | | | | 2(22.2%) | 1(16.6%) | 1(16.6%) | 2(22.2%) | 1(16.6%) | | |
| klebsiella pneumoniae (n=3) | | 3(100%) | | | | 1(33.3%) | | | 1(33.3%) | | | 1(33.3%) | |
| serratia marcescens (n=1) | | | | | | | | | | | | 1(100%) | |
| escherichia coli (n=1) | | 1(100%) | | 1(100%) | 1 (100%) | | | | | | | | |
| morganella morganii (n=1) | | 1(100%) | | | | | | | | | | 1(100%) | |

P: penicillin, A : ampicillin, T/S: tmp/smx, G: gentamycin, Cf: ciprofloxacin, L: levofloxacin, P/T: pip/taz, T/C: ticar/clav, Cfz: ceftazidime, C/S: cefopera/sul, Ak: amikacin, Ip: imipenem, Cp: cefepime, A/C: amoxy/clav, Lz:linezolid, Cd: clindamycin, T : tetracyclin

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