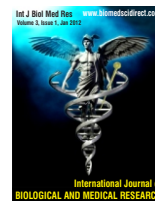


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### Original Article

## Bacterial Isolates Causing Pharyngitis

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#### ARTICLE INFO

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#### ABSTRACT

**Background:** Sore throat and pharyngitis are one of the most common of the physical complaints, which result in a clinical visit for diagnosis and treatment. Group A Streptococci (GAS) is the most common cause of bacterial pharyngo-tonsillitis. **MATERIALS AND METHODS:** The present study was conducted during a one year period from January to December 2012. A total of 158 throat swab samples were processed during the study period using standard techniques. The throat swabs were inoculated on to sheep Blood Agar & MacConkey agar, and incubated over night at 37°C. Any growth was smeared for Gram's stain, and the organisms were further processed, and antibiotic sensitivity done using Microscan autoSCAN-4 instrument (SIEMENS). **RESULTS & CONCLUSIONS:** A total of 158 throat swabs were processed during the study period (January to December 2012). Out of 158 samples, 67 samples (42.4%) were positive for growth of pathogens and 91 (57.59%) were negative. Staphylococcus aureus was the predominant isolate (34.32%), followed by Streptococcus pyogenes- 25.37% and Klebsiella pneumoniae- 23.88%. Group A Streptococcal pharyngitis has to be identified properly and treated promptly to avoid un-necessary complications further.

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### 1. Introduction

Sore throat and pharyngitis are one of the most common of the physical complaints, which result in a clinical visit for diagnosis and treatment. In more than 80% of the cases, the cause is non-bacterial<sup>1</sup>. Sore throat is often a symptom of various illnesses such as colds and flu, glandular fever, respiratory tract infections, tonsillitis, quinsy, chicken pox, measles and mumps<sup>2</sup>. Group A Streptococci (GAS) is the most common cause of bacterial pharyngo-tonsillitis. Diagnosis of Upper Respiratory Tract Infections (URTIs) is complicated by the presence of most pathogens in the normal individual in the absence of symptoms. Even Streptococcus pyogenes may be found, usually in small numbers, in the throats of asymptomatic individuals. The major exception to this rule is Neisseria gonorrhoeae, which is found only in Sexually Transmitted Infections (STIs). The oropharyngeal flora of normal individuals is comprised mainly of viridians streptococci. B-haemolytic Streptococci, Staphylococcus aureus, Haemophilus influenzae, Streptococcus pneumoniae, Moraxella catarrhalis and many anaerobic bacteria including Fusobacterium species and Actinomyces israeli, yeasts including Candida albicans, Adenovirus

and Herpes Simplex Virus, all inhabit the upper respiratory tract without causing disease. In patients who are sick and have been admitted to the hospital, the indigenous flora switches from Gram positive (Streptococci) to Gram negative (Enterobacteriaceae and Pseudomonas species). The reason for this alteration appears to be due to the loss of fibronectin, which enhances binding of Gram positive bacteria from the surfaces of oro-pharyngeal epithelial cells<sup>2</sup>. The following study was conducted to estimate the pattern of bacterial pathogens causing pharyngitis at a diagnostic center in Hyderabad.

### 2. Materials and methods

The present study was conducted during a one year period from January to December 2012. A total of 158 throat swab samples were processed during the study period. The throat swab was collected from the tonsillar fossae and posterior pharyngeal wall using a sterile cotton swab in the lab. Taking all precautions to avoid contamination, the samples were immediately processed. The samples were processed in the Microbiology lab through a Gram's stain to look for the morphology and staining characters. There was no suspicion or no appearance of a grey patch in the throat in the present study, and hence Albert's stain was not done for any of the throat swabs so processed. The throat swabs were inoculated on to sheep Blood Agar & MacConkey agar, and incubated over night at 37°C. Any growth was smeared for Gram's stain, and the organisms

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were further processed, and antibiotic sensitivity done using Microscan autoSCAN-4 instrument (SIEMENS). Prompt Inoculation System D (SIEMENS) was used to prepare the inocula for biochemical reactions and antibiotic sensitivity testing. The prepared inocula were poured into either Gram positive or Gram negative panels depending on the morphology and staining characters of the isolates so obtained. The inoculated panels were incubated over night at 37°C in an incubator and read the next day in Micro SCAN auto SCAN-4 instrument for the final identification of the organism.

### 3. Results

A total of 158 throat swabs were processed during the study period (January to December 2012). Out of 158 samples, 67 samples (42.4%) were positive for growth of pathogens and 91 (57.59%) were negative (67- no growth and 24 no pathogenic growth which yielded Coagulase Negative Staphylococci- CONS, yeasts and diphtheroids in a mixed growth).

**Table 1: Isolates Obtained**

ISOLATE	NO	%
Staphylococcus aureus	23	34.32
Streptococcus pyogenes	17	25.37
Klebsiella pneumoniae	16	23.88
Pseudomonas aeruginosa	5	7.46
Escherichia coli	2	2.98
Streptococcus equisimilis	2	2.98
Enterobacter cloacae	1	1.49
Acinetobacter baumannii	1	1.49
TOTAL	67	99.97

*Corynebacterium diphtheriae* was not isolated in the present study.

### 4. Discussion

Throat swab culture as a diagnostic test for an individual ailment may have marginal utility. But at the same time it is a very common investigation<sup>2</sup>. The throat swab after collection may be allowed to dry during transport without compromising the recovery of viable organisms, mainly for GAS. Some reference labs even recommend that swab tips be placed in a desiccant, like silica gel, to suppress the survival of commensal micro-organisms and improve the recovery of *Streptococcus pyogenes*<sup>2</sup>. 42.4% of the samples were positive for pathogens in the present study. Other reported studies include P T Wakode et al- 42.64% and Pramod et al- 56.5%. *Staphylococcus aureus* was the predominant isolate in the present study (34.32%), followed by *Streptococcus pyogenes*- 25.37% and *Klebsiella pneumoniae*- 23.88%. Wakode et al had reported a high isolation of Coagulase Positive Staphylococci (CPS)- 59.23% followed by GAS -24.61% in their study. Pramod et al also reported CPS to be isolated in a little higher percentage (41.42%), than compared to our study, followed by  $\alpha$ - haemolytic Streptococci (29.52%). Group C Streptococci (GCS) -*Streptococcus equisimilis* was isolated in 2.98% samples in the present study. Lewis et al had reported GCS in 4.4% cases in their study. GCS are usually pathogens of animals. *Streptococcus equisimilis* causes occasional infections

in humans. It causes upper respiratory tract infections, pneumonia, osteomyelitis, endocarditis, brain abscess and puerperal sepsis. *Streptococcus equisimilis* shows tolerance to penicillin; hence patients may not respond to treatment with penicillin<sup>6</sup>. Although different bacteria can cause pharyngitis, the primary cause for bacterial pharyngitis is *Streptococcus pyogenes* (30%).

Viral pharyngitis or other causes of pharyngitis must be differentiated from that cause by *Streptococcus pyogenes* since pharyngitis resulting from that caused by *Streptococcus pyogenes* is treatable with penicillin, where as viral infections are not. In addition, treatment is of particular importance because infection with *Streptococcus pyogenes* can lead to complications such as acute rheumatic fever and glomerulo-nephritis, which are non-suppurative sequelae. *Streptococcus pyogenes* can also lead to pyogenic infections like tonsillitis, sinus infections, that of middle ear, or cellulitis- as secondary sequelae to pharyngitis. Hence Streptococcal pharyngitis should be thoroughly treated for<sup>7</sup>. Oguz Karabay et al had recommended in their study that throat gargling method is a safe, quick and easy method of detecting GAS, and that it serves as an effective alternative to throat swab cultures. Michael Gerber et al had recommended rapid detection of GAS in throat swabs by using commercially available antigen detection tests for timely and effective treatment to prevent complications further. Quantitative cultures for *Streptococcus pyogenes* was given by Collee et al. The authors recommended that the relative abundance of *Streptococcus pyogenes* colonies in the culture plate have to be noted and reported. The authors opined that the organism is more likely to be a pathogen when it is numerous (>100 colonies) in the primary plate than when it is scanty. An appreciable number of healthy persons- 1-10% of adults and up to 20-30% of children carry *Streptococcus* in the throat, and the organism will be detected in a throat swab when a carrier develops a sore throat primarily due to other pathogens, such as a virus.

### 5. Conclusions

A total of 158 throat swab samples were processed from Jan. - Dec. 2012, of which 67 (42.4%) were culture positive for pathogens. The predominant pathogens isolated include *Staphylococcus aureus* - 34.32%, followed by *Streptococcus pyogenes*- 25.37% and *Klebsiella pneumoniae*- 23.88%. *Corynebacterium diphtheriae* was not isolated in the present study. GAS pharyngitis has to be identified properly and treated promptly to avoid un-necessary complications further.

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### 6. References

- [1] Oguz Karabay, Hasan Ekerbicer and Fahrettin Yilmaz. Efficacy of throat gargling for detection of Group A Beta Haemolytic Streptococci. Japanese journal of Infectious Diseases, 2009; 58: 39-40.
- [2] Washington Winn Jr, Stephen Allen, William Janda, Elmer Koneman. Guidelines for collection, transport, processing, analysis and reporting of cultures from specific specimen sources. In: Koneman's colour atlas and textbook of Microbiology, 6th edition. Lippincott, Williams and Wilkins publications, 2006: 68-111.

- [3] P T Wakode, S H Gawarle, S V Joshi, R Bajoriya. Throat swab culture and sensitivity reports- an overview. *Indian journal of Otolaryngology and Head and Neck Surgery*, April- June 2003; 55(2): 76-80.
- [4] Pramod E Jadhav, Swapnatai A Mesharam, Rajnish S Borkar, Satyanarayana, M Hemanthrao. A study of pattern of organisms in throat swab culture and their sensitivity to antibiotics in patients of RIMS, Adilabad, Andhra Pradesh. *International Journal of Biological & Medical Research*, 2013; 4(1): 2915-2919.
- [5] R F M Lewis, A E Balfour. Group C Streptococci isolated from throat swabs: a laboratory and clinical study. *Journal of Clinical Pathology*, 1999; 52: 2593-2594.
- [6] S C Parija. Streptococci and Enterococci. In: *Textbook of Microbiology*. 1st edition, Elsevier publications, 2009; 231-243.
- [7] Fuselier PA, Garcin LS, Procop GW. Upper respiratory tract infections and other infections of the oral cavity and the neck. In: Betty AF, Daniel FS, Alice SW, editors. *Bailey and Scott's Diagnostic Microbiology*. Mosby, 2002; 899-906.
- [8] Michael A Gerber and Stanford T Shulman. Rapid diagnosis of throat gargling for detection of Group A  $\beta$ - haemolytic Streptococci. *Clinical Microbiology Reviews*, July 2004; 17(3): 571-580.
- [9] Collee, Fraser, Marmion. Laboratory strategies in the diagnosis of infectious syndromes. In: *Mackie and McCartney Practical Medical Microbiology*, 14th edition. Churchill Livingstone, New York. 2006: 53 to 94.
- [10] K R Rijal, N Dhakel, R C Shah, S Timilsina, P Mahato, S Thapa and P Ghimire. Antibiotic susceptibility of Group A Streptococci isolated from throat swab culture of school children in Pokhara, Nepal. *Nepal Medical College Journal*, 2009; 11(4): 238-240.
- [11] J Mc Isaac, David White, David Tannenbaum, Donald E Low. A clinical score to reduce unnecessary antibiotic use in patients with sore throat. *Canadian Medical Association Journal*, January 13 1998; 158(1): 75-83.
- [12] James W Fox, Mario J Marcon and Bema K Bonsu. Diagnosis of Streptococcal pharyngitis by detection of Streptococcus pyogenes in posterior pharyngeal wall versus oral cavity specimens. *Journal of Clinical Microbiology*, 2006; 44(7): 2593-2594.
- [13] Malcolm Mc Donald, Rebecca Towers, Peter Fagan, Melita Mc Kinnon, Norma Benger, Ross Andrews, Bart J Currie and Jonathan Carapetis. Recovering Streptococci from the throat, a practical alternative to direct plating in remote tropical countries. *Journal of Clinical Microbiology*, February 2006; 44(2): 547-552.
- [14] David M Goldfarb, Robert Slinger, Ron K Tam, Nicholas Barrowman and Francis Chan. Assessment of flocced swabs for use in identification of Streptococcal pharyngitis. *Journal of Clinical Microbiology*, September 2009; 47(9): 3029-3030.