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ORIGINAL ARTICLE

Prevalence of Microorganisms in Acute Pharyngitis from Throat Swab in a tertiary care hospital

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ABSTRACT

Background: Acute pharyngitis is the inflammation of the mucous membrane of oropharynx which is caused by various infectious organisms like bacteria, viruses and fungi. The other less common seen causes include allergies and gastro-esophageal reflux disease.
Aim: To look for range of microorganisms involved in causing acute pharyngitis on throat swab specimens.
Methods: After getting consent all the pharyngitis patients attending ENT Department at Akbar Niazi Teaching Hospital (ANTH), Islamabad from January to June 2017 were included in the study. From total of 100 patients throat swabs were obtained by established aseptic method and were sent for culture. The organisms involved were recognized by biochemical tests & their propensity to antimicrobial agents was established by established methods. Data was entered and analyzed by using SPSS v.21.
Results: Out of 100 specimens' microorganisms were identified in 25 specimens while 75 specimens had no growth. Streptococcus pyogenes was the frequently seen organism 9(90%), while the list was followed by Staphylococcus aureus 14(56%) and Candida albicans 3(12%). In 40% single pathogen was identified with Streptococcus pyogenes in 9 samples (90%) and Staphylococcus aureus in 1(10%), whereas 60% of the culture reports were that of the mix infection.
Conclusion: The study concluded that streptococcus pyogenes and staphylococcus aureus were responsible for majority of single organism infections, while candida albicans together with these bacteria were isolated from mixed infections.
Keywords: Pharyngitis; Streptococcus pyogenes; Throat; Microorganisms.

INTRODUCTION

Acute pharyngitis is the inflammation of the mucous membrane of oropharynx which is caused by various infectious organisms like bacteria, viruses and fungi. The other less common seen causes includes allergies and gastro-esophageal reflux disease[1]. It is the commonest infection that is seen and diagnosed at primary health clinics. Of these about 50% to 80% are viral in origin while most common bacterial pathogen is Group A beta-hemolytic streptococcus (GABHS), which is Gram-positive pathogen and is involved in 5-15% of adult cases and among 20-30% younger patients. The other microorganisms that can cause an acute pharyngitis are H. influenza, staphylococcus, streptococcus pneumonae, candida albicans and mycoplasma pneumonae[2]. Streptococcus hemolyticus which is now known as Streptococcus pyogenes whose incubation period is 2-5 days and infection due to this organism recovers spontaneously within 7-10 days but can cause mild to severe infections like pharyngitis, impetigo, toxic shock syndrome and necrotizing fasciitis with possible sequel as tonsillar abscess, otitis media, rheumatic fever and post-streptococcal glomerulonephritis (PSGN)[3,4].

Currently Streptococcus pharyngitis cases are reduced in the developed countries due to use of broad spectrum antibiotic treatment but it is estimated that approximately 600 million symptomatic pharyngitis due to GABHS are caused annually in younger people of age over four years and of these about 550 million are seen in under developed countries[5,6]. Clinical signs and symptoms between bacterial and viral pharyngitis usually overlap and is difficult to make a precise diagnosis of pharyngitis due to group A streptococcal GABHS as only 20–30% of patients present with classical symptoms of bacterial pharyngitis. Centor's criteria (Fever of ≥38°C, Tonsillar swelling or exudates, palpable Jugulo-digastric lymph node and absence of cough) are the standard for bacterial pharyngitis[4,7,8].

Accurate diagnosis can be made on the result of throat swab cultures which usually takes 2-3 days to isolate the organisms from the specimen obtained by swabbing from the tonsil and posterior pharyngeal wall and presence of Streptococcus pyogenes confirm the streptococcal pharyngitis while the outcomes are further evaluated and identified on biochemical test such as Gram stain and Pyrrolidonyl acrylamides test[9]. The throat swab sensitivity and specificity of the cultures is 81.1% and 94.9% respectively[10].

Our study was intended to explain the frequency of possible pathogenic microbes in throat swab specimens from patients with pharyngitis.

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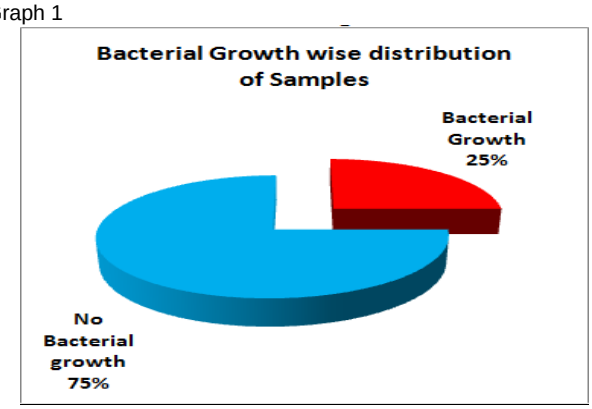
METHODOLOGY

After getting hospital ethics committee approval this analytical cross sectional study was conducted in ENT department of Akbar Niazi Teaching Hospital (ANTH), Islamabad from January 2017 to June 2017. The population included was the patients who visited ENT clinic of the Hospital with active pharyngitis. A total of 100 cases (sample size was calculated by WHO sample size calculator whereas, precision rate was 7% with CI 95% and significance level was 5%),[2] consecutively was recognized and incorporated in the study after getting their consent. Patients with tonsillitis, rhinosinusitis and post nasal drip (PND) were excluded. Patients who were reluctant to take part in the study were expelled from the study. Particulars were gathered from all the included cases and were entered to pre designed proforma in detail. Specimens from throat were obtained and were processed by direct examination under microscope, culture and antibiotic propensity test. Gram's Method was applied for direct microscopy. Samples were cultured on Blood Agar and MacConkey agar plates. Antimicrobial sensitivity was established by disc diffusion. Data gathered was summarized and analyzed on SPSS v.21. Age was presented with mean and standard deviation. Infectious isolates were represented as count (number) and percentage. Chi-square test was performed to age based analysis to deduce type of organisms. A p value of ≤ .05 was taken as significant.

RESULTS

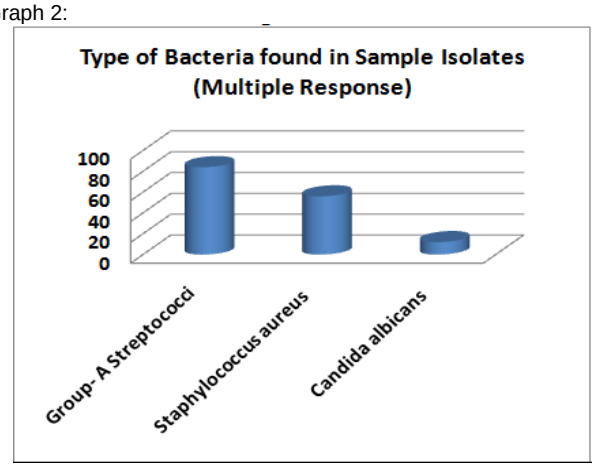
In this study total 100 patients were enrolled. The age was ranging from 1 year to 54 years while the mean age was 16.5±6.2 years. Total of 25% samples were positive on culture while other 75% cultures were found negative (Graph 1).

Graph 1



On processing of these cultures group A streptococci were most frequently found organism (n=13). Other organisms found on the culture were staphylococcus aureus (n=14) and candida albicans (n=3). Out of 25 cases, 40% of the positive cases there was single infection involved (n=10), of which 9(90%) had a growth of streptococcus pyogenes, while 1(10%) had a growth of staphylococcus aureus. Mixed infection was seen in 60% of the samples (n=15). Of these group A streptococci were isolated in 88% of samples (n=22) followed by staphylococcus aureus in 56% samples (n=14) and candida albicans in 3(12%) of sample isolates (Graph 2).

Graph 2:



Whereas we further analyzed isolates throat swab culture according to age and it was sorted that streptococci were present in every age group cultures while staphylococcus aureus & candida albicans with addition to GABHS on the other hand were isolated from the patients with age of more than 15 years.

n patients of age group of less than 15 years there were 9 cases with of group A streptococci. In patients with 16-30 years age group there were only 3 patients having positive bacterial culture with one that of streptococci and staphylococcus aureus, second had streptococci & candida albicans while the third sample was positive for staphylococcus aureus. In patients with 31-45 years age group five cases had positive culture with 4 having staphylococcus aureus and streptococci while the other was that of staphylococcus aureus & candida albicans. In patients with age more than 45 years 6 cultures were positive with staphylococcus aureus and streptococci while one culture was positive for streptococci, staphylococcus aureus and candida albicans. The distribution of different organisms with respect to age was found statistically insignificant with p-value of 0.122.

Table I: Age wise relation of pathogens

Age (in years)	Organisms isolated			Total sample with Bacterial Growth
	Group A Streptococci	*Staphylococcus aureus*	*Candida albicans*	
1 - 15	9	0	0	9
16 - 30	2	2	1	3
31 – 45	4	5	1	5
Above 45	7	7	1	8
Total	22	14	3	25

Chi-square value = 10.060; p-value = 0.122

DISCUSSION

In current study 9% group A beta-hemolytic streptococcus (GABHS) was detected in children under 15 years which is in accordance to epidemiological statistics presented for other countries like 11%, 12% and 9.7% in Turkey, Brazil and Ethiopia respectively[11-13]. Low prevalence is found in India (2.8%)[14] and Taiwan (4.1%)[15].

The data from this study predicts the positivity rate of throat swab is 25% which is almost in accordance with a meta-analysis carried out by Oliver J, et al[16] in which the positivity rate was 24.1% with Group A beta-hemolytic streptococcus (GABHS/GAS) being the most common pathogen isolated accounted for 22.7% for all age group which is comparable to our study with 22% prevalence rate.

The positivity rate in our study also matches the study conducted by Rathi et al[17] in Karachi which had 25.3% positivity rate with 60.7% of subjects under 15 years of age and 3.3% above 45 years which is in contrast to our study where infection under 15 is 36% and above 45 is 32%. However, it is almost same for subjects between 15–45 years.

Group A beta-hemolytic streptococcus is the frequent cause of acute bacterial pharyngitis, responsible for 20–30% of sore throat in general population. The episodes of GABHS pharyngitis occur as bimodal peaks; in the showery rainy weather and in the winter. In monsoon and winter people usually stay indoors in populated settings, which amplify the infection spread. In countryside areas, the maximum streptococcal carrier rate was seen in late fall and start of winter and lowest in the months of summer[18]. Whereas local data is inadequate and significant scrutiny has not been done.

In Pakistan quality of healthcare is restricted by economics. Therefore, for a common illness like sore throat, throat cultures are not done in routine practice. In our study, Centor's criteria and throat swab was found to be the most reliable device for the diagnosis of pharyngitis caused by GABHS[19].

There is variability among the positivity rate of pathogen isolation among different studies in different regions. In our study culture was positive for microorganisms in 25 cases; of which only one microorganism was isolated in 10 cases (40%) while mix pathogens were involved in other 15 cases (60%). Studies by Sayyahfar S, et al[20] from 200 children, 59(30%) cases were positive for GABHS and the prevalence of infection in a study by Ba-Saddik, et al[21] on Yemini children was 41.5% which were high in contrast to our study. Similarly, the results of study by Naik et al[22] detected pathogens in 38% with lower prevalence of GABHS noted which was 9.17% in contrast to 22% in current study, while Pramod E, et al[23] in his study established bacterial growth in 10.23%. The bacterial growth culture positivity is reducing with time which may be because of antibiotics usage.

In the present study the most frequently yielded organism was streptococcus pyogenes (GABHS) which is 88% of all positive cultures affecting the people of all age groups but exclusively present in children while other two organisms, staphylococcus aureus and candida albicans were isolated in adults which is in contrast to study by Mwaba C, et al[24] where GAS was cultured in 31.5% and staphylococcus aureus in 5(7%) samples in children while study by Ba-Saddik, et al.,[21] cultured GAS in 89.1% which is almost similar to ours.

These results were comparable to the results by Jose JJ, et al[5], Mwaba C, et al[24] and Naveen G et al[25] published their reports with streptococcus pyogenes as primary pathogen and staphylococcus aureus as secondary pathogen in oropharynx.

CONCLUSION

Streptococcus pyogenes and staphylococcus aureus were responsible for majority of single organism infections, while candida albicans together with these bacteria were isolated from mixed infections which comprised 60% of total samples.

Authors Contribution: MAU: provided concept/research design and did data collection, **NA, MNB and NQ** did statistical analysis and manuscript writing, **MAU & MM** did edit of manuscript and project management, **AJ** did critical revision of the manuscript for important intellectual content, Islamabad Medical and Dental College, Islamabad, **MAU & MM** takes the responsibility and is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Conflict of interest: Nil

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