Volume : 2 | Issue : 8 | August 2013 • ISSN No 2277 - 8179

Research Paper

Prevalence of Streptococcal Infections in Sore Throat Patients

Medical Science

KEYWORDS : Sore throat, Beta-haemolytic streptococci, Antibiotic susceptibility

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ABSTRACT

Objective: Sore throat is a common presentation in the Otorhinolarynogology outpatient department. A study was carried out in a tertiary care hospital to determine the prevalence of streptococci in sore throat patients.

Material and Methods: 100 patients of different age groups suffering from sore throat but not treated with any antibiotic were included in the study. Throat swabs were collected for culture and sensitivity and serogroup determination for the isolates of beta-haemolytic streptococci was performed.

Results: The predominant age group of presentation was 11-20 years with 22% males and 31% females. Beta haemolytic streptococci were found to be the causative agents in 18% of the sore throat cases. Distribution of streptococcal serogroups isolated showed 16% were due to Group A streptococci (GAS) while only 1% case each was due to Group C and G. 50% of the positive cases were in the age-group of 5-10 years. The antibiograms further established that all the isolates were susceptible to penicillin, amoxicillin and erythromycin (100%), while levofloxacin was the least effective (38.9%).

Conclusion: GAS is a model human pathogen responsible for a spectrum of diseases. Antibiotic therapy after laboratory testing is a must for symptomatic relief and prevention of post-streptococcal sequelae.

INTRODUCTION

Sore throat is one of the most common symptoms that primary health care physicians are confronted with. Acute onset sore throat has a wide spectrum starting from inflammation, localized primarily to the tonsils, to generalized inflammation of the whole pharynx. More than 225 pathogens including about 200 viruses are responsible for upper respiratory tract infections (1). Approximately 7.3 million outpatient visits per annum are attributed to sore throat occurrences amongst children alone in India and the beta-haemolytic streptococci are responsible for 15 - 36% of cases. Non-suppurative sequelae to Group A beta haemolytic streptococcal (GAS) pharyngitis includes acute rheumatic fever (ARF), post streptococcal glomerulonephritis (PSGN) and paediatric autoimmune neuropsychiatric disorders associated with streptococcal infections (PANDAS). Children are major reservoirs of GAS and are most susceptible to its suppurative and non-suppurative complications. Some studies have indicated 28.3% GAS in patients with tonsillitis and the carriage rate of GAS alone was 8.4% in areas endemic for streptococcal infections (2). Other reports state that point prevalence of beta-haemolytic streptococcal sore throat is 13.6% (3). Routine culture and sensitivity methods should be performed to differentiate a bacterial aetiology from viral pharyngitis and numbers of colonies isolated are important to distinguish between a pathogen and the carrier state (1). Although Group C and G streptococci are primarily animal pathogens, they are being increasingly reported in cases of exudative pharyngitis, deep infections and septicemia in human beings (4) *Streptococcus dysgalactiae* subsp *equisimilis* (Lancefield Group G) is a well documented organism of epidemic tonsillopharyngitis in adults (5).

A microbiological diagnosis of clinically suspected pharyngitis is essential for the confirmation of a bonafide beta-haemolytic streptococcal infection (6). Appropriate treatment with antibiotics is essential to prevent the spread of respiratory infections by streptococci in the community. This, in turn, would reduce the incidence of life-threatening post-infectious sequelae.

MATERIALS AND METHODS

The study was carried out in the Department of Otorhinolaryngology, ASRAM Medical College, Eluru (Andhra Pradesh) taking 100 outpatients complaining of sore throat during August 2008 to July 2010 (two years). All patients of acute sore throat attending the ENT OPD during this period were included in the study. Patients treated with antibiotics within 7 days of presentation to OPD were excluded from the study.

Sterile cotton wool swabs were used to collect as much exudates as possible from the tonsils, posterior pharyngeal wall and any other area, which was inflamed. The swabs were further processed in the Department of Microbiology, ASRAM Medical College, Eluru.

The throat swabs were inoculated on blood agar media containing 5-7% defibrinated sheep blood and incubated for 24 hrs at 37°C in an atmosphere containing 5-10% CO_2. If more than 20 typical beta-haemolytic colonies were isolated, they were considered for gram staining, catalase test and antibiotic susceptibility testing. The bacitracin sensitivity test (0.04 U/disc) was carried out on the isolates of beta-haemolytic streptococci. The HiMedia™ latex test kit [LK06-25NO] was used for serogrouping. Antibiotic susceptibility test was performed with the isolates using the Kirby-Bauer disc-diffusion method following the clinical and laboratory standards institute (CLSI) guidelines. The antibiotics used were penicillin (10U), amoxicillin (10µg), erythromycin (15µg), ceftriaxone (30µg), azithromycin (15µg) and levofloxacin (5µg).

RESULTS

Table I and Fig 1 show the age and sex-wise distribution of sore throat patients. The predominant age group of presentation was in between 11-20 years with 22% males and 31% females. Table II and Fig. 2 depict the distribution of positive cases for beta-haemolytic streptococci. There were 7 positive cases in males in the 5-10 year age group, while 3 females in the age group of 11-20 years were positive for beta- haemolytic streptococci. Table III shows the statistical interpretation of the results, which were positive for beta-haemolytic streptococcal infection. There was a significant difference between male and female positive cases ($p<0.1$). There is also considerable variance in male cases in the age-group of 5-10 years and 11-20 years. Table IV and Fig. 3 show the distribution of serogroups of streptococci isolated from sore throat cases. It was found that 16 cases (16%) were due to GAS showing its predominance and only 1 (1%) case each was due to Group C and G respectively.

Table V and Fig 4 show the antibiogram for streptococci isolated from throat swabs. All the isolates were susceptible to penicillin, amoxicillin and erythromycin (100%). The isolates were least susceptible to levofloxacin (38.9%). Fig 5 and 6 show a typical beta-haemolytic streptococcal isolate and its antibiotic susceptibility testing on blood agar plates.

DISCUSSION

In general, the clinical features of GAS pharyngitis are not spe-

Volume : 2 | Issue : 8 | August 2013 • ISSN No 2277 - 8179

cific and cannot be easily differentiated from non-streptococcal sore throat. However, the clinical and epidemiological factors may narrow down the diagnosis, which may be confirmed by laboratory methods (6). Group A beta-haemolytic streptococci are spread via respiratory secretions through close contact. Out of a total of 100 test cases included in the study, 47 were males and 53 were females. Beta-haemolytic streptococci were isolated in 18% of the cases out of which GAS was the causative agent in 16%.

In a similar study, Sobhan Nandi and Rajesh Kumar (2002) from Chandigarh have reported 13.4% GAS from sore throat cases (7). Menon and Shanmugasundaram (2004) from Chennai reported 10% positivity rate of GAS (8).

Age has been reported to be an important factor in the microbiological aetiology of pharyngitis, with peak incidence of GAS pharyngitis occurring in children aged 5-10 years, as reported by Cauwenberge, P.B.V. et al (1991)(9).

Sobhan Nandi et al (2001) reported GAS pharyngitis to be more in schoolchildren aged around 11 years (1). 50% of the cases positive for beta-haemolytic streptococci were in the 5-10 year age group in the present study. There was worsening pharyngitis in a few cases. Group C streptococci were isolated in a 10 year old boy having enlarged tonsils while Group G streptococci were isolated in a 26 year old man who had congested and granular posterior pharyngeal wall with foci of pus over it. Brahmadathan K.N. and Malini A et al (2004) report that Group G streptococci (GGS) can cause extensive deep neck space infections in immunocompetent hosts. GGS share virulence factors such as M protein, streptokinase, fibronectin, IgG binding proteins, streptolysin O, streptolysin S, C5a peptidase, NADase and possibly the hyaluronic acid capsule with Group A streptococci (10).

Rapid antigen strep testing is done in many hospitals to exclude streptococcal sore throat which may continue to worsen in the absence of adequate treatment (11). If negative in highly suspicious cases they should always be followed up with a routine culture and sensitivity test.

The primary clinical rationale for treatment of streptococcal pharyngitis with antibiotics is the prevention of suppurative and non-suppurative sequelae.

Despite penicillin tolerance GAS continues to be exquisitely sensitive to penicillin, which is the drug of choice (6). Antibiotic therapy in patients with pharyngitis speeds up the relief of symptoms and if started within 10 days of initial diagnosis, it prevents acute rheumatic fever. All the isolates of beta-haemolytic streptococci were susceptible to penicillin in this study.

In patients with penicillin allergy macrolides can be administered. In addition to symptomatic relief the aim of antibiotic therapy should be prevention of recurrence. Vaccines for streptococci are still in the developmental stages. Vaccine strategies have focused on recombinant M protein and C5a peptidase vaccines, and mucosal delivery systems are under investigation (12).

CONCLUSION

Acute sore throat is one of the five common reasons for which the patient comes for episodic care. GAS is the predominant bacterial cause of pharyngitis and precedes acute rheumatic fever. School-going children (population in which pharyngitis occurs most frequently) serve as a reservoir of infection for the community. Evaluation of streptococcal pharyngitis by culture and sensitivity methods remains the gold standard till today. Treatment of sore throat is mostly empirical by clinicians but this is leading to increasing penicillin tolerance and macrolide resistance. Appropriate treatment with antibiotics is mandatory in all cases of sore throat to prevent recurrences and both suppurative and non-suppurative sequelae.

Table I: Age and sex distribution of patients taken up for study

Age group (yrs)	Male	Female	Total
5-10	15	14	29
11-20	22	31	53
21-30	9	7	16
31-40	1	0	1
41-50	0	1	1
Total	47	53	100

Table II: Distribution of positive cases in beta-hemolytic streptococci in various age groups

Age gr. (yrs)	Male		Female	
	Total cases	Positive	Total cases	Positive
5 to 10	15	7	14	2
11 to 20	22	2	31	3
21 to 30	9	3	7	1
31 to 40	1	0	0	0
41 to 50	0	0	1	0
Total	47	12	53	6

Table III: Statistical analysis of positive cases for beta-haemolytic streptococci

Attributes	p value	Z value
Male-Female	0.1	1.85
Male (5-10 years)	0.15	1.55
Male (11-20 years)	0.2	1.5

Table IV: Distribution of various serogroups in positive cases

Group	Percentage isolated
A	16
C	1
G	1

Table V: Sensitivity and resistance to various antibiotics used in positive cases

Antibiotic	Sensitive	Resistant	Cases tested
Amoxicillin	18(100%)	0	18
Erythromycin	18(100%)	0	18
Penicillin	18(100%)	0	18
Ceftriaxone	17(94.4%)	1(5.6%)	18
Azithromycin	17(94.4%)	1(5.6%)	18
Levofloxacin	7(38.9%)	11(61.1%)	18

Fig 1: Age and sex distribution of patients taken up for study

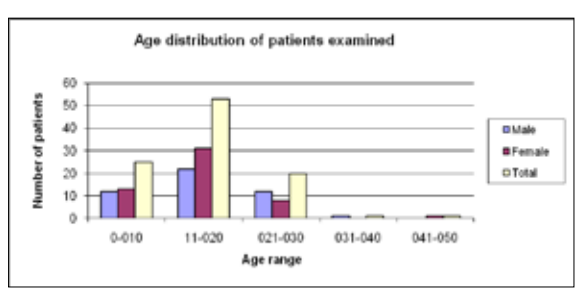

Fig 2: Distribution of beta-haemolytic streptococci in various age groups.

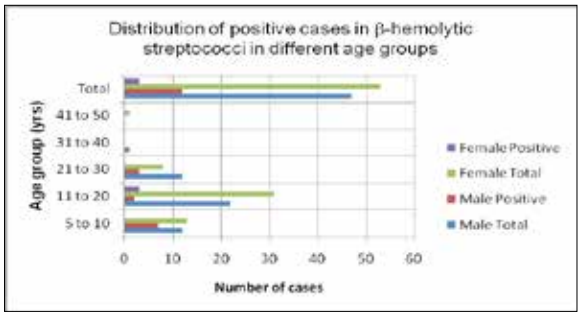

Fig 3: Distribution of positive cases in various serogroups

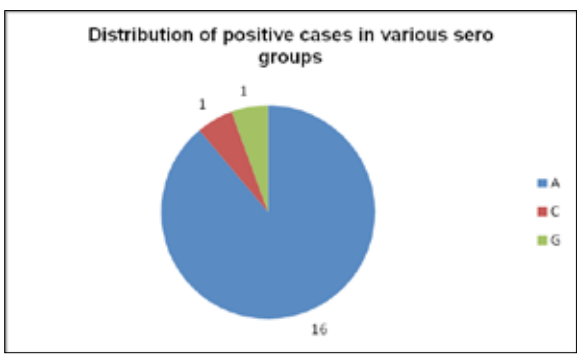

Fig 4: Sensitivity to various antibiotics in cases positive for beta-haemolytic streptococci

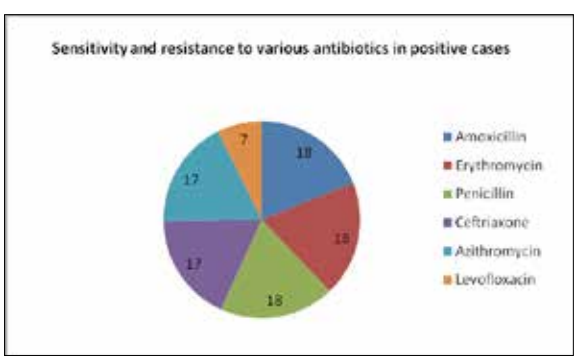

Fig 5 : Beta haemolytic streptococci isolated from throat swab culture

Fig 6: Antibiotic susceptibility testing for a typical beta-haemolytic isolate (Bacitracin disc in the centre)

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