



## PREVALENCE OF *STREPTOCOCCUS PYOGENES* THROAT INFECTION AMONG SCHOOL CHILDREN

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### ABSTRACT

*Streptococcus pyogenes* is one of the commonest bacterial pathogens that cause pharyngitis among school going children. **Aim of our study:** To study the prevalence of throat carriage of Group Abetahemolytic streptococci among school children in Hyderabad and to find their antimicrobial susceptibility pattern. **Methods:** 200 children of age 5-15 years, clinically suspected of acute streptococcal pharyngitis and tonsillitis were included in the present study. The study was conducted over a period of one year (October, 2006 to September, 2007). Throat swabs were collected from patients for Gram stain and Culture. *Streptococcus pyogenes* was identified by beta hemolytic colonies on blood agar and Bacitracin sensitivity and PYR positivity. **Results:** Among 200 clinically suspected children, in 24 cases *Streptococcus pyogenes* was isolated (prevalence of 12%). The prevalence was more in the age group 5-10 years and slightly more in females than males. All the isolates were sensitive to Penicillin, Ampicillin and Cephalothin (100%), 95.83% of isolates were sensitive to Erythromycin and 87.5% of isolates were sensitive to Gentamycin. 33.33% of the culture positive cases were also positive for the Antistreptolysin 'O'.

**Key words:** *Streptococcus pyogenes*, school going children, Gram stain, Culture, ASO titre,

### INTRODUCTION:

*Streptococcus pyogenes* or Lancefield Group A beta hemolytic streptococci is one of the commonest bacterial pathogens that cause pharyngitis among school aged children living in lower socioeconomic conditions<sup>1,2,3</sup>. The organism has been the focus of intense clinical investigative interest because of its association with two non suppurative sequel; Acute Rheumatic Fever and Acute Glomerulonephritis, responsible for a significant number of cases of mortality<sup>2,4,5,6,7,8</sup>. The prevalence of group A beta hemolytic streptococci (BHS) carriage in the throat of school children varies from 13 to 50% depending upon the population studied, season and other factors<sup>1</sup>. This study was done to know the prevalence of throat carriage of Group A betahemolytic streptococci among school children in Hyderabad and to find their antimicrobial susceptibility pattern.

### MATERIALS AND METHODS

The study included 200 school going children suspected clinically of acute streptococcal pharyngitis and tonsillitis, attending outpatient department of ENT hospital, Koti, Hyderabad. The age of the children included in the study ranged from 5 to 15 years. The study was conducted for a period of one year i.e., October, 2006 to September, 2007, in the department of Microbiology, Niloufer Hospital, Hyderabad. Swabs were prepared by using wooden applicator tipped with thick buds of absorbent cotton. Two throat swabs were collected from each child. Throat swabs were processed immediately in the laboratory. From the two throat swabs one was examined microscopically after staining the prepared smear by Gram staining technique. The second throat swab was cultured on basal medium i.e., 5% sheep blood agar and a selective medium i.e., crystal violet blood agar. These inoculated plates were incubated overnight at 37<sup>o</sup> C. After plating, the swabs were incubated in Brain Heart Infusion (BHI) broth

overnight at 37<sup>o</sup> C and fresh blood agar plates were inoculated the following day. These plates were incubated overnight at 37<sup>o</sup> C aerobically. After incubation beta hemolytic colonies were identified and streptococcus was confirmed by microscopic examination of the Gram stained smear from these colonies. The confirmed beta hemolytic streptococcus (BHS) was subcultured in fresh BHI broth and Todd Hewitt broth and incubated at 37<sup>o</sup> C. After incubation, Gram staining was done for confirmation.

#### Presumptive identification of *Streptococcus pyogenes*:

The Gram smear confirmed BHS colonies were subcultured into BHI broth and incubated at 37<sup>o</sup> C for 4 hours. The broth was used to test the susceptibility of BHS for Bacitracin (0.04 units) disc. After overnight incubation, the zone of inhibition was measured. An inhibitory zone diameter of > or = 11mm was considered. The isolates were further processed for confirmation as *Streptococcus pyogenes* by standard conventional method using STREP IDENTIFICATION Kit

(Microexpress – Tulip diagnostic Pvt. Ltd.). The antibiotic susceptibility pattern of the test isolates was done by Kirby Bauer's disc diffusion method. The following antibiotics were used. Penicillin (10µg), Ampicillin (10 µg), Cephalothin (30 µg), Gentamycin (10 µg), and Erythromycin (15 µg). The media and antibiotic discs used in the study were procured from Himedia Laboratories Pvt. Ltd. Blood samples were also collected from culture positive cases. The serological evidence for streptococcal infection was sought by estimating the Antistreptolysin 'O' (ASO) titre in the culture positive cases. ASO titre was determined by latex agglutination method (RHELAX – ASO Tulip diagnostic Pvt. Ltd.).

#### RESULTS:

The present study was conducted for a period of one year i.e., from October, 2006 to September, 2007. 200 clinically suspected children were included. Among these, 24 cases were isolated as Beta hemolytic streptococci. Percentage of isolation is depicted in table I

Table I: Percentage of isolation of Betahemolytic streptococcus (BHS)

Total no of cases included (n)	No. of BHS isolated	Percentage of isolation
200	24	12%

The age of these children ranged from 5-15 years. In this study, the percentage of isolation of *Streptococcus pyogenes* was found to be more among children of 5-10 years age (75%). The age wise distribution of children is shown in Table II.

Table II: Age Distribution

Age in years	BHS positive	% BHS
5-10	18	75%
11-15	6	25%

All the 24 isolates were sensitive to Bacitracin (0.04 units), zone of inhibition ranging between 12-16 mm in diameter and positive for pyrrolidonyl-beta-naphthylamide test (PYR test).

Table III: Percentage of BHS positive for important presumptive diagnostic tests

Total no. of cases	Bacitracin sensitivity (0.04U)	%	PYR positivity	%
24	24	100	24	100

The confirmed isolates were tested for antibiotic sensitivity pattern by Kirby – Bauer disc diffusion method by using antibiotic discs of Penicillin (10µg), Ampicillin (10 µg), Cephalothin (30 µg), Gentamycin (10 µg), and Erythromycin (15 µg). All the isolates were sensitive to Penicillin, Ampicillin and Cephalothin (100%), 95.83% of isolates were sensitive to Erythromycin and 87.5% of isolates were sensitive to Gentamycin. Antibiotic sensitivity pattern of the isolates is shown in table IV.

Table IV: Antibiogram

Total no of isolates, n=24

Name of the antibiotic tested	% Sensitive	% Resistant
Penicillin (10µg)	100%	0
Ampicillin (10µg)	100%	0
Cephalothin (30 µg)	100%	0
Erythromycin (15 µg)	95.83%	4.17%
Gentamycin (10 µg)	87.5%	12.5%

Among the 24 culture confirmed cases, the ASO titre was positive in 8 (33.33%) cases. The ASO titre was greater than 400IU/L in 2 cases (8.33%) while in 6 (25%) of them the titre ranged between 200-400 IU/L. Breakup of ASO is shown in table V

Table V: Antistreptolysin O titre among culture positive cases

Total no of cases tested for ASO titre, n=24	ASO titre positive	ASO titre IU/L	% (no)
		8 (33.33%)	<200
		200 – 400	25(6)
		>400	8.33(2)

## DISCUSSION:

Acute streptococcal pharyngitis and tonsillitis constitutes an important health problem in children. In a study in south India by Koshi et al<sup>9</sup>1970, the prevalence of streptococcal pharyngitis among children was 12%. In 1988 (Sarkar S et al)<sup>10</sup>, its prevalence rate in rural area of Varanasi, India was 13.6%. In another study in 1992 by Gupta et al<sup>1</sup>, prevalence of streptococcal (*Streptococcus pyogenes*) pharyngitis was 13.7%. According to Sobhan Nandi et al<sup>2</sup> in 2002, the prevalence of streptococcal pharyngitis was 13.5%. In the present study, the prevalence is 12% which is in concordance with other studies. The findings are comparable to Vellore study in Myer and Koshi<sup>3</sup>, who recorded peak prevalence of beta hemolytic streptococcal pharyngitis in 6-10 years age group. Such finding was also reported by Pike and Fashena<sup>4</sup> and Quinn Denny and Rilley (1957)<sup>5</sup> who reported that the children of age group 8-10 years showed 59% culture positive for beta hemolytic streptococci. Peak prevalence of streptococcal pharyngitis occurred in 5-10 years age group was also observed by Cauwenberge PBV, et al<sup>11</sup> in 1991. In our study also prevalence is higher among 5-10 years of age group. The prevalence of streptococcal sore throat was not significantly different between boys and girls. According to Reed BD et al<sup>6</sup> in 1990, the prevalence is slightly more in girls than boys. In our study also prevalence rate is slightly higher in girls (54.16%) than boys (45.84%). Bacitracin sensitivity and PYR positivity were considered as presumptive identification tests for *Streptococcus pyogenes*. In the present study also all the isolates (100%) were sensitive to Bacitracin (0.04 units) and were also positive for PYR test. Antimicrobial resistance has not been a significant issue in the treatment of group A beta hemolytic streptococcus pharyngitis. No clinical isolates of Group A streptococcus anywhere in the world has been documented to be resistant to penicillin. (IDSA guidelines, 2002)<sup>7</sup>. In the present study, all the isolates were sensitive to Penicillin, Ampicillin and Cephalothin (100%), 95.83% of isolates were sensitive to Erythromycin and 87.5% of isolates

were sensitive to Gentamycin. S.Nandi et al (2001)<sup>8</sup> mentioned in their publication that in an Egyptian study, the attack rate of Group A beta hemolytic streptococcus infection was defined as positive throat culture with concomitant rise in Antistreptolysin 'O' titre. In the present study, 33.33% of the culture positive cases showed rise in ASO titre.

Even though much of the work was done on prevalence of beta hemolytic streptococcus and its relation with rheumatic fever by many authors, there is a need to assess the streptococcal problem in a given area from time to time so that one can estimate the risk from these diseases.

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