



Prevalence of Group A streptococcal throat carriage in children

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Abstract : Objective To study the prevalence of Group A Streptococci throat carriage in children. Methods A total of 103 healthy children aged 5-15 years were enrolled in this study. The throat swabs were collected and cultured on blood agar. Group A streptococci identified on the basis of beta haemolysis, Gram stain and sero grouped by agglutination tests. Results Out of 103, which were included, 76 were male and 27 were female. The beta hemolytic gram positive streptococci was isolated from 22 children, among these two were Group A streptococci (1.94 percent). Both were male and from noncrowded low socio economic family with good oral hygiene. Conclusion The carriage rate of the beta hemolytic streptococci which are seen in children poses a threat to the community and it should be checked. Carrier rates which ranged from 2.3 percent to 34 percent were reported from different parts of our country. A regular screening needs to be done to control the development of non-suppurative sequelae such as acute rheumatic fever and post streptococcal glomerulonephritis, which are debilitating and difficult to treat.

Keyword : Beta hemolytic streptococci, Children, Streptococcal carriers.

Introduction

One of the commonest infections of the oral cavity in children is pharyngitis and tonsillitis.¹ A variety of more than 225 pathogens ranging from viruses, bacteria and chlamydia are responsible but majority of them are viruses^{2,3} and are self limiting. In developing countries like India the commonest bacterial cause is *Streptococcus pyogenes* or Lancefield Group A streptococcus (GAS). It is responsible for 5- 30% of acute pharyngitis and the prevalence of asymptomatic throat carriers range from 10-50% in school going healthy children.⁴ It spreads by direct person to person contact through droplets of saliva or nasal secretions. Crowding increases transmission, and outbreaks of streptococcal pharyngitis are common in institutional settings, the military, schools and families. Rarely it can spread from human contamination of food during preparation.¹ Overcrowding and poor oral hygiene may be the important contributing factors of spreading and colonization of Group A Streptococcus. It has an incubation period of 2 to 5 days.¹ Group A streptococcal pharyngitis can cause both suppurative and non suppurative complications.⁵ The suppurative complications include peritonsillar or retropharyngeal abscess, sinusitis, cervical suppurative

lymphadenitis, mastoiditis, otitis media, bacteremia, pneumonia, meningitis and endocarditis. The non suppurative complications include Rheumatic fever / Rheumatic heart disease and post streptococcal glomerulo nephritis.

The prevalence of asymptomatic carriage of Group A Streptococci in different parts of India has been reported to be in the range of 11.2 – 34%.⁶ The incidence of Rheumatic fever is 27 -100 / 100,000 / yr in developing countries and the prevalence of Rheumatic heart disease in India is around 6 to 11/ 1000 school going children.^{7,8} Because of the potential risk of complications, the detection of streptococcal pharyngitis and screening of throat carriers are considered important. Culture and isolation of Group A Streptococci from throat swab, in blood agar medium is the gold standard in the diagnosis.^{1,8} This study was done to help the physician to give the proper management to the carriers and to prevent drug resistance, thereby preventing the dreadful complications.

Materials and methods

This prospective cross sectional study was conducted in a residential school near our tertiary healthcare hospital from March to August 2011. One hundred and three children were randomly selected for this study.

Inclusion criteria:

1. Children between the ages of 5 – 15 years.

Exclusion criteria:

Children less than 5 years and more than 15 years.

Children with signs and symptoms of upper / lower respiratory tract symptoms.

Children with impetigo and joint swelling.

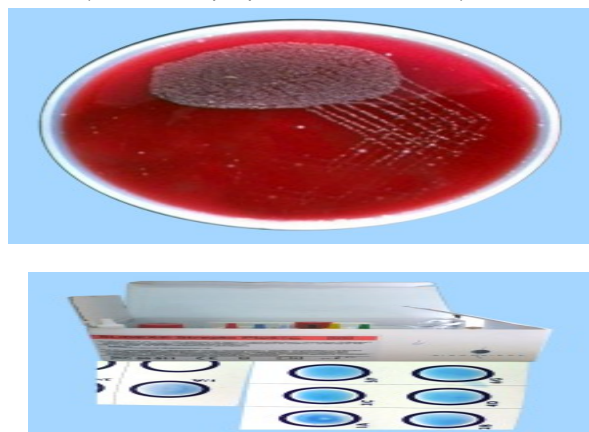
Children who were on antibiotics and who have taken antibiotics in the last 2 weeks.

Children with history of tonsillectomy.

Personal profile of the children, parent's occupation & educational level, socioeconomic status, number of family members, residence details - hostelite or dayscholar, general ear, nose & throat examination findings were recorded. Children who fulfilled the criteria were taken into this study.

From each student two throat swabs (one for the direct smear and other for culture) were collected after getting oral consent and inoculated on a 7% sheep blood agar medium. The plates were incubated at 37° C in a candle jar.

After 24 hours, the beta hemolytic colonies were selected and Gram stain was performed. The colonies showing Gram positive cocci in chains with negative catalase test were sub-cultured on crystal violet blood agar for further isolation and incubated at 37°C in a candle jar for 24 hours. From the subculture, sero grouping was done by latex agglutination method. (SLIDEX Strepto plus kit. BIOMERIEUX). **Procedure**



**blood agar plate
strepto plus kit**

For typing, 0.4ml of extraction enzyme was taken from the Strepto Plus kit in a sterile test tube. Three to four similar beta hemolytic colonies from the culture were added into the test tube and were mixed using a vortex-type mixer. It was incubated at 37°C for 10 minutes.

One drop of each latex reagent (A, B, C, D, F and G) placed onto the corresponding reaction fields of the card. Then 15l of extraction enzyme-colony mixture was added to each drop of latex reagent. After mixing and rotating the card for 2 min, the results were read using magnifying lens. The latex kit identified A, B, C, D, F and G Lancefield group of streptococci based on modified nitrous acid extraction method. Isolates not agglutinating with the any of the above mentioned groups were designated as non- groupable.

Results

Of the 103 school children, 76 (73.78 %) were males and 27 (26.27 %) were females. Among them, 48 (48.60%) children had growth of beta hemolytic colonies and Gram positive cocci in chains were observed in Gram staining. Normal throat commensals were observed in the rest of the culture. Among the 48 cases, 22 were groupable with Streptoplus kit and the others were non- Groupable. Of these 22, four were males and 18 were females. Out of the 22 strains, two were group A streptococci 1.94%(2 of 103), the other isolated groups were group B-4.85%(5 of 103), group D- 0.97 %(1 of 103) , group F- 5.82 % ,(6 of 103) group G- 5.82 % (6 of 103) and 1.94 % (2 of 103) combined group of B & F. (Table.1). **Table 1: Prevalence and grouping of Beta haemolytic streptococci among asymptomatic throat carriers**

GENDER	NUMBER OF SAMPLES	GP A	GP B	GP D	GP F	GP G	GP B+F
MALE	76	2	4	1	5	4	2
FEMALE	27		1	-	1	2	-
TOTAL	103	2	5	1	6	6	2

The two cultures positive for Group A Streptococci in the present study were from male children. They were above the age of 10yrs with poor oral hygiene, studying in a non crowded class room (35 students per class room). They were coming from low socio economic but from a non crowded family (total family members 4) of primary school level educated parents.

The two isolated Group A streptococci were sensitive to Penicillin, Erythromycin and Co-trimoxazole, Amoxicillin with Clavulanate and Cephelexin. **Discussion**

Carriers of Group A streptococci harbor the organism in their nose or throat but display no

symptoms of acute infection. The carriers may develop active throat infection and also act as important sources of infection, from which other children and adults acquire infection, even which can lead to severe epidemics. So the treatment and the prevention of dangerous complications in the GAS pharyngitis is of great importance. GAS is more commonly seen among the school going children

compared to adults. In the present study, the overall prevalence of Beta Haemolytic Streptococci was 22%. It was higher than Charmaine study reported from Chennai in which the rate was 16.3%.⁹

Shaikh in 2010 in his meta analysis observed that in different studies from various places in the world the prevalence of GAS carriage among asymptomatic children has been reported to be 12% (9-14%) and prevalence of symptomatic Group A Streptococcal infection was 37% (32-43%).¹⁰

In the present study, the rate of GAS carriage in school children was 1.94%. This is lower than Navaneeth et al¹¹ and Charmaine⁹ studies, in which the carriage rates were 28.8% in Salem, 8.4 % in Chennai respectively. Dhanda¹² conducted a study in North India and reported isolation rate of GAS from asymptomatic children to be 0.8% and a recent study conducted among 210 healthy children in Manila revealed a carriage rate of 0 %.¹³ In an earlier study conducted in the district of Vellore, the carriage rate of GAS was 2.3 per cent.¹⁴ The other studies have reported the carrier rates of 2.5%,¹⁵ 10.9%¹⁶ and 25.9 %.¹⁷ The carriage rates of GAS in the present study conducted in Tirunelveli seems to be slightly on the lower side comparable to these studies. The factors contributing to the low prevalence rates may be due to improvements in health, hygiene and living conditions. **Conclusion**

The carrier rate of Group A Streptococci among school children is a public health concern. When screened and appropriately treated with antibiotics, transmission and infection can be prevented in the school and the community. This would ultimately reduce the incidence of life-threatening sequelae which are debilitating and difficult to treat. It is recommended to conduct regular screening and surveillance of Group A streptococci in schools by health programmes, and treat them to minimize both carriage and infections rates.

This study would be useful to the clinicians to assess the incidence of streptococcal pharyngitis and guide them in proper management. It also highlights the importance of organizing regular surveillance programmes to keep the group A Streptococcus infections and their carriage in check. This would further facilitate the control and the development of non-suppurative sequelae such as acute rheumatic fever and post streptococcal glomerulonephritis, which are debilitating and difficult to treat.

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