

Prevalence of asymptomatic pharyngeal carriage of β -hemolytic Group A *Streptococcus pyogenes* among school going children of age 5-12 years in Bharatpur, Nepal

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Abstract

Background: β - haemolytic Group A *Streptococcus pyogenes* infection is a common cause of bacterial pharyngitis among children. Children are the target population for pharyngitis as well as other suppurative and non-suppurative infections.

Objectives: The objectives of this study are to find out the rate of asymptomatic throat carriage of *Streptococcus pyogenes* and to study antibiotic susceptibility pattern of the isolates.

Methods: Total 106 randomly selected children between five to 12 years were included in this study. Throat swabs collected were inoculated on 5% sheep blood agar and incubated for 24-48 hours at 37°C. Identification of Group A *Streptococcus pyogenes* was done by β -haemolytic colony, Bacitracin sensitivity, Co-trimoxazole resistivity and catalase negativity. Antibiotic susceptibility test was performed on Muller-Hinton agar containing 5% sheep blood by modified Kirby-Bauer disc diffusion method. Results were interpreted as per National Committee for the Clinical Standards Guidelines.

Results: Of total 106 throat swabs Group A *Streptococcus pyogenes* was isolated in 15 (14.15%) cases. Among the isolates seven (46.7%) were from male children whereas eight (53.3%) were from female children. Out of the 15 isolates 100% were sensitive to penicillin and its derivatives whereas 13.2%, 6.7% and 6.7% of the isolates were resistant to Erythromycin, Chloramphenicol and Ciprofloxacin respectively. Similarly Azithromycin was found to be 100% sensitive.

Conclusion: Regular screening is needed to keep the GAS infection and carrier state in check as well as to prevent from further development of complications.

Key words: β -haemolytic, GAS, *Streptococcus pyogenes*

INTRODUCTION

Infection caused by *Streptococcus pyogenes* (*S. pyogenes*) is a common cause of bacterial pharyngitis among children¹. It is the leading cause of acquired heart diseases; increasingly it is the major cause of death attributed to the bacterial sepsis among both children and adults². Children are the major reservoir of Group A *Streptococcus* (GAS) and are the target population for pharyngitis as well as other suppurative and non-suppurative infections. They represent the pool from which adults acquire severe invasive diseases³. Prevalence of carrier state of GAS varies according to

geographical area, season, socioeconomic condition and age group⁴.

GAS is responsible for about 616 million cases of throat infection (pharyngitis, tonsillitis) worldwide per year and 111 million cases of skin infection (primary non-bullous impetigo) in children of less developed countries⁵. GAS are the most frequently isolated pathogens in acute pharyngitis-laryngitis cases in school aged children causing approximately 20% of pharyngitis^{6,7}.

There is not much information available on screening of children for carriage of GAS in Nepal. Hence this study will be helpful in providing information on prevalence, distribution and antibiotic susceptibility pattern of *S. pyogenes*.

METHODS

This is a cross-sectional study conducted among 106

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school children of age five to 12 years from different schools of Bharatpur, Chitwan, Nepal. The study was conducted from March 2007 to October 2007. Two throat swabs collected from each child were brought to the Department of Microbiology of College of Medical Sciences; Bharatpur for the processing. One swab was used for Gram's staining and the other for culture and sensitivity. Swab was inoculated on 5% sheep blood agar with Bacitracin (0.04 Unit) disc and incubated at 37°C for 24 to 48 hours. Preliminary identification of the Streptococci was done on the basis of α -haemolytic colony and Bacitracin sensitivity. A zone size >15 mm was considered as sensitive⁸.

Further confirmation of GAS was done by Gram's staining and catalase test. Antibiotic susceptibility test (AST) was performed on Muller Hinton agar containing 5% sheep blood by modified Kirby-Bauer disc diffusion method. Antibiotics used were Penicillin (10 U), Erythromycin (15 μ g), Ampicillin (10 μ g), Cotrimoxazole (25 μ g), Ciprofloxacin (5 μ g), Azithromycin (15 μ g) and Chloramphenicol (30 μ g). Results of AST were interpreted according to National Committee for the Clinical Standards (NCCLS) Guidelines⁹.

RESULTS

Out of 106 swabs studied, *S. pyogenes* was isolated from 15 (14.5%) samples. Among the isolates seven (46.7%) were from males whereas eight (53.3%) were from females. Highest rate of colonization of *S. pyogenes* was found in the age group eight to 11 years (Table 1).

Of the 15 *S. pyogenes* isolated, 11 (73.3%) were found to be resistant to Co-trimoxazole. Resistance to Chloramphenicol, Ciprofloxacin and Erythromycin was found in one (6.7%), one (6.7%) and two (13.2%) isolates respectively. No isolates were resistant to Penicillin and its derivatives (Ampicillin), similarly 100% sensitivity was noted with Azithromycin.

DISCUSSION

Group A *Streptococcus* throat carriage is an important public health issue as the infection often leads to post streptococcal sequelae and individuals colonized with

GAS serve as a source for spread of infection to other individuals in the community. In our study, overall 14.15% of asymptomatic school children were found to be colonized with GAS, which is similar to the study conducted by Durmaz et al who showed 14.3% *S. pyogenes* carriage¹⁰. Similar studies have been conducted in Turkey where the rate of GAS carrier in asymptomatic school children varied from 2-46%^{11, 12}. Disease caused by *S. pyogenes* varies through the world in accordance with the season and age group¹¹.

The age group 8-10 years was the most susceptible group for throat carriage of GAS, followed by age group 5-7 and 11-12 years respectively. Few studies have reported the age group variation¹¹.

Present study showed that isolates are 100% susceptible to penicillin and its derivative (Ampicillin). Resistance shown by the isolates to Cotrimoxazole, Chloramphenicol, and Erythromycin were 73.3%, 6.7% and 13.2% respectively. This result is similar to another study conducted in Nepal¹³.

Due to emergence of drug resistance, appropriate treatment for severe invasive Streptococcal infection is a major challenge in many regions of the world. Our study showed a quite high resistance rate of 73% to Cotrimoxazole which is one of the commonly prescribed drugs to treat children with respiratory diseases in Nepal. None of the isolates were found to be resistant with Penicillin and its derivatives. Similar result was observed by Dumre et al¹⁴. In Nepal penicillin derivatives are among the easily available antibiotics even in sub health post level where culture facility is not available. None of the literature has reported penicillin resistant GAS till date. We also found that 100% of the isolates were susceptible to the Azithromycin which is supported by the study conducted in Nepal¹⁴. Azithromycin is commonly prescribed drug in Nepal for respiratory tract infection. However, its high frequency of prescription and possible irrational use may give rise to resistance in future. Hence it is mandatory to screen the carriage rate of GAS and its antibiotic susceptibility pattern.

Table 1: Distribution of culture positive cases according to age & sex.

Age group (Year)	Male		Female		Total	
	Number of throat swab	Number of <i>S. pyogenes</i> isolates	Number of throat swab	Number of <i>S. pyogenes</i> isolates	Number of throat swab	Number of <i>S. pyogenes</i> isolates
5-7	20	2 (10%)	16	2 (12.5%)	36	4 (11.11%)
8-10	17	4 (23.52%)	28	4 (14.28%)	45	8 (17.77%)
11-12	11	1 (9.09%)	14	2 (14.28%)	25	3 (12%)
Total	48	7 ((14.58%))	58	8 (13.79%)	106	15 (14.15%)

CONCLUSION

The result of preliminary study highlights the importance of regular surveillance to keep GAS infection and carrier state in check. Children found to be carrier could be adequately treated with antibiotics.

This would further facilitate control of development of the non-suppurative sequel such as acute rheumatic fever and post Streptococcal glomerulonephritis which are debilitating and difficult to treat.

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