

The Prevalence of Group A *Streptococci* Carriers Among Asymptomatic School Children

VIJAYA D, SATHISH JV, JANAKIRAM K

ABSTRACT

Aim: The Group A *Streptococci* (GAS) cause several suppurative and nonsuppurative infections. GAS frequently gets colonized in the throat of asymptomatic school children. A preliminary study was conducted to identify the GAS carrier state in apparently healthy children who belonged to various schools which were located in and around the rural village, B.G.Nagara, Mandya Dist, Karnataka state, India.

Material and Methods: Throat swabs were collected from 2000 asymptomatic school children who were aged 5-15 years. The *beta haemolytic streptococci* isolates were sero-grouped by agglutination tests by using specific antisera (HiStrep Latex Test, Hi-Media, Mumbai, India).

Results: Out of the 44 (2.2%) *beta haemolytic* which were isolated, 38 (86.36%) were GAS, 5 (11.36%) were Group C *Strep-*

tococci and one (2.27%) was Group G *Streptococcus*. Among the 38 GAS positive children, 24 (63.16%) were transient carriers, 10(26.32%) were recurrent carriers and 4 (10.52%) were chronic carriers. The GAS chronic carriers were of the age group of 9-12 years.

Conclusion: The present study showed the prevalence of GAS among the asymptomatic school children in this location. The chronic carriers were treated with azithromycin for 3 days. A bacteriological cure was confirmed by doing throat swab cultures at intervals of one month and four months after the treatment. Identification of the GAS carriers and treating them, not only prevents them from developing non-suppurative complications, but they also prevent the spread of GAS to their family members and other children.

Key Words: Survey, Infection, Throat, Students, *Streptococci*

INTRODUCTION

The Group A *Streptococcus* (GAS) associated disease and sequelae continue to have devastating effects on the public health and the national economy, as they mainly affect children and young adults [1]. GAS frequently gets colonized in the throats of asymptomatic persons. There are few studies which have described the natural history of the pharyngeal carriage with GAS [2]. A *streptococcal* carriage has been defined as the recovery of GAS from the nasopharynx or the oropharynx in the absence of any evidence of an acute infection [3].

GAS has remained a significant human pathogen for centuries. It causes a wide variety of infections in humans, which range from mild upper respiratory and skin infections to non-suppurative sequelae like Acute Rheumatic Fever (ARF) and Rheumatic Heart Disease (RHD). Although ARF and RHD have declined in many parts of the world, they continue to be major causes of the cardiovascular morbidity and mortality in India [4].

A preliminary study was undertaken to identify the GAS carriers among healthy school children.

MATERIALS AND METHODS

A total of 2000 (1347 boys and 653 girls) apparently healthy school children who were studying in 8 schools in and around B.G.Nagara, a village which is 60 kms away from the city, formed

the study group. About 6000 students are studying in 20 schools in and around B.G. Nagar. The study period was from December 2010 to March 2012. The age of the study group ranged from 5-15 years. This study was conducted in the Department of Microbiology, AIMS, B.G.Nagara, which was established in 1986.

The school children were selected for the study if they met the inclusion criteria.

- No history of tonsillectomy.
- Absence of any signs or symptoms which showed upper respiratory infections.
- No antibiotic usage during the past two weeks before the sampling.

Those who received an antimicrobial therapy or those who had suffered from sore throat in the previous three months, were excluded from the study.

An ethical clearance was obtained from the institution. Consents were obtained from the school authority and the parents of the children.

The throat swabs which were collected were inoculated onto 5% sheep blood agar plates on the spot itself. The streaked plates were incubated at 37°C in a candle jar for 24 to 48 hours. All the *beta haemolytic* colonies were identified and sero grouped by the

latex agglutination method (HiStrep Latex Test Kit, Hi-Media, Mumbai). The latex kit identifies the groups A, B, C, D, F and G of the Lancefield group of *Streptococci*.

Two more throat swabs were studied from the GAS positive students at intervals of 3 months, to classify them as transient (first culture- positive and the subsequent two cultures- negative), recurrent (first two cultures- positive and the third culture- negative) and chronic carriers (all the three cultures positive) [2].

RESULTS

The mean age of the study group was 10.6 years. The beta-haemolytic *Streptococci* were isolated from 44 (2.20%) samples. Among the 44 *beta haemolytic Streptococci*, 38 (86.36%) were GAS, 5 (11.36%) were Group C *Streptococci* and one (2.27%) was Group G *Streptococci*. Among the 38 GAS positive children, 24 (63.16%) were transient carriers, 10 (26.32%) were recurrent carriers and 4 (10.52%) were chronic carriers.

[Table/Fig-1] shows the prevalence of GAS with respect to the age and sex.

DISCUSSION

Throat cultures have always been considered as the "gold standard" for diagnosing the presence of GAS [1]. The healthy carriers of GAS are the sources of a bacterial dissemination and they are able to communicate the disease and even lead to severe epidemics [5]. According to different studies, GAS is seen more in the pharynges of children as compared to that in adults [5]. In the present study, *Beta Haemolytic Streptococci* (BHS) were isolated from 44 (2.2%) children, which was less than those which were isolated in other studies [3,6-8]. GAS was isolated from 38 children (1.9%) in the present study, while other studies had reported higher incidences [3,6-10].

[Table/Fig-2] shows the prevalence of the asymptomatic carriage of GAS, as was reported by various studies. The low prevalence of the GAS carriage in the present study may be explained by the geographical location and the setting of the study, it being

free from air pollution and overcrowding and 60 kms away from the city, with a population of approximately 25,000. This study was undertaken in an agricultural area and the people of the area mainly belonged to the middle and the lower socio economic groups. The high prevalence rates which were reported by others could be due to the high population density, the hot and humid climate, air pollution and more number of students in the class rooms, which may have contributed to the spread of the GAS infection [3,6-10].

The variations in the carriage rates among different schools in the same village may be explained on the basis of the location which was studied [9]. The maximum number of GAS was found in the age group of 9-12 years (2.38%) and a minimum number was found in the age group of 5-8 years (0.9%), which was similar to the report of Dumre et al., [9] Rijal et al., reported the maximum number of GAS in the age group of 5-8 years (11.8%) and a minimum in the age group of 9-12 years (7.8%) [11].

The GAS carrier rate was higher in girls (2.14%) than in boys (1.76%), which was similar to other reports [6,9,10]. Fatemah Nabipour (54.4%) and Navneeth (55.7%) reported higher GAS carriage rates among boys [5,8].

Among the BHS (44) which were isolated, 5(0.25%) were Group C *Streptococci* and one (0.25%) was Group G *Streptococcus*, which were lower in number than those which were reported in the studies of others [3,6-8]. GCS and GGS are primarily animal pathogens and they may cause infections in humans [3].

The GAS throat carriage is an important public health issue, as the infection often leads to post *streptococcal* sequelae and as the individuals who are colonized with GAS can serve as a source of the infection for other children and their family members in the community [9].

The chronic carriers of GAS were given a course of antibiotics, with the aim of preventing the non-suppurative complications and the spread of GAS to their family members and other children. Health education regarding the GAS infections, their seque-

Age in years	Boys No.1347		Girls No.653		Number Studied	Positives (%)
	Positive	Negative	Positive	Negative		
5-8	2	248	2	176	428	04 (0.9%)
9-12	14	597	7	261	879	21 (2.38%)
13-15	08	478	5	202	693	13 (1.87%)
Total	24	1323	14	639	2000	38 (1.9%)

[Table/Fig-1]: Prevalence of GAS in relation to age and sex of study group (2000)

Reference	Year of study	Number of children	Age range (years)	Place of study	Sample collection	Prevalence of GAS carriage %
Present study	2011	2000	5-15	B.G.Nagara, Karnataka	Three cultures	1.9
Dumre [9] 2009	2007	350	5-15	Nepal	Single culture	10.9
Lloyd [3] 2006	2004	1102	5-17	Chennai	Single culture	8.4
Thangam [7] 2004	2004	230	5-14	Chennai	Single culture	7.8
Navaneeth [8] 2001	1998	481	5-15	Salem	Single culture	6.2
Rajkumar [10] 2001	1991	178	5-15	Chennai	Single culture	3.7
Gupta [6] 1992	1991	749	5-15	Delhi	Single culture	13.7

[Table/Fig-2]: Prevalence of asymptomatic carriage of GAS as reported in various studies

lae and their prevention, was given to the children, their teachers and their parents. The magnitude of the problem of ARF and RHD in India is high [12]. To prevent this, all the Microbiology Departments have to be upgraded for the isolation of GAS. Once this is achieved, the GAS associated disease and sequelae will narrow down.

CONCLUSIONS

The present study which was done on the prevalence of the asymptomatic GAS carriers among school children in the community, may provide useful information about the prevalence of GAS in this location. This study highlighted the importance of a regular surveillance to keep the GAS carriage in check, by treating the children with antibiotics.

ACKNOWLEDGEMENTS

The study was supported by Medical Education Research Trust (MERT), Bangalore. Authors are grateful to Chairman and trustees of the MERT, Bangalore. Authors are thankful to Dr. Mohan ME, Medical superintendent, AH & RC, B.G.Nagara for his encouragement. Special thanks to Poojya guru Sri SriNirmalanandaSwamiji for the consent and encouragement for this study. Authors wish to thank the school teachers and the children for their consent and co-operation during the entire period of study.

REFERENCES

- [1] Shet A, Kaplan E. Addressing the burden of Group A streptococcal disease in India. *Indian J Pediatr.* 2004; 71:41-48.
 [2] Martin JM, Green M, Barbadora KA, Wald ER. Group A streptococci

among school aged children: Clinical characteristics and the carrier state. *Paediatrics.* 2004; 114:1212-19.

- [3] Lloyd CAC, Jacob SE, Menon T. Pharyngeal carriage of group A streptococci in school children in Chennai. *Indian J Med Res.* 2006; 124:195-98.
 [4] World Health organization study group. Rheumatic fever and rheumatic heart disease. World Health organization Technical Report Series # 764, Geneva, Switzerland: WHO. 1988; 1-58.
 [5] Nabipour F, Tayar Zadeh M. Prevalence of Beta-haemolytic streptococcus carriage state and its sensitivity to different antibiotics among guidance- school children in Kerman-Iran. *Am J Infect Dis.* 2005; 1(2):128-31.
 [6] Gupta R, Prakash K, Kapoor AK, Subclinical Group A Streptococcal throat infection in school children. *Indian Pediatr.* 1992; 29:1491-94.
 [7] Menon T, Shanmugasundaram S, Kumar MP, Kumar CPG. Group A streptococcal infections of the pharynx in a rural population in South India. *Indian J Med Res.* 2004; 119: 171-73.
 [8] Navneeth BV, Nimanda R, Chawda S, Selvarani P, Bhaskar M, Suganthi N. Prevalence of beta -haemolytic streptococci carrier rate among school children in Salem. *Indian J Paediatr.* 2001; 68:985-86.
 [9] Dumre SP, Sapkota K, Adhikari N, Acharya D, Karki M, Bista S, et al Asymptomatic throat carriage rate and antimicrobial resistance pattern of streptococcus pyogenes in Nepalese School children. *Kathmandu University Med J.* 2009; 7(4): 392-96.
 [10] Rajkumar S, Krishnamurthy R. Isolation of group A beta -haemolytic streptococci in tonsillopharynx of school children in Madras city and correlation with their clinical features. *Jpn J Infect Dis.* 2001; 54:147-39.
 [11] Rijal KR, Dhakal N, Shah RC, Timisina S, Mahato P, Thapa S, et al. Antibiotic susceptibility of Group A streptococcus isolated from throat swab culture of school children in Pokhara, Nepal. *Nepal Med Coll J.* 2009; 11(4): 238-40.
 [12] Brahmadathan KN, Anitha P, Gladstone P. Increasing resistance among group A streptococci causing tonsillitis in a tertiary care hospital in Southern India. *Clin Microbiol Infect.* 2006; 11:335-37.

AUTHOR(S):

1. Dr. Vijaya D
2. Dr. Sathish JV
3. Dr. Janakiram K

PARTICULARS OF CONTRIBUTORS:

1. Professor & HOD, Department of Microbiology,
2. Assistant Professor, Department of Microbiology,
3. Associate Professor, Department of Microbiology, AIMS, B.G.Nagara, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Vijaya D,
 Professor & HOD, Department of Microbiology,
 AIMS, B.G.Nagara 571448, Karnataka, India.
 Phone: 94820 09120
 E-mail: vijayadanand@rediffmail.com

FINANCIAL OR OTHER COMPETING INTERESTS:

None.

Date of Submission: **Sep 11, 2012**

Date of Peer Review: **Sep 19, 2012**

Date of Acceptance: **Jan 15, 2013**

Date of Publishing: **Mar 01, 2013**