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Short Communication

High throat carriage of Groups G/C streptococci among school children in Bangalore City and its significance

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The present study was designed to determine the prevalence of comparative throat carriage of diverse antigenic groups of beta hemolytic streptococci (BHS) among school children. BHS were identified by Lancefield grouping with commercial kits. BHS were isolated from 112 (10.4%) of 1156 asymptomatic children, of which 36 (32.1%) belonged to Group A, 55 (49.1%) to Group G and 11 (9.8%) to Group C. A throat carrier rate of 59% of GGS/GCS among 112 BHS from this population indicated its possible importance in the etiology of streptococcal pharyngitis in this population.

Key words: Beta hemolytic streptococci, post-streptococcal sequelae, Group G streptococci.

INTRODUCTION

Groups G and C streptococci (GGS/GCS) has attracted attention in recent times as possible etiological agents of pharyngitis and post-streptococcal sequelae. Beta-hemolytic streptococci belonging to Group G (GGS) and C (GCS) include two important species, namely *Streptococcus dysgalactiae* subsp*. equisimilis* and *Streptococcus anginosus.* They are commonly considered as throat commensals with a capacity to cause opportunistic infections in individuals with underlying medical conditions (Baracco and Bisno, 2004). Recent reports have indicated that GGS/GCS are emerging as important causes of invasive disease. Their large colony forming strains resemble Group A streptococci (GAS) in terms of virulence (Mathur et al., 2004; Reissmann et al., 2010). In recent times, there have been an increasing number of reports showing the association of GGS/GCS with diverse human infections. They have also been identified as causative agents of infections of the respiratory tract, skin and soft tissue, as well as life threatening infections such as endocarditis, bacteremia, and meningitis, frequently with poor prognosis (Kittang et al., 2010; Zaoutis et al., 2004).

More recently, an increasing number of reports have described their association with streptococcal syndromes generally caused by GAS such as streptococcal toxic shock syndrome (STSS) (Yamaoka et al., 2010) and acute rheumatic fever (ARF) (Haidan et al., 2000). This assumes significance in countries like India where ARF continues to be a major health problem. Hence, this study was undertaken to determine the prevalence of GGS/GCS as colonizers in normal healthy school children in and around Bangalore city vis-à-vis GAS.

MATERIALS AND METHODS

A total of 1156 school children aged 5 - 15 years in 5 different schools in and around Bangalore city were selected for the study. Informed consent was obtained from their parents or other adult legal guardians. Children were examined with regard to the presence of clinical symptoms such as sore throat, fever, chills, malaise and erythema, and swelling of the pharyngeal mucosa.

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Table 1. Type of streptococci isolated from school children

Type of isolated streptococci	No of throat cultures in healthy children	Total
BHS	112	121
GAS	36	36
GBS	4	4
GGS	55	55
GCS	11	11
GFS	6	6
Total	1156	1156

BHS, Beta-hemolytic streptococci; GAS, Group A streptococci; GBS, Group B streptococci; GGS, Group G streptococci; GCS, Group C streptococci; GFS, Group F streptococci.

Those who had any such symptoms or signs were excluded and only asymptomatic children were included. The entire study was carried out from August 2009 to January 2010. Lancefield Groups A, B, C, F and G streptococci were identified by their colony morphology and β-hemolysis on blood agar, bacitracin susceptibility, pyrrolidonyl-arylamidase test and Lancefield grouping with commercial kits (Plasma Tech Laboratories, U.K.). Identification of GGS/GCS isolates was confirmed at the Streptococcus Laboratory, Department of Clinical Microbiology, Christian Medical College and Hospital, Vellore, Tamil Nadu, India, using standardized methods.

RESULTS AND DISCUSSION

The GAS and GGS/GCS isolated among the throat cultures of asymptomatic school children are given in (Table 1). Among asymptomatic children, beta hemolytic streptococci (BHS) were isolated from 112 (10.4%) of the 1156 children screened. Of these, 36 (32.1%) belonged to Group A, 55 (49.1%) belonged to G and 11 (9.8%) to Group C.

This study comprising of 1156 children, is one of the larger school surveys conducted in southern India. The study showed an asymptomatic BHS carriage of 9.7% in which GGS (4.7%) was the most predominant antigenic group. This assumes significance in the Indian context, where ARF and rheumatic heart disease (RHD) are still endemic. Such findings have been reported from other Indian studies as well (Lloyd et al., 2006; Gupta et al., 1992; Menon et al., 2004; Navaneeth et al., 2001), but significantly different from those reported from western countries (Altindis et al., 2001; Badaruddin, 2003; Faruq et al., 1995; González-Lama et al., 2000). Findings similar to ours have also been reported from indigenous population in Australia where RF/RHD is highly endemic (McDonald et al., 2006, 2007; Parnaby and Carapetis, 2010).

Higher carrier rate of non Group A streptococci especially GGS and GCS is of great interest in clinical situations. In recent times, they have been reported to be involved in human throat and other pyogenic infections (Menon et al., 2004). Recently a case of neonatal toxic shock syndrome due to *S. dysgalactiae* subsp. *equisimilis* was reported from Japan (Yamaoka et al., 2010). Invasive infections caused by this species are also increasingly seen in Japan (Takahashi et al., 2011), while one case of necrotizing fascitis and another case of toxic shock syndrome were reported from Norway (Kittang et al., 2010). Recently, Reissmann et al. (2010) showed that *emm*-related virulence genes were present in a high percentage of *S. dysgalactiae* subsp. *equisimilis*, causing human infections in southern India. Also, population genetic studies on *S. dysgalactiae* subsp. *equisimilis* from Australia, USA and Portugal revealed widely dispersed clones and extensive recombination among these strains (McMillan et al., 2010). Lateral gene transfer, genetic recombination involving housekeeping genes and *emm*-based typability among GGS/GCS strains seem to indicate their close relationship to GAS strains. Due to these reasons, it is tempting to hypothesize that GGS/GCS strains may be involved in the pathogenesis of post-streptococcal sequelae. Meanwhile, our study was based on a relatively small sample size. Therefore, these findings need to further confirmed by carrying out a study with a larger sample size.

In conclusion, the higher carrier rate of GGS/GCS is in concordance with the reported literature from India and western countries. It has also been shown that GGS/GCS may be involved in pathogenesis of rheumatic fever (RF)/rheumatic heart disease (RHD).

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