Molecular characteristics of Neisseria meningitidis carriage strains isolated from Korean adolescents

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ABSTRACT

BACKGROUND

Neisseria meningitidis is a commensal bacterium commonly found in the oropharynx and is occasionally involved in various meningococcal diseases. A high rate of meningococcal carriage is related to men and boys, and most carriage is not associated with clinical symptoms. To understand the epidemiology and pathogenesis of meningococcal disease, the carriage rates need to be investigated. Although many carriage studies on various populations were reported in Europe and United States (3), recent information is not available in Korea. Because of the high incidence and prevalence of meningococcal disease in Korea, understanding of the dynamics of meningococcal carriage is important. This study was conducted to investigate the carriage rates of meningococci in Korean adolescents. The reasons for refusal and their demographic data were not further analyzed. A total of 2,908 students in nine high schools were invited to participate to the study. A total of 1,892 students participated in the study and 1,740 samples were obtained. In all, 1,690 samples were considered to be reliable. Sixty-nine percent of the samples contained meningococci. The most frequent STs were ST3, ST44, and ST269, which are commonly found in meningococcal disease diagnoses. The carriage rate ranged from 1.3% to 6.8% and the highest rate of carriage was observed in the summer months. Further studies on meningococcal carriage in particular, meningococcal serogroup B, is necessary.

RESULTS

In the study, we provided the first report on the carriage rate, serogroup, and meningococcal disease among Korean adolescents. To understand the carriage rates, meningococcal disease, and meningococcal carriage in particular, meningococcal serogroup B, is necessary.

MATERIALS AND METHODS

Study population and recruitment

A total of 2,908 students in nine high schools were invited to participate to the study in Incheon, Korea. The population was recruited to the study by getting written information about the study and signing consent from their parents. The study was approved by the Ethics Committee of the University College of Medicine. Three criteria were applied to exclude subjects from the study: (a) those who were receiving antibiotic treatment within the past 6 months, (b) those who had abnormal medical symptoms determined by the study team, and (c) those who had meningococcal disease or meningococcal vaccination in the past 6 years. A total of 1,892 students participated in the study and 1,740 samples were obtained. In all, 1,690 samples were considered to be reliable. Sixty-nine percent of the samples contained meningococci. The most frequent STs were ST3, ST44, and ST269, which are commonly found in meningococcal disease diagnoses. The carriage rate ranged from 1.3% to 6.8% and the highest rate of carriage was observed in the summer months. Further studies on meningococcal carriage in particular, meningococcal serogroup B, is necessary.

Oropharyngeal swab

A solution of 9 parts of saline and 1 part of 1.0% NaCl was used for the culture. Sample was cultured on blood agar plates and incubated at 37°C for 24 hours. The plates were examined for the growth of meningococcal colonies.

Serogrouping by PCR

Genomic DNA were purified using DNA purification kit (Promega, Madison, WI, USA). PCR was performed for all meningococcal isolates by using species-specific primers. 

Serogrouping by the MLST method

DNAs were purified using DNA purification kit. The sequence types were determined by using the MLST method. The circle sizes correlate with the number of strains of each sequence type.