

SEROTYPE DIVERSITY OF *S. PNEUMONIAE* IN NASOPHARYNGEAL CARRIAGE AMONG HEALTHY CHILDREN AFTER VACCINATION: ASSESSMENT OF VACCINE PREVENTION EFFECTIVENESS

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Background. Nasopharyngeal carriage of *Streptococcus pneumoniae* is considered one of the main factors contributing to the transmission and spread of pneumococcal infections among children. Continuous monitoring of circulating pneumococcal serotypes is essential for evaluating epidemiological changes and determining the effectiveness of pneumococcal vaccination programs. Changes in the serotype landscape of invasive pneumococcal strains may lead to an increase in diseases caused by non-vaccine serotypes. This creates a need for further scientific research aimed at expanding the number of serotypes included in conjugate vaccines and improving preventive strategies against pneumococcal diseases.

Aim of the Study. To evaluate the effectiveness of pneumococcal vaccination by studying the serotype diversity of *S. pneumoniae* in nasopharyngeal carriage among healthy vaccinated children.

Materials and Methods. A bacteriological examination of nasopharyngeal mucus was carried out in order to detect *S. pneumoniae* carriage in 77 healthy vaccinated children. All participants had received three doses of the PCV13 vaccine (Prevenar 13) according to the recommended immunization schedule. Specific primers were used for serotyping the following pneumococcal serotypes: 6A/B/C/D, 9A/V, 23F, 19F, 18A/B/C/F, and 15A/F. Identification of pneumococcal serogroups was performed using Pneumotest-Latex diagnostic antisera. The obtained data were statistically analyzed using Microsoft Office Excel 2012 software on a Pentium-IV personal computer, including standard statistical processing methods and built-in analytical functions.

Expected Significance. The study findings may provide important information regarding the circulation of pneumococcal serotypes in vaccinated children and help assess the long-term effectiveness of PCV13 immunization. Monitoring serotype replacement and persistence of non-vaccine serotypes is important for optimizing future vaccination strategies and reducing the burden of pneumococcal diseases in pediatric populations.

Results and Discussion. During the investigation of nasopharyngeal carriage, 12 strains of *S. pneumoniae* were identified among the examined children. Among these 12 isolates, serotype 6 was detected in 5 samples, while other investigated serotypes were not identified. The detected serotype 6 belongs to the serotypes included in the PCV13 vaccine formulation.

The group of vaccinated children included in this study consisted of non-organized children, meaning that they did not attend preschool or kindergarten institutions. A comparative analysis was performed between these vaccinated non-organized children and healthy organized children who attended preschool institutions but had not received pneumococcal vaccination.

Among the 77 vaccinated children, *S. pneumoniae* carriage was detected in 12 cases, accounting for 15.6%. In children who did not attend preschool institutions, normal nasopharyngeal microflora was isolated in 22% (17/77) of cases. Opportunistic pathogenic microorganisms were more frequently isolated in children who had not received pneumococcal vaccination, accounting for 42% (15/34) of cases, which was almost two times higher compared to children attending preschool institutions.

The prevalence of *H. influenzae*, *S. pneumoniae*, and *M. catarrhalis* was significantly lower among children who did not attend kindergarten compared with organized children attending preschool institutions. These findings may indicate the positive influence of vaccination and reduced exposure to infectious agents in non-organized children.

Conclusions. Further investigation of pneumococcal seroepidemiology and continuous monitoring of currently circulating serotypes are important for predicting the long-term effectiveness of pneumococcal vaccine prevention strategies. Such studies may also provide essential information for the development of next-generation pneumococcal conjugate vaccines with broader serotype coverage. The obtained data on the serotype spectrum of *Streptococcus pneumoniae* allow an assessment of the effectiveness of pneumococcal vaccination and support the importance and feasibility of vaccine prophylaxis in children. The results of nasopharyngeal carriage analysis demonstrate a reduction in *S. pneumoniae* carriage after vaccination, confirming the preventive role of PCV13 immunization in the pediatric population.