

Short Communication

The Low Rate of Methicillin-Resistant *Staphylococcus aureus* in Turkish Children

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SUMMARY: During a 6-month period, swab samples were obtained from the nares, axilla, and perineum of 1,000 children, age 0 to 16 years, who were attending a pediatric outpatient clinic. *Staphylococcus aureus* was isolated in 173 of the children. Only one child, a 35-day-old boy who had remained at the neonatal intensive care unit for 1 week after birth, was identified as a carrier of methicillin-resistant *S. aureus*. Except in diagnosed cases of allergic rhinitis, potential predisposing factors for colonization with *S. aureus* in our sample were comparable to those in non-colonized children.

Community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) is being frequently reported in children with no identifiable predisposing risk factors. A 25-fold increase in the prevalence of CA-MRSA during an 8-year period was reported from a children's hospital in the USA (1). The extent of MRSA carriage in many communities is largely unknown, and it varies in different geographical regions (1-4). Continuing surveillance is needed to assess the geographic distribution and epidemiology of infections more accurately and to develop strategies that will improve the treatment and control the spread of the disease. Since little data is available on the epidemiology of CA-MRSA in Turkey, we studied the frequency of carriage in children attending a pediatric outpatient clinic. The second aim of the study was to assess potential predisposing factors associated with *S. aureus*.

This study was performed at the Marmara University Hospital, Istanbul, between August 2002 and January 2003. After written consent was obtained from parents, swab samples were collected from the nares, axilla, and perineum from 1,000 children between 0 to 16 years of age who had been admitted to the pediatric outpatient clinic. Study personnel verbally administered a questionnaire to parents regarding predisposing risk factors for the acquisition of MRSA that included the following: previous hospitalizations, history of any surgical procedures, treatment by an antibiotic therapy, history of the use of a urinary catheter, attendance in a day care center during the previous 6 months, smoking in their homes, the presence of any household contacts who were health care workers, and diagnoses of asthma, allergic rhinitis or atopic dermatitis. Swab samples were inoculated into 5% sheep blood agar. After incubation for 24 h at 37°C, suspected colonies were identified as *S. aureus* by conventional methods. Methicillin resistance was screened according to guidelines of the National Committee of Clinical Laboratory Standards. An isolate with a zone diameter of ≤ 10 mm surrounding a 1 μ g oxacillin disk (Oxoid Ltd., Hampshire,

UK) in NaCl-supplemented Mueller Hinton agar, or an isolate grown in NaCl-supplemented Mueller Hinton agar containing 6 μ g/ml oxacillin was considered resistant to oxacillin and therefore to methicillin. Oxacillin MIC was determined by broth microdilution method. Resistance was defined as an oxacillin MIC > 4 μ g/ml, while susceptible isolates were defined as those with an oxacillin MIC value ≤ 2 μ g/ml. For statistical analysis, all data were recorded in Excel 2000® (Microsoft, Redmond, Wash., USA) and analyzed with the use of STATA statistical software version 7.0 (Stata Corp. College Road, Tex., USA). Descriptive data were noted as simple frequencies. Univariate analyses of categorical variables were done with the chi-square test or Fisher's exact test when appropriate. *P*-value < 0.05 was considered significant. The coefficients were expressed as OR with 95% CI.

During the study period there were enrolled 1,000 children, age 0 to 16 years (mean age 53 ± 47 months), of whom 466 (46.4%) were girls and 534 (53.4%) were boys. Six-hundred and forty children (64%) were 5 years old or younger, 260 (26%) were between 6 and 10, and 100 (10%) were older than 11. *S. aureus* was colonized in 173 (17.3%) of the children: 169 from the nares, 3 from the perineum, and 1 from both the nares and perineum. Only one of all subjects sampled was identified as a carrier of MRSA (a prevalence of 0.1%). The carrier was a 35-day-old boy who had remained at the neonatal intensive care unit for 1 week after birth. The MIC value of this isolate to oxacillin was 4 μ g/ml, and it was susceptible to clindamycin, rifampin, trimethoprim-sulfamethoxazole, erythromycin, and gentamicin. Potential predisposing factors in children colonized with *S. aureus* were comparable to those in non-colonized children, except where there were diagnosed cases of allergic rhinitis, which was significantly associated with the *S. aureus* colonization as indicated in Table 1.

In this study, we isolated only one MRSA in children attending the pediatric outpatient clinic. The strain was obtained from a newborn infant who had been hospitalized during the first week of his life in the neonatal intensive care unit, which may suggest a nosocomial origin. Only a few studies in the English literature are available about the frequency of CA-MRSA in Turkey. Palanduz et al. isolated

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Table 1. Potential predisposing factors in children with and without methicillin-sensitive *S. aureus* (MSSA) carriage

Predisposing factor	No. of MSSA (%)		OR	95% CI	P
	carrier (n = 173)	non-carrier (n = 827)			
No. of female	83 (48.0)	383 (46.3)	1.0	0.8-1.3	0.7
Hospital admission during last year	64 (37.0)	336 (40.6)	0.8	0.6-1.1	0.4
Antibiotic therapy during last 6 months	106 (61.3)	508 (61.4)	0.9	0.7-1.3	0.9
Health care worker in household	9 (5.2)	59 (7.1)	0.7	0.4-1.4	0.4
Day care attendance during last 6 months	17 (9.8)	67 (8.1)	1.1	0.7-1.8	0.5
Smoker in household	61 (35.3)	347 (42.0)	0.8	0.6-1.0	0.1
Urinary catheterization	25 (14.5)	137 (16.6)	0.8	0.6-1.2	0.5
Surgery during last 6 months	13 (7.5)	80 (9.7)	0.8	0.4-1.3	0.4
Underlying disease					
Asthma or reactive airways	26 (15.0)	112 (13.5)	1.1	0.7-1.8	0.6
Allergic rhinitis	15 (8.6)	31 (3.7)	2.4	1.2-4.8	0.005
Atopic dermatitis	7 (4.0)	30 (3.6)	1.1	0.4-2.6	0.8

CA-MRSA from 3 of 135 healthy children of a hospital staff and Cesur and Cokca from 13 of 500 adults attending an infectious disease clinic (5,6). The isolation of MRSA in our population, therefore, appears to be a rare event, similar to what was previously observed in other studies that reported the nasal carriage of MRSA in only 1 of 812 healthy adults in Italy and only 1 of 500 healthy children in New York (4,7). In our study population, the most frequently used antibiotics during the 6 months before enrollment were beta-lactams, beta-lactam with beta-lactamase inhibitors, macrolides, and second generation cephalosporins. Overemphasizing the prevalence of CA-MRSA may lead to the inappropriate use of glycopeptides and/or the hospitalization of children with suspected infections. However, population surveys should be confirmed with prospective surveillance studies in order to estimate the accurate prevalence of CA-MRSA among infected patients.

Methicillin-sensitive *S. aureus* (MSSA) nasal carriage is significantly associated with allergic rhinitis in our study. Although there have been many reports on the association between atopic disorders such as bronchial asthma and atopic dermatitis and bacterial colonization, few studies have documented *S. aureus* colonization as a predisposing factor for allergic rhinitis. Our data supports the findings of Shiomori et al. suggesting that nasal *S. aureus* carriage is associated with perennial allergic rhinitis and the aggravation of the disease (8). Rossi and Monasterolo showed that staphylococcal enterotoxins and antitoxin specific IgE antibodies might even have additional significance for the prognosis of allergic rhinitis (8,9). Further studies are required to determine what role the eradication of nasal *S. aureus* carriage may have in preventing the aggravation of allergic rhinitis. As a conclusion, the rare occurrence of CA-MRSA should be considered as an aspect of the empirical treatment of community-acquired infections in Turkish children, at least for now.

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