ORIGINAL ARTICLE

Staphylococcus aureus carriage in selected kindergartens in Klang Valley

Nurul Azmawati Mohamed, MPath1, Shalinaawati Ramli, MSc1, Nur Natasha Zulkifli Amin, BSce, Wan Shahida Wan Sulaiman, PhD, Ilina Isahak, MSc1, Tengku Zetty Maztura Tengku Jamaluddin, PhD2, Nooriah Mohammed Salleh, DrPH1

1Faculty of Medicine and Health Science, Universiti Sains Islam Malaysia, Kuala Lumpur, Malaysia, 2Faculty of Medicine and Health Science, Universiti Putra Malaysia, Serdang, Selangor, Malaysia

ABSTRACT

Introduction: Nasal colonisation of S. aureus in healthy children was 18% to 30%. One to three percent of them were colonised by Methicillin-resistant Staphylococcus aureus (MRSA). Although MRSA infection has become increasingly reported, population-based S. aureus and MRSA colonisation estimates are lacking. The main objective of this study was to determine the prevalence of S. aureus carriage among children.

Methods: Nasal samples for S. aureus culture were obtained from 250 children from three kindergartens in the Klang Valley, after consent was obtained from the children and their parents. Swabs were transported in Stuart medium, and inoculated on mannitol-salt agar within four hours of collection. Identification and disk diffusion test were done according to guidelines. Polymerase chain reaction was done on MRSA isolates for the presence of mecA and lukS/F-PV genes.

Results: Overall prevalence of S. aureus and MRSA carriage were 19.2% (48/250) and 1.6% (4/250) respectively. mecA gene was present in all isolates, 50% isolates carried Panton-Valentine leucocidin (PVL) gene. Sccmec type I was found in 2 isolates and the remaining isolates has Sccmec type V.

Conclusion: The prevalence of S. aureus and MRSA carriage were similar to other studies. However, risk of contracting severe infection might be higher due to presence of PVL gene in half of the MRSA isolates.

KEY WORDS:
Nasal colonisation; Staphylococcus aureus; children

INTRODUCTION

Staphylococcus aureus is a Gram positive bacterium that usually colonises skin and anterior nares. The bacterium gets into the skin through abrasion or small openings in the skin, particularly around hair follicles. S. aureus usually causes skin and soft tissue infections such as a boil, pimple, abscess and cellulitis with purulent drainage. Methicillin-resistant Staphylococcus aureus (MRSA) refers to isolates that are resistant to all currently available β-lactam antibiotics (except for the fifth generation cephalosporin).

Carriage of S. aureus in the nose appears to play important role in pathogenesis and epidemiology of infection. Nasopharyngeal carriage of S. aureus is present in one-third of population, and is more prevalent among children.1 Most individuals who develop S. aureus infections are infected with their own colonising strains.

Children cared for at day-care centres exhibit two to three time greater risk of acquiring infections, which impact both the individual health and on the dissemination of diseases through to the community.2 The objective of this study were to determine the prevalence of nasal colonisation of Staphylococcus aureus and its antibiotic susceptibility patterns, among healthy children in kindergartens.

MATERIALS AND METHODS

This random sampling, cross-sectional study involved preschoolers aged five- and six-year-old studying in afternoon session at preschools under Majlis Agama Islam Wilayah Persekutuan (MAIWP) in Malaysia. There were eight preschools running afternoon session with a total of 694 preschoolers. The calculated sample size was 149. Only 3 preschools (total number of students 352) were randomly selected using “Stat Trek Random Number Generator” Software after considering the inclusion and exclusion criteria.

Written approval from related agency (Majlis Agama Islam Wilayah Persekutuan) was obtained prior to commencement of the study. Consent forms and self-explanation hand-outs with regards to this study were distributed to the parents a month ahead. Verbal consent from the children was also sought. Those without consent were excluded. Kindergarten A, was located in an army camp, and almost all of the parents were army personnel. Kindergarten B was located in one of elite areas in the Klang Valley, while Kindergarten C was situated in the middle of high-rise low-cost residences.

Nasal swab was taken using sterile cotton swabs with sterile 0.9% saline solution, rotated two or three times in the vestibule of both anterior nares and immediately placed in Stuart transport medium and processed in the microbiology laboratory within four hours of collection. Swab was inoculated onto mannitol salt agar (MSA) and incubated at 37°C for 24 hours. Colonies with mannitol-salt fermentation and morphology suggestive of Staphylococcus were sub-
Staphylococcus aureus carriage in selected kindergartens in Klang Valley

Antibiotic susceptibility test against cefoxitin (30 μg), rifampicin (5 μg), gentamicin (10 μg), clindamycin (2 μg), doxycycline (30 μg), erythromycin (15 μg) and penicillin (10 μg) was done on Mueller Hinton agar based on Kirby Bauer method. The results were interpreted according to the CLSI guideline, 2014. Isolates that were resistant to cefoxitin (MRSA) were also tested with vancomycin E-test® strip.

Polymerase chain reaction was done on all four MRSA isolates to check for the presence of mecA and lukS/F-PV genes. mec gene complex and ccr were also done to determine Sccmec type.

RESULTS
A total of 250 Malay children aged five to six years from three kindergartens participated in this study: 120 from kindergarten A, 71 from kindergarten B and 59 from kindergarten C. The prevalence of S. aureus carriage in kindergarten A, B and C were 15% (18/120), 18.4% (13/71) and 28.8% (17/59) respectively. Overall prevalence was 19.2% (48/250). Table I shows the gender distribution of S. aureus carriers.

Out of 48 S. aureus isolates, 91.7% (44/48) was susceptible to cefoxitin. This isolates were also known as Methicillin Sensitive S. aureus (MSSA). All isolates were susceptible to gentamicin and rifampicin. Susceptibility to other antibiotics ranged from 6.3% (penicillin) to 95.8% (doxycycline). Table II shows the result of antibiotic susceptibility test.

Four out of 48 S. aureus isolates were resistant to oxacillin. This is known as Methicillin Resistant S. aureus (MRSA). All MRSA were isolated from kindergarten C. In other words, 23.5% (4/17) of carriers in Kindergarten C carries resistant organism i.e., MRSA. No MRSA was isolated from kindergartens A and B. The overall prevalence of MRSA was 1.6% (4/250). All MRSA were sensitive to vancomycin. Table III shows the MRSA profiles.