

Comparison of Incidence of Nasal Carriage of *S Aureus* in Children of Parents with Hospitals Employees and Other Jobs in Kindergartens in AJA University

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Abstract

Background: Asymptomatic carriage of *Staphylococcus aureus* is common and one of the common sites (20-30%) is in the nose. On the other hand, it is a known cause for wide range of infectious disease. In current study, we evaluated the incidence of *Staphylococcus aureus* in the nostril of kids, in 2 groups, first whose mothers were working in a hospital and second whose mothers were on other jobs in the kindergartens at the AJA University in 2018.

Methods: In this cross-sectional study, all children aged 1-6 years were included. The demographic information was collected and *Staphylococcus aureus* was isolated and identified from nasal swabs via standard microbiologic methods.

Result: In this study, 120 children were examined. The mean age of these children was 4.03 ± 1.04 years. Male: female ratio was 1.18:1. 76 (63 %) mothers were hospital's staffs and 55% had direct contact with the patients. Nasal cultures were positive for *Staphylococcus aureus* in 24 (20%) samples, of which 4 (3.3%) were MRSA. there was no relation between age and sex of kids and also their mother jobs with positive results.

Conclusion: *Staphylococcus aureus* is still a common human pathogen with a considerable morbidity and mortality. Methicillin-resistant staphylococcus aureus (MRSA) may be seen in nasal carriers and it is important to consider hygiene and parents job when we have kids in a day care centre such as kindergartens.

Keywords: *Staphylococcus aureus*; Nasal carrier; Children

Introduction

Staphylococcus aureus is a round shaped gram positive bacteria. Although it is a usual microbial strain for human, it is a frequent cause of infections with high morbidity, mortality, and healthcare-associated costs it can cause a

wide range of illnesses, from minor infectious disease, such as impetigo or cellulitis to life-threatening diseases such as meningitis, sepsis or TSS with high mortality and healthcare-associated costs. On the other hand despite all hygiene plans, it is still one of the five most common causes of hospital-acquired infections [1].

Staphylococcus aureus is a common human skin surface and mucosa and 20- 30% of human are asymptomatic persistent carriers for it, particularly in their anterior part of the nasal cavity. and some of vices in children such as nose picking can increases nasal *S. aureus* colonization [2,3].

There are a large number of host characteristics and environmental factors that can predispose to colonization results, such as timeline (for example the risk of disseminating *S. aureus* in the air increases during viral upper respiratory infections, and infection outbreaks may occur in spring or autumn) of sample collection, age of individuals, characteristics of their environment (being in a day care centers, kindergartens, schools or other households), amount of contact with carriers, immunological status of study subjects, technological methods for diagnosis, and so on. [4] and sometimes *S. aureus* colonization was negatively associated with other strains of staphylococcus such as *S. epidermidis* [5].

Staphylococcus aureus nasal colonization may start within the first hours of life in human and pre-existing nasal carriers could predispose to have a persistent staphylococcal colonization and persistent carriers tend to carry similar strains in their nose for many years when they live in the same day care or households [6-8].

After birth, hands are the main vector for *S. aureus* transmission. Healthcare workers and hospital staffs can be asymptomatic nasal carriers for MRSA and their outbreaks. This hypothesis is supported by a double-blind randomized placebo-controlled trial in which mupirocin applied to decreased nose and hand carriage in health-care workers [9,10].

One of the main risk factor for children to be a MRSA carriage is having a parent with MRSA carriage and also we know hospital staffs are prone to infections [11] this was our main hypothesis and in current study, we evaluated the frequency of prevalence of *Staphylococcus aureus* in the nose of kids in the kindergarten at the AJA University of medical sciences because in this kindergarten we have both children of hospital staffs and children with parents who just have an administrative job in the university or may be a housewife.

Methods and Materials

In this cross-sectional study, 120 children aged (1 - 6 years old) were examined. They all were kept in the AJA

University of medical sciences. The schoolmaster and also all kindergarten coaches were justified and our team explained them the reason of our search and also the procedure in details and wanted them to prepare parents.

Because viral upper respiratory tract infections could affect in our results and since it was possible to make a positive and false response, we set a few certain days at regular intervals for our sampling and in all these days first we explained our procedure for the mothers and informed consents, although the kindergarten coaches had already justified them. The demographic information was collected by the help of their parents. Kids were grouped base on their class groups in the kindergarten and after completing the questionnaire form, we had an exact complete physical exam from them. If they did not have any certain infectious disease especially viral URT infections, nasal samples were taken from secretions of the anterior nasal mucosa of the nose with a sterile swab. Nasal samples were cultured at Salt agar mannitol at 37 °C, in hospital lab, isolated sample were cultured at Blood agar and at least antibiogram tests were done for staphylococcus growth and Methicillin responsiveness checked.

After collecting data, the chi-square method was used for statistical analysis via SPSS version 21 software.

Results

120 children were enrolled in the study. The mean age of the subjects was 4.03 ± 1.64 years. Of these, 65 (54.2%) were boys and 55 (56.8%) were girls. Male: Female ratio was found to be 1.18:1.

One of our variables was parent's job. Among mothers, 76 (63 %) were hospital's staffs (among them 55% had direct contact with the patients, 45% had indirect contacts such as working in pharmacy or secretary or any administrative jobs in hospital) and 59 (75%) of hospital staffs had worked there more than 3 months.

On the other hand, other mothers were administrative officers 17 (14%), housewives 27(23%), likewise, their fathers' jobs were asked, none of them had worked in hospitals. So just mother's works was important.

Only in 24 cases (20%), the cultures were positive and *staphylococcus aureus* grew and in 96 cases (80%) cultures were negative. Among the positive results,16 (66.7%) were hospital staffs (Table 1).

Positive <i>S. aureus</i> cultures	Hospital Staffs		Non-hospital workers	
	number	percentage	number	percentage
Methicillin resistant	3	18.80%	1	12.50%
Methicillin sensitive	13	81.20%	7	87.50%
total	16	100%	8	100%

Table 1: Separation of *Staphylococcus aureus* grown according to antibiotic susceptibility.

According to the Chi-square test [p value = 0.699 (> 0.05)], there was no significant relationship between the job of the mothers and the culture results, and also based on to the Chi-square test [p value = 0.86 (> 0.05)], there was no significant relationship between the incidence rate of positive methicillin resistance cultures and mother jobs.

When we compared their age, 5 (10.2 %) of kids aged 1-3 years and 19 (26.8%) of kids older than 3 years old had positive results. According to the Chi-square test [p value = 0.026 (< 0.05)], there was relationship between the age of kids and the culture results. Despite of this, there was no significant relationship between the kid's sex and the culture results (Table 2). [p value = 1 (> 0.05)]

Contact rate Culture results	Direct contact		Indirect contact	
	number	percentage	number	percentage
<i>Staphylococcus aureus</i>	16	28.10%	8	12.70%
negative	41	71.90%	55	87.30%
total	57	100%	63	100%

Table 2: Relation between contact rate of their mothers with patient and kids' cultures result.

However, there was a significant relationship between the incidence rate of positive cultures and contact rate of their mothers with patients. [p value = 0.036 (< 0.05)]

Mothers asked for using antiseptics before returning their kids to home, although all of them said they did this, but their answer is doubtful, so we didn't pay attention to it and it was just an educational confirmation.

Discussion

Staphylococcus aureus is still a common cause of both community and hospital associated infection especially in children. Colonization of *Staphylococcus aureus* in the nostrils is common and in our study the prevalence rate was 20% and it was similar to other studies.

Since in our kindergarten we have kids, who's their mother work in the different units of hospital including ICU, CCU, infectious, general, surgery and so on, and in the

other hand some them just work in the hospitals but don't have any direct contact with patients including pharmacy, secretary, labs and so on. On the other hand, we have kidded whose mothers are housewives or just have an administrative job in the university. In our study, it was found there in no difference between these kids in terms of nasal carrier for *Staphylococcus aureus*. In a similar study Rahimi et al [12] and Jomehpour [13] also showed there is a relation between kids age and prevalence of positive staph. aureus cultures in the kindergartens. The justification can be that, they are most gone in mothers' arms and as a result closer contact.

There was no relationship between the kid's sex and prevalence of positive staph. aureus cultures in our study. Tafaraji et al., [14] also showed this in the kindergarten and an elementary school.

In our study, we found a positive relationship between the incidence rate of *Staphylococcus aureus* growth and

contact rate of mothers. Salman et al showed a similar result in Afghanistan's hospital staffs [15]. Our suggestion for these mothers is simple preventive care such as washing hands before and after the patient's examination and also before returning their kids, prevent nose picking. Albeit literatures do not suggest routine use of topical intranasal mupirocin for nasal carriers, but it may be ideal and effective for some individuals such as *patients undergoing dialysis, HIV-infected individuals or patients with surgical wounds* [16]. So, we didn't recommend it for our known cases.

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