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## **The Effectiveness of the Mupirocin Ointment in Treatment of Nasal Carriers of *Staphylococcus aureus* in Medical Staffs in Ali Ebne Abitaleb Hospital, Rafsanjan (Southeast of Iran)**

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### **ABSTRACT**

*Staphylococcus aureus* nasal carriers in medical staffs are one of the important causes of nosocomial infections. They can easily be treated by Mupirocin ointment. We studied the effect of the Mupirocin ointment in the treatment of *Staphylococcus aureus* nasal carriers in clinical wards staffs. This cross-sectional study was done on 18 cases. One week and 1 to 3 months after Mupirocin application in their anterior nasal vestibules, nasal cultures were done. Between them, 83.3% after one week of their treatment had negative cultures. Ninety three percent of the above group after one month had negative cultures and 86% of them after 3 months had negative cultures. All of the isolates were sensitive to vancomycin. It seems that Mupirocin is effective in treatment of nasal carriers of *Staphylococcus aureus*.

**Key words:** Rafsanjan Mupirocin, *Staphylococcus aureus*, staffs, nasal carriage

### **INTRODUCTION**

Hospital infections occur during admission of patients and can develop complications. So according to the potential effects of hospital infections, the occurrence rate, complications, mortality rate and high economic costs, recognition of correlated factors are very important (Taylor and Lillis, 2008). Many factors correlate to hospital infections and one of them is the presence of *Staphylococcus aureus* nasal carrier among hospital personnel. *Staphylococcus* is the most common strain causing hospital infections. In humans and especially in adults, *Staphylococcus aureus* desire to colonize in anterior nasal mucosa temporarily or permanently and about 10-40% of individuals and hospital personnel are *Staphylococcus aureus* nasal carriers and act as the important source of infection (Laupland *et al.*, 2003). The resistance of *Staphylococcus* to various antibiotics is one of the most important health problems. In order to overcome this problem, the detection methods to control and eradicate the *Staphylococcus aureus* nasal carriers are essential. Mupirocine is one of these methods of treatments (Dupeyron *et al.*, 2006). For example, the study of long-term (55 months) of Dupeyron in a GI ward during the three rounds, showed reduction in the rate of nasal carriers of *Staphylococcus aureus* carriers and also reduction of the prevalence of *Staphylococcus aureus* after Mupirocine treatment (Dupeyron *et al.*, 2006). This study reveals the

effectiveness of Mupirocin in the treatment of nasal carriers of *Staphylococcus aureus* in medical staffs in Ali Ebne Abitaleb Hospital, Rafsanjan (IRAN) that had not been performed before in this area.

## **MATERIALS AND METHODS**

In this clinical interventional study, the subjects were 240 cases of hospital personnel of Ali Ibn Abi Talib, Rafsanjan. All of them were screened in order to recognize the *Staphylococcus aureus* nasal carriers. The results showed that 44 cases had positive nasal cultures. They were identified in Sheikholeslami study performed in 2009 (Shekholeslami *et al.*, 2009). Twenty six cases were excluded from the project (5 cases left the center, in 19 cases initial tests were negative and 2 cases did not accompany). All of the cases filled the initial questionnaire included demographic details: age, sex, sector of residence, usage of antibiotics in the recent 48 h, the result and the antibiogram of their nasal cultures. Samples were obtained by sterile swabs from deep tissue of anterior nasal and then cultured on Blood-Agar media. After Mupirocine application 2 times daily for 1 week, nasal cultures were done after 1 week, 1 and 3 months. If any one used antibiotics in the past 48 h, the initial sampling was postponed for 48 h. Antibiogram tests were done by Standard Agar Diffusion method. For identification of *Staphylococcus aureus*, the major tests of catalase, coagulase and DNase were done. Disks of penicillin, cefixim, vancomycin, oxacillin, erythromycin, clindamycin, cefazolin, nitrofurantion, co-trimoxazole, ciprofloxacin, cephalothin and doxycyclin were used for antibiogram. Data were analyzed by using SPSS software, applying Chi-Square and t-tests.

In all analysis, the significant level of p-value has been set on less than 0.05. All of the information were secret. The limitations of research were: (1) lack of cooperation of personnel although we gave them confidence that no social problem will be created for them and (2) low number of samples so we were forced to eliminate the age and sex separations. Also we could not use placebo because the participants did not agree.

## **RESULTS**

Educational degrees of cases were elementary cycle, diploma, associate, bachelor, master and doctoral which elementary cycle and MS respectively had 33/3 and 5/6% frequency.

According to personal titles; they were divided into different groups such as physician, metro nurse, auxiliary nurse and hospital workers which auxiliary nurse and metro respectively had 33/3 and 5/6% frequency.

According to wards where cases were working, they were divided into different wards such as CCU, internal ward, ICU, pediatric, surgery and between them, the CCU had the highest frequency rate (27/58%) of positive nasal cultures. After the initial cultures, antibiogram analysis in 18 cases showed the highest sensitivity to Vancomycin (100%) (Table 1). Participants that had positive nasal cultures, were treated with topical ointment of Mupirocin twice daily for one week. One week after treatment, 16/7% of the cases had positive cultures and 83/3% had negative cultures. Following 1 month later after treatment 93/3% and three months after treatment 85/1% still had negative cultures. Totally, we studied 18 cases that their nasal cultures were positive. Between them, 83.3% after one week of their treatment had negative cultures. Ninety three percent of the above group after one month had negative cultures and 86% of them after 3 months had negative cultures.

Table 1: The susceptibility pattern of *Staphylococcus aureus* among nasal carriers

Total (%)	Intermediate (%)	Resistance (%)	Susceptible (%)	The antibiotics susceptibility rate
18 (100)	1 (5/6)	15 (83/3)	2 (11/1)	Penicillin
18 (100)	0 (0)	18 (100)	0 (0)	Cefixim
18 (100)	2 (11/1)	2 (11/1)	14 (77/8)	Oxacillin
18 (100)	10 (55/6)	1 (5/6)	7 (38/9)	Erythromycin
18 (100)	2 (11/1)	2 (11/1)	14 (77/8)	Doxycyclin
18 (100)	3 (16/7)	3 (16/7)	12 (66/6)	Cefalotin
18 (100)	1 (5/6)	1 (5/6)	16 (88/9)	Cotrimoxazole
18 (100)	2 (11/2)	1 (5/6)	15 (83/3)	Ciprofloxacin
18 (100)	6 (33/3)	9 (50)	3 (16/7)	Clindamycin
18 (100)	5 (27/8)	2 (11/2)	11 (61/1)	Cefazolin
18 (100)	1 (5/6)	0 (0)	17 (94/4)	Nitrofurantoin
18 (100)	0 (0)	0 (0)	18 (100)	Vancomycin

## DISCUSSION

Recent years the resistant strains of *Staphylococcus* caused severe epidemics in the hospitals in all over the world (Dupeyron *et al.*, 2006). In many cases, infection is transferred to the patient through the hospital personnel and they act as potential reservoir of infection. One of the best ways in order to control this problem is the eradication of nasal carriers of *Staphylococcus aureus* between hospital personnel by using the Mupirocin ointment (Van Rijen, 2008). We studied totally 18 cases that the results of their nasal cultures due to *Staphylococcus aureus* were positive. The efficacy of Mupirocin ointment in the eradication of *Staphylococcus aureus* nasal carriers on 339 cases in Doebbeling and colleagues study was 91% (Doebbeling *et al.*, 1993). Their results are similar to our findings. In another study by Dimitrov *et al.* (2003) that was performed on the ICU staff; the response rate to treatment after 6 days application of Mupirocin ointment was 100%. After 1, 5 and 8 months alternatively, 94, 76 and 60% of cases had still negative cultures. Although, in our study the rate of response to treatment after 1 week was lower than the Demitrieva study (83/3% versus 100%) but after one month follow-up our result was similar to this research (93/3% versus 94%) and after three-months follow-up 86% of our cases remained negative culture results but after 7 months 60% of the cases in the Demitrieva study had negative cultures. This dissimilarity may be due to the differences in the period of final follow-up between our studies (7 months in the Demitrieva study versus 3 months in this study).

Wertheim *et al.* (2005) revealed that the efficacy of Mupirocin ointment in permanent nasal carriers after 5 weeks was 69% and in the alternative nasal carriers 58% and the reviews showed Mupirocin. The result of our study showed the better efficacy of Mupirocin ointment in comparison to the Wertheim study and more likely we can emphasize on the efficacy of this ointment.

In addition, after the initial culture; antibiogram results showed that between all of the antibiotics, no resistance against Vancomycin was reported.

The following suggestions have been made:

- We suggest to perform another study with additional cases in order to obtain more exact results and also to determine and compare the prevalence of nosocomial infections before and after of this treatment
- We suggest to screen and treat *Staphylococcus aureus* nasal carriers among hospital personnel prior to employ in health centers and hospitals

- As our study has shown the highest sensitivity to Vancomycin (100%), we recommend to use this antibiotic correctly in order to avoid construction of the resistant strains
- The lack of cooperation of some personnel was a problem for us, so it seems some additional educational efforts should be done in order to clear the significance of nosocomial infections for health personnel

## CONCLUSION

It seems the efficacy of Muphrocine ointment in the treatment of nasal *Staphylococcus* carriers among hospital personnel in this study is optimal.

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