

Full length research paper

# Prevalence of Methicillin Resistance *Staphylococcus aureus* Colonization in Anterior Nares of Healthcare Workers in Alzahra Hospital

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*Staphylococcus aureus* (*S. aureus*) is an important pathogen that threat human being. Most *S. aureus* infections assume to come from nasal carriage. Eradication of *S. aureus* from the anterior nares has been proven to reduce *S. aureus* infections, so we planned to measure the prevalence of colonization of *S. aureus* and MRSA strains in the anterior nares of health care workers. 60.5% MRSA colonization rate that indicates high colonization rate in health care workers in our study. High resistance rate of MRSA isolates to erythromycin, ciprofloxacin and chloramphenicol prove that eradication of *S. aureus* colonization in anterior nares of health care workers seem to be necessary.

**Keywords:** Antimicrobial, Bacteria, Resistance, Methicillin Resistant *Staphylococcus aureus*

## INTRODUCTION

Hospital acquired infections are increasingly becoming a major concern in both developed and developing economies. In hospital admitted patients, surgical site infections, catheter associated urinary tract infections, intravenous devices infection and respiratory infections are frequent causes of prolonged hospital stay, morbidity and mortality. Frequently, most of the nosocomial pathogens are multidrug resistant bacteria which pose serious therapeutic challenges. Hospital outbreaks of methicillin resistant *Staphylococcus aureus* (MRSA), vancomycin resistant enterococci (VRE), extended-spectrum beta lactamases (ESBLs) producing Gram negative bacteria which are resistant to cephalosporins and monobactams, and multidrug resistant *Pseudomonas* spp. have severally been reported (Hidron *et al.*, 2005, Albrich *et al.*, 2008, Metri *et al.*, 2011). *Staphylococcus aureus* (*S. aureus*) is an important

pathogen that threat human being. Its ability to become resistant is a threat that needs attention (Laupland and Conly 2003, Akindele *et al.*, 2010). Because its habitat is moist squamous epithelium of the anterior nares, most *S. aureus* infections assume to come from nasal carriage (Mainous *et al.*, 2006). Eradication of *S. aureus* from the anterior nares has been proven to reduce *S. aureus* infections (Kalmeijer *et al.* 2002, Von Eiff *et al.*, 2001). Antibiotic resistance especially in the developing countries is a growing concern and should be controlled (Sharif *et al.* 2013). In our hospital settings, there are reports of high antibiotic resistance and lots of antibiotics have become useless because of that (Sharif *et al.* 2013, Alizargar *et al.*, 2013). Antibiotic resistance concerning the antibiotics that use as the last line of treatment have also been reported (Sharif *et al.*, 2013, Alizargar *et al.*, 2013).

The role of health care workers in the transmission of infections has been extensively described (Albrich *et al.* 2008). So we planned to measure the prevalence of colonization of *S. aureus* and MRSA strains in the anterior nares of health care workers of Alzahra Hospital and evaluate their susceptibility to erythromycin, ciprofloxacin and chloramphenicol.

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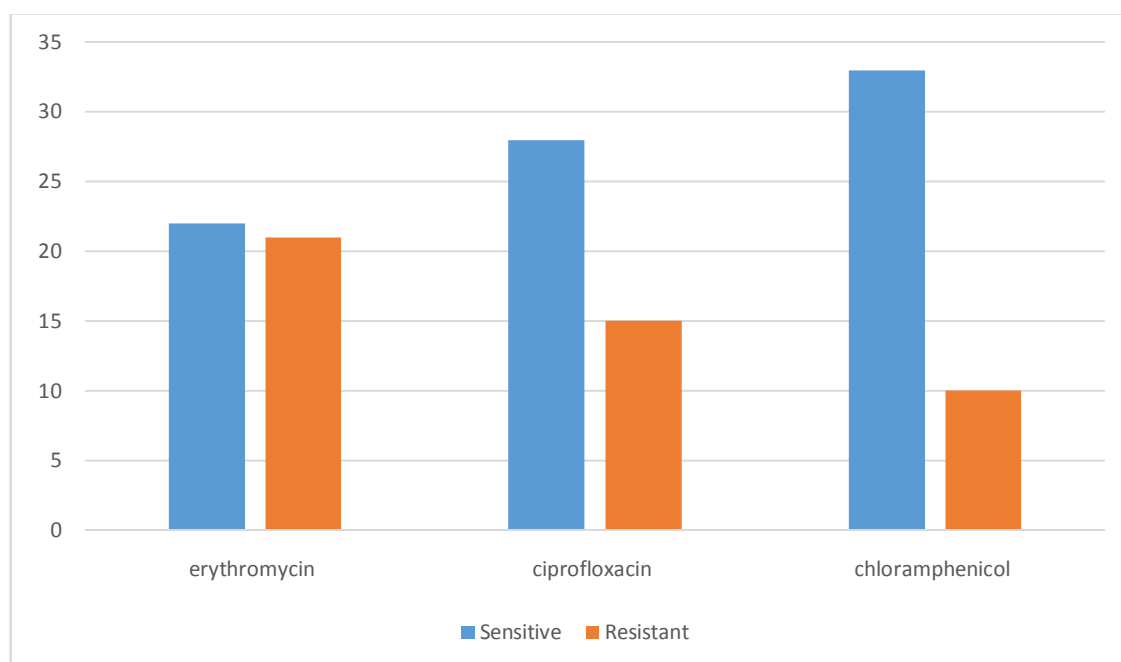


Fig 1. Susceptibility pattern of MRSA strains colonization in anterior nares of health care workers

## MATERIALS AND METHODS

From Jun 2013 to Dec 2013, from all of the health workers (71 members) of clinics of Alzahra Hospital, specimens were taken from both anterior nares with rayon swabs for culture. The swabs were plated directly onto 5% sheep's blood agar plates, which were incubated at 35°C with 5% CO<sub>2</sub> for 48 hours (Kutlu *et al.* 2012). *S. aureus* was identified systematically. Antimicrobial susceptibility was evaluated by the Kirby-Bauer disk diffusion method in guide lines of Clinical and Laboratory Standards Institute (Clinical and Laboratory Standards Institute, 2008). Oxacillin disk (1 µg), was used to investigate methicillin resistance of *S. aureus* isolates and *S. aureus* ATCC 25923 used as a control strain. Disk diffusion method was used for the following antibiotics: erythromycin (15 µg), ciprofloxacin (5 µg), and chloramphenicol (30µg).

## RESULTS

Data of 71 health workers included in our study. The mean age of them was 39.4 years and 39(54.9%) were male and 32(45.1%) were female. From those 71, 56(78.8%) were colonized with *S. aureus*. From these 56 isolates 43(76.7%) were MRSA. Moreover, out of the MRSA isolate, 21(48.8%) were resistant to erythromycin. The resistance to ciprofloxacin and chloramphenicol were 15(34.8%) and 10(23.2%) respectively. The susceptibility pattern of 43 MRSA isolates can be seen in figure 1.

## DISCUSSION

This study evaluated 71 health care workers' nasal swab isolates for detecting colonization of *S. aureus* and also determines the prevalence of MRSA. It also announced the resistance rate of these MRSA isolates to erythromycin, ciprofloxacin and chloramphenicol. The prevalence of *S. aureus* colonization was 78.8% and the overall rate of MRSA was 60.5% in the 71 health care workers. 76.7% of those colonized *S. aureus* isolates were MRSA. Resistance rate of MRSA isolates was 48.8, 34.8 and 23.2% regarding erythromycin, ciprofloxacin and chloramphenicol respectively.

The prevalence of *S. aureus* colonization was 80% and from the MRSA isolates, 57 and 9% were also resistant to erythromycin and ciprofloxacin in the study of Edem *et al.* (Edem *et al.* 2013). Rate of *S. aureus* colonization and MRSA isolates resistance rate to erythromycin were in concordance in our study and Edem *et al.*, but the rate of resistance to ciprofloxacin in our study is 4 times greater theirs. San Juan *et al.* (San Juan *et al.*, 2012) reported 22.6% *S. aureus* colonization prevalence out of 30 health care workers and none of them was resistant to erythromycin or ciprofloxacin. The results of this study are in contrast to ours that shows greater colonization and greater antibiotic resistance in our hospital settings. The prevalence of MRSA was reported 35.8% in another study that authors of the present study conducted in 2013 on diabetic patients (Alizargar *et al.*, 2013). The resistance rate of MRSA isolates in this study was 42.5, 21 and 11.5% regarding erythromycin, ciprofloxacin and

chloramphenicol respectively. Some Iranian cities have reported over 90% MRSA rate in the clinical isolates (Ghorbani *et al.* 2013). But this rate have been announced 20.48 % in Isfahan (Havaei *et al.* 2011) and 35.13% in Gorgan (Vaez *et al.* 2011) (two big cities in Iran). The 60.5% MRSA colonization rate shows the high colonization rate in health care workers in our study. High resistance rate of MRSA isolates to erythromycin, ciprofloxacin and chloramphenicol prove that eradication of *S. aureus* colonization in anterior nares of health care workers seem to be necessary.

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