

## MRSA-CARRIER DETECTION IN SEMESTER-1 STUDENTS OF MEDICAL DOCTOR PROGRAM, FACULTY OF MEDICINE, AIRLANGGA UNIVERSITY, SURABAYA, CLASS 2009

N Sa'diyah AP<sup>1</sup>, Eko Budi Koendhori<sup>2</sup>, Deby Kusumaningrum<sup>2</sup>

<sup>1</sup>Medical Doctor Study Program, <sup>2</sup>Department of Medical Microbiology  
Faculty of Medicine, Airlangga University, Surabaya

### ABSTRAK

*Methicillin-resistant Staphylococcus aureus (MRSA) telah menjadi salah satu penyebab yang paling luas dari infeksi sekunder, terutama di rumah sakit. Baru-baru ini, laporan telah muncul bahwa S. aureus strain yang resisten terhadap methicillin tidak hanya dari pasien dan masyarakat, tetapi juga dari petugas kesehatan (mahasiswa khususnya kedokteran). Penelitian ini dilakukan untuk mendeteksi menyebar dan persentase Methicillin-resisitant antara isolat pada mahasiswa Fakultas Kedokteran di Universitas Airlangga, Surabaya, 2009. Sampel dikumpulkan dari penyeka hidung dari mahasiswa kedokteran yang alumnus dari SMA di Surabaya. Untuk mengidentifikasi kolonisasi S. aureus, adalah dengan kemampuan diidentifikasi hemolitik (oleh kultur di Lempeng Darah-agar), morfologi (dengan Gram staining), dan pengujian biokimia (katalase dan koagulase tets). Setelah itu, melakukan uji kepekaan Antimicrobial dengan menggunakan oksasilin dan Cefoxitin disk. according untuk ditetapkan dalam pedoman rekomendasi dari Klinik dan Laboratorium Standar Institute. Prevalensi MRSA dari usap hidung adalah 60 (83,3%) isolat S. aureus Non (26 isolat dari laki-laki dan 34 isolat dari perempuan) dan 12 isolat S. aureus. 3 (4,2%) isolat dari 12 adalah MRSA dan tidak satupun dari mereka adalah perempuan. Akhirnya, MRSA kolonisasi ditemukan pada mahasiswa Fakultas Kedokteran di Universitas Airlangga, Surabaya, 2009. Untuk mencegah penyebaran MRSA, kami sarankan menindaklanjuti pemeriksaan dan pengobatan yang diperlukan segera. (FMI 2012;48:126-130)*

**Kata kunci:** MRSA, mahasiswa kedokteran, Universitas Airlangga, deteksi

### ABSTRACT

*Methicillin-resistant Staphylococcus aureus (MRSA) has become one of the most widespread causes of secondary infection, especially in the hospital. Recently, reports have emerged that S. aureus strains which is resistant to methicillin not only from the patients and community, but also from healthcare worker (especially medical student). This study was undertaken to detect the spreads and percentage of Methicillin-resisitant among isolat at university student of Faculty of Medicine in Airlangga University, Surabaya, 2009. The samples were collected from nasal swabs of medical student who were alumnus from High School at Surabaya. To identifies colonization of S. aureus, are by identified hemolytic capability (by culturing in Blood-agar Plate), the morfology (by Gram staining), and biochemical testing (catalase and coagulase tets). After that, doing Antimicrobial susceptibility tests by using Oxacillin and Cefoxitin disk. according to guideline recommendations of the Clinical and Laboratory Standards Institute. The Prevalence of MRSA from nasal swabs were 60 (83,3%) isolates Non S. aureus (26 isolates from men and 34 isolates from women) and 12 isolates S. aureus. 3 (4,2%) isolates of 12 was MRSA and none of them is woman. Finally, MRSA colonization was found in university student of Faculty of Medicine in Airlangga University, Surabaya, 2009. To prevent the spreading of MRSA, we suggest that follow up examination and treatment are needed immediately. (FMI 2012;48:126-130)*

**Keywords:** MRSA, medical student, Airlangga University, detection

**Correspondence:** N Sa'diyah AP, Medical Doctor Program, Faculty of Medicine, Airlangga University, Jalan Prof dr Moestopo 47, Surabaya 60131, Indonesia. Phone: 62-31-5020251

### INTRODUCTION

*Staphylococcus aureus (S. aureus)* is a normal flora of human colonies are found on the front of the nose (anterior nares), can also be found in the skin, vagina, axilla, perineum, and oropharynx (Fauci et al 2008). Although it is normal flora, *S. aureus* can cause some acute infection often causes pus as boils, pimples and impetigo. Sometimes accompanied by subcutaneous abscess and submucous are common in postoperative wounds, osteomyelitis, bronchopneumonia, lymph-

adenitis, bacteriemia, nephritis, and acute bacterial endocarditis in adult patients. In addition, it can also occur with diarrhea vomiting, in case of food poisoning or toxic shock syndrome (Cruickshank, 1974, Sherris 1984).

Effect of *S. aureus* colonization is increasing since the emergence of antibiotic resistant strains, namely MRSA. Methicillin-Resistant *S. aureus* (MRSA) *S. aureus* is resistant or resistant to the antibiotic group beta-lactam, Such as methicillin, oxacillin, penicillin, amoxicillin,

and cephalosporins. In addition to resistance to beta-lactam, Also found resistance to tetracycline, erythromycin, and clindamycin (Gorwitz et al 2008, Davis 2011). Carrier or a carrier of MRSA can be found in the general population (community acquired / CA-MRSA) or in patients and health workers in the health service (hospital acquired / HA-MRSA) (Centre for Health Protection (KDP) 2008). In the majority of HA-MRSA carrier or carrier came from workers and patients in hospitals, amounting to 60-70%. Previous studies showed that the percentage of students of the Faculty of Medicine carrier in Diponegoro University preclinical 35.2%, while in the clinic accompanied by an increase of 42.6% resistant strains (Prasanti 2010).

From several previous studies, there is still a lack of research on MRSA-carrier that focuses on health workers, especially in the S1 Student Medical Education Faculty of Medicine, University of Airlangga Force 2009. In fact, health professionals have a great potential as a source of the spread of infection by MRSA in the home environment ill. Therefore, this research needs to be done as a precaution against the spread of MRSA in the hospital environment. This study aims to determine the spread and a large percentage of MRSA-carriers on S1 Student Medical Education Faculty of Medicine, University of Airlangga Force in 2009.

## MATERIALS AND METHODS

This type of research used in this study is an experimental study with cross-sectional design, which in this study investigated was large percentage of MRSA-carriers on S1 Student Medical Education Faculty of Medicine, University of Airlangga Force in 2009 at the time of the study. Students study population was all S1 Medical Education Faculty of Medicine, University of Airlangga Force 2009. Samples were taken randomly from the study population (by predetermined criteria) with a sample size of 72 students.

The instrument used in this study is a nasal swab sample with the criteria of high school alumni from Surabaya. This research was conducted in the Department of Microbiology, Faculty of Medicine, University of Airlangga from December 2011 to January 2012. Data collection techniques in this study were to use primary data obtained through culture results from nasal swab samples. The collected data is processed in accordance with predetermined criteria, then described in the form of tables or diagrams.

## RESULTS

This study uses primary data source obtained from the nasal swab cultures S1 Student Medical Education Faculty of Medicine, University of Airlangga Force in 2009 with the criteria of high school alumni from Surabaya. The samples used in this study amounted to 72 samples consisting of 38 women and 34 men. Culture results from nasal swab samples were divided into two groups, non *S. aureus* and *S. aureus*. While *S. aureus* group narrowed again into *S. aureus* sensitive and resistant to antibiotics beta-lactam (MRSA).

Table 1. Results of identification of nasal swab cultures students

| Samples | Non<br><i>S. aureus</i> | Ox5 and<br>Fox30-<br>sensitive <i>S.</i><br><i>aureus</i> | Ox5 and Fox<br>30-resistant<br><i>S. aureus</i> | Total<br>Samples |
|---------|-------------------------|-----------------------------------------------------------|-------------------------------------------------|------------------|
| Males   | 26 (36,1%)              | 5 (7%)                                                    | 3 (4,2%)                                        | 34 (47,2%)       |
| Females | 34 (47,2%)              | 4 (5,5%)                                                  | 0                                               | 38 (52,8%)       |
| Total   | 60 (83,3%)              | 9 (12,5%)                                                 | 3 (4,2%)                                        | 72               |

In the nasal swab sample was then performed to identify bacteria cultures which grew out of the results of nasal swabs. First results of the swab directly on the arcs (streaking) on BAP medium (Blood-agar plate) to see the ability of haemolysis and incubated for 24 hours. A colony can be said to be positive if the haemolysis seems clear zone around the colony (Figure 1). After 24 hours, selected one colony that shows haemolysis for subculture on NA medium (Nutrient-agar Plate) (Figure 2). Colonies on the subculture were used to identify morphology by Gram staining. Results of staining were seen using a microscope magnification 100x10. In the visual outcome with a microscope which showed gram-positive cocci (round, purple) will be carried out biochemical tests. Biochemical tests that will be done after the Gram ie, catalase test, culturing on mannitol-agar plate media, and coagulase test (Figure 3-5).

Catalase test is done to differentiate *Streptococcus* sp. and *Staphylococcus* sp., because the bacteria is gram-positive cocci. This test is done by dripping H<sub>2</sub>O<sub>2</sub> on bacteria. Catalase positive *Staphylococcus* show results, namely the emergence of bubbles after hatching H<sub>2</sub>O<sub>2</sub>. In germ haemolysis, Gram-positive cocci, and catalase positive, was cultured on selective media Mannitol agar plate. On this medium, colonies of *S. aureus* bacteria will change the color of this medium from pink to yellow. To confirm, having obtained positive results (yellow) to the culture in the mannitol-agar Plate coagulase test will be conducted blood plasma. Colonies of bacteria grown in part on Broth-agar medium and incubated 24 hours in an incubator. Then a few drops of blood plasma in the media and the results are awaited

for 30 minutes. If clumping occurs, it is certain that germs are germs of *S. aureus*.

After identification results show the results of *S. aureus* colonization, antibiotic diffusion test was done to determine the methicillin-resistant *S. aureus* (MRSA). To test the antibiotic, bacteria grown on media MuellerHinton first-order Plate as shown in Figure 5.6. Trials of antibiotics in this study used antibiotic disks Oxacillin 5µg (OX5) and Cefoxitin 30µg (Fox30). After 24h incubation, measurement of the diameter of the inhibition zone of each antibiotic by using a vernier caliper. From a series of culture and test, the obtained 3 positive MRSA MRSA-carriers while non-carrier number 69.



Figure 1. Media Blood agar plate (BAP), is used to look at the ability of germs haemolysis. Light zone indicates haemolysis.

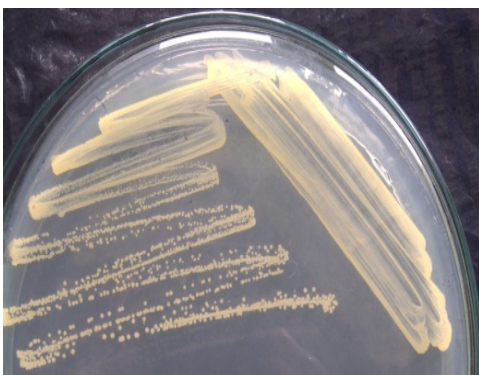


Figure 2. Nutrient-agar Plate (NA). It is used to see the gold pigment commonly found in colonies of *S. aureus*, although it does not always appear.

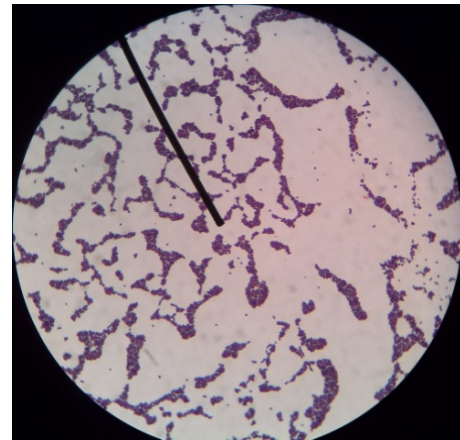


Figure 3. The results of the Gram stain showed the presence of bacteria colonization of Gram-positive cocci clusters (clustered round and purple).



Figure 3. Catalase test conducted by hatching H<sub>2</sub>O<sub>2</sub> on bacteria, to differentiate *Staphylococcus* and *Streptococcus*. If there are bubbles on a hatch, it shows the *Staphylococcus* bacteria colonies.

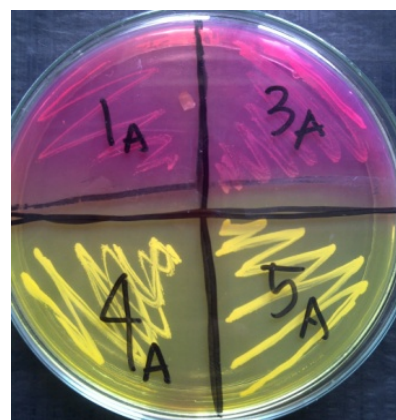


Figure 4. A selective medium, mannitol-agar Plate NaCl content contained therein, in which the *S. aureus* bacteria can still grow. The growth of bacteria on the medium is characterized by changing the color to yellow media.



Figure 5. Coagulase test is done to confirm and ensure colonization of *S. aureus*. In this test, the bacteria grown in broth-agar medium, and then used as drops in blood plasma.



Figure 6. The diffusion antibiotic susceptibility test. In this test, the medium used is MuellerHinton-order Plate (MH) and Cefoxitin antibiotic disks (Fox30) and Oxacillin (OX5). In the diffusion method to determine resiten or sensitive by calculating the amount of inhibition zone (clear area)

## DISCUSSION

This research is a quantitative study was conducted using the experimental cross sectional study design, which in this study investigated was large percentage of MRSA-carriers on S1 Student Medical Education Faculty of Medicine, Airlangga University, 2009. This study was aimed to determine the spread and a large percentage of MRSA-carrier on S1 Student Medical Education Faculty of Medicine, University of Airlangga, Class 2009. the sampling technique in this study is by random sampling with high school alumni criteria Surabaya. Sources of data used in this study were the primary data source, that is by doing a nasal swab sample. Then the cultures were taken and tested relating to the detection of MRSA-carriers.

Of the 72 samples taken were found 12 (16.67%) with *Staphylococcus aureus* colonization and 60 (83.3%) with *S. aureus* colonization Non. 3 (4.2%) of the 12 *S. aureus* colonization is MRSA. In this study indicate that the percentage of MRSA-carriers still quite a bit of <10% when compared to the research conducted by students of the Faculty of Medicine, University of Diponegoro was 35.2% in the pre-clinical students (Prasanti 2010). When compared with other studies to be undertaken in Indonesia, can be seen a decrease in the percentage of MRSA from 23.5% in 2006 (Sumarsono 2009) to 4.2%.

In addition to this study, also found differences in the percentage of MRSA among the several states. The highest percentage of *S. aureus* resistant to methicillin was found in North Florida and found the percentage of MRSA in hospital patients as many, 85% and 47.5% of healthy communities (Beam & Buckley 2006). In Trinidad percentage of 20.8% (Orrett & Land 2006) and in Toronto the percentage of resistance was 19% (Adam et al 2009). A study in India, which was cultured from nasal swab sample, 18.1% of MRSA isolates are (Saxena et al 2003). In New Jersey conducted a similar study by taking samples at stethoscopes used by health professionals in the emergency department. From the results obtained cultur in higher percentage (32%) (Merlin et al, 2009) when compared with the results obtained in this study (4.2%). The difference in the percentage of MRSA from several countries probably due to the variation of the population and sample, the biological characters of strains of *S. aureus*, and / or control of infections.

When compared to the percentage of *S. aureus* and non-aureus in this study indicate that *S. aureus* colonization of the non-dominant, ie 83.3%. This is because the normal flora of the anterior nares is dominated by non-aureus bacteria, such as *Staphylococcus epidermidis* and

Corynebacterium. While *S. aureus* colonization is only slightly (about 20%) in the anterior nares as bacteria and is more often found in the throat (Todar 2009). It has also been demonstrated in a study conducted by Peter Nilsson, ie 40% of *S. aureus* colonization in the anterior nares and 31% of the throat (throat) (Nilsson and Ripa 2006). Efforts to prevent the spread of MRSA infections, the necessary consciousness of each individual in hygiene, such as washing hands, showers were clean, keep the wound from infection, do not share personal items, and keep the environment clean. As for the individuals who are diagnosed with MRSA-carrier, they are able to use mupirocin for mild infections (Davis nd).

## CONCLUSION

MRSA-carrier in S1 Student of Medical Education, Faculty of Medicine, University of Airlangga, Class 2009 was 4.2% (3 of 72 samples). MRSA-carriers are entirely male.

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