RESEARCH NOTE

PREVALENCE OF METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS FROM NOSE AND THROAT OF PATIENTS ON ADMISSION TO MEDICAL WARDS OF DR SOETOMO HOSPITAL, SURABAYA, INDONESIA

K Kuntaman1, Usman Hadi2, Firman Setiawan1, Eko Budi Koendori1, Musofa Rusli2, Dewi Santosaningsih3, Juliette Severin4 and Henri A Verbrugh4

1Department of Microbiology, 2Department of Internal Medicine, Faculty of Medicine, Universitas Airlangga/Dr Soetomo Hospital Surabaya; 3Department of Microbiology, Faculty of Medicine, Brawijaya University/Dr Saiful Anwar Hospital, Malang, Indonesia; 4Department of Microbiology and Infectious Disease, Erasmus University Medical Centre, Rotterdam, The Netherlands

Abstract. Epidemiological data of methicillin resistant Staphylococcus aureus (MRSA) carriage in Indonesian hospitals are still scarce. These data are required for health management of infectious diseases in order to control hospital MRSA. The carriage rate of MRSA in nose and throat of patients on admission to Dr Soetomo Hospital Surabaya, Indonesia was 8.1% of 643 patients, 5.4% from throat, 3.9% from nose and 1.2% from both sites. Prevalence of MRSA among patients admitted to surgical and non-surgical ward was not different (8.2% and 8.0%, respectively). Although MRSA prevalence in Indonesian hospitals is low compared to many other countries worldwide, appropriate health strategies will be needed to be implemented if this infection is to be controlled.

Keywords: MRSA, prevalence, medical ward, surgical ward, nose, throat, Indonesia

INTRODUCTION

The problem of methicillin resistant Staphylococcus aureus (MRSA) is increasing worldwide, mainly in Asia (Chen and Huang, 2014). The spread of MRSA is through direct and indirect contacts among patients who have been colonized or infected with MRSA. For instance, in Germany the percent MRSA in S. aureus isolates derived from blood cultures has increased from 9 in 1999 to 20 in 2002 (Yang et al, 2010). Nosocomial infection caused by MRSA in Taiwan was also increased from 26.3% in 1986 to 77% in 2001 (Hsueh et al, 2004). Survey of MRSA in India by INSAR group, also indicated the higher rate of infection caused by MRSA (INSAR, 2013). MRSA has also been iden-
tified in animals (Juhász-Kaszanyitzky et al, 2007), or associated with animal products, such as pig (van Cleef et al, 2010) and bovine (Tavakol et al, 2012).

To date, there has been limited data on MRSA in Indonesia. An early study conducted in 2001 identified 1 (0.3%) MRSA isolates among 329 S. aureus nares flora from 3,995 patients (Severin et al, 2008). By 2011, in three teaching hospitals (Denpasar, Semarang and Malang) in Indonesia, screening of 1,502 surgery patients at time of discharge by culturing nares, throat and skin lesion, revealed a MRSA carriage rate of 4% (Santosaningsih et al, 2014).

Carriers may acquire MRSA from the community, but acquisition and spread in hospitals have been found in health care settings worldwide (Bartoloni et al, 2013; Yamamoto et al, 2013; Santosaningsih et al, 2014). Accordingly, this study addresses the epidemiology and distribution of MRSA in surgical and other medical wards of Dr Soetomo Hospital, Surabaya, Indonesia. Such information is crucial to develop preventive strategies for combating emerging MRSA infection in the Indonesian health care system.

MATERIALS AND METHODS

Samples collection

Screening was conducted on patients at the time of admission to the wards of the Department of Surgery and Department of Internal Medicine of Dr Soetomo Hospital, Surabaya, Indonesia from June to September, 2014. Anterior nares and throat samples were obtained using sterile dry cotton swabs, one swab for both nostrils, from every patient enrolled in the study. Specimens were transported to the Microbiology Laboratory and inoculated into 5 ml of phenyl mannitol salt broth (Difco, Detroit, MI), incubated overnight at 37°C, then sub-cultured onto prepoured culture plates MRSA Chromagar medium (Brilliance™ MRSA Agar; Oxoid, Basingstoke, UK) and incubated for 24-48 hours at 37°C before being inspected for typical MRSA colonies of denim blue color. These colonies were picked and re-cultured on nonselective agar (Trypticase Soy Agar, Oxoid). The suspected bacteria were then confirmed by catalase test (3% H$_2$O$_2$), mannitol fermentation in Mannitol Salt Agar (MSA, Oxoid) plate and using Staphaurex (Remel Europe, Lenexa, KS).

The study protocol was approved by the Medical Ethics Committee of Dr Soetomo Hospital Surabaya (approval no. 181/Panke.KKE/III/2014).

Detection of mecA

Bacterial DNA was extracted by the TE boil extraction method, a modification of the bacterial DNA extraction method as described previously (Li et al, 2003). Briefly, a tip of bacterial colony was suspended in 100 µl TE buffer [10 mM Tris-HCl, 1 mM Na$_2$EDTA, (pH 8.0)], and the briefly mixed on a vortex mixer. The suspension was placed on the block heater at 95°C for 10 minutes and then centrifuged at 12,000 rpm for 1 minute. Primers for amplification of MRSA mecA were 5’ AAAATCGATGGTAAAGGTTGGC 3’ and 5’ AGTTCTGCAGTACCGGATTTGC 3’ (Mukarami et al, 1991). DNA amplification was carried out in 20-µl reaction solution consisting of 10 µl of 2X Master Mix (Intron Biotechnology; Gyeonggi-do, Korea), 1 µl (10 pmol) of each primer, 5 µl of DNA template, and 3 µl of distilled water. Thermocycling (conducted in Bioer GeneTouch Thermal Cycler; Alpha Laboratories; Hampshire, UK) was performed as follow: 94°C for 4 minutes; followed by 30 cycles of 94°C for 45 seconds, 55°C
Table 1
Distribution of MRSA carriages among wards in Dr Soetomo Hospital, Surabaya, Indonesia, June to September, 2014.

<table>
<thead>
<tr>
<th>Ward</th>
<th>Number of patients screened</th>
<th>Number of MRSA carriage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical ward A(^1)</td>
<td>38</td>
<td>7 (18)</td>
</tr>
<tr>
<td>Surgical ward B(^2)</td>
<td>51</td>
<td>5 (10)</td>
</tr>
<tr>
<td>Surgical ward C(^3)</td>
<td>17</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Surgical ward D(^4)</td>
<td>27</td>
<td>1 (4)</td>
</tr>
<tr>
<td>Surgical ward E(^5)</td>
<td>67</td>
<td>6 (9)</td>
</tr>
<tr>
<td>Surgical ward G(^6)</td>
<td>74</td>
<td>5 (7)</td>
</tr>
<tr>
<td>Surgical ward H(^7)</td>
<td>42</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Female Internal Medicine ward(^8)</td>
<td>128</td>
<td>9 (7)</td>
</tr>
<tr>
<td>Male Internal Medicine ward(^1)</td>
<td>47</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Male Internal Medicine ward(^2,10)</td>
<td>56</td>
<td>6 (11)</td>
</tr>
<tr>
<td>Female Tropical Disease ward(^11)</td>
<td>61</td>
<td>6 (10)</td>
</tr>
<tr>
<td>Male Tropical Disease ward(^12)</td>
<td>35</td>
<td>2 (6)</td>
</tr>
<tr>
<td>Total</td>
<td>643</td>
<td>52 (8)</td>
</tr>
</tbody>
</table>

\(^1,2\)General elective surgery, \(^3\)elective surgery for mild classification, \(^4\)urology surgery, \(^5\)orthopedic surgery, \(^6,7\)post-operative from Emergency Department, \(^8\)mainly patients with diabetes mellitus, \(^9,10\)chronic diseases, such as hepatic disease/cirrhosis, \(^11,12\)also ward for hematology/oncology patients.

for 45 seconds, and 72\(^\circ\)C for 45 seconds; then one cycle of 72\(^\circ\)C for 10 minutes. Amplicon (533 bp) was detected by electrophoresis in 1.5% agarose gel (Sigma, St Louis, MO), staining with RedSafe\textsuperscript{TM} DNA Staining Solution (Intron) and visualization under UV illumination (Sage Creation, Beijing, China).

RESULTS

Among the 643 (279 males and 364 females) patients enrolled in the study (316 and 327 from the surgical and other medical ward, respectively), based on culture and presence of meca\(^A\) (data not shown) a total of 60 MRSA isolates (from 52 patients) were detected, 35 from nose (17 and 18 from surgical and medical ward, respectively); 25 from throat (11 and 14 from surgical and medical ward, respectively), and 16 from both nose and throat (4 and 12 from surgical and medical ward, respectively). There is no significant difference in MRSA colonization rate of patients on admission between surgical and medical wards (Table 1).

DISCUSSION

The MRSA carriage (8\%) among patients admitted to surgical and other medical wards of Dr Soetomo Hospital, Surabaya is as high as that previously reported among discharged patients from a teaching hospital in Malang (Santosaningsih \textit{et al}, 2014), a 16-fold increase since the first study in 2001 (Severin \textit{et al}, 2008). These results highlight the continuing high prevalence of MRSA among patients in hospitals in Indonesia. The fact that the MRSA carriages were detected prior to hospital admission would indicate that the infection was community acquired.
Among the patients on admission to Dr Soetomo Hospital, Surabaya with positive colonization of MRSA, 15% of the patients had colonization of either nose or throat, and so it is important that these two sites are swabbed simultaneously.

Huang et al (2007), in an analysis of community (CA, 26 isolates) and hospital (HA, 382 isolates) acquired MRSA stored between 1999 and 2005 at the National University of Taiwan, showed that PFGE-pulsotype C was identified in SSCmec V type of 10 CA and 4 HA MRSA. A study of the Emergency Intensive Care Unit (EICU) at a tertiary teaching hospital of Chonnam National University, Republic of Korea, showed that 129/282 (46%) patients are colonized with MRSA, 106 (82%) in throat and 48 (47%) in nares, and that infection rate of MRSA during stay in EICU rises to 19% compared with 3% upon admission (Jang et al, 2014). All the above facts show that patients without MRSA colonization on admission to hospital are at risk of acquiring MRSA infection during their hospital stay. Krishnamurthy et al (2014) showed that 9.2% of nursing students working in a hospital in the town of Tumkur in southern India between September 2010 and February 2012, harbor MRSA in either nose or throat, whereas those not daily contact with patients have a prevalence of 4%.

Evidences demonstrating higher prevalences of MRSA carriers in other countries indicate that MRSA infection may increase in Indonesia in the near future. The “Search and Destroy” strategy recently applied in Denmark may provide a good strategy for controlling MRSA infection in Indonesia as well (Bocher et al, 2010). Of course, the health policy and health management systems in Indonesia should anticipate this problem. Up to date information regarding the spread of MRSA among patients in hospitals is a requirement towards implantation of such a policy in Indonesia.

ACKNOWLEDGEMENTS

The authors thank the Director of Dr Soetomo Hospital, Surabaya, Indonesia who has facilitated our work and all staffs and nurses. We also gratefully acknowledge the contribution of young medical graduates of the Faculty of Medicine, Universitas Airlangga: Yanuar Ari Pratama, Tigor Sitorus and Ratna Kartika, for assistance in data collection. The research was supported by a grant from DIPA Universitas Airlangga 2014, Ministry of Education and Culture, Republic of Indonesia.

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