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Study on Methicillin – Resistant *Staphylococcus aureus* (MRSA) from dermatological specimens in Iraq

KEYWORDS: Methicillin, Resistant, Stapylococcus aureus, Dermatology

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ABSTRACT *In recent years, the increase in the number of Methicillin – resistant S. aureus (MRSA) has become a serious clinical and epidemiological problem. The early detection of methicillin resistance is of key importance in the prognosis and control of infections. In this study Disk diffusion method (oxacillin disc 1 µg) was used to screen MRSA from 476 swabs obtained from 238 patients from different sits of body. The results show that Out of 476 samples 135 (28.24%) were MRSA positive, of which 72 (15.12%), 26 (5.24%), 26 (5.24%) and 11 (2.31%) were from the abdomen, hands and legs, dorsal and groin and axilla respectively.*

Introduction

Staphylococcus aureus (S. aureus) species is commonly found on the skin and mucous membranes of healthy people. In addition to colonization, S. aureus may occasionally get into the body through breaks in the skin or indwelling catheters causing skin and soft tissue infections or more sever infections such as necrotizing pneumonia, sepsis and osteomyelitis which are usually seen in hospitals in patients with other comorbiditie.

Since the late of 1970, there has been a developing occurrence of hospital-acquired and community-acquired infections caused by staphylococcus aureus that are resistant to multiple antibiotics. Most of these resistant strains are methicillin – resistant S. aureus (MRSA) which has gained worldwide disrepute as a hospital superbug. In addition to methicillin, MRSA is resistant to as many as 20 different antimicrobial agents representing most of the available drug classes (1).

Methicillin is resistant of S. aureus which is caused by the acquirement of an exogenous gene, mecA, that encodes an additional B-lactam resistant pencillin – binding protein (PBP) called PBP 2a (2). The mecA gene is carried by mobile genetic elements designated staphylococcal cassette chromosome mec (sccmec), inserted near the chromosomal origin of replication (3). At least 7 sccmec types and several subtypes have been described (4, 5).

Infections with MRSA are a meticulous problem in hospitals. Some patients who harbour MRSA on their skin or nose may develop infections if the MRSA spread to other parts of the body (eg if MRSA spread from the colonised nose or skin to a wound), this results in a wide spectrum of infections, including skin and soft tissues infections, surgical site infections and catheter related infections. Individuals colonised with MRSA may also spread MRSA to other patients or hospital staff.

The potential impact of the infection with S. aureus on patients, hospitals and society is extremely significant. Such infections lead to increase morbidity and mortality, increase costs related to the control of the infection, spread of the infection, treatment and laboratory investigations, and also the length of hospital stay, in addition to other economical effects.

The control of MRSA is still an important factor in the provision of quality patient care. Screening every patient for MRSA at time of admission into hospitals is an important infection control policy. Infection control measures, including patient screening procedures for MRSA colonization, and increasing emphasis on appropriate hand – hygiene along with the use of appropriate personnel protective equipment, have reduced the clinical MRSA burden (6, 7). Patients in intensive care units who are not identified as MRSA positive on admission may remain as hidden reservoirs for cross transmission, until they are identified by regular culture methods. Culture-based detection of MRSA by traditional methods requires 48 – 96 hours for results (8, 9). IDI MRSA assay offers rapid identification of MRSA – colonized patients within 2hrs (10, 11|). The BD gene ohm MRSA Acp assay is currently approved by the United States food and drug administration (FAD) for detection of MRSA from nasal axilla and groin sites (12).

The objective of the present study is to detect colonized patients with MRSA by taking swabs from different sites of the body including; the abdomen, dorsal and groin, hands and legs and axilla at time of admission into; hospitals, outpatient clinics, private laboratory and general clinics in Iraq.

Materials and Methods:

This work has been carried out in private microbiology laboratory and Health and Medical technology College in Basrah, Iraq, from January 2013 to December 2013 . MRSAs were screened from 476 samples taken from 238 patients. Samples were taken from the abdomen, dorsal and groin, hands and legs and axilla by using sterile swabs. The swabs were immediately transported to the laboratory and immediately processed or kept at 4 C°.

The swabs were inoculated onto a blood agar and mannitol agar plate (Oxoid, UK). The cultures were incubated aerobically at 37 C° for 24 – 48 hours. Haemolytic colonies on blood agar were isolated and subcultured on other blood agar and identified as Staphylococcus aureus by standard procedures (Gram stain; Catalase, tube Coagulase test; coagulase plasma EDTA DIAGNOSTICS, UK).

To detect MRSA strains, suspected colonies were inoculated on a Mueller Hinton Agar (Oxoid, UK) and oxacillin disc (1 mg) was placed; the culture was then incubated aerobically at 37C° over for 24 hours and growth colonies were considered as oxacillin resistant (13).

Results and Discussion:

The results shown in Table 1 represent 476 samples from 238 patients. The specimens were obtained from the abdomen,

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hands and legs, dorsal and groin and axilla. The disk diffuse method was used to detect the Methicillin reistant Staphylococcus aureus (MRSA).There was an absence of a inhibition zone around oxacillin disk (1 mg), considered as Methicillin-sensitive Staphylococcus aureus (MSSA).

Out of 476 samples 135 (28.4%) were MRSA positive, of which 72 (15.12%), 26 (5.24%), 26 (5.24%) and 11 (2.31%) were from the abdomen, hands and legs, dorsal and groin and axilla respectively. These finding indicate that many patients harbour MRSA which can cause a particular problem in hospitals and the community.

Methicillin-resistant Staphylococcus aureus (MRSA) is a well known pathogen around the world, leading to serious illnesses with a high rate of morbidity and mortality. In recent years, people colonised with MRSA have become increasingly prevalent and this has shown a potentialaly negative clinical and economic impact on patients, hospitals and the community. Staphylococcus aureus infections, in particular, represent a substantial burden of resistant infections in the hospital. For these reasons, accuracy and promptness in the detection of methicillin resistance is of key importance in the prognosis of infections caused by S. aureus as well as control and isolation of MRSA in hospital environments, to avoid them spreading.

Different methods have been developed for detecting methicillin (oxacillin) resistant Staphylococcus aureus. These methods are varied in their specificity and sensitivity.

In this study we used the disk diffusion method which shows high number of MRSA (28.24%) among 476 specimens. The highest number of MRSA was from the abdominal site compared with other sites (Table 1).

Bartels et al (14) and Farley et al (17) used molecular and culture methods, to detect MRSA. However, their findings were less than predicted, Bartels et al 15.5% and Mathaip et al 21.6%. This may be because of the sensitivity and specificity values of the methods used which vary depending on the person carrying out the test and the techniques used. Different culture media used for the isolation of MRSA have shown a low sensitivity compared to molecular methods (15, 16). Nahimanaet et al used a chromogenic medium plate which showed a sensitivity value of 47.65% increasing to 79.95% when a broth enrichment medium was included (8).

In light of the above information, it can be stated that choosing the appropriate methods in regards to specificity and sensitivity and obtaining many samples rather than single swab are significantly important in developing the detection of MRSA. ,

Table 1. Methicillin Resistant Staphylococcus aureus (SA) assay using desk diffusion test.

	MRSA Positive		MRSA Negative	Total
Swabs sites				
Abdominal Swabs				
SA Positive	72	15.12%	31	103
SA Negative	-		55	55
Total	72		86	158
Dorsal and groin Swabs				
SA Positive	26	5.4%	40	66
SA Negative	-		24	26
Total	26		64	90
Hands and legs Swabs				
SA Positive	26	5.4%	33	59
SA Negative	-		77	77
Total	26		110	136
Axilla Swabs				
SA Positive	11	2.3%	18	29
SA Negative	-		63	63
Total	11		81	92
	135	28.4%	341	476

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