ORIGINAL ARTICLE

# Methicillin Resistant *Staphylococcus Aureus* (MRSA) Prevalence in a Tertiary Care Hospital Lahore

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## ABSTRACT

**Aim**To evaluate the prevalence of methicillin resistant *staphylococcus aureus*isolated from hospital patients, staff and settings.
**Study period:** June 2015 to August 2016
**Settings:** Department of pathology, Microbiology section, Continental Medical College Lahore, attached with Ch. Rehmat Ali Memorial Trust Teaching Hospital.
**Method:** 100 samples of coagulase positive staphylococcus aureus were isolated from hospital and were subjected to confirmation and susceptibility testing. OPD samples and samples from community settings were not included in this study.
**Results:** Out of theses 100 samples of coagulase staphylococci 39 were found to be methicillin resistant. The susceptibility of organisms to antibiotics was tested by disc diffusion method. Among these MRSA no organism was found resistant to vancomycin.
**Conclusion:**Strict and standard SOP should be adopted and implemented by hospital infection control team.
**Keywords:** Staphylococcus aureus, methicillin, vancomycin

## INTRODUCTION

Different types of infections are the result of *Staphylococcus aureus,* which may be mild skin infections to fatal ones that can claim patient's life[1].This organism can be colonized as normal flora or infectious to patients admitted in hospitals. It's worrisome that antibiotics, especially beta lactam drugs that were effective against *Staphylococcus aureus*are now proving ineffective due to emergence of MRSA strains[2].

The MRSA infections can be easily spread from person to person. It can spread through direct contact or though indirect contact with contaminated fomites. It not only infects human beings from causing simple skin infections to life threatening conditions. Even animals are not spare of its menace and its cause of infections in sheep and goat etc. A high prevalence has been reported in subcontinent, India and Pakistan. The peril of all this lies in *mec-A* gene acquired by *staphylococcus aureus*[3].

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Hospitalized patients that are colonized with MRSA strains and medical staff are the prime source of infection spread. This provides a rout for MRSA infection dissemination[4]. Potential factors that count for the MRSA spread are lengthen stay at hospital, irrational antibiotic prescription and use, inadequacy of information to staff as well as patients, drug abusers and different medical devices such as IV lines and catheters[5].

It's challenging to eliminate MRSA strains by virtue of their ability to be multidrug resistant, except gylcopeptides with only option available.[1]The resistance of organisms varies in different settings and a large number of factors affect it. Resistance pattern is different in different cities and hospitals[6,7].

It is hour of the need to know about the resistance pattern of MRSA strains for competent treatment of infections. The present study was designed to determine the prevalence of MRSA strains burden in our settings.

## MATERIALS AND METHODS

This study was conducted on MRSA samples that were collected from Rehamt Memorial Hospital which 500 beds teaching hospital and is attached with Continental hospital Lahore. A total 100 *staphylococcus aureus* samples were collected separately from total 3597 samples of blood, urine, pus, high vaginal swabs and sputum. The samples from groin, nose and axilla as well as from floor of

rooms, beds, tables of patients were also included in this study.

Theses samples were grown overnight on different media and growth was identified as *Staphylococcus aureus.* All isolates were identified on the basis of catalase test, fermentation of mannitol, slide coagulase test and tube coagulase test. The main criteria was tube coagulase method.[8] Tube coagulase test was performed by diluting rabbit plasma with normal saline. 2 to 3 colonies of overnight incubated culture were emulsified in 1 ml of diluted plasma taken in test tube. The reading were taken at 1, 2, 3 and 4 hours. If the samples were negative for tube test then these were further incubated overnight.

Kirby Bauer disc diffusion method was used to determine antibiotic sensitivity. The organism was laid as lawn on Muller Hinton agar plate and antibiotic discs of oxacillin and vancomycin were applied. After overnight incubation the zone diameters were measured according to CLSI guidelines[9]. ATCC stain 29213 was used as a reference strain. Only those coagulase positive *Staphylococcus aureus*were included in this study. Only those samples were included that were collected from hospitals and from admitted patients.Those organisms that were coagulase negative were excluded from the study. The samples received from OPD of from community were not included in this study.

**Sampling and examination of samples:** The organisms were isolate from different patient's samples for culture as well from samples of inanimate hospital objects. These organisms were further subjected to test their sensitivity against methicillin and vancomycin. Only those samples were retained for analysis that were coagulase positive. Their resistance against methicillin was determined using Muller Hinton agar by Kirby Bauer disc diffusion method. All results were evaluated according to CLSI guidelines.

**Statistical analysis:** The statistical analysis was done according to the CLSI standards. The results were presented as numbers and percentages in tabular form.

## RESULTS

A total 100 coagulase positive Staphylococcus aureus samples were included in this study. These organisms were from different sources which include patient samples as well as hospital inanimate objects. The highest number of samples collected were from surgery and lowest from axilla samples. The different types samples collected from different wards is shown in table 1.

The antibiotic sensitivity was done by Kirby Bauer disc diffusion method. It was done culturing organism on MH agar (Bio Rad) plates. Oxacillin discs were used to determine resistance to methicillin and vancomycin for VRSA detection. After overnight incubation the results were recorded according to CLSI guidelines. Out of 100 samples 39 were found to be methicillin resistant. No sample was found to be resistant to vancomycin. All were sensitive to vancomycin. This is shown in table-2 and table-3.

The results of above tables show that out of 100 samples 39 were positive for MRSA while no organism was found to be resistant to vancomycin.

Table1: Different samples from various sources

| Ward name | Pus | Urine | HVS | Blood | Drain tip | Sputum | Axilla of pts | Total |
|---|---|---|---|---|---|---|---|---|
| Medicine | 03 | 07 | - | 09 | 02 | - | 01 | 22 |
| Surgery | 17 | 05 | - | 03 | 11 | 01 | - | 37 |
| Paeds | 01 | 02 | - | 08 | 02 | - | - | 13 |
| Gynaecology | 03 | 11 | 03 | - | 02 | - | - | 19 |
| ENT | 02 | - | - | - | - | 01 | - | 03 |
| Chest ward | 01 | - | - | - | 02 | 03 | - | 06 |
| Total | 27 | 25 | 03 | 20 | 19 | 05 | 01 | 100 |

Table-2 MRSA and its percentage

| Total No. | MRSA | %age of MRSA | Non-MRSA | %age Non-MRSA |
|---|---|---|---|---|
| 100 | 39 | 39% | 61 | 61% |

Table-3 Showing sensitivity and resistance to vancomycin

| Total MRSA | No. of VRSA | No. of VSSA |
|---|---|---|
| 39 | 00 | 39 |

## DISCUSSION

The result of this study show that methicillin resistance of coagulase positive staphylococcus in samples collected from our hospital settings is high and worrisome. The results of study show that 39% of samples were resistant to methicillin. No organism was found resistant to vancomycin in this study. Methicillin resistance found in different hospitals in Pakistan was different. In Peshawar it was found to be 54%, in Rawalpindi 46%. It was found 44% in a study conducted in two Government hospitals of Kohat. The results of our study somewhat close to these studies. The main reason behind the resistance is improper use of antibiotics. No development of new antibiotics. *Staphylococcus aureus* is acquiring *mec-A* genes that is causing resistance to methicillin[10].

The variation between different studies is due to nature of different strains at different localities, hospital infection control strategies and other measures taken to control use of antibiotics. In a study conducted on hospital infections has reported very high prevalence of *staphylococcus aureus* resistance to methicillin. In this study 77% of all strains were resistant to methicillin.[11] In one study reported in Nepal the prevalence of MRSA was reported 40%. This study supports the results of our study.[1] In our study 100% MRSA were sensitive to vancomycin. However, physicians should be guided how to use on patients in hospital settings to avoid resistance.

## CONCLUSION

This study concludes that MRSA exist in our hospital settings. Strict and standard SOP should be adopted and implemented by hospital infection control team. Regular surveillance should be available and hospital staff should be educated and trained. MRSA testing should be done and vancomycin should be used wisely.

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