



A STUDY ON THE PREVALENCE OF METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) ISOLATES FROM VARIOUS CLINICAL SAMPLES IN TERTIARY CARE HOSPITAL

Microbiology

Dr. Dolly Solanki MD Microbiology

Dr. Madhulika Mistry

Associate Professor, in charge virology and molecular lab. PDU Medical College

ABSTRACT

Staphylococcus aureus is the most common cause of hospital and community acquired infections. The increasing prevalence of Methicillin Resistant *Staphylococcus aureus* (MRSA) has led to the widespread use of Vancomycin which in turn leads to the emergence of resistance to glycopeptides antibiotics. The health-care institutions face constant and evermore problems, because of MRSA. A Regular surveillance of hospital-associated infections is mandatory to minimize the emergence of this organism and its spread. Study concludes that implement appropriate diagnostic methodology for Isolating MRSA strains and also to ensure strict antibiotic policy in all the healthcare Institutions with precautionary measures before starting the patient on Vancomycin.

KEYWORDS:

INTRODUCTION

Methicillin resistant *Staphylococcus aureus* (MRSA) are a type of *Staphylococcus* or "staph" bacteria that are resistant to many antibiotics. Staph bacteria, like other kinds of bacteria normally live on the skin and in the nose, usually without causing problems. MRSA is different from other types of staph because it cannot be treated with certain antibiotics such as methicillin. Staph bacteria only become a problem when they cause infection. For some people, especially those who are weak or ill, these infections can become serious. MRSA infections are more difficult to treat than ordinary staph infections. This is because the strains of staph known as MRSA do not respond well to many common antibiotics used to kill bacteria.

When methicillin and other antibiotics do not kill the bacteria causing an infection, it becomes harder to get rid of the infection. MRSA bacteria are more likely to develop when antibiotics are used too often or are not used correctly. Given enough time, bacteria can change so that these antibiotics no longer work well. This is why MRSA and other antibiotic-resistant bacteria are sometimes called "super bugs." Methicillin-resistant *Staphylococcus aureus* (MRSA) were first reported in the early 1960's and are now regarded as a major hospital acquired pathogen worldwide. The term methicillin resistant is historically used to describe resistance to any of this class of antimicrobials.

Resistance occurs when the organism has a *mecA* gene producing an altered penicillin binding protein, PBP2a (also known as PBP2') and either an oxacillin MIC of 2mg/l or a methicillin MIC of 4mg/l. Infected and colonized patients are the reservoir of MRSA both in hospitals and the community with transmission generally being via contact with health workers. Effective, rapid laboratory diagnosis and susceptibility testing is critical in treating, managing and preventing MRSA infections. Attempts are frequently made to eradicate carriage of MRSA from either patients or medical staff colonized by this organism. However, clinical experience has shown that oropharyngeal carriage of MRSA can be difficult to eradicate [7].

AIM AND OBJECTIVE

- To know the prevalence of MRSA among hospitalized patients and to guide in minimizing the spread of systemic or deep MRSA infection.
- To know the Antibiotic Sensitivity Pattern of MRSA strain among our study population.

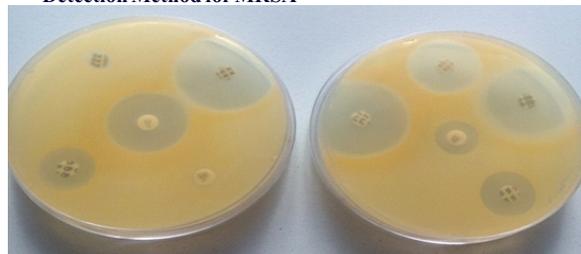
MATERIAL AND METHOD

This study was carried out on various clinical samples received for culture sensitivity from April to September 2016 in the Department of Microbiology in PDU Medical College, Rajkot. These collected samples were immediately transported to the microbiology laboratory and inoculated onto MacConkey agar and Blood agar, Nutrient agar.

These plates were incubated at 37°C for 24-48 h. Plates were observed for growth and a Gram smear was performed from different types of colonies. Gram reaction, colony morphology, pigment formation, catalase, coagulase, urease and oxidase tests were performed and allocated to appropriate genera to the isolates. The cultural characteristics including lactose fermentation on MacConkey agar and golden yellow colored colonies of *S. aureus* on Blood agar were noted.

All the confirmed *S. aureus* strains were subsequently tested for methicillin resistance based on Kirby-Bauer disk diffusion method on the basis of guidelines published by the Clinical and Laboratory Standards Institute (CLSI 2016).

Detection Method for MRSA



CLSI Zone Diameter Breakpoints for cefoxitin 30 ug Screen.

Species	Susceptible	Intermediate	Resistant
<i>S. aureus</i>	>22 mm	-	≤21 mm

- If the zone of inhibition was >22 mm in diameter, the isolate was considered as MSSA.
- If the zone of inhibition was ≤21 mm in diameter, the isolate was considered as MRSA.

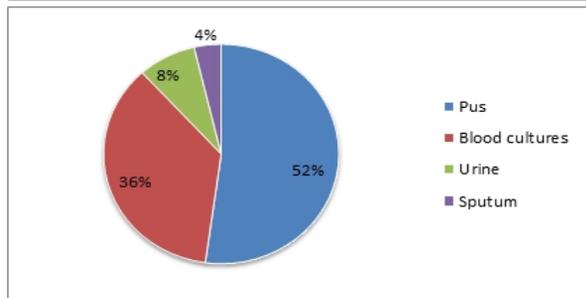
During Reporting MRSA

MRSA are considered resistant to other β-lactam agents, i.e. penicillin, β-lactam/β-lactam inhibitor combination, cephalosporins (with the exception of the cephalosporin with anti MRSA activity {Ceftibiprole, ceftaroline}), and carbapenem.

This is because MRSA infection responded poorly to β-lactam therapy. (CLSI 2016)

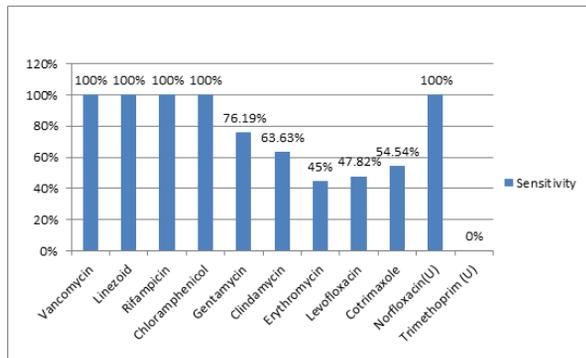
RESULTS

Out of Total 5,850 samples, Staphylococci were isolated from 173 samples. Of the 173 samples, 14.28% (25) of them were found to be methicillin resistant. MRSA were isolated in majority from Pus samples (52%), followed by blood cultures (36%), Urine (8%), and Sputum (3.7%).



6. Working Party Report, Revised guidelines for the control of methicillin-resistant *Staphylococcus aureus* infection in hospital, *J Hosp Infect*, 39, 253-290 (1998).

• **Antibiotic sensitivity pattern of MRSA**



All MRSA strains were sensitive 100 % to Vancomycin, Linezolid ,Rifampicin, Chloramphenicol and follow by Gentamycin(76.19%), Clindamycin(63.63%),Cotrimaxole(54.54).Erythromycin(45%),Levofloxacin(47.82).

DISCUSSION

In our study incidence of MRSA is 14.28%.All MRSA strains were sensitive 100 % to Vancomycin, Linezolid ,Rifampicin, Chloramphenicol and follow descending order to Gentamycin (7 6 . 1 9 %) , Clindamycin (6 3 . 6 3 %) , Cotrimaxole(54.54).Erythromycin(45%),Levofloxacin(47.82).

In India, the incidence of MRSA shows a large variation, from 6.9% to 81%. Some studies have reported comparable prevalences: 20.25% in Gujarat,[1] 54.8% in Uttar Pradesh,[2] 52.9% in Assam,[3] 80.89% in Indore,[4] and 19.56% in Nagpur.[5]

CONCLUSION

MRSA is a major nosocomial pathogen which causes significant morbidity and mortality in all health care levels. Infection control strategies should be applied strictly in tertiary-care hospitals such as

General measures:

Hand hygiene, Cleanliness, Proper disinfection, Use of contact precautions, Education and training of all health-care workers.

Specific measures:

Patient isolation, Eradication of MRSA carriage, Surveillance and screening of patients and health-care workers.

A regular surveillance of hospital-associated infection, including monitoring antibiotic sensitivity pattern of MRSA, is mandatory to control the spread in the hospital and strict drug policies are mandatory. The emergence of resistance to vancomycin is a threat to the already challenging therapy of MRSA. So Vancomycin use should be limited to those cases where they are clearly needed.

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