



## A CLINICAL PROFILE OF BACTEREMIA CASES DUE TO METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS – HOSPITAL BASED PROSPECTIVE STUDY.

### General Medicine

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### ABSTRACT

**Introduction :** Bacteremia caused by staphylococcus aureus continues to be a common problem worldwide. In the pre-antibiotic era, most cases occurred in young patients without underlying disease. The associated death rate was 82% even with antimicrobial drug treatment. Staphylococcus aureus is present in the nose (usually temporarily) of about 30% of healthy adults and on the skin of about 20%. The percentages are higher for people who are patients in a hospital or who work there.

**Materials and Methods :** A hospital based prospective study where total of 100 blood samples of patients that were received at microbiological laboratory are included by random sampling. The clinical profile of MRSA has been studied.

**Results :** Of the 100 samples , 38 blood samples turned to be positive for MRSA with the common comorbidity associated was diabetes mellitus and most of the cases were from the post-operative wards. The common complication was sepsis. Among the tested groups of antibiotics, MRSA was maximally sensitive to 3rd generation cephalosporins(47.3%).

**Conclusion :** The most common hospital acquired infection especially in the post operative wards is staphylococcus aureus. So adequate precautions should necessarily be taken to prevent cross infection among patients against this dreaded organism. The geographical pattern of sensitivity to various antibiotics will help us to initiate treatment empirically when suspected before the blood culture reports and available.

### KEYWORDS

#### INTRODUCTION

Bacteremia caused by staphylococcus aureus continues to be a common problem worldwide. In the pre-antibiotic era, most cases occurred in young patients without underlying disease. The associated death rate was 82%<sup>1</sup>. even with antimicrobial drug treatment , death rate remains high; in a recent meta-analysis of 31 studies , estimates of death rates for methicillin – resistant strains (MRSA) varied from 0.0% to 83.3% (median 34.2%), while those for methicillin sensitive strains (MSSA) varied from 3.6% to 51.7% (median 25%)<sup>2</sup>. Many of these infections are healthcare associated and thus are potentially preventable. Antimicrobial resistance in S.aureus arose early after the development of anti-microbial agents and continues to evolve. In Australia , hospital strains are frequently methicillin resistant and resistant to several other antimicrobials<sup>3</sup>. This resistance limits the potentially efficacious agents and results in frequent use of glycopeptides such as vancomycin. The reliance on vancomycin cause difficulties because vancomycin has been shown to be less effective than isoxazolyl penicillins (ex: flucloxacillin) in treating sever infections caused by S.aureus<sup>4</sup>. this may explain for the higher death rate associated with bacteremia caused by MRSA , compared with that caused by MSSA<sup>2</sup>. Although MRSA tends to be the bacterium discussed most often in relation to health care associated infections, MSSA strains are responsible for the largest proportion of hospital acquired infections<sup>3</sup>. S.aureus remains the common cause of bloodstream infections of community onset. Certain populations are at greater risk of invasive staphylococci infection than normal population. They are represented by hemodialysis, peritoneal dialysis, IV drug abusers, diabetes mellitus and alcohol abusers<sup>5</sup>. organism have developed resistance virtually to all antibiotic classes which include aminoglycosides, tetracyclines, cotrimoxazole, quinolones, oxazolidinones. Hence this knowledge of risk factors and resistance pattern in a geographical area will help us to guide appropriate and judicious antibiotic use.

#### AIMS :

- 1) To study the prevalence of staphylococcus bacteremia
- 2) To study the antibiotic sensitivity pattern
- 3) To study the risk factors associated with MRSA

#### MATERIALS AND METHODS:

A hospital based prospective study ,conducted in AJIMS&RC, Mangalore where blood samples of the sepsis patients were collected according to the standard precautions. A total of 100 patients were included in the study, where the samples was from January 2018 to june 2018. Data was recorded using a semi-structured performa and then compiled to the Microsoft excel. Statistical package SPSS ver

11.5 was used to do the analysis. X<sup>2</sup>test was used to find the association and p>0.05 was considered as significant.

#### RESULTS

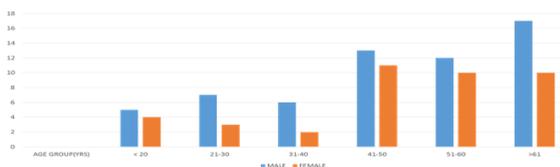
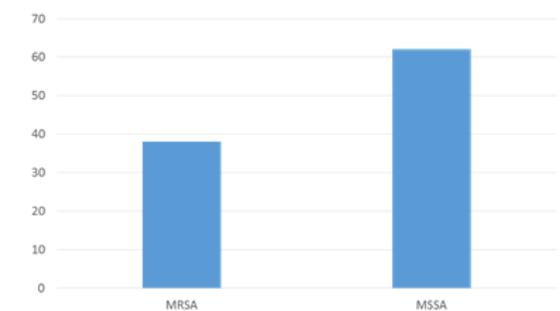


FIG 1 : Gender Distribution In Different Age Groups



The majority of patients were elderly , more than 60 years.

FIG 2: patients in MRSA and MSSA groups

38 isolates were MRSA and 62 of the patients blood culture revealed MSSA organisms.

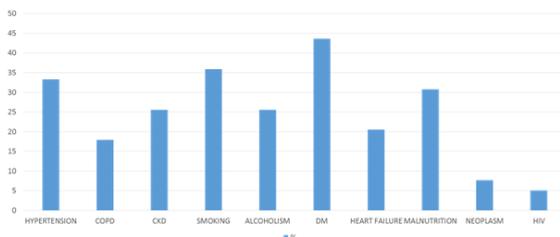


FIG 3 : comorbidities associated with MRSA bacteremia

Majority of them had diabetes mellitus as a major comorbidity among MRSA bacteremia(43.6%).

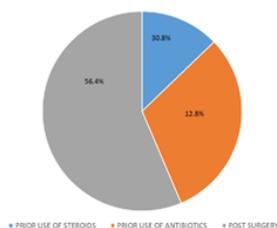


FIG 4 : Prior clinical history in patients

56.4% of the patients acquired the infection in the post-operative period which suggests that staphylococcus is an important organism in the post operative wards.

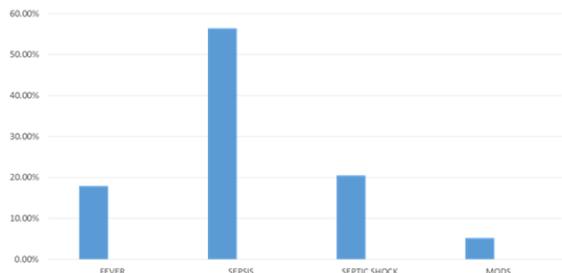


FIG 5 : complications in MRSA :

It is seen that majority of cases with MRSA developed sepsis(56.4%)

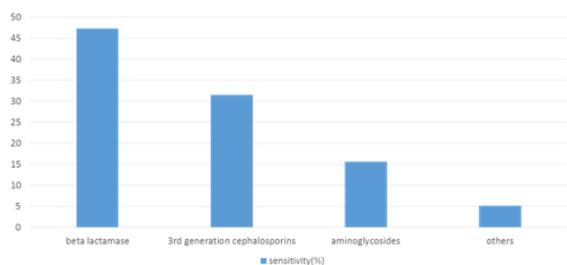


FIG 6 : Sensitivity pattern of MRSA to different group of antibiotics

Among the tested group of antibiotics in the study , it has been observed that the sensitivity of MRSA was 31.5% to beta lactamase, 47.3% to third generation cephalosporins and 15.7% to aminoglycosides.

**DISCUSSION**

The clinical severity and outcomes of S. aureus infection in a given individual is likely to be dedicated by a complex interplay between host and pathogen. The study of bacterial pathogenesis is further complicated by the heterogeneity of S. aureus. The genetic complement of MRSA isolates, particularly the accessory genes, may produce a more virulent phenotype in a case of catheter associated bacteremia.

Initially, penicillin was the drug of choice for S. aureus bacteremia but after several years it developed resistance to penicillin by its protein transformation, which lead into emergence of Methicillin, but presently Methicillin resistant strain threat to the human. Out of 100 cases which were included in our study, about 38% of the S. aureus was Methicillin sensitive, which is in proximity to the study done by Fowler, Amrta justice, Benjamin, Woods, Steven Cambell, Ralph Corey, et al under the title, “Risk factors for Hematogenous complication and Intravascular catheter associated Staphylococcus aureus bacteremia”.

This study, also presents the outcome of one of the largest series of patients with co morbid conditions affected with S.aureus bacteremia. The prevalence of the s.aureus bacteremia is maximum in patients belonging to more than 60 years of age group (27%), which is close proximity to the study done by Isabal, Albesto, Ricando, Yerid, Wigo,

Patricia, under the title, “Risk factors for Mortality caused by S.aureus bateremia in cancer patient”.

Clinical history in both MRSA and MSSA is in very high correlation with that of prior surgery (56.4%) which clearly implies that staphylococcal infection is mainly Iatrogenic, followed by prior use of antibiotics. Staphylococcal group of organisms develops resistance to the various groups of antibiotics very rapidly because of its erratic use in the hospitals. This is in positive correlation with that of the study done by Collington, Nimmo, Thomas, Loin B. Gosbell under the title “Staph aureus bacteremia”.

A similar situation is evident in Denmark, where in 2002, atleast 59% of all the S. aureus infections were associated with health care procedures. Staph. aureus bacteremia is a very serious infection hazardous complications which include fever, sepsis, septic shock, and multi organ dysfunction. In our study, sepsis was the most important complication owing to about 56.4%, followed by septic shock (20.5%), fever (17.90 %), and multi-organ dysfunction (5.2%). It is also worth noted that sepsis was the most important complication that is shared by both MRSA .

Also, in our study it is observed that the sensitivity was 31.5% to beta lactamase and 15.7% to aminoglycosides. This gives a rough idea for the physicians about the therapeutic efficacy of these drugs against Staph. aureus bacteremia. 3rd generation cephalosporins were the drugs of choice for many types of bacterial infection including Staph. aureus associated bacteremia. The sensitivity pattern of MRSA to this drug is 47.3% which is evident in our study.

**CONCLUSION :**

From the above mentioned three groups of drugs, aminoglycosides have an upper hand among the other two that is evident from our study. Judicious use of these drugs may be helpful in reducing the mortality rates due to staph aureus bacteremia. The management of bacteremia caused by it is a growing challenge, as the rates of this infection continue to rise globally.

S.aureus infections were associated with health care procedures. Clearly, substantial scope exists internationally for intervention in health-care setting to decrease the number of those episodes. Interventions to reduce S.aureus bacteremia need to target health care associated infusion in the broadest sense and include those following non –inpatient related medical procedures.

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