

Prevalence of MRSA and its susceptibility pattern among various clinical samples in our tertiary care hospital.

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Abstract

Background: *Staphylococcus aureus* is a normal habitant of skin & mucous membrane. But when it enters into enter into body through cuts, incision, abrasion, injuries, burns, catheters and causes various pyogenic infections. Antibiotic resistance among bacteria is of great public health burden leads to increased stay and cost for the treatment and again added with hospital acquired infections makes the scenario worrisome. **Materials and method:** Various clinical samples were collected from patients attending our hospital and transported to lab immediately and processed as per standard protocol using grams staining, culture and biochemical reactions for *Staphylococci*. All the *Staphylococcus aureus* isolates were subjected for antibiotic susceptibility testing as per CLSI guidelines.

Results and discussion: A total of 143 *S. aureus* isolates were isolated from various clinical samples. Of them 46 [32.2%] isolates were MRSA and 97 [67.8%] were MSSA. Pus was the predominant sample of isolation of *S. aureus*. Vancomycin and Linezolid were 100% sensitive for MRSA and Predominant resistance was observed for Penicillin, gentamycin, ciprofloxacin and amikacin. **Conclusion:** As antibiotic susceptibility varies with different area, treatment of MRSA should be properly guided by antibiotic susceptibility report. Vancomycin and Linezolid can be used as reserve drug for MRSA infections

Key words: *Staphylococcus aureus*, MRSA, antibiogram.

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I. Introduction

Staphylococcus aureus, though normal habitants of skin and mucous membrane, important cause of surgical site infections, blood stream infections, skin and soft tissue infections, osteomyelitis, device associated infections, respiratory and urinary tract infections in human beings. (Trivedi *et al.*)

Changes in the antibiotic susceptibility, makes them less effective against *Staphylococcus aureus* infections and difficult to treat. Reduced sensitivity to beta lactum antibiotic is reported globally. Methicillin resistance is due to acquisition of *mecA* gene which causes alteration in penicillin binding protein 2a [PBP2a] and less affinity for beta lactum antibiotics. Infections caused by Methicillin Resistant *Staphylococcus aureus* [MRSA] has poor prognosis and cause burden in health care system. (Hamid *et al.*)

According to data published by WHO in 2014, it showed greater than 80% of *Staphylococcus aureus* infections having MRSA. (World Health Organization. Antimicrobial Resistance: April 2014)

This study was taken to estimate the prevalence of MRSA and its susceptibility pattern for other antibiotics among various clinical samples in our hospital.

II. Materials And Method

This study was conducted at microbiology department, Villupuram Medical College, Villupuram. Study period was from January 2019- June 2019. Various clinical samples were collected from patients attending our hospital with all aseptic precautions and transported to lab immediately and processed as per standard protocol using grams staining, culture and biochemical reactions for *Staphylococci*. All the *Staphylococcus aureus* isolates were subjected for antibiotic susceptibility testing as per CLSI guidelines. The following antibiotics were used: penicillin, amoxycillin, amoxiclav, gentamycin, amikacin, erythromycin, cotrimoxazole, vancomycin, ciprofloxacin. All *S. aureus* were screened for MRSA using cefoxitin disc (30µg) as per CLSI recommended disc diffusion method. 0.5 Mc Farland standard inoculum of *Staphylococcus aureus*

were inoculated on Muller Hinton agar and Cefoxitin disc was placed on it and plates were incubated at 35° c for 18 hrs. Zone diameter of ≤ 21 mm was considered as methicillin resistance and ≥22 mm was reported as sensitive.(Bailey & Scott, Mackie, CLSI)

III. Results

A total of 143 *S. aureus* isolates were isolated from various clinical samples. Of them 46 [32.2%] isolates were MRSA and 97 [67.8%] were MSSA. Pus was the predominant sample of isolation of *S.aureus*. Vancomycin and Linezolid were 100% sensitive for MRSA and Predominant resistance was observed for Penicillin, gentamycin, ciprofloxacin and amikacin.

Table -1 : Distribution of *Staphylococcus aureus* and sample

| N=143 | Numbers | Percentage |
|------------------|---------|------------|
| Pus | 110 | 77 |
| Sputum | 22 | 15 |
| Blood | 4 | 03 |
| Urine | 4 | 03 |
| Peritoneal fluid | 1 | 0.7 |
| Synovial fluid | 2 | 1.3 |
| | 143 | 100 |

Table-2 : Antibiotic susceptibility pattern of MRSA

| N=46 | Number of Sensitive isolates | Percentage | Number of resistant isolates | Percentage |
|---------------|------------------------------|------------|------------------------------|------------|
| Penicillin | 1 | 2 (%) | 45 | 98(%) |
| Gentamycin | 16 | 34(%) | 30 | 66(%) |
| Ciprofloxacin | 16 | 34(%) | 30 | 66(%) |
| Amikacin | 22 | 48(%) | 24 | 52(%) |
| Amoxiclav | 27 | 58(%) | 19 | 42(%) |
| Erythromycin | 33 | 72(%) | 13 | 28(%) |
| Cotrimoxazole | 39 | 85(%) | 7 | 15(%) |
| Vancomycin | 46 | 100(%) | 0 | 0 |
| Linezolid | 46 | 100(%) | 0 | 0 |

IV. Discussion

Staphylococcus aureus cause wide range of infections from minor skin lesions to life threatening infections and resistance among them limits the therapeutic option and become matter of concern.

In our study, pus was the predominant sample of isolation of *Staphylococcus aureus* [77%], which is followed by sputum [15%].(Jyothshna *et al*) reported similar findings. *S.aureus* resides as normal commensal of skin and can enter into body through cuts, incision, abrasion, injuries, burns , catheters and causes various pyogenic infections.(Shakiet *al*, Dilsenaet *al*)

Antibiotic resistance among bacteria is of great public health burden leads to increased stay and cost for the treatment and again added with hospital acquired infections makes the scenario worrisome. The prevalence of MRSA is not uniform globally and great variation in the prevalence has been noted throughout the world could be due to the extensive use of beta-lactam group of antibiotics to treat bacterial infections.

Of the 143 *Staphylococcus aureus*, 32.2% were MRSA. Similar observations were reported by (Harshan *et al*). Varying high rates of resistance 47.5 % , 54.9% , were noted in the study of (Sathish *et al*, Khadri *et al*). A very high rate of MRSA 70.64% ,80.89 % were isolated and reported by (Jyothshna *et al*, Verma *et al*).

The different pattern and rates were evident in many studies worldwide could be attributed to variations in patient populations, sample size, laboratory procedures and infection control measures and practices in that hospital and the biological nature of particular strain. Increase in resistance over the years are due to wide use of antibiotics, availability of drugs over the counter without specific laboratory antibiogram guidance and improper use.

All MRSA isolates were susceptible to Vancomycin & linezolid. This is concordant with Abbas et al & Sathish et al.,85 % , 72 % , & 58% sensitivity was observed for Cotrimoxazole, Erythromycin& Amoxyclav respectively.

Predominant resistance was observed for Penicillin, gentamycin, ciprofloxacin and amikacin. The raised resistance rates to antimicrobial agents are due to indiscriminate & inappropriate widespread use of antibiotics and poor compliance with infection control practices which facilitates the transmission of resistance.

V. Conclusion

As antibiotic susceptibility varies with different area, treatment of MRSA should be properly guided by antibiotic susceptibility report. Based on this, formulation & implementation of antibiotic policy, judicious use and enforced standard infection control precaution helps to control the antibiotic resistance. Vancomycin and Linezolid can be used as reserve drug for MRSA infections.

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