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PREVALENCE AND ANTIMICROBIAL RESISTANCE PATTERNS OF METHICILLIN RESISTANT STAPHYLOCOCCI IN VARIOUS CLINICAL SAMPLES AT A TERTIARY CARE CENTRE IN HYDERABAD

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ABSTRACT

Background: Prevalence of MRSA and MRCONS has been constantly increasing over decades. This study has been done to compare prevalence of MRSA and MRCONS in various clinical samples and its isolation rates from various departments to frame an epidemiologic data helpful for empirical therapy. And also to compare MRSA and MRCONS antibiotic susceptibility patterns. **Materials and Methods:** Present study was undertaken at Department of Microbiology at Osmania General Hospital in south India from January 2020 to December 2022 all the clinical samples collected with aseptic precautions were processed as per standard protocol .All clinically significant staphylococcus isolates cultured were subjected to antimicrobial susceptibility testing as per CLSI guidelines. Screening for methicillin resistance was done by CLSI recommended cefoxitin disc (30ug) method. **Results:** The prevalence of MRSA according to our study was 63% and that of MRCONS is 71%. Highest isolation being from pus samples, and from surgical department. **Conclusion:** Regular surveillance of methicillin resistance and antibiogram formation is important to combat increasing prevalence.

KEYWORDS: Methicillin resistant staphylococcus aureus, Methicillin resistant coagulase negative Staphylococci, Cefoxitin.

INTRODUCTION

Methicillin-resistant *Staphylococcal* strains , emerged in the last decade as a cause of nosocomial infections responsible for rapidly progressive, potential fatal diseases including life-threatening pneumonia, necrotizing fasciitis, endocarditis, osteomyelitis, severe sepsis, and toxinoses such as toxic shock syndrome.[1]

A multifactorial range of independent risk factors have been reported in literature and include immunosuppression, hemodialysis peripheral malperfusion, advanced age, extended in-hospital stays, residency in long-term care facilities (LTCFs), inadequacy of antimicrobial therapy, indwelling devices, insulin-requiring diabetes, and decubitus ulcers, among others.[1,2]

Methicillin resistant staphylococci are resistant to methicillin, oxacillin, penicillin and amoxicillin due to altered PBP due to chromosomally coded mec A gene. Vancomycin is the drug of choice for methicillin resistant staphylococci.[3] Methicillin resitance is an emerging threat due to increasing rates seen over last few decades. Thus there is need for regular surveillance of Methicillin resistant Staphylococci and there drug resistance patterns.[4]

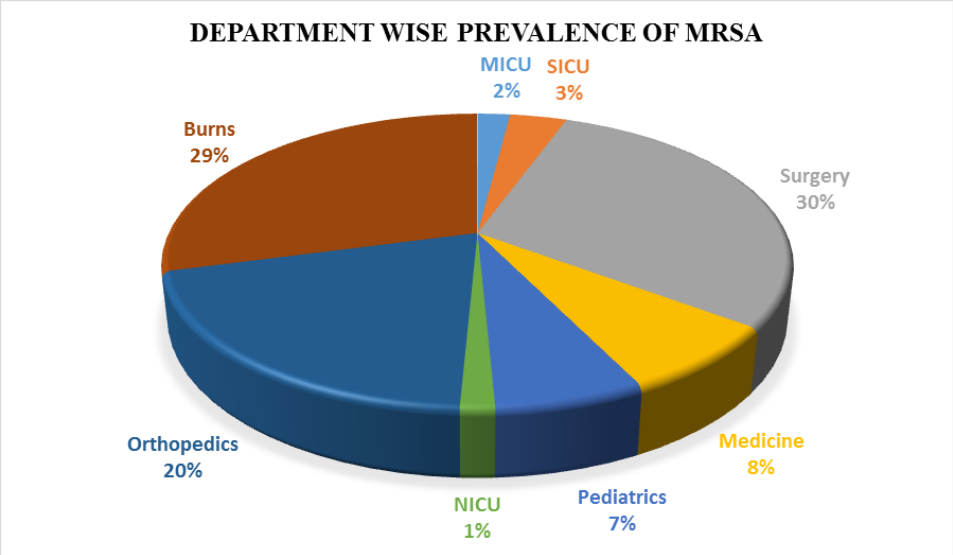
MATERIALS AND METHODS

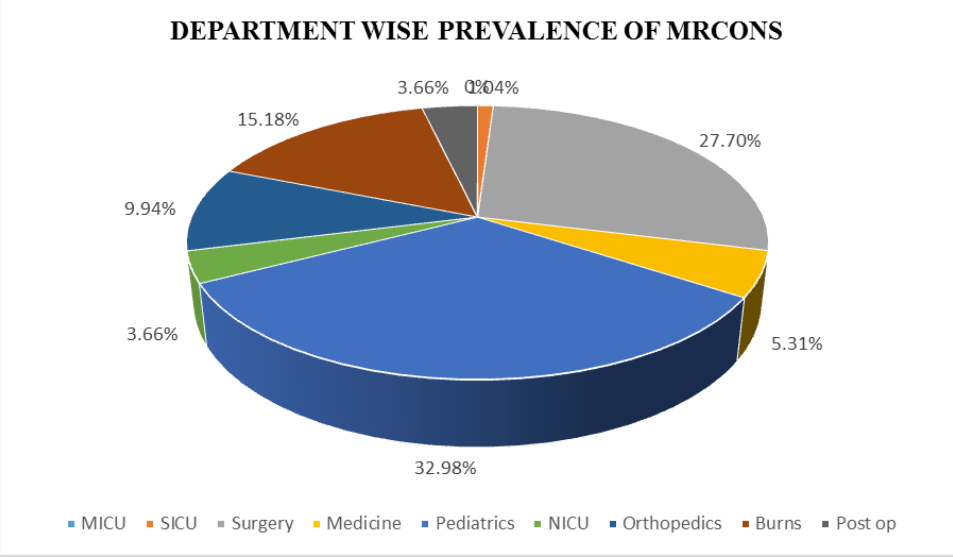
This is study was done at Osmania General Hospital in Hyderabad from January 2020 to December 2022. The study population involved outpatient and inpatient (including Intensive Care Units).

Using standard precautions different samples from the various departments of the hospital were collected and transported to the microbiology laboratory for the isolation and susceptibility testing. The antibiotic susceptibility testing was performed by the Kirby Bauer's disc diffusion technique, using Clinical and Laboratory Standards Institute (CLSI) recommendations.[5,6] Cefoxitin (30 µg) was used for methicillin resistance. The other antibiotics tested included Amoxyclav 30 µg gentamicin (10 µg), co-trimoxazole (1.25/23.75 µg), ciprofloxacin (5 µg), erythromycin (15 µg), clindamycin (2 µg), vancomycin (30 µg) and linezolid (30 µg). Inoculum was prepared by making a direct saline suspension of isolated colonies selected from an 18- to 24-h blood agar plate. Turbidity

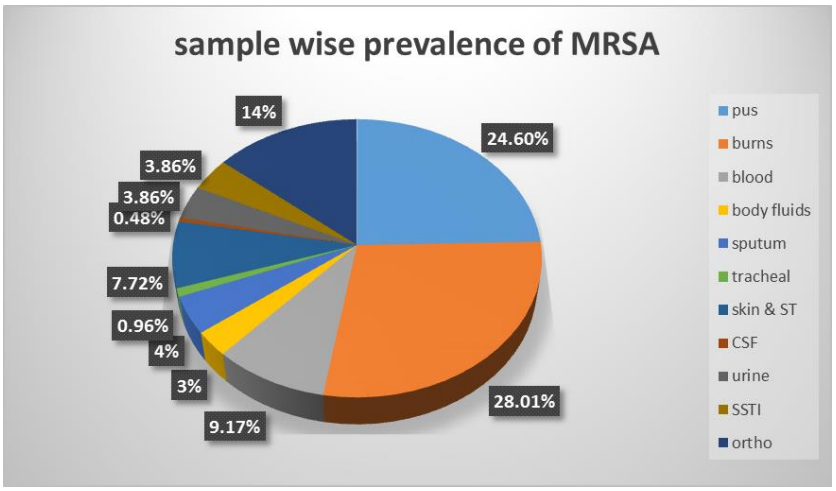
of the suspension was adjusted to achieve a turbidity equivalent to a 0.5 McFarland standard and five discs were applied on a 100mm Mueller Hinton agar plate as per CLSI guidelines .The following information age, gender, specimen, source of referral (Outpatient, inpatient, IUC), along with the antibiotic susceptibility data was collected in a structured excel sheet. Definitions According to CLSI guidelines MSSA– zone diameter ≥ 22 using cefoxitin (30µg) disc, Kirby Bauer's disc diffusion technique MRSA– zone diameter ≤ 21 using ,MSCONS – zone diameter ≥ 25 , MRCONS zone diameter ≤ 24 using cefoxitin (30µg) disc.

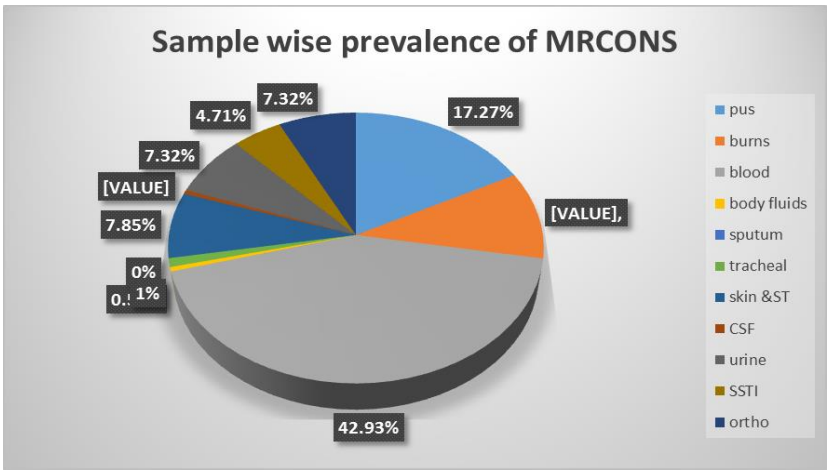
TOTAL S. aureus(n=308) CONS=176	MSSA(120)	MRSA (207)	MSCONS(75)	MRCONS(191)
MICU	4	4	0	0
SICU	3	7	1	2
Surgery	44	59	34	53
Medicine	12	15	5	11
Pediatrics	2	13	17	63
NICU	1	3	3	7
Orthopedics	19	40	6	19
burns	26	58	5	29
Post-operative	9	8	4	7



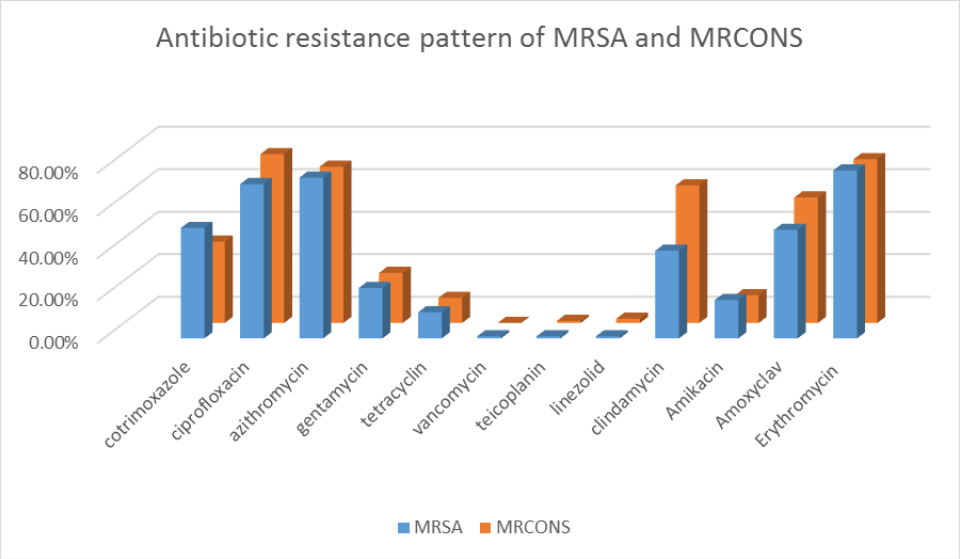


SPECIMEN	MSSA (120)	MRSA(207)	MSCONS(75)	MRCONS(191)
Pus from abscess	51	51	30	33
Burns wound	26	58	6	20
Blood	12	19	16	82
Body fluids	1	6	1	1
Sputum	1	9	0	0
Tracheal aspirate	1	2	0	2
Skin and soft tissue	7	16	11	15
CSF	0	1	1	1
Urine	2	8	3	14
Surgical wound swab	0	8	3	9
Orthopedics	19	29	3	14





ANTIBIOTIC	MSSA% R	MRSA% R	MSCONS %	MRCONS %R
Co trimoxazole	41%	51.9%	23%	38.2%
Ciprofloxacin	34%	72.5%	45%	79.41%
Azithromycin	56%	75.57%	34%	73.5%
Gentamycin	14%	23.66%	12%	23.52%
Tetracycline	0%	12.21%	0%	11.76%
Vancomycin	0%	0%	0%	0%
Teicoplanin	0%	0%	0%	0%
linezolid	0%	0%	0%	0%
Clindamycin	13%	41.22%	34%	64.70%
Amikacin	0%	18%	0%	13%
Amoxyclav	23%	51%	21%	59%
Erythromycin	56%	79%	45%	77%



DISCUSSION

The prevalence of MRSA in was 14 -76% in various studies in last decade from India.[7,8] Our study showed higher MRSA Prevalence of 63%. Shresta et al in there study reported 58% of MRCONS,[12] our study showed a higher prevalence of 71%. Most of the MRSA were isolated from surgical department 30%,, followed by burns cases 29% coming to sample wise prevalence most of MRSA were from burns wound 29%, pus samples 24%.

MRCONS were maximum from pediatric department 33% and from blood samples 43%. Overall methicillin resistant strains showed higher resistance than methicillin sensitive strains, Amikacin showed good sensitivity (82% MRSA, 87% MRCONS) followed by Gentamycin (76% both MRSA & MRCONS),similarly Ahmed et al reported 93% sensitivity to amikacin in their study [13] increased Cotrimoxazole (52%MRSA & 38% MRCONS) and Amoxyclav (49%MRSA & 41% MRCONS) resistance noted was of concern , There was no resistance documented against Teicoplanin, Vancomycin and linezolid . [9] Tetracyclin showed good sensitivity for both MRSA and MRCONS. MDR isolated were mostly resistant to Erythromycin, clindamycin & Ciprofloxacin.

CONCLUSION

Raising prevalence of methicillin resistant staphylococci especially MRCONS needs regular surveillance, antibiograms and maintainance of antibiotic stewardship to combat threat of raising multidrug resistance. CONS unlike in previous decades is gaining pathogenic potential and MRCONS prevalence is rapidly increasing.

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