

**METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS*
(MRSA) IN CLINICAL SAMPLES AND NASAL
SCREENING FOR MRSA CARRIAGE AMONG HEALTHY
CARRIERS IN HOSPITAL SETTING**

A

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of Master of Science in Microbiology**

(Medical Microbiology)

By

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ABSTRACT

Staphylococcus aureus is a Gram positive bacterium responsible for several bacterial infections. Antimicrobial resistance of *S. aureus* especially methicillin-resistant *S. aureus* (MRSA), usually resistant to several antibiotics is a global public health problem, associated with considerable mortality and morbidity. This study investigated the susceptibility pattern of *S. aureus* isolates from various clinical samples and nasal swabs in the Shree Birendra hospital, Kathmandu. In addition, characterization of Methicillin-sensitive *S. aureus* (MSSA) and MRSA were reported to determine the current prevalence of MRSA as well as nasal carrier rate among hospital staffs and patient visitors. Characterization and identification of *S. aureus* was confirmed by microbiological methods and antimicrobial susceptibility testing was performed by Kirby-Bauer disc diffusion method. A total of 138 *S. aureus* were isolated from various clinical samples. Among isolates, 18.1% were found to be MRSA. Similarly 25.0% and 18.0% *S. aureus* nasal carrier rate was found among health personnel and patient visitors respectively. No MRSA was found among positive isolates from healthy carriers. The higher MRSA was isolated from inpatient setting. Among MSSA isolates from clinical samples, 60.2% (68/113) were multidrug-resistant (MDR) while among MRSA isolates, more than 90.0% were MDR. In case of nasal isolates from health personnel, only 32.0% (8/25) were MDR strains. Gentamicin was found to be more effective against MSSA with 93.6% sensitivity. More than 50.0% of MRSA strains from clinical samples were resistant to all antibiotics used except Vancomycin. Isolates of both clinical samples and nasal swabs showed highest resistance towards penicillin. In view of the high resistance rates of MRSA to Gentamicin, Erythromycin, Ciprofloxacin and Cotrimoxazole, treatment of MRSA infections with these antibacterial agents would be unreliable. MRSA infections are still one of the most threatening infections in the hospitals. Therefore, regular surveillance of MRSA related infections including monitoring of antimicrobial susceptibility pattern of MRSA and formulation of a definite antimicrobial policy may be helpful for reducing MRSA prevalence in hospital setting. In addition, improvement of hygiene standards in hospitals among personnel and visitors will help to prevent *S. aureus* and MRSA transmission.

Key words: *S. aureus*, MSSA, MRSA, nasal healthy carriers, MDR, Shree Birendra hospital

TABLE OF CONTENTS

No.	Page
Title page	i
Recommendation	ii
Certificate of approval	iii
Board of examiners	iv
Acknowledgements	v
Abstract	vi
Table of contents	vii
List of tables	xi
List of figures	xii
List of photographs	xiii
List of appendices	xiv
List of abbreviations	xv-xvi
CHAPTER- I: INTRODUCTION	1
CHAPTER-II: OBJECTIVES	4
2.1 General objective	
2.2 Specific objectives	
CHAPTER-III: LITERATURE REVIEW	5
3.1 <i>Staphylococcus</i>	5
3.2 Characteristics of <i>S. aureus</i>	5
3.2.1 Cultural characteristics	5
3.2.2 Biochemical characteristics	6
3.3 Virulence factors and pathogenesis	7

3.3.1 Cell wall associated factors	7
3.3.2 Cell surface proteins	7
3.3.3 Microcapsule	8
3.3.4 Exoproteins	8
3.3.5 Super- antigen proteins	8
3.3.6 Extracellular enzymes	9
3.4 Human diseases caused by Staphylococcal infections	10
3.4.1 Localized skin infections	10
3.4.2 Disease due to organ invasion	11
3.4.3 Disease caused by exotoxin release	12
3.5 Methicillin-resistant <i>S. aureus</i> (MRSA)	13
3.5.1 Mechanism of resistance	14
3.6 Hospital-acquired MRSA (HA-MRSA)	15
3.6.1 Prevalence of MRSA in the hospitals	16
3.7 Community-acquired MRSA (CA-MRSA)	18
3.7.1 Prevalence of MRSA in the community	20
3.8 Glycopeptide intermediate resistant <i>S. aureus</i> (GISA)	21
3.9 Nasal Carriage of <i>S. aureus</i> and MRSA	22
3.9.1. Assessment of Nasal Colonization	25
3.10 Sources and transmission of MRSA	25
3.11 Infection control for MRSA	26
3.12 Resistance and treatment	26
CHAPTER-IV: MATERIALS AND METHODS	28
4.1 Materials	28
4.2 Sample size and types	28

4.3 Questionnaire sheet and sample collection protocol	28
4.4 Sample collection	29
4.4.1 Sample transportation	29
4.4.2 Sample processing	29
4.5 Bacteriological identification of <i>S. aureus</i>	30
4.5.1 Sub-culture on NA	30
4.6 Antibiotic Susceptibility Testing	30
4.7 Quality control for the tests	31
4.8 Data analysis	31
CHAPTER-V: RESULTS	33
5.1 Clinical samples	33
5.1.1 Distribution of <i>S. aureus</i> in the samples	33
5.1.2 Distribution of <i>S. aureus</i> among outpatients and inpatients	33
5.1.3 Antibiotic susceptibility pattern of <i>S. aureus</i> isolates	34
5.1.4 Comparison of <i>S. aureus</i> isolates and MRSA strains isolated from different clinical samples	35
5.1.5 Distribution of MRSA in outpatients and inpatients	35
5.1.6 Antibiotic susceptibility pattern shown by MSSA and MRSA	36
5.1.7 Multi- drug resistant (MDR) <i>S. aureus</i> isolates	37
5.2 Nasal swabs from health personnel	38
5.2.1 Sex wise nasal carriage of <i>S. aureus</i> among health personnel	38
5.2.2 Age wise nasal carrier of <i>S. aureus</i>	38
5.2.3 Occupation–wise nasal carrier of <i>S. aureus</i>	39
5.2.4 Ward wise distribution of <i>S. aureus</i>	40
5.2.5 Rank wise distribution of <i>S. aureus</i> among health personnel	40

5.2.6 Antibiotic susceptibility pattern of <i>S. aureus</i> isolated from nasal swab	41
5.2.7 MDR <i>S. aureus</i> isolated from hospital personnel	41
5.3 Nasal swabs from visitors	42
5.3.1 Sex wise nasal carriage of <i>S. aureus</i>	42
5.3.2 Age wise nasal carrier of <i>S. aureus</i>	42
5.3.3 Ward wise distribution of <i>S. aureus</i>	43
5.3.4 Antibiotic susceptibility pattern of <i>S. aureus</i> isolated from nasal swab	44
CHAPTER-VI: DISCUSSION AND CONCLUSION	45
6.1 Discussion	45
6.2 Conclusion	54
CHAPTER-VII: SUMMARY AND RECOMMENDATIONS	55
7.1 Summary	55
7.2 Recommendations	57
CHAPTER-VIII: REFERENCES	59
APPENDICES	

LIST OF TABLES

No.	Tables
Table 1.	Distribution of <i>S. aureus</i> in clinical samples
Table 2.	Distribution of <i>S. aureus</i> among outpatients and inpatients
Table 3.	Antibiotic susceptibility pattern of <i>S. aureus</i> isolates
Table 4.	Distribution of <i>S. aureus</i> and MRSA in different clinical samples
Table 5.	MRSA in outpatient and inpatients
Table 6.	MRSA in outpatient and inpatients of different age groups
Table 7.	Antibiotic susceptibility pattern of MSSA and MRSA
Table 8.	Sex- wise nasal carrier rate of <i>S. aureus</i> among health personnel
Table 9.	Age group wise nasal carrier rate of <i>S. aureus</i> among health personnel
Table 10.	Occupation- wise nasal carrier of <i>S. aureus</i> among health personnel
Table 11.	Ward wise distribution of <i>S. aureus</i> among health personnel
Table 12.	Rank wise distribution of <i>S. aureus</i> among health personnel
Table 13.	Antibiotic susceptibility pattern of <i>S. aureus</i> isolated from health personnel
Table 14.	Sex- wise nasal carrier rate of <i>S. aureus</i> among patient visitors
Table 15.	Age group wise nasal carrier rate of <i>S. aureus</i> among visitors
Table 16.	Ward wise distribution of <i>S. aureus</i> among patient visitors
Table 17.	Antibiotic susceptibility pattern of <i>S. aureus</i> isolated from visitors

LIST OF FIGURES

- Figure 1. Flow chart for processing of clinical samples and nasal swabs
- Figure 3. MDR strains among MSSA and MRSA strains
- Figure 4. MDR strains among nasal isolates

LIST OF PHOTOGRAPHS

- Photograph 1. Culture plate of *S. aureus* on BA
- Photograph 2. Culture plate of *S. aureus* and CONS on MSA
- Photograph 3. Tube coagulase test of *S. aureus*
- Photograph 4. Antibiotic susceptibility testing of *S. aureus* on MHA
- Photograph 5. Oxacillin and Methicillin resistant Vancomycin sensitive strain of *S. aureus*

LIST OF APPENDICES

APPENDIX –I	Materials and Equipments
APPENDIX –II	Bacteriological Media
APPENDIX-III	Reagents/Stains
APPENDIX-IV	Gram’s staining Procedure
APPENDIX-V	Further Identification Tests
APPENDIX-VI	Antibiotic Susceptibility Test
APPENDIX-VII	Zone Size Interpretative Chart
APPENDIX-VIII	Questionnaire Sheet for Nasal Sample Collection

LIST OF ABBREVIATIONS

AMR	: Antimicrobial Resistance
ATCC	: American Type Culture Collection
CDC	: Centre for Disease Control
CLSI	: Clinical and Laboratory Standards Institute
CONS	: Coagulase Negative <i>Staphylococci</i>
CVP tip	: Centre Venous Pressure tip
DNA	: Deoxyribonucleic Acid
ELISA	: Enzyme Linked Immunosorbent Assay
FDA	: Food and Drug Administrator
HAI	: Hospital Acquired Infection
HA-MRSA	: Hospital Acquired MRSA
KDa	: Kilo Dalton
MA	: MacConkey Agar
MDR	: Multidrug Resistance
MIC	: Minimum Inhibitory Concentration
MRSA	: Methicillin Resistant <i>Staphylococcus aureus</i>
MSA	: Mannitol Salt Agar
MSSA	: Methicillin Sensitive <i>Staphylococcus aureus</i>
NA	: Nutrient Agar

NCCLS	: National Committee for Clinical Laboratory Standards
OPD	: Out Patient Department
ORSA	: Oxacillin Resistant <i>Staphylococcus aureus</i>
PBPs	: Penicillin Binding Proteins
PCR	: Polymerase Chain Reaction
PRSA	: Penicillin Resistant <i>Staphylococcus aureus</i>
PYR	: L-Pyrroldonyl- β -naphthylamide
RFLP	: Restriction Fragement Length Polymorphysim
SCC	: Staphylococcal Cassette Chromosome
SSTs	: Skin and Soft Tissue Infections
TMP-SMX	: Trimethoprim-Sulfamethoxazole
TSST	: Toxic Shock Syndrome Toxin
TUTH	: Tribhuvan University Teaching hospital
ICU	: Intensive Care Unit
ITCU	: Intensive Trauma Care Unit
VISA	: Vancomycin Intermediate <i>Staphylococcus aureus</i>
VRSA	: Vancomycin Resistant <i>Staphylococcus aureus</i>
WHO	: World Health Organization