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NASAL CARRIAGE OF MRSA AMONG HEALTH CARE WORKERS IN A TERTIARY CARE HOSPITAL IN CENTRAL INDIA

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ABSTRACT **Background:** MRSA infection is a global health issue in which not only patient are suffering but also the health care provider. It is also necessary to mass screen the health care provider too in order to reduce the risk associated and also to prevent the infection. **Material Method:** 150 health care workers are included and screened for MRSA. Out of 150 workers 50 were doctors, 50 were nurses, 25 were lab staffs, and rest 25 were kitchen staffs were included in the study. The sample was collected from both nostril with help of cotton swab. Sample was send to lab for MRSA detection and antibiotic susceptibility test of isolates Staphylococcus aureus samples. **Result:** Out of 150 sample 92 (61.3%) were female and 58 (38.6%) were male. Highest MRSA carriage rate of 3.3% was found among Doctors. The antibiotic of the MRSA isolates revealed that resistance to Penicillin G (80%) & Cotrimoxazole (60%). All the MRSA isolates were sensitive to Linozolid (100%), vancomycin (100%) and Tetracycline and Teicoplanin (85.7%). The risk factors associated for MRSA colonization for Doctors 3.3%, Nurses 2%, Lab Technician 1.3% and Kitchen Staff 0.6% whereas male 6.8% and female 7.6%. **Conclusion:** Every health care center must take all the possible measures to stop the MRSA infection along that regular screening of MRSA of the healthcare workers.

KEYWORDS :

INTRODUCTION:

MRSA infection and colonisation in health care become a global problem in which health care professionals during their course of work are exposed to patients with MRSA infection. Currently, the Methicillin Resistant Staphylococcus Aureus is one of the alerting pathogens which get colonising in the environment of hospital. The infection which is increasing day by day is due to an alteration in the PBP2a protein, making the organism resistant to the antibiotic beta lactam. Methicillin resistance is usually acquired during exposure to hospital and other health care setup. In India the mean isolation rate is 20 – 40% .(1) It is difficult to diagnose and treat these infection even though the technology has been advanced and even various newer drugs classes has been introduced.(2) In the immuno-competent, individuals with MRSA infection treatment is mostly not required and even it not lead to harmful infection whereas in immuno-suppressed it can cause severe to fatal infections.(3) MRSA infections associated with the worse outcome, longer stay in hospital, high economical treatment cost, and increased mortality.(4) The ecological niches of S. aureus are the anterior nostrils.(5) For most of the invasive infections nasal carriages are responsible mostly, 0.8% to 3% in community and 6% to 17.8% in health care setup are the carrier rates of MRSA among adults. (6, 7) The necessity of mass screening of health care workers for MRSA has been debated regarding the advantages, disadvantages and ethical issues involved.(8) MRSA transmission from health care worker to the patients is higher.(9) So the first steps for infection control in health care setup is via screening and identify the MRSA carriers in hospital environment itself in order to stop spread to the community. In debilitated or compromised patients the coagulase negative staphylococci is considered as opportunistic pathogens which accounts 9% of hospital acquired infections in total. (10)

MATERIALS AND METHODS:

In our study 150 health care workers are included and screened for MRSA. Out of 150 workers 50 were doctors, 50 were nurses, 25 were lab staffs, and rest 25 were kitchen staffs were included in the study. The person who has history of recent nasal surgery or medication was excluded from the study. A disposable sterile cotton swab stick had been taken for collection of sample. Before collection swab is dipped in normal saline for better moistened then it is inserted in both nostril to the depth of 1 cm, rotated five times over the inner wall of ala and nasal septum. After collection the tube was properly capped, labelled and transferred to lab for culture.

Samples were inoculated into Blood agar, Chocolate agar and Mannitol salt agar media within one hour after collection and were incubated aerobically at 37˚C for 18- 48 hours. Isolated organism was subjected to microscopy, catalase, slide and tube coagulase test. Gram positive cocci arranged in cluster form and positive catalase and tube coagulase test helps to diagnosed Staph aureus.

All the isolated Staphylococcus aureus strains were tested against different antimicrobial agents by the modified Kirby Bauer disc diffusion method. Commercially available antibiotic discs were used, which were obtained from HiMedia Laboratories Ltd. The antimicrobial Erythromycin, Clindamycin, Penicillin G, Tetracyclin, Cotrimoxazole, Cefioxitin, Vancomycin, Linozolid, Levofloxacin, Nalidixic Acid, Teicoplanin, & Gentamicin were used. The zone diameters were interpreted according to the Clinical Laboratory Standards Institute (CLSI) guidelines. Staphylococcus aureus were further screened for Methicillin resistance by the Kirby-Bauer method by using cefoxitin (30 mcg) discs according to the CLSI guidelines. If the inhibitory zone diameter ≤ 21mm around the cefoxitin disc, the strain of staphylococci was interpreted as MRSA strain.

RESULTS

Out of 150 sample 92 (61.3%) were female and 58 (38.6%) were male. (Table 1)

TABLE 1: Health care worker screened for MRSA

CATEGORY	FREQUENCY	MALE	FEMALE
Doctors	50 (33.3%)	20 (13.3%)	30 (20%)
Nurses	50 (33.3%)	20 (13.3%)	30 (20%)
Lab Technician	25 (16.6%)	9 (6%)	16 (10.6%)
Kitchen Staff	25 (16.6%)	9 (6%)	16 (10.6%)
TOTAL	150	58 (38.6%)	92 (61.3%)

Out of 150 samples, 35(23.3%) were nasal carriers of S. aureus and among them 11 (7.3%) were carrier of MRSA. Highest MRSA carriage rate of 3.3% was found among Doctors. (Table 2)

TABLE 2: Distribution of Staphylococcus aureus & methicillin resistance Staphylococcus aureus (MRSA) carriers among health care worker

CATEGORY	No. of SAMPLE	S. Aureus	MRSA +ve (Carrier Rate)

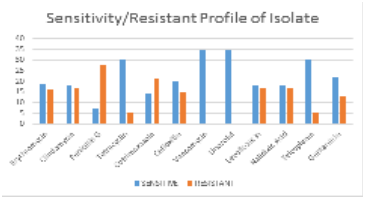
Doctors	50	11 (7.3%)	5 (3.3%)
Nurses	50	9 (6%)	3 (2%)
Lab Technician	25	3 (2%)	2 (1.3%)
Kitchen Staff	25	1 (0.6%)	1 (0.6%)
TOTAL	150	24 (16%)	11 (7.3%)

Antibiotic susceptibility test were done for 35 isolates of Staphylococcus aureus. 12 antibiotic discs were used. Their susceptibility patterns were shown in Table 3. The antibiotic of the MRSA isolates revealed that resistance to Penicillin G (80%) & Cotrimoxazole (60%). All the MRSA isolates were sensitive to Linozolid (100%), vancomycin (100%) and Tetracycline and Teicoplanin (85.7%) (Table 3)

Table 3: Sensitivity/Resistant Profile of Isolate

ANTIBIOTIC AGENT	SENSITIVE	RESISTANT	% of SENSITIVE (Total 35)
Erythromycin	19	16	54.2
Clindamycin	18	17	51.4
Penicillin G	7	28	20
Tetracyclin	30	5	85.7
Cotrimoxazole	14	21	40
Cefioxitin	20	15	57.1
Vancomycin	35	0	100
Linozolid	35	0	100
Levofloxacin	18	17	51.4
Nalidixic Acid	18	17	51.4
Teicoplanin	30	5	85.7
Gentamicin	22	13	62.8

Fig. 1: Sensitivity / Resistance Profile of Isolate



The risk factors associated for MRSA colonization for Doctors 3.3%, Nurses 2%, Lab Technician 1.3% and Kitchen Staff 0.6% whereas male 6.8% and female 7.6%. (Table 4)

Table 4: Risk factors associated with MRSA colonization

CATEGORY	MRSA Carrier
OCCUPATION	
Doctors	5 (3.3%)
Nurses	3 (2%)
Lab Technician	2 (1.3%)
Kitchen Staff	1 (0.6%)
SEX	
Male	4 (6.8%)
Female	7 (7.6%)

DISCUSSION

MRSA carriers are the most common for healthy worker in the hospital who acts as a common sources of infection to the patients. In order to control it all hospital and health care facility centers must adopt the regular screening of the hospital personnel.

In the study, nasal carriage rate of Staphylococcus aureus were identified 24 (16%) whereas MRSA were detected 11 (7.3%). Similar study was conducted 4.6% and 6%.[11,12] Higher rate were reported 29%, 34.2% and 41%.[13,14,15] In India lower rate were reported by 1.8%.[16]

These differences can be attributed to variations in microbiological methods (sampling technique, culture and method of MRSA identification), local infection control standards and the local prevalence of MRSA.

In the present study, among healthcare personnel MRSA + ve carrier rate in doctors is 3.3 which is highest in our study compared to other categories that is nurses 2%, Lab technician 1.3% and Kitchen staff 0.6% which is mighty be due to more exposure to hospital environments and more frequent contact to the patients. MRSA were highly resistance to Penicillin G (80%) & Cotrimoxazole (60%). All the MRSA isolates were sensitive to Linozolid (100%), vancomycin (100%) and Tetracycline and Teicoplanin (85.7%). Varying degree of resistance towards different antibiotics by MRSA were due to production and become resistance to many commonly used antimicrobials via spontaneous mutation in plasmid chromosome and exposure to high selective pressure.[17] Low resistance indicates these antibiotics might be an option for empirical therapy of MRSA infections at our hospital. The poor personal hygiene of the participants and poor sanitation of the hospital might influence the carrier rate it might be possible that proper sampling technique was not followed.[12]

CONCLUSION

Every health care center must follow all the guidelines of hygiene and sanitation along that all the possible measures to be taken to stop the MRSA infection along that regular screening of MRSA of the healthcare workers, wards, operatory zone, lab and other possible infection areas must be taken so that patient stay in hospital can be reduced and infection can be controlled as low as possible.

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