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Original Research Article

Screening for nasal carriage of methicillin resistance *Staphylococcus spp.* among housekeeping personnel in a tertiary care hospital

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ABSTRACT

Background: Methicillin resistance *Staphylococcus aureus* and coagulase negative *Staphylococci* are commonly isolated pathogens from nosocomial infections. Colonized hospital personnel may be an important factor in dissemination of infection to patients and vice- versa. Among the various cadres of healthcare workers, housekeeping personnel are the most significant source of pathogen dissemination compared to other hospital staff, such as doctors, nurses, and lab technicians. This study aimed to determine the rate of methicillin-resistant *Staphylococcus spp.* colonization among housekeeping personnel at a tertiary care institute.
Methods: This study was a prospective study. Approximately 150-200 Housekeeping personnel were working in Hospital setting at the time of study period. Those with upper respiratory tract infections and those with history of intake of antibiotics in previous 3 months were excluded. A single nasal swab was used to take the mucosal samples from both the anterior nares by the study investigators.
Results: A total 40 housekeeping personnel had participated and agreed to give nasal samples. Out of 40 Housekeeping personnel nasal swab, 12 (30%) had shown gram positive cocci in clusters. Out of 12 isolates, only 1 (8%) isolate was *Staphylococcus aureus*, all other 11 (92%) isolates were Coagulase Negative *Staphylococcus*. Out of 11 Coagulase Negative *Staphylococci*, 4 (36%) were MRCoNs. And no MRSA found in housekeeping personnel.
Conclusions: Colonized Housekeeping personnel may be an important factor in the dissemination of infection from them to patients and vice-versa. Policies and guidelines should be framed to create awareness among HCWs regarding the screening methods for the detection and treatment of nasal carriage.

Keywords: Methicillin resistance *Staphylococcus aureus*, Housekeeping personnel, Nasal Colonization, Screening

INTRODUCTION

Staphylococcus is a commonly isolated pathogen from the nosocomial infections. Antibiotic resistance in *Staphylococcus* species specially in *S. aureus* is a worldwide phenomenon. It colonization is mainly found in the anterior nares. Most of the Staphylococcal infection results due to the endogenous colonization or through carriers. Eradication and inhibition of Staphylococcal colonization is an important measure to prevent the transmission. Methicillin was used to prevent or eradicate the carriers. But due to the development of Methicillin resistant *Staphylococcus aureus* (MRSA), there is an increase in the number of MRSA carriers among HCWs which cause serious nosocomial infection.[1] Nosocomial or Health care associated infections (HAIs) have become a potential threat to the world. *Staphylococcus aureus* especially the one that is Methicillin resistant is one of the leading cause of HAIs. *Staphylococcus* colonizes various places and mucous membranes of the human body, 30% of the population is colonized worldwide especially in the

anterior nares.[2,3] Colonization can be transient - ranging from hours to days- or persistent over many months and years. Colonized hospital personnel may be an important factor in the dissemination from health care workers to patients and vice-versa.[4-6] As per the data from the Microbiology Department of the same institute, during December 2023 to July 2024, MRSA rate is 15% in the hospital including both OPD and IPD patients. So, screening the nasal carriage of staphylococcus among all health care workers of tertiary care hospital including doctors, resident doctors, nurses, lab technicians etc. needs to be done. Among them, housekeeping personnel working in hospital are the most potential source of dissemination of pathogens from them to the patients as compared to other hospital staffs like doctors, nurses , lab technicians etc. due to less compliance with the hand hygiene and other universal precautionary measures, lack of knowledge, lack of attitude and practices even in knowledgeable workers So this study was aimed to know the rate of methicinillin resistance *Staphylococcous aureus* colonization among housekeeping personnel of a tertiary care institute.

METHODS

This study was a prospective study, done after the institutional Ethical approval (NCH.NO/PA/Permission to conduct the study/28843/2023, Dated 24.11.2023) done at GMC, Surat, Gujarat. We approached the housekeeping personnel when they came to attend the training programme regarding AMR awareness in May 2024 at Microbiology Department. Approximately 150-200 Housekeeping personnel are working in Hospital setting. All the Housekeeping personnel were informed orally about the study in brief and how the nasal samples from them will be collected.

Written consent was obtained from housekeeping personnel who were willing to participate. Those with upper respiratory tract infections and those with history of intake of antibiotics in previous 3 months were excluded.

A single nasal swab was used to take the mucosal samples from both the anterior nares by the study investigators and transported to the Microbiology Department without delay.

Nasal swabs were inoculated on to blood agar and incubated at 37° C.

Any growth was identified as S. aureus by using standard procedures to study colony morphology, microscopic appearance on gram-stained smears, catalase test, tube coagulase test and deoxyribonuclease test. The isolated strains of *S. aureus* were screened for methicillin susceptibility by Kirby-Bauer method by using cefoxitin (30 µg) discs on Mueller-Hinton agar (MHA) by using an inoculum density which was equivalent to McFarland's 0.5 standard (1.5 × 108 CFU/ml) and results were analyzed using CLSI guidelines 2023.[7,15]

All the data were entered in to excel sheet and percentage analysis was done to know the MRSA rate in healthcare personnel.

RESULTS

After excluding not willingness to participate, who were on antibiotic within last 3 month, 40 Housekeeping personnel had participated and agreed to give nasal samples. Average job year was 5 years among all the participants. The age range between 35-45 years. These workers were from surgical ward (3%), orthopedic ward (5%), orthopedic OPD (3%), emergency OPD (3%), Medicine ward (8%), burns wards (3%), passage area (8%) and few were from other part of hospital indirectly dealing with the patients.

Table 1: Age, place of work, Job experience and results of nasal swab for the housekeeping personnel at the time of data collection for the study.

Age (years)	Place of work	Job experiences years	Gram stain
34	Medicine	7	Gram positive cocci in clusters
29	UG hostel	2	
35	Medicine	2	
42	PG hostel	15	Gram positive cocci in clusters
30	PG hostel	3	
45	New college	5	
55	New college	5	Gram positive cocci in clusters
32	Physiotherapy OPD area	3	Gram positive cocci in clusters
25	Girls hostel	9	
30	PG hostel	2	
42	College building passage area	6	
35	Surgery ward	5	
25	Physiology department	1	

Continued.

Age (years)	Place of work	Job experiences years	Gram stain
37	Old civil hospital ward passage area	5	
41	New college	1	
33	New college	3	
39	New college	15	
30	New college	3	
38	Intern hostel	3	Gram positive cocci in clusters
24	Hospital OPD area	1	Gram positive cocci in clusters
42	PG hostel	2	
21	PG hostel	4	
45	Medicine	5	
40	Lobby kb.	2	
40	Casulty	13	
49	PG hostel	5	
42	Lobby old building	5	
26	New college	1	
49	New college	10	
48	Labour room	6	Gram positive cocci in clusters
42	PG hostel	6	Gram positive cocci in clusters
30	Ortho ward	2	Gram positive cocci in clusters
54	AP quarter	5	Gram positive cocci in clusters
35	PG hostel	6	Gram positive cocci in clusters
32	New college	1	Gram positive cocci in clusters
45	Lobby kb.	1	
48	Burn ward	5	
45	New college	4	
38	PG hostel	2	
40	Ortho OPD	10 months	

Out of 40 housekeeping personnel nasal swab, 12 (30%) had shown gram positive cocci in clusters. Out of 12 isolates, only 1 (8%) isolate was *Staphylococcus aureus*, all other 11 (92%) isolates were coagulase negative *Staphylococcus*. Out of 11 coagulase negative *Staphylococci*, 4 (36%) were Cefoxitin resistance with zone of inhibition of ≤21 mm. While *Staphylococcus aureus* isolate was sensitive for cefoxitin with zone of inhibition of >21 mm. So, in present study we found 4 MRCoNS and no MRSA found in housekeeping personnel.

DISCUSSION

It is necessary to detect the MRSA carriers among health care workers (HCWs) in hospitals. These individuals act as a potential source of infection to their patients, causing nosocomial infections and thereby causing extended stays in the hospital. The best methods which can be used for controlling this, are regular screening of the HCWs and taking the appropriate preventive measures. The prevalence of MRSA varies between institutions and geographic areas. The differences in the study design, such as the sample size and the method which is employed for MRSA detection, may account for the disparity in the carriage rate. Literature search done by Albrich and Harbarth from January 1980 to March, 2006, which involved 127 investigations and screening of 33, 318 health-care participants, revealed that 4.6% of the health care personnel were either infected or colonized with MRSA.[6] They also reported 41 studies which involved 10,589 participants, which revealed a carriage rate of 23.7% of methicillin sensitive *S. aureus*. According to the findings study by Radhakrishna M.et al, nasal carriage of *S. aureus* among healthcare workers who were involved in the management of critically ill patients was 17.5%. The *S. aureus* carriage was particularly high among doctors (32.5%) and housekeeping personnel (26.7%), followed by nursing staff (13.6%) and student nursing trainees in a study by D'Souza et al (13.6%).[1]

MRSA rate reported was 1.8% which was obtained from study of Pondicherry, Assam (11.48%) and Bangalore (10%) respectively.[8-10]

Molecular typing was not conducted on the MRSA strains in our study and therefore, it was not possible to establish as to whether strains were shared in a particular hospital unit or across the units. Therefore, it may be desirable to conduct a molecular typing of MRSA in the epidemiological perspective.

Limitation

All screening the nasal carriage of staphylococcus among all Health care workers of tertiary care hospital including doctors, resident doctors, Nurses, lab technicians etc. needs to be done to know the overall prevalence of colonization in a hospital setting. Those found methicin resistant needs to be screened for Mupirocin resistance also before giving treatment for decolonization.

CONCLUSION

The MRSA colonisation rate not only depends on prolonged exposure to the hospital environment, but also on the active involvement in patient care and hand hygiene practices. Here we found no MRSA and 4 cases of MRCoNs which suggest need for screening of more housekeeping personnels to know the true colonizationn rate in them. 4 cases of MRCoNs suggest that, these cases should not be ignored but screened after some time duration and if found same needs to be decolonized.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. D'Souza M, Kotigadde S, Saralaya KV, Kotian MS. Prevalence of Methicillin Resistant Staphylococcus aureus Carriage amongst Health Care Workers of Critical Care Units in Kasturba Medical College Hospital, Mangalore, India. J Clin Diagn Res. 2013;7(12):2697-700.
2. Kausar R, Pimpalkar S. Screening of Nasal MRSA Carriage among Health Care Workers at a Tertiary Care Centre in Chhattisgarh at Rajnandgaon District. Int. J. Curr. Microbiol. App. Sci. 2020;9(12):1467-74.
3. Rai JR, Amatya R, Rai SK. Hand and nasal carriage of Staphylococcus aureus and its rate of recolonization among healthcare workers of a tertiary care hospital in Nepal. JAC Antimicrob Resist. 2022;4(3):dlac051.
4. Jayathilaka, Nishadi, Piyumali M, Weerasinghe TG, Nakkawita D, Senaratne T. Nasal Colonization of Methicillin-Resistant Staphylococcus Aureus Among Nurses at a Sri Lankan Hospital. South Asian Journal of Research in Microbiology. 2024;8(9):1-9.
5. Chauhan S, Surender, Rappai TJ. Mupirocin resistance in Staphylococcus aureus isolated from nasal swabs of ICU and OT staff- A study from A tertiary care hospital. J Pure Appl Microbiol. 2021;15(4):2059–64.
6. Albrich WC, Harbarth S. Healthcare workers: Source, vector or victim of MRSA. Lancet Infect. Dis. 2008;8:289-301.
7. CLSI. Surveillance for Methicillin-Resistant Staphylococcus aureus: Principles, Practices, and Challenges; A Report. CLSI document X07-R. Wayne, PA: Clinical and Laboratory Standards Institute; 2023.
8. Mathanraj S, Sujatha S, Sivasangeetha K, Parija SC. Screening for methicillinresistant Staphylococcus aureus carriers among patients and health care workers of a tertiary care hospital in Southern India. Indian J. Med. Microbiol. 2009;27:62-4.
9. Rongpharpi SR, Hazarika NK, Kalita H. The prevalnace of Nasal carriage of Staphylococcus aureus among health care workers at a tertiary care hospital in Assam with special reference to MRSA. J Clin Diag Res. 2013;7(2):257–60.
10. Malini J, Shruti A Harle, Padmavathy M, Umapathy BL, Navaneeth BV, Keerthi Mannan J, et al. Methicillin resistant Staphylococcus aureus Carriage among the Health Care Workers in a Tertiary Care Hospital. J.Clin Diagn Res. 2012;6(5):791-3.

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