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SUAL FOR RESERFE	Original Research Paper	Medical Microbiology				
International	PIDEMIOLOGICAL TOOL IN THE STUDY OF HEALTH CARE WORKERS OF TERITARY (	MRSA NASAL CARRIAGE AMONG CARE HOSPITAL - ITS UTILITY				
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	round And Objectives: Stanhylococcus aureus is a co	ommon cause of community and hospital				

acquired infections. Methicillin resistant Staphylococcus aureus (MRSA) is a common nosocomial pathogen in the ICUs and other parts of the hospital and presents a challenge for all health care institutions. One of the important sources of MRSA in hospital setting is nasal carriage among health care workers (HCW's). Thus screening of health care workers for MRSA carriage will be helpful in preventing spread of MRSA from colonized health care workers to patients. The objective of the study is to to estimate the prevalence of nasal carriage of MRSA among health care workers of our institution. **Materials And Methods:** It is a prospective study done at Institute of Microbiology, Madurai Medical College, Madurai with the study period of two months. Nasal swabs collected from 100 healthcare workers working in different departments of our tertiary care hospital. All the swabs were inoculated on to Mannitol salt agar plates and incubated at 37°c for 24hrs to isolate Staphylococcus aureus. MRSA strains were identified by disc diffusion method using Cefoxitin (30]g) disc. **Results:** Out of 100 HCWs, 21 (21%) were nasal carriage rate was highest among Staff nurses 27.7% (5/18) while MRSA carriage rate was highest among Interns 3.3%(1/30). **Conclusion:** In our study, nasal carriage of MRSA among the health care Workers are more involved in the patient care activities, it is necessary to sensitize them regarding this issue and we should emphasize the importance of hand washing on them.

# **KEYWORDS** : Health care workers, MRSA screening.

# INTRODUCTION:

Staphylococcus aureus is a common cause of community and hospital acquired infections. Methicillin resistant Staphylococcus aureus is a common nosocomial pathogen in the intensive care units and other parts of the hospital and presents a challenge for virtually all healthcare institutions. As the prevalence of healthcare-associated infections (HAIs) caused by multidrug-resistant organisms continues to increase it is essential to prevent MRSA transmission and reduce the number of MRSA HAIs. Infections caused by MRSA strains are associated with longer hospital stay, prolonged antibiotic administration and higher costs than infections caused by Methicillin Sensitive Staphylococcus aureus (MSSA) strains.<sup>(14)</sup>

One of the important sources of *Staphylococci* for nosocomial infection is nasal carriage among health care workers (HCW's). HCWs are the important link between hospitals and communities. In hospitals, the MRSA can be transmitted to a patient from another patient or through the hands, clothes and equipments of HCW. In most cases, colonized HCWs are asymptomatic, but they can be a potential reservoir of infection for susceptible patients. Rates of nasal carriage of MRSA among HCW's vary from 1-2% and 6-8% <sup>(6)</sup>.

Screening for MRSA among this population is necessary for nosocomial infection control, because they serve as reservoirs and disseminators of MRSA. Identification of healthcare workers colonized with MRSA and decolonizing them, combined with other precautions like hand hygiene can be helpful in reducing transmission and controlling spread of MRSA<sup>(6)</sup>To control the spread of MRSA in a health care facility, it is important to estimate the extent of the problem and to find the effectiveness of our hospital infection control policy. This forms the ultimate basis for our study and the staunch importance to screen the health care workers for MRSA.

# **AIMS AND OBJECTIVES**

 To estimate the prevalence of nasal carriage of MRSA among health care workers of our institution.
To study the antimicrobial susceptibility pattern of MRSA.

### MATERIALS AND METHODS

It is a prospective study done at Institute of Microbiology, Madurai Medical College, Madurai. Ethical clearance obtained from Institutional Ethical committee at March 2021.

### Sample Size

Nasal swabs from 100 Health Care workers (HCWs)

### Study Duration

 $2 \text{ months} (5^{\text{th}} \text{April } 2021 - 5^{\text{th}} \text{ June } 2021)$ 

# Study Population:

Health care workers working in different departments of our tertiary care hospital were selected randomly. Data, including age, sex, demographic profile, work profile, and medical history have been recorded from each volunteer. Prior to commencement of the study written informed consent was obtained from the study population.

### Inclusion And Exclusion Criteria

Healthy health care workers including doctors, Staff nurses, Interns and laboratory personnel not suffering from any upper respiratory tract infection and who have not received any antibiotics for the last one week were included in the study. Those hospitalized within the previous 1-year or on antibiotics within last 1-week of collection of the swabs were excluded from the study.

# Sample Collection

Nasal swabs collected using a sterile cotton swab moistened with sterile normal saline. Swab inserted into each anterior nares and then rotated for 5-10 times over the inner wall of ala and nasal septum of both nostrils. Samples were transported within 2 hours to the microbiology laboratory for further processing.

#### Sample Processing

All the swabs were inoculated onto Mannitol salt agar plates and incubated at 37°c for 24 hrs to isolate *Staphylococcus aureus*. After incubation, growth was identified as *Staphylococcus aureus* on the basis of colony morphology, Gram stain, catalase and coagulase test (slide and tube). Methicillin Resistant Staphylococcus Aureus (MRSA) strains were identified by Cefoxitin disc method.

Antimicrobial susceptibility testing (AST) of staphylococcus aureus & detection of MRSA.

All confirmed Staphylococcus aureus isolates were further tested for detection of Methicillin resistance by Kirby–Bauer disc diffusion method using cefoxitin 30 []g discs (Hi Media Laboratories, Mumbai, Maharashtra, India) as per Clinical and Laboratory Standards Institute (CLSI 2020) guidelines <sup>(7)</sup>. Zone of inhibition of size of  $\leq 21$  mm was taken as resistant and  $\geq 22$  mm as sensitive.

Other Antibiotic discs used for AST are Vancomycin(30µg), Amikacin (30µg), Gentamicin (5µg), Ampicillin (10µg) Linezolid, Ciprofloxacin (5µg), Clindamycin (2µg), Erythromycin(15µg), Penicillin (10units), Amoxicillinclavulanic acid(30µg), Cefotaxime(30µg), Cotrimoxazole(25µg). Zone diameter interpretation for determining sensitive, intermediate or resistant was done as per CLSI guidelines<sup>(7)</sup>.

### **OBSERVATIONS & RESULTS**

Of 100 HCWs, 21 (21%) were nasal carriers of S.aureus and among them 2 (2/21) (9.5%) were carrier of MRSA. The overall nasal carriage rate of MRSA was 2% (2/100).

S. aureus carriage rate was highest among Staff nurses 27.7 % (5/18) while MRSA carriage rate was highest among Interns 3.3 % (1/30) (Table 1 & 2).

Table 1	: Sex	Wise	Distribution	ı Of	S.aureus	Among	HCW
(n=100	)						
Health	Male		I	'ema	le		Total

Health	Male			rema	lotal		
care	No of	No of S.	MRSA	No of	No of S.	MRSA	sampl
worke	sam	aureus		sam	aureus		es (n)
rs	ples	isolated		ples	isolated		
Doctor	30	7	1	18	1	0	48
s		(23.3%)	(3.3%)		(5.5%)		
Interns	20	6	1	10	2	0	30
		(30%)	(5%)		(20%)		
Staff	5	2	0	13	3	0	18
Nurses		(40%)			(23.07%)		
Lab	3	0	0	1	0	0	4
Person							
nel							
Total	58	15	2	42	6	0	100
		(25.86%)	(3.4%)		(14.28%)		

Table 1 shows that out of 58 male HCW, S.aureus was isolated from 15 HCW (25.86%) and out of 42 female HCW, only 6 (14.28%) had S.auerus colonization in their anterior nares. As stated in Table 1, the highest prevalence of S. aureus colonization seen in male staff nurses (2/5)(40%) followed by male interns (6/20)(30%) & male doctors (7/30)(23.3%).

One out of 30 (3.3%) male doctor and one among 20 interns (5%) harbored MRSA. None of the staff nurses had MRSA colonization.

Table 2:	Distribution	Of	S.aureus	And	MRSA	Among	HCW
(n = 100)							

Healthcare	No of samples	S. αureus (%)	MRSA (%)
workers			
Doctors	48	8 (16.6%)	1 (2.08 %)
Interns	30	8(26.6%)	1 (3.3%)
Staff Nurses	18	5(27.7%)	0
Lab Personnel	4	0 (0)	0
Total	100	21(21%)	2%

Among 48 doctors 8 (16.6%) were the carriers of S. aureus and 1 (2.08%) was MRSA carrier. Out of 30 interns the carriage rate of S.aureus and MRSA was 26.6%(n=8) and 3.3% (n=1) respectively. The highest rate of S.aureus isolation was from staff nurses (5/18) (27.7%) but none of them had MRSA carriage. (Table 2& Fig.1)



Mannitol Salt Agar shows Growth of S.aureus

Table	3:	Antibiotic	Susceptibility	Pattern	Of	s.	Aureus
Isolate	es (	n=21)					

Antibiotics	Sensitive(no/%)	Resistant(no/%)
Penicillin	13 (62%)	8 (38%)
Ampicillin	15 (71%)	6 (29%)
Vancomycin	21 (100%)	0 (0)
Linezolid	21 (100 %)	0 (0%)
Erythromycin	18 (86%)	3 (14%)
Amoxicillin-clavulanicacid	18 (86%)	3 (14%)
Amikacin	20 (95%)	1 (5%)
Cefotaxime	17 (81%)	4 (19%)
Ciprofloxacin	18 (86%)	3 (14%)
Cotrimoxazole	16 (76%)	5 (24%)
Cefoxitin	19 (90.5 %)	2(9.5%)





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Among 21 isolates of S.aureus, 2 isolates (9.5%) were MRSA as detected by resistance to cefoxitin and 19 isolates(90.5%) were MSSA that showed sensitive to Cefoxitin. Resistance to penicillin was 38% whereas all the isolates were sensitive to vancomycin and Linezolid (Table 2). All MRSA isolates were sensitive to Linezolid and vancomycin (Fig. 2).

#### DISCUSSION

This study detected a nasal carriage rate of S. aureus as 21 % among HCWs and the prevalence of MRSA carriage among Health Care Workers in our Hospital is 2% which is lower than internationally reported range. This is in consistent with several other reports in literatures.

Khanal et al<sup>(11)</sup> had reported the prevalence of nasal carriage of MRSA was about 3.4 % in their study. Similar results were found in study performed by Shrestha et al. in Nepal (2.3%)<sup>(12)</sup> and Peters et al. in Germany (1.6%)<sup>(13)</sup>

In contrast to our study, several studies have shown higher prevalence of nasal carriage of MRSA in HCWs. In a study by Golia et al., they found the nasal carriage of MRSA was 13.37% in their study group.<sup>(10)</sup> Rongpharpi et al., also found the high prevalence of MRSA in their study population (11.43%) and was higher among male HCWs.<sup>(8)</sup>Both the studies have reported a higher prevalence of MRSA than our study (2%). A study by Goyal et al., at Delhi had also shown higher prevalence of MRSA among HCW (6.6%)<sup>(9)</sup>

In our present study we have observed that the prevalence of MRSA is higher in male HCW when compared to female HCW. 2 out of 52 male HCW (3.4%) have shown the carriage of MRSA in their anterior nares. This is similar to a study conducted by Rongpharpi et al<sup>(8)</sup>. In contrast to the present study, there was a higher prevalence of MRSA in female HCW in a study done by Ahmad S et al., 2010<sup>(14)</sup>

Such differences in the rate of nasal carriage of S. aureus and MRSA among HCWs may be due to different factors such as Sample size, sampling techniques, culture methods, identification methods of S. aureus and MRSA, study criteria, study population, and hospital environment etc.

MRSA represents a challenge for virtually all health care institutions. As the Health Care Workers may serve as reservoirs and disseminators of MRSA, the purpose of this study is to identify the healthcare workers (HCWs) colonized with Methicillin Resistant Staphylococcus aureus (MRSA) early and to implement Infection control practices to reduce the spread of MRSA to susceptible individuals. Hand Hygiene is the single most important measure that should be practiced in an appropriate manner to prevent the occurrence of Nosocomial infections including MRSA.

#### CONCLUSION

In our study, nasal carriage of MRSA among the health care workers is 2 % with the rate being highest among Interns (3.3%). Considering the fact that Health Care Workers are more involved in the patient care activities, it is necessary to sensitize them regarding this issue and we should emphasize the importance of hand washing on them.

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