



## Nasal Methicillin Resistant *Staphylococcus Aureus* Colonisation and the Incidence of Invasive Staphylococcal Infection in Patients Undergoing Hemodialysis

Dear Editor,

Methicillin resistant *Staphylococcus aureus* (MRSA) is a nosocomial pathogen associated with significant morbidity and mortality. People with diabetes, intravenous drug abusers, and patients with recurrent hospital admissions are more likely to develop infection, usually following colonization. This makes targeted screening an attractive option for infection prevention and control.<sup>1,2</sup> Data on MRSA surveillance and invasive infections in rural to semi-urban settings of low- and middle-income countries are essential for formulating infection surveillance strategies and antibiotic policies. The current study aims to determine the MRSA colonization prevalence in a cohort of patients with end-stage renal disease (ESRD) undergoing dialysis.

This prospective observational cohort study was done in the hemodialysis (HD) unit in Kerala. The hospital predominantly caters to middle income patients. Demographic data, and previous hospitalization details, including infection with *Staphylococcus* were collected from hospital records. Comorbid illnesses were defined according to standard criteria.

Trained personnel inserted dry swabs 1 cm into each nasal vestibule and rotated 4 times while maintaining even contact with the nasal mucosa. All specimens were collected within 12 hours of admission. Culture and sensitivity tests were done according to standard methodology.<sup>3</sup> Those positive for MRSA colonization were treated with mupirocin topical ointment and retested every 3 weeks until negative.

Patients were followed up every three months for 1 year. Infections were defined according to National Healthcare Safety Network (NHSN) surveillance definitions.<sup>4</sup>

Colonization was defined as isolating MRSA from nasal smears without evidence of active infection at any site. Invasive infections were determined according to Centre for disease control and prevention NHSN surveillance criteria.<sup>4</sup>

A total of 123 patients were included in the study. Two patients did not consent and two were lost to follow up. The final analysis included 119 patients. The demographic data is shown in Table 1. Males were predominant, and the majority were undergoing HD via arteriovenous fistula 2-3 times a week. Eight patients had internal jugular or femoral dialysis catheters. Four patients were positive for MRSA. All four underwent nasal decolonization with mupirocin ointment topical application for five days and when subjected to repeat swabbing after two weeks, were found to be negative. On follow-up, 25 (21%) patients

**Table 1: Demographic characteristics, risk factors for MRSA colonization and hemodialysis patterns in the patients**

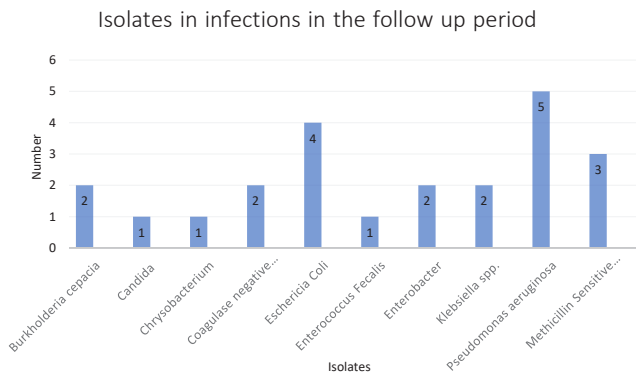
	Number (%)
Gender	
Male	97 (80)
Female	24 (20)
Comorbidities	
Diabetes	70 (57.9)
Hypertension	38 (31.4)
CAD	110 (90.9)
CVA	24 (19.8)
Frequency of hemodialysis	
Once weekly	3 (2.5)
Twice weekly	31 (25.6)
Thrice weekly	87 (71.9)
Duration of hemodialysis	
Upto three months	11 (9.1)
3 months to 1 year	21 (17.3)
More than 1 year	89 (73.6)
Hospital admission in the last 90 days	32 (26.4)
Risk factors for MRSA colonization	
Skin and soft tissue infections	9 (7.4)
Presence of implants or devices	12 (9.9)
Intravenous antibiotics in the last 90 days	44 (36)
Recent surgery or interventional procedure	118 (97.5)
Comorbid illnesses	116 (96)
Smoking	13 (10.7)
Presence of AV fistula	111 (91.7)

CAD: Coronary artery disease, CVA: Cerebrovascular accident, MRSA: Methicillin resistant *Staphylococcus aureus*, AV: Arteriovenous.

had developed invasive infections. Eight patients had staphylococcal infections, of which two were bloodstream, and six were skin and soft tissue infections. None of these patients had positive surveillance nasal swabbing. The predominant infections were bloodstream, skin, and soft tissue infections. The distribution of isolated organisms is given in Figure 1. *Pseudomonas aeruginosa* was the most frequently isolated organism.

Nasal colonization with MRSA is considered a risk factor for invasive infections. Invasive infections by MRSA are associated with high mortality in ESRD patients.<sup>5</sup> The human nose is the largest ecological reservoir for human strains of *Staphylococcus aureus*. Around the world, the incidence of MRSA nasal carriage has ranged from 2% to 45%.<sup>6</sup>

The MRSA colonization data on Indian patients range from 10% to 80%. The pooled prevalence of MRSA in India from 2015 to 2020 was 37%.<sup>7,8</sup> One study on nasal carriage by healthcare workers in an ICU in Kerala found an 18%



**Figure 1:** Isolation of pathogens in invasive infections in the follow up period. MSSA: Methicillin-sensitive *Staphylococcus aureus*.

carrier rate among ICU staff.<sup>9</sup> Carriage rates in community settings have been reported to be lower. The variation in the MRSA nasal carriage rate in various studies can be attributed to the admission rates, the prevalent infection prevention measures, and whether the study was done during an outbreak.

The 3% detection rate in this study is low compared to other similar studies.<sup>10,11</sup> The nasal swabbing, done within 12 hours of admission to the hospital for dialysis, could mean that our study population effectively represented the relatively low rates in the community.

The other important observation was that the major pathogens causing invasive infections in the follow-up period belonged to the gram-negative group. *Pseudomonas aeruginosa* had the greatest number of isolations from blood and pus samples. This questions the usefulness of nasal surveillance and MRSA colonization detection and eradication programs in preventing infections in patients undergoing HD in our setting. Whether the surveillance target should move towards gram-negative infections rather than gram-positive ones is a question to be answered by further research.

**Conflicts of interest:** There are no conflicts of interest.

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