

**Methicillin-Resistant Staphylococcus Aureus Clinico Microbiological correlation in a Tertiary care center in Kerala, India*****Pushpa Kizhakkekarammel, Kalpana George**, Girija K.R*****

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Correspondence Author: Pushpa Kizhakkekarammel, Departments of Microbiology, Govt. Medical College Manjeri, Malappuram, Kerala,India**Type of Publication:** Original Research Paper**Conflicts of Interest:** Nil**Abstract**

Methicillin resistant Staphylococcus aureus (MRSA) has emerged as one of the most important nosocomial pathogen to cause severe morbidity and mortality world over. However improper sample collection or increased colonization rate of MRSA among hospitalized patients have lead to over reporting of MRSA infections in hospitalized patients. This study observes the clinical correlation of MRSA isolates on the basis of drug treatment received by the patients and their clinical outcome. MRSA isolated from 2.9% of various clinical samples tested and 42% of MRSA isolates were from newborns. MRSA isolates from blood culture was around 3%, the maximum being from newborns. A great majority (>90%) of MRSA culture positive cases were cured of their ailments with the standard treatment schedule which does not include anti MRSA drugs. In clinical settings, MRSA is largely over reported due to flows in sample collection and MRSA culture positive cases should be reviewed for clinical relevance.

Introduction

Staphylococcus aureus emerged as a major nosocomial pathogen all over the world during 1950.¹ When Penicillinase resistant penicillins came into use for

treating infections caused by Penicillin resistant Staphylococcus aureus, mutant strains of Staphylococcus aureus have emerged by 1960s which are resistant to Methicillin and Cloxacillin. These strains were designated as Methicillin Resistant Staphylococcus aureus (MRSA).² MRSA has now become a serious problem all over the world as they show resistance towards many of the beta lactam antibiotics, Gentamicin and macrolides. Several tertiary care centers report MRSA as a major bacterial isolate from clinical specimens accounting 30-58% of the total isolates.³ Among patients admitted to long-term care facilities, 6 – 34 % are reported to have colonized with MRSA.⁴ The risk of MRSA colonization is more with increased use of invasive devices, skin diseases, wounds, burns and previous treatment with broad spectrum antibiotics.⁵ Colonization of MRSA in burns is reported to be twice as heavy as in operative wounds⁶. Colonized patients do serve as the reservoirs of MRSA in hospital settings and colonization is an important precursor of invasive disease. The risk of infection with colonized MRSA varies with the facility where the patients are admitted and also the patient factors. In intensive care units and haemodialysis units, the infection rate is found to be near 25% whereas in rehabilitation centers, it is only

3%³. Diabetes Mellitus and Peripheral vascular occlusive diseases are detected to be the strongest predictors of infection with MRSA⁷. About 2% of post-operative patients had wound infection with MRSA⁸. In neonatal inpatients, skin colonization with MRSA is well documented. Even though MRSA colonization is relatively common in hospitalized patients, infection due to MRSA and attributed mortality appear to be low. Presence of Intra venous catheters and foreign bodies are well known predisposing factors for MRSA septicemia. This study analyses the clinical significance of the MRSA isolates in a tertiary care centre, by retrospective clinico-microbiological correlation of the MRSA isolates from various samples, with the patient's clinical presentation, treatment history and their clinical outcome.

Methods

Among the patients admitted and treated for various ailments in a tertiary care centre in Central Kerala, all MRSA culture positive patients identified in 1 year period were evaluated by bed side visits and discussions with the treating clinicians and followed up by and case record reviews.

MRSA culture positive patients were grouped into 2.

1. Those who were treated with specific anti MRSA drugs (systemic Vancomycin /Linezolid/ Streptogramins or local therapy with Mupirocin) because the isolate was considered clinically significant by the treating physician
2. Those who were not treated with specific anti MRSA drugs as invasive infection was not suspected on clinical grounds.

Treatment received by the patient and the clinical outcome were correlated.

Results:

A total of 4128 specimens were included in the study. MRSA were isolated from 121 specimens (2.9%). Sample wise distribution is shown in Table1.

Table 1: MRSA isolations – Sample wise distribution

Sample	Number tested	No: of MRSA isolates	%
Blood	1034	32	3.1%
Swabs (Skin/ear/conjunctiva)	887	83	9.4%
Aspirates	170	4	2.3%
Urine	1715	1	0.06%
Sputum	322	1	0.3%
Total	4128	121	2.9%

Age wise distribution of isolates obtained is shown in table 2.

Table 2: MRSA among the Staphylococcal isolates – distribution in different age groups

Age group	No. of samples tested	No:of Staphylococcal isolates	No: & % of MRSA isolations
Newborns	554	184	51 (27.7%)
Children	1130	64	14 (21.8%)
Adults	2444	145	56 (38.6%)
Total	4128	393	121 (30.8%)

Table 3 shows the numbers of MRSA isolated from various samples across different age groups.

Table 3

MRSA isolations – Sample wise distribution in different age groups

Age group	Blood		Swabs		Aspirates		Urine		Sputum		Total	
	No: tested	MRSA isolated	No: tested	MRSA isolated	No: tested	MRSA isolated	No: tested	MRSA isolated	No: tested	MRSA isolated	No: tested	MRSA isolated
NB	260	18 (6.9%)	230	33 (14%)	40	0	24	0	0		554	51 (9.2%)
Child	403	8 (2%)	72	5 (6.9%)	30	1 (3%)	602	0	23	0	1130	14 (1.2%)
Adults	371	6 (1.6%)	585	45 (7.6%)	100	3 (3%)	1089	1 (0.1%)	299	1 (0.3%)	2444	56 (2.3%)
Total	1034	32 (3.1%)	887	83 (9.36%)	170	4 (2.35%)	1715	1 (0.06%)	322	1 (0.3%)	4128	121 (2.9%)

Clinical outcomes of MRSA culture positive cases are shown in table 4.

Table 4: Clinical correlation - MRSA culture positive cases

Age group	No: MRSA isolated	No: patients evaluated	Not treated with anti MRSA drugs	Treated with anti MRSA drugs		Clinical outcome		
				Systemic	Topical	D/d better	D/d , Not improved	Expired
NB	51	51	46 (90%)	1	4	47 (92%)	1 (2%)	3 (6%)
Child	14	14	14 (100%)	0	0	14 (100%)	0	0
Adult	56	56	45 (80.6%)	10	2	51	4	1
Total	121	121	104 (86%)	11	6	112	3	3 (2.5%)

Samples from which MRSA are isolated and the clinical outcomes in newborns and adults are shown separately in tables 5 & 6.

Table: 5 Clinical correlation - MRSA isolations in newborns

Samples	No: MRSA isolates	Treated with anti MRSA drugs		Not treated with anti MRSA drugs	Clinical outcome	
		Systemic	Topical		D/d better	Expired
Blood	26	1 (3.8%)	0	25 (96.2%)	24	2
Umb. swab	11	0	3	8	11	0
Conj.swab	10	0	0	10	9	1
Skin swab	4	0	1	3	3	0
Total	51	1	4	46	47	3

Table 6: Clinical correlation - MRSA isolations in adults

Sample from where MRSA isolated	No: of patients	Treated with anti MRSA drugs		Not treated with anti MRSA drugs	Clinical outcome		
		Systemic	Topical		D/d better	Expired	D/d at request & lost for follow up
Skin swab	52	7	2	43	49	0	4
Pus/aspirate	1	1	0	0	1	0	
Urine	1	1	0	0	1	0	
Blood	1	0	0	1	1	0	
Sputum (tracheostomy)	1	1		0		1	
Total	56	10	2	44	51	1	4

Discussion

This one year study conducted at a tertiary care centre in Central Kerala observes that MRSA accounts for nearly 3% of all bacterial isolates from various clinical materials tested in routine diagnostic facility. Among the Staphylococcal isolates, 30.8% (121/393) were found to be MRSA. A surveillance study conducted simultaneously at three centres across India by AA Mehta et al found that 32% of all Staph .aureus isolates are Methicillin resistant, being 27% from Bombay, 42.5% from Delhi and 47% from Bangalore.⁹ Another study from a tertiary care centre at Central Kerala report that MRSA accounts for 45% of all Staphylococcal isolates.¹⁰ Studies from AIIMS Delhi,^{9,4} and Uttar Pradesh⁴ report this rate as 42% and 54.85% respectively. This study found that a great majority of MRSA isolations are from swabs which included post operative wound infections, umbilical swabs and conjunctival swabs of newborns, swabs from skin lesions and ear swabs. The prevalence of MRSA isolation from newborns is found to be 27.7% which is comparatively less with the reported data from some of the tertiary care centers of developing nations.^{11,12} Maximum number of isolations were from skin and conjunctiva, which indicates high rate of skin colonization with MRSA in newborn inpatients. Swabs from newborn patients yield the highest percentage of MRSA (14%). Only 14% of MRSA culture positive patients had clinical indications to treat with anti MRSA drugs and 86% of culture positive cases were managed as colonization which was justifiable as 91% of the untreated patients were cured of their disease with the routine management. All the 3 newborns expired were pre term babies with septicemia. One was a case of CHD. 12 out of 56 MRSA culture positive adult patients (21%) were given anti MRSA treatment as they showed no clinical improvement otherwise. These include five cases of burns, one case of

road traffic accident, three post operative wound infection cases, one auricular abscess, one urinary tract infection in a diabetic patient and one patient on ventilator support. All except the one on ventilator improved clinically. None of the MRSA culture positive child received anti MRSA drugs, and all were cured of their illness. This indicates over reporting of MRSA from clinical samples which is not often clinically correlated and the burden of MRSA infections in tertiary care centers of Kerala is not significantly high.

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