



EFFICACY OF MUPIROCIN AMONG MRSA ISOLATED FROM WOUND INFECTION

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ABSTRACT

MRSA is one of the leading causes of infections in chronic wounds, for which mupirocin is an effective topical antibiotic used for treatment. This study is done to explore the resistance pattern of MRSA to mupirocin in the pus swabs collected from the wound infection in a tertiary care hospital in south India. Out of 137 *Staphylococcus* species isolated, 101 are *Staphylococcus aureus* and out of this 86% (87) were MRSA. A total of 64% (56) of MRSA were mupirocin sensitive and 36% (11) mupirocin resistant. Out of 36 CoNS 94% (34) were methicillin-resistant CoNS (MRCoNS) in that 32% (11) were mupirocin sensitive and 68% (23) were mupirocin resistant. The study shows that mupirocin is still an efficient topical antibiotic though resistance is gradually increasing due to its indiscriminate use. Both *Staphylococcus aureus* and CoNS had shown considerable resistance to mupirocin. Judicial use of mupirocin can prevent this and could be reserved for treating outbreaks due to MRSA.

KEYWORDS : MRSA, Mupirocin resistance

INTRODUCTION

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a problem in hospitals worldwide [1] because of indiscriminate use of antibiotics, prolonged hospital stay. Carriage of MRSA in nose, axilla, perineum are also important risk factors for MRSA acquisition [2]. The commonly used antibiotic for treatment of MRSA infection is vancomycin or linezolid, while mupirocin is an effective topical antibiotic used for treating chronic wound infections [3]. Mupirocin is pseudomonic acid, derived from *Pseudomonas fluorescens* & it acts by binding with bacterial isoleucyl-tRNA synthetase (IRS) and thereby inhibits protein synthesis [4]. The increased use of this antibiotic has been accompanied by outbreaks of MRSA resistant to mupirocin, although the frequency of resistance is still low [5].

Studies suggest that *mupA* gene which is known to encode for mupirocin resistance is transferred from *Staphylococcus epidermidis* to MRSA [6]. The increasing prevalence of mupirocin resistance among MRSA is an important threat to the future use of mupirocin [7]. Though mupirocin resistance is often associated with methicillin resistance, the true extent of mupirocin-resistant methicillin-resistant *Staphylococcus* spp. in our country is unknown. Thus, this study is carried out primarily to detect the rate of MRSA in wound infection and its sensitivity to mupirocin by disc diffusion method.

AIMS AND OBJECTIVES

1. To isolate methicillin Resistant *Staphylococcus aureus* (MRSA) from wound infection.
2. To detect the sensitivity of isolated MRSA to Mupirocin.
3. To analyse the rate of mupirocin Resistance among MRSA

MATERIAL AND METHODS

This study was conducted in Diagnostic Laboratory of Microbiology, Institute of Microbiology, tertiary care hospital in south India. A total of 137 pus samples were collected over a period of two months. All other clinical sample like aspirated pus, Blood, Urine, Body fluids, sputum etc. were excluded from the study. Specimens were collected from deeper area of wound using two sterile pus swabs and transported immediately to the laboratory.

Processing and Lab analysis

One swab was used for doing Gram stain and another swab was inoculated on to Nutrient agar and Blood agar. Both media were incubated at 37°C for 24 hours. After incubation *Staphylococcus aureus* and Coagulase negative *Staphylococcus* were identified by doing Gram stain, coagulase test and other biochemical reaction. All the isolates were tested for susceptibility to cefoxitin (30 µg) and mupirocin (5 µg) by disc diffusion method.

Disc diffusion method:-

- 1) The isolated staphylococci species were inoculated into peptone water.
- 2) The turbidity was matched with 0.5% McFarland standard and it was inoculated on Muller-Hinton agar plate.
- 3) Cefoxitin (30 µg) and Mupirocin (5 g) disc was kept and incubated for 24 hours in 37°C.

Next day the zone of inhibition was measured

INTERPRETATION

The interpretation is done as follow:

For cefoxitin disc (30 µg):-

If the zone size is ≤ 21 mm, it is resistant If ≥ 22 mm, it is sensitive and

If the zone size is falling between the two, is an intermediate

For Mupirocin disc (5 g):-

If the zone size is ≤ 13 mm, it is resistant If ≥ 14 mm, it is sensitive and

If the zone size is falling between the two, is an intermediate

All the results were compiled and tabulated and analysed statistically.

RESULTS

- The total isolates were 174, of which *Staphylococcus aureus* and CoNS together contributed 137.
- Out of 137 *Staphylococcus* species 101 are *Staphylococcus aureus* and 36 are CoNS.

- Out of 101 staphylococcus aureus, 86%(87) are MRSA in that 64%(56) are mupirocin sensitive and 36%(11) are mupirocin resistant.
- Out of 36 CoNS 94% (34) were were methicillin-resistant CoNS (MRCoNS) in that 32%(11) were mupirocin sensitive and 68%(23) were mupirocin resistant
- 43%(6) of MSSA and one isolate of methicillin-sensitive CoNS (MSCoNS) was resistant to mupirocin

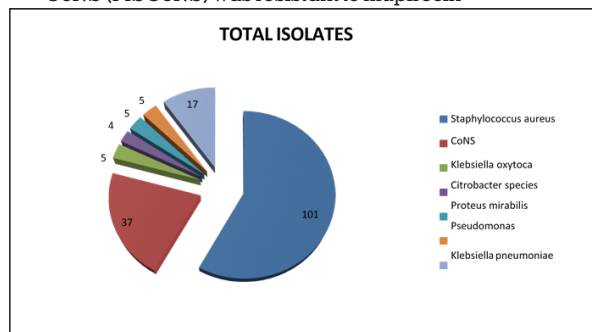


Fig. 1:- Pie chart of total isolates(n=174)

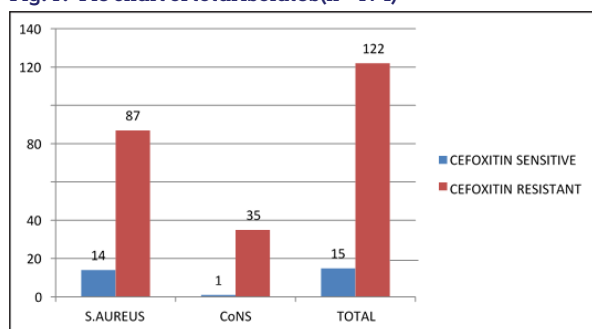


Fig. 2:-Column of Cefoxitin sensitive and resistant Staphylococci

	CEFOXITIN RESISTANT		CEFOXITIN SENSITIVE	
	NO.	%	NO.	%
MUPIROCIN SENSITIVE	56	64	8	57
MUPIROCIN RESISTANT	31	36	6	43
TOTAL	87	100	14	100

Table. 1:- Efficacy of mupirocin on Staphylococcus aureus

	CEFOXITIN RESISTANT		CEFOXITIN SENSITIVE	
	NO.	%	NO.	%
MUPIROCIN SENSITIVE	11	32	1	50
MUPIROCIN RESISTANT	23	68	1	50
TOTAL	34	100	2	100

Table. 2:- Efficacy of mupirocin on CoNS

DISCUSSION

MRSA is an important pathogen in wound infection. Often this is associated with resistance to multiple other antibiotics and so we have limited options for treatment of MRSA wound infections. Mupirocin has been proved to be effective in treating the colonization of MRSA for a longtime [8]. The resistance of MRSA to mupirocin is increasing. There are no much studies regarding the prevalence of mupirocin resistance in MRSA in our country. This study is done to find the efficacy of mupirocin against the MRSA by disc diffusion method.

Our study shows that Staphylococcus aureus is the commonest bacteria isolated from the wound swab and

CoNS was the second most isolated from the wound infection. 86% isolates were MRSA as shown in Table no.1 showing the higher prevalence of the MRSA in wound infection which is similar to the increase incidence of MRSA in wound infection in a study done by Dolapçı et al[9]. More than half of MRSA(64%) were sensitive to mupirocin though there is a significant resistance of 36% MRSA to mupirocin also noted. The easy availability of this antibiotic over-the-counter along with increased usage of mupirocin should be the cause of development of resistance. There are studies reporting mupirocin resistant ranging from 0.9 to 18.2%[10]. In our study the resistant goes upto 36% which shows that gradual increase in mupirocin resistant MRSA raising a future threat to use of mupirocin among MRSA patients.

While mupirocin resistance was 36% in MRSA, it was 68% in MRCoNS as shown in Table no:-2. This is comparable with study done by the SK Oommen et al[11] which also shows increase in MRCoNS resistant to mupirocin in south india. This may be due to the coexistence of CoNS which is skin commensal with Staphylococcus aureus leading to transfer of resistant gene from Staphylococcus aureus to CoNS. The presence of comparatively higher rates of MRCoNS have chance of transmitting the resistant gene(mupA) to MSCoNS and MSSA, MRSA. This may be the reason for getting mupirocin resistant in 6(43%) of MSSA and one isolate of MSCoNS in this study.

Conclusion

The study shows that the mupirocin is still an efficient topical antibiotic though going resistant gradually due to its indiscriminate use. Both Staphylococcus aureus and CoNS had shown considerable resistance to the mupirocin.

To prevent the resistance to mupirocin it should be available only on prescription and should be reserved for treating outbreaks due to MRSA.

Continued surveillance and more research studies are needed to know the real extent of mupirocin resistance among MRSA to treat the staphylococcal wound infections effectively.

If the resistance to mupirocin is going to increase then we have to find an alternate topical antibiotic agent which is more effective than mupirocin and tends to develop less resistant than other antibiotic

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