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Research article

BACTERIOLOGICAL PROFILE OF WOUND INFECTION IN RURAL HOSPITAL IN R.R DISTRICT

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ABSTRACT

Background: Wound infection is a major problem in hospitals in developing countries. Wound infection causes morbidity and prolonged hospital stay thus the study was undertaken to know the bacteriological profile of wound infection and antibiogram of organisms isolated. **Methods:** pus from various sites of wound area was collected using sterile swab under aseptic precautions and further processed by Grams stain and culture. Culture was done on Blood agar, Mac Conkeys agar, incubated at 37°C for 24hrs. Isolates confirmed by biochemical tests, antibiotic susceptibility testing was done using muller Hinton agar by Kirby Bauer's method as per standard CLSI guidelines. **Results:** out of 396 pus samples, 236 were culture positive. Most common organisms isolated was *staphylococcus aureus* 81 (34.3%) followed by *Staph.epidermidis*. Other isolates included were *Enterococci*, *E.coli*, *Klebsiella*, *Pseudomonas*, and *Proteus* spp. **Conclusion:** Present study showed bacteria causing wound infection. High rates of bacterial growth were seen in samples collected from surgery wards followed by orthopedics. *S.aureus* (34.3%) was the predominant isolated followed by CoNS (15.8%), *E.coli* (10.5%) MRSA incidence in our study was 10% and ESBL's detected in 20% of *E.coli* strains and 6.6% *Klebsiella* strains.

Keywords: Wound infection, Pus, *Staphylococcus aureus*, MRSA, ESBL.

INTRODUCTION

The development of wound infection depends on the integrity and prospective function of skin. ¹ The potential for infection depends on a number of patient variables such as the state of hydration nutrition and existing medical conditions as well as extrinsic factors such as pre, intra and postoperative care if the patient has undergone

surgery. Thus it is difficult to predict which wound will become infected.² The overall incidence of wound sepsis in India is from 10-33%. Relative resistance to antibiotics relatively more virulent strains and capacity to adapt quickly to changing environment make the

pathogens acquired in hospitals a matter of concern.³

Wound infection is one of the most common hospital acquired infections and important cause of morbidity and accounts for 70-80% .⁴ The importance of wound infections in both economic and human terms, should not be underestimated.⁵ In a study on an average, patients with wound infections stays about 6-10days more in hospital than if the wound had heal without infections.⁶ This additional stay doubles the hospital cost. Wound infections can be caused by different groups of microorganisms, most commonly isolated aerobic microorganisms includes *S.aureus*, *CoNS*, *Enterococci*, *E.coli*, *P.aeruginosa*, *Klebsiella pneumoniae*, *Enterobacter*, *Pr.mirabilis*, other *streptococci*, *Candida*, *Acinetobacter*.⁷

MATERIALS AND METHOD

The study was done over a period of time of 1year from November 2011 to December 2012. A total of randomly selected 396 samples received by a bacteriology section of the microbiology department from various departments of MIMS Medchal AP, rural hospital were processed. Pus samples were collected with sterile disposable cotton swabs and immediately inoculated onto Blood agar & Mac Conkeys agar media and incubated at 37⁰c for 24hrs. After incubation, identification of bacteria from positive cultures was done with a standard a microbiological technique which includes Grams stain, biochemical reactions.⁸

The antibiotic sensitivity testing of all isolates was performed by modified Kirby Bauers disc

diffusion method on Muller hinton agar using antibiotics of Hi media as per the CLSI (Clinical Laboratory Standard Institute) guidelines.

MRSA was detected using cefoxitin disk (30µg) according to CLSI guidelines. ESBL (Extended Spectrum Betalactamases) was detected using ceftazidime (30µg) as an indicator drug by disc diffusion as per CLSI guidelines as a screening method and confirmation was done by a phenotypic disc confirmatory test using Ceftazidime (30µg) and Ceftazidime/clavulanic acid combination disk (20µg/10µg). *Klebsiella* ESBL ATCC (American Type Culture Collection) (700603) as a positive control and *E.coli* non ESBL strain ATCC 25922 as a negative control was used.

RESULTS

A total of 396 samples received by the laboratory of which, 297 were from different wards and 99 from OPD, were randomly selected for the study. Out of 396 samples 236 showed aerobic growth & 160 remained sterile even after 48hrs incubation. The highest rate of bacterial growth was seen in samples collected from the surgical wards followed by orthopedics. (Table 1).

Majority of the wound was infected with single organism. Gram positive cocci 64% and Gram negative bacilli 36%. Most frequently isolated organism was *S.aureus* 81(34.3%) followed by *Staph.epidermidis*, other isolates included *Enterococci*, *E.coli*, *Klebsiella*, *Pseudomonas*, and *Proteus spp.* (Table 2) 8 were MRSA out of 81 *S.aureus* strains. ESBL's were reported 5 *E.coli* and 1 *Klebsiella* strains.

Table 1: Ward wise distribution of samples

SURGICAL			MEDICAL			OTHERS		
WARD	NO	%	WARD	NO	%	WARD	NO	%
GSW	117	39.3%	GMW	10	3.3%	SPL W	14	4.7
GOW	48	15.4%	GDMW	14	4.7%	NICU	1	0.3
GENT	3	1%	MICU	12	4%	PICU	2	0.6
			TB CHEST	1	0.3%	CTICU	3	1
			PSYCHATRY	1	0.3%	LR & GY	36	12.1

Table.2 : Bacteriological profile of pus

ISOLATES	Total No.	percentage
<i>S.aureus</i>	81	34
<i>CoNS</i>	44	18.6
<i>Enterococci</i>	25	10.5
<i>E.coli</i>	25	10.5
<i>Klebsiella spp</i>	15	6.3
<i>P.aureginosa</i>	8	3.3
<i>Proteus</i>	19	8.5
<i>Citrobacter</i>	9	3.8
<i>Prt spp</i>	9	3.8
<i>Acinetobacter</i>	1	0.4
Total	236	100

Table 3: Antibiogram of wound infection

	<i>S.aureus</i>	<i>CoNS</i>	<i>E.coli</i>	<i>klebsiella</i>	<i>pseudomonas</i>	<i>acinetobacter</i>	<i>proteus</i>	<i>enterococci</i>
penicillin	1	4	-	-	-	-	-	1
gentamicin	28	13	6	8	11	-	5	14
cotimoxazole	-	-	4	8	4	-	2	-
Cefuroxime	4	2	-	-	-	-	-	2
Erythromycin	37	26	-	-	-	-	-	12
Vancomycin	29	14	-	-	-	-	-	13
Cefoxitin	8	2	-	1	-	-	2	2
Ampicillin	-	-	-	-	-	-	-	-
Amikacin	66	40	12	15	16	-	6	21
Cefotaxime	33	12	8	7	13	-	5	4
Piercillin-tazobactam	41	19	15	20	19	-	8	7
Ciproflox/levoflox/lomeflox	15	11	5	11	12	-	7	9
Amoxy-clav	43	36	-	-	-	-	-	7
Caz	16	12	8	2	8	-	4	5
Imipenem-	-	-	-	3	3	-	-	2
Cephlexin	4	2	-	3	3	-	-	2

DISCUSSION

As a wound infection is becoming the major hospital acquired infection, hospital environment plays a major role in causing wound infection. In our study, 58% of pus samples showed bacterial growth with 9 different bacterial species and the most common isolate was *S.aureus* (34.3%) followed by *CoNS* (28.6%) and *E.coli* (10.5%).

It correlated with the study conducted by Tapan at Navoday Medical college, Raichur who also reported *S.aureus* (27.5%) as the most common isolate followed by *CoNS* (8.5%)⁹ In a similar study conducted at Kathmandu model hospital, 50% of Pus samples showed bacterial growth with 15 different species and the most common

isolate was *S.aureus* (41.31%) followed by *E.coli* (20.89%) CoNS (15.44%)¹⁰ similar study was conducted in TUTH showed 82.5% bacterial growth and 13 different bacterial species of which *S.aureus* was predominant (57.7%) followed by *E.coli* (11%) and CoNS (3%)¹¹

Similar studies conducted at Dhiraj general hospital, Sri Ramchandra medical college and at Namakkal showed *S.aureus* as predominant isolate^{3,12,13}

In our study, most of the Enterobacteriaceae members and Pseudomonas were susceptible to Amikicin, 3rd generation Cephalosporins and Piperacillin with Tazobactam in case of gram positive bacteria the highly effective antibiotics were Oxacillin, Erythromycin, Vancomycin, amoxy-clav least effective antibiotics were Penicillin & Cephalixin.

The incidence of methicillin-resistant *S.aureus* in our study was 8 (10%). This finding is in agreement with the reported incidence of 10% MRSA in a study which was conducted by Agarwal and Khanna¹⁴. A similar study conducted by Gaythree Naik at kasturba medical college, Mangalore showed an incidence of 9.6%¹⁵. In our study ESBL were reported in 5 strains of *E.coli* (20%) & 1 strain of *Klebsiella* (6.6%)

CONCLUSION

This study revealed the presence of wound infection causing bacteria. High rates of bacterial growth were seen in samples collected from surgery wards followed by orthopedics. *S.aureus* (34.3%) was the predominant isolated followed by CoNS (15.8%), *E.coli* (10.5%). MRSA incidence in our study was 10% and ESBL's detected in 20% strains and 6.6% *Klebsiella* strains. Due to increased morbidity and mortality which are associated with these drug resistant organisms an early detection and intervention is a prerequisite in surgical patients. The government should take proactive steps in setting up hospital antibiotic policy guidelines in instituting hand washing among health care personnels. Hospitals

should screen MRSA among their staff and treat those who are affected.

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