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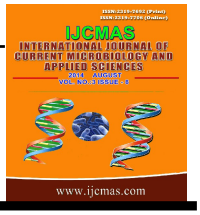

Original Research Article

A two year study of spectrum of bacterial isolates from wound infections by aerobic culture and their antibiotic pattern in a tertiary care center

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Keywords

Aerobic pus culture, *Staphyloccoous aureus*, MRSA, ESBL

A B S T R A C T

Definitive management of wound infections is most important in nosocomial setup, where patients present for definitive care. A predictable bacterial profile and antibiotic sensitivity in wound infections will be of great help for clinicians to start empirical treatment. The purpose of this study is to show the spectrum of bacterial profile and its antibiogram pattern from wound infections for a period of two years in a tertiary care center in South India. A total of 282 pus samples were collected from various departments. The samples were processed and the pathogens were identified and subjected to antibiotic susceptibility by CLSI guidelines. The results were analyzed in IBMSS 20 software. Out of total 282 pus samples, 219 samples (77.6%) were positive for aerobic bacterial culture. Culture positivity in males was 66.6% and 33.3% in females. *Staphylococcus aureus* was the major bacterial isolate (37.4%) with *Pseudomonas aeruginosa* being the second predominant one (29.6%). Among *S.aureus* 27.5% of them were found to be methicillin resistant *Staphylococcus aureus* (MRSA)The extended spectrum beta lactamase producers (ESBL) among *Escherichia coli*, *Klebsiella pneumoniae* and *Proteus mirabilis* were found to be 11(44%), 12(63.1%) and 7(50%) respectively. *S.aureus* was the major isolate in our study followed by *P.aeruginosa*. The percentage of MRSA was 27.5% and ESBL among *E.coli, K.pneumoniae* and *P.mirabilis* were 44%, 63.1% and 50% respectively.

Introduction

Wound infections were considered as the most serious burden for patients and health care people, particularly in nosocomial settings. The probability of wound infections largely depends on the host defenses, local wound conditions and microbial burden. Urinary tract infection is reported to be highest (42 to 50%), followed by wound infection (10 to 33%) and respiratory tract infection (10.5%) in India(1. Basu, et al., 2009). Effective treatment of wound infections depends upon proper understanding of causative pathogen, pathophysiology of the infectious process and pharmacology of the therapeutic agents. The inadvertent use of antibiotics leads to

emergence of drug resistant pathogens, which in turns acts as a great challenge to the health services. A predictable bacterial profile in the wound infections is very important for clinicians who intend to start empirical treatment for patients, while laboratory culture reports are awaited. The purpose of this study is to show the spectrum of bacterial profile and its sensitivity pattern from wound infections for a period of two years in a tertiary care center in South India.

Materials and Methods

This study was done in a tertiary care center in Chennai for the period of two years (Jan 2012 – Dec 2013). A total of 282 pus samples were collected from both inpatients and outpatients of various departments. The samples were transported immediately and processed in the laboratory. Gram stain was done and the samples were inoculated into blood agar, macConkey agar and nutrient agar by standard techniques. The plates were aerobically incubated for 48 hours at 37°C and the growth was observed.

On correlating the gram stain and culture report, further identification of the isolates were done with biochemical tests such as catalase, coagulase, oxidase, indole, citrate, urease, triple sugar iron agar, and mannitol motility medium. The antibiotic susceptibility patterns was done in Muller hinton agar by Kirby Bauer method as per CLSI guidelines(CLSI, 2006). Separate set of antibiotics were used for gram positive organisms and gram negative organisms Detection of Methicillin resistant Staphylococcus aureus (MRSA) was done with Cefoxitin (30 µg) disc. Extended spectrum betalactamase (ESBL) production was detected with the help of Ceftazidime (30 µg) and Ceftazidime + Clavulanic acid (30/10 µg). The results obtained were analysed with IBMSS 20 software.

Results and Discussion

The period of study is from January 2012 to December 2013 with total of 282 pus samples. Out of that 219 samples (77.6%) were positive for aerobic bacterial culture. Of the positive cultures, 146 (66.6%) patients were male and 73(33.3%) were females (Figure 1). Isolation of two organisms from one sample was obtained from 18 samples (8.2%). About 60% of positive cultures were gram negative bacteria and 40% were gram positive. *Staphylococcus aureus* was the major bacterial isolate (37.4%) with *Pseudomonas aeruginosa* being the second predominant organisms (29.6%).Various other bacterial isolates obtained from the culture are shown in Figure 2. The antibiotic sensitivity pattern of *S. aureus* and *Streptococcus pyogenes* are shown in Table 1 and the sensitivity pattern of gram negative organisms in Table 2. MRSA was detected with the help of Cefoxitin (30 µg) and 22(27.5%) was found to be MRSA. ESBL producers among *Escherichia coli*, *Klebsiella pneumoniae* and *Proteus mirabilis* was detected with ceftazidime (30 µg) and ceftazidime – clavulanic acid (30/10 µg) disc and was found to be 11(44%), 12(63.1%) and 7(50%) respectively (Figure 3).

Infection of wounds is one of the common causes to increase hospital stay. Emerging drug resistant organisms further add fuel to the threat. The surveillance of wound infections in a nosocomial with an emphasis on antimicrobial sensitivity pattern will be of great help to the clinicians in choosing an empirical antibiotic therapy. In our study, the wound infection was more common in male than female (2:1). Pappu *et al.,* 2011, also observed males to be commonly infected than females (1.43:1). Majority of our results are mono – microbial (91.7%) and *S. aureus* was found to be the most

common pathogen in our study (37.4%), Similar report was also observed by Basu S *et al.*,2009; Lee CY *et al.,* 2009; Tiwari, *et al.,* 2010, The second common pathogen in our study was *P. aeruginosa* (29.6%). Basu S et al., 2009 and Zubair, *et al* ., 2011, also reported *P.aeruginosa* to be the second most commonly occurring pathogens in wound infections. Gram positive organisms obtained in our study (*S.aureus* and *S.pyogenes*) were 100% sensitive to vancomycin. Among *S. aureus* 27.5% was found to be MRSA (Cefoxitin resistant). Anupurba *et al.,* (2003) observed 32% and Rajaduraipandi *et al.,* (2006) observed 31% of MRSA in their study.

These percentages were higher when compared with our study. The difference in percentage may be due to the sample size. Among the gram negative enterobacteriaceae all of them are sensitive to Imipenam (100%) followed by ciprofloxacin (73%) and cefotaxime (63%). The difference between ciprofloxacin and cefotaxime were not statistically significant ($p>0.05$). The extended spectrum beta lactamase producers (ESBL) among *Escherichia coli, Klebsiella pneumoniae* and *Proteus mirabilis* were detected with ceftazidime (30 µg) and ceftazidime – clavulanic acid (30/10 µg) disc and found to be 11(44%), 12(63.1%) and 7(50%) respectively (Figure 3). The ESBL production was found to higher with *K.pneumoniae* in our study. A study conducted by Ananthan and Subha from Chennai reported 23.6% of ESBL *K.pneumoniae* from clinical isolates Ananthan, et al., (2005). In other studies, Menon *et al.,* (2004) from Chennai have also reported the prevalence of ESBL producing *K. pneumoniae* were 21.2%. The higher percentage of ESBL producing K.pneumoniae observed in our study could be due to difference in sample size. Oxidase positive nonfermentor obtained in our study *(P.aeruginosa and A.baumanii*) was found to be 100 % sensitive to imipenam, followed by ceftazidime(78.5%) and piperacillin-tazobactum (77%). The difference between ceftazidime and piperacillin tazobactum were not found to be statistically significant ($p>0.05$).

The importance of wound infections, in both economic and human terms, should not be underestimated. *S.aureus* was the major isolate in our study followed by *P.aeruginosa*. The percentage of MRSA is 27.5% and ESBL among *E.coli, K.pneumoniae and P.mirabilis* were 44%, 63.1% and 50% respectively. The key principles for the management of a patient with a wound infection includes recognizing the signs of inflammation, increased bacterial burden, able to take 'reliable' wound swabs, able to interpret culture reports, treat the infection, consider antibiotic sensitivities, minimize the risk of cross infection and reduce the risk of any complications. Future studies are needed in such a way to correlate the clinical outcome of the patients after appropriate treatment.

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