



BACTERIOLOGICAL STUDY OF POSTOPERATIVE WOUND INFECTION AND THEIR ANTIMICROBIAL SUSCEPTIBILITY PATTERN IN A TERTIARY CARE HOSPITAL OF SOUTH GUJARAT.

Dr. Mili Shah	Senior Resident, Department of Microbiology, SMIMER Medical College, Surat, Gujarat, India
Dr. Charmi Shah*	Consultant Microbiologist, Sun Diagnostic Centre, Mumbai, India *Corresponding Author
Dr. Dhruvkumar Patel	Second Year Resident, Department of Microbiology, SMIMER Medical College, Surat, Gujarat, India

ABSTRACT Most postoperative wound infections are hospital acquired, varies from one hospital to another and they cause significant post-operative morbidity, mortality and prolonged hospital stay, leading directly or indirectly to an enormous increase in the hospitalization cost and to the emergence of new health hazards for the community. This study aimed to evaluate the prevalence, risk factors and outcomes associated with post-operative wound infection in a tertiary care hospital in South Gujarat over 3 months period from October 2020 to December 2020. **Method:** The study included patients clinically suspected of having post-operative wound infection Direct microscopy and culture of pus aspirate and swab specimen was done. Identification of organism was made as per standard microbiological protocol and antimicrobial susceptibility testing was carried out for appropriate selection of antibiotic as per CLSI guidelines & data was analysed. **Result:** Out of 969 suspected cases, 526(54%) were culture positive for post-operative wound infection. Gram negative isolates were predominant (81%) and gram positive isolates were (19%). *Acinetobacter* spp. (27%) & *Staphylococcus Aureus* (16%) was the predominant organism among the gram negative & gram positive isolates respectively. Gram negative isolates showed highest resistance to 3rd generation Cephalosporins (78%). *Staphylococcus aureus* showed highest resistance to Quinupristin/Dalfopristin (97%). Gram negative organisms were most sensitive to Minocycline (80%). Gram positive organisms showed highest sensitivity to Glycopeptide group of drugs (97%) like Vancomycin and Teicoplanin. **Conclusion:** Routine microbial analysis of post-operative wound infections and their antibiogram is recommended so as to guide clinician for the treatment of post-operative wound infections.

KEYWORDS : Post-operative Wound Infection, Culture, *Acinetobacter* spp, *Staphylococcus Aureus*

INTRODUCTION

- Post-operative wound infection has been reported to be one of the most common causes of nosocomial infections; is accounting for 20% to 25% of all nosocomial infections worldwide.
- Post-operative wound infection can double the length of time a patient stays in hospital and thereby increase the costs of health care and responsible for the substantial morbidity and occasional mortality related to surgical operations.
- Postoperative wound infections or Surgical Site Infections wound may be defined as infections that occur at incision site within thirty days after surgery. It may be defined as invasion and multiplication of microorganisms in body tissue which may be clinically apparent, or result in local cellular injury because of competitive metabolism, toxins, intracellular replication or antigen-antibody response
- These infections complicate illness, because anxiety, increase patient discomfort, delayed healing and can lead to death. The occurrence of a postoperative infection is dependent upon the interaction of patient- or host-related factors, such as host immunity, nutritional status, comorbid conditions; procedure related factors, including the presence of foreign bodies and tissue trauma associated with the procedure; microbial properties, such as ability to adhere to tissue or foreign bodies and innate virulence, and appropriate and timely antimicrobial prophylaxis. Wound infection can be caused by different group of organisms like bacteria, virus, fungi and protozoa and may co-exist as polymicrobial communities especially in wound margins and in chronic wounds. In many cases there is a mixed infection with more than one bacterial species.

MATERIAL AND METHOD

- The present study was conducted for 3 months from October 2020 to December 2020 in Microbiology department, South Gujarat
- The study included the Pus aspirate & Swab samples of patients having post-operative wound infection with discharge of surgical wards, orthopaedic wards and surgical ICU of tertiary care hospital, South Gujarat
- A total of 969 samples were collected and processed. They were gram stained and cultured in appropriate culture media, identification was made as per standard microbiological protocol and antimicrobial susceptibility testing was carried out for appropriate selection of antibiotic as per CLSI guidelines & data was analysed.

Inclusion Criteria:

Samples from suspected cases of postoperative wound infection were included in the study.

Exclusion Criteria:

Repeat sample from same patient were excluded from the study.

Collection of Specimens

Pus aspirate or swab samples collected from patients were subjected to microbiological processing in the laboratory.

Collection of pus from swab: Open wounds containing surface material were thoroughly cleaned and irrigated with sterile saline. About five times, the swab was gently rolled over the wound's surface, paying particular attention to any areas showing signs of pus or tissue. Two sterile cotton swabs were used for dry wounds, which were moistened with sterile saline. Swabs were transported to the lab for further processing.

Direct Microscopic Examination:

Gram Stain:

The samples collected for the study were smeared on glass slide, heat fixed and gram stain was performed.

Culture:

Culture was done on Nutrient agar, Blood agar and MacConkey agar using Standard Microbiology techniques. Plates were incubated at 37°C for 24 hours aerobically. Identification of the isolates were done using Standard Microbiology techniques. All types of colonies on the primary plates were examined macroscopically for haemolysis in Blood agar, changes in physical appearance of differential media and colony characteristics were recorded. The colony present on the plates was gram stained, identified by motility testing and biochemical testing. The antibiotic sensitivity testing of all isolates was performed by Kirby-Bauer's disc diffusion method on Mueller Hinton agar using antibiotics as per CLSI guidelines.

RESULT

- Total number of cases included in the study were 969 who shown postoperative wound discharge, out of which 526 cases shown culture positivity.
- 54% culture positive was observed in samples of Post-operative wound infection among clinically suspected cases.
- Predominantly gram negative isolates 81% & gram positive isolates 19%.

- Among the gram negative isolates, *Acinetobacter* spp. was the predominant etiological agent accounting for 140(27%) followed by *E.coli* 131(25%), *Pseudomonas* spp.107(20%), *Klebsiella* spp. 35 (7%), *Proteus* spp. 8(2%) & *Enterobacter* spp. 5(1%).
- Among the gram positive isolates, *Staphylococcus aureus* was the predominant etiological agent accounting for 82 (16%) followed by *Coagulase Negative Staphylococcus* 10(2%) & *Enterococcus* spp.8(2%).
- Gram negative isolates showed highest resistance to 3rd generation Cephalosporins(78%) followed by Trimethoprim/Sulfamethoxazole(77%).
- Amongst gram negative isolates, *Acinetobacter* spp. showed highest resistance to 3rd generation Cephalosporins (95%).
- In present study, *Staphylococcus aureus* showed highest resistance to Quinupristin/ Dalfopristin (97%) followed by Penicillin (94%).
- Gram negative organisms were most sensitive to Minocycline (80%) followed by Carbapenem (63%) & Aminoglycoside (51%) group of drugs.
- The predominant etiological agent, *Acinetobacter* spp. showed highest sensitivity to Minocycline (94%) followed by Netilmycin (58%).
- Overall gram positive organisms showed highest sensitivity to Glycopeptide group of drugs (97%) like Vancomycin and Teicoplanin followed by Minocycline (88%).

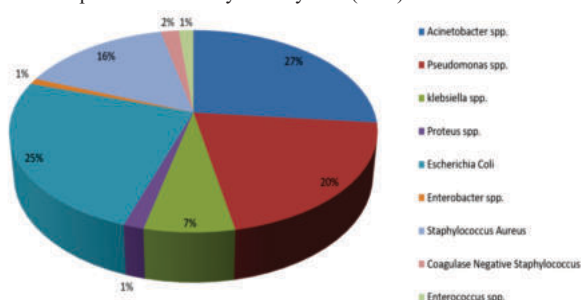
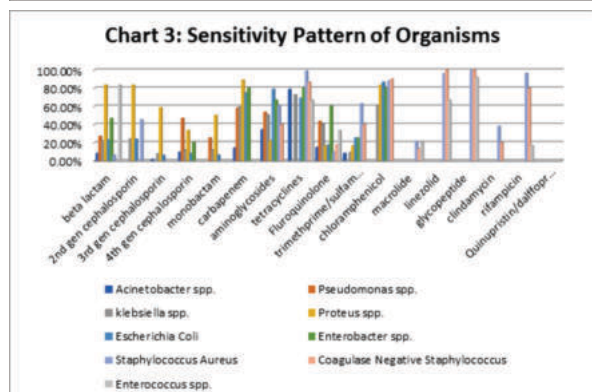
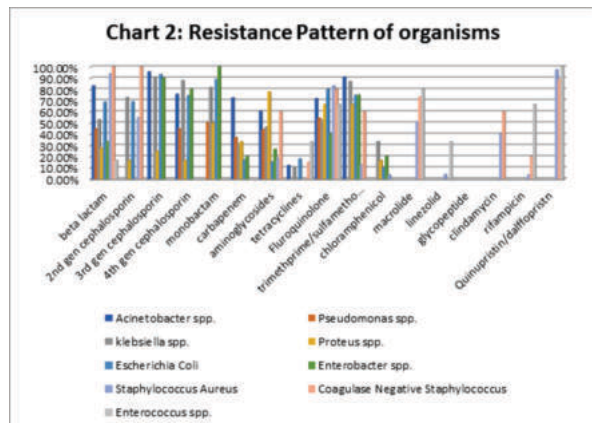


Chart 1: Different Isolates in Percentage From Positive Wound Culture



DISCUSSION

- The present study showed 54% culture positive rate which is higher than other study like Bastola et al. (49%).
- In present study, *Acinetobacter* spp. is the most prevalent organism

accounting 27% followed by *E.coli* (25%), *Pseudomonas* spp.(20%), *Staphylococcus aureus* (16%) while in Amatya J study the predominant isolates were *Pseudomonas* spp. (33.9%), followed by *Escherichia coli* and *Staphylococcus aureus*.

- Gram negative isolates showed highest resistance to 3rd generation Cephalosporins(78%) followed by Trimethoprim/sulfamethoxazole (77%), Aztreonam (74%) similar to Sowmya et al. study where gram negative bacteria reported maximum resistance to ceftazidime (56.7%)
- Gram positive isolates showed highest resistance to Quinupristin/ Dalfopristin(95%) followed by Cefoxitin (77%), Fluoroquinolones (76%), Penicillin (70%).Gram positive bacteria reported maximum resistance to ciprofloxacin (50%) in Sowmya et al.study
- The predominant etiological agent, *Acinetobacter* spp. showed highest resistance to 3rd generation Cephalosporins (95%).
- Among gram positive , 55% isolates were Methicillin resistant *Staphylococcus aureus*.
- Gram negative isolates showed maximum sensitivity to Tetracycline group of drugs and Chloramphenicol. In Roopashree S study majority gram negative isolates being susceptible to Imipenem, Meropenem and Amikacin.
- Gram positive isolates shows maximum sensitivity to Teicoplanin and Vancomycin in present study. Sowmya et al.study gram positive isolates showed maximum sensitivity to was vancomycin (69.3%).

CONCLUSION

- The present study was conducted in Microbiology department, South Gujarat. A total of 969 cases were examined for post operative wound infection. The samples were pus aspirates and wound swab of which 526 were culture positive and 446 were culture negative.
- The most commonly isolated pathogens were *Acinetobacter* spp. and *E.coli*, followed by *Pseudomonas* spp.
- On antimicrobial susceptibility testing, Chloramphenicol was the most effective drug among gram negative isolates and Tetracycline group of drugs were the most effective for the overall bacterial isolates.
- Vancomycin was found to be 100 % sensitive in gram positive isolates. So Vancomycin could be the drug of choice for MRSA.
- So Post-operative wound infection can not be completely eliminated, but reduction in the infection rate can be achieved by proper preoperative, intra operative and post -operative management of the patients.
- So look & pay attention to antibiotic policy to prevent post-operative wound infection and use of empirical treatment for prevention of antimicrobial drug resistance.

REFERENCES

- Bastola, R., Parajuli, P., Neupane, A., & Paudel, A. (2017). Surgical site infections: Distribution studies of sample, outcome and antimicrobial susceptibility testing. *Journal of Medical Microbiology & Diagnosis*, 6, 252. <https://doi.org/10.4172/2161-0703.1000252>
- Reddy, B. R., Vani, J., Gade, P. S., & Kurkure, S. V. (2012). Trends in surgical site infections in general surgery at a tertiary hospital. *Journal of Medicine and Allied Sciences*, 2(1), 19–22.
- Patel, S. M., Patel, M. H., Patel, S. D., Soni, T. S., Kinariwala, D. M., & Vegad, M. M. (2012). Surgical site infections: Incidence and risk factors in a tertiary care hospital, Western India. *National Journal of Community Medicine*, 3, 193–196.
- Amatya, J., Rijal, M., & Baidya, R. (2015). Bacteriological study of the postoperative wound samples and antibiotic susceptibility pattern of the isolates in B&B Hospital. *JSM Microbiology*, 3(1), 1019.
- Sowmya, M., Sukanya, S., & Ananthi, B. (2024). Bacterial profile and antibiogram of post-operative wound infections in a tertiary care hospital, Chennai. *International Journal of Pharmaceutical and Clinical Research*, 16(6), 463–468.
- Roopashree, S., Prathab, A. G., & Sandeep, T. (2021). Bacteriological profile and antibiotic susceptibility patterns of wound infections in a tertiary care hospital in South India. *Indian Journal of Microbiology Research*, 8(1), 76–85.