



PSEUDOMONAS AERUGINOSA: EMERGING THREAT TO POST OPERATIVE WOUND INFECTION.

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Abstract

Background - . In the recent condition, the growing incidence of *P. aeruginosa* has been increasing in post operative wound infection and becoming more serious problem in developing countries because of lack of general hygienic measures and mass production of low quality antiseptic : The aim of this study was to determine the prevalence of *Pseudomonas aeruginosa* in postoperative wound infection and its susceptibility pattern.

Methodology

Study design- Retrospective observational Study.

Study Centre- Bundelkhand Medical College, Sagar, Madhya Pradesh

Study duration- September 2021 to June 2022.

Methods and material –This is a record based study of 10 month duration. 252 patients were enrolled for the study and their post operative wound swab received were processed for identification of bacterial pathogens .

Result –Out of 252 wound swabs, 80(34.7%) were *P. aeruginosa*, followed by *Escherichia coli* (52/22.6%), *Klebsiella spp.*(46/20%), *Staphylococcus aureus*(35/15.2%), *Proteus spp.*(13/5.6%), *Acinetobacter spp.* (4/1.7%). There was no growth in (22/8.7%) wound swabs.

Interpretation & conclusions -Our study shows that *P. aeruginosa* was most prevalent (34.7%) the pathogens isolated from the surgical wounds. The primary reason for this increase in postoperative infection rate with prolonged preoperative hospitalization may be the colonization of patients with hospital-acquired resistant microorganisms.

Keywords – Antimicrobial resistance, *Pseudomonas aeruginosa*, postoperative wound, prevalence

INTRODUCTION Postoperative wound infection or surgical site infection is an important cause of health care associated infections among surgical patients. Patients who develop wound infections have longer hospital stays, more expensive hospitalizations, and increased mortality.[1] The development of wound infections depends on the integrity and protective functions of the skin.[2] *Pseudomonas aeruginosa* is a leading cause of health care associated infections, ranking second among gram-negative pathogens as reported by the United States national nosocomial infection

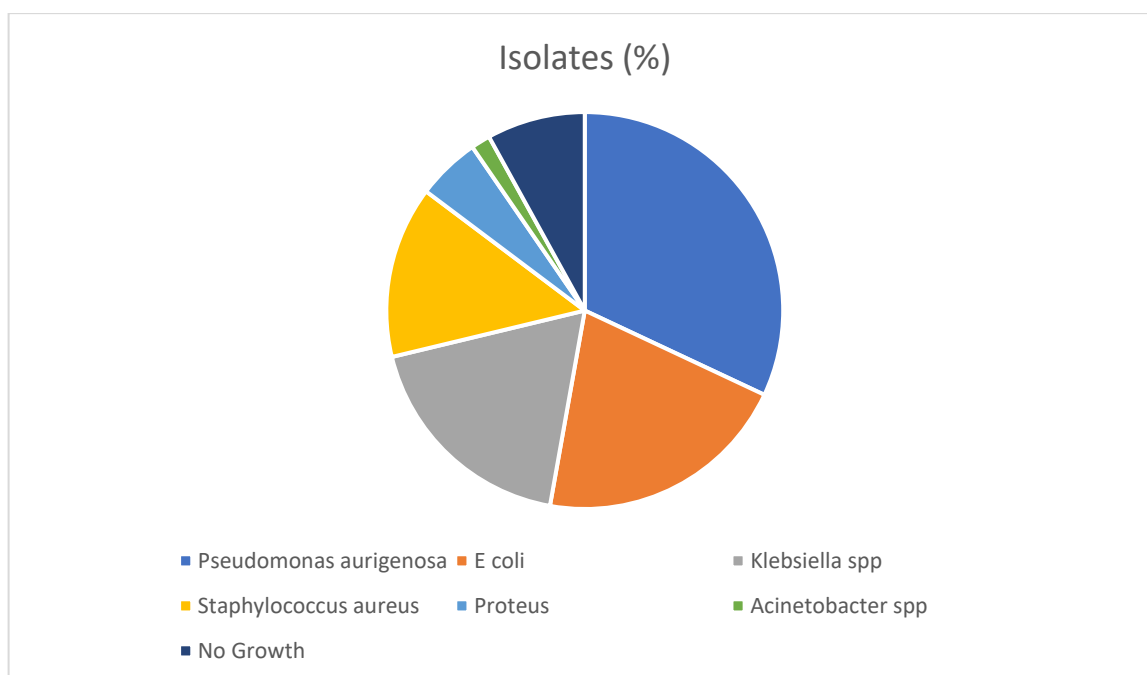
surveillance system. *P. aeruginosa* contributes substantially to wound-related morbidity and mortality worldwide. The organism enters into the blood, causing sepsis that may spread to the skin and leads to ecthyma gangrenosum, a black necrotic lesion.[3] It produces several substances that are thought to enhance the colonization and infection of host tissue.[4] These substances together with a variety of virulence factors, including lipopolysaccharides (LPSs), exotoxin A, leukocidin, extracellular slime, proteases, phospholipase, and several other enzymes, make *P. aeruginosa* the most clinically significant pathogen among non-fermenting bacteria. *P. aeruginosa* has the capacity to carry plasmids containing genes that regulate antimicrobial resistance, and this feature has led to the appearance of some strains that are resistant to normally reliable antibiotics.[5] Out of these, there are multiple reasons for postoperative wound infections, which have been validated and documented as risk factors. A risk factor is any recognized contribution to an increase in postoperative wound infection.[6] The virulence and invasive capability of the organisms have been reported to influence the risk of infection, but the physiological state of the tissue in the wound and immunological integrity of the host seem to be of equal importance in determining whether infection occurs or not.[7] Primary infections are usually more serious, appearing within 5–7 days of surgery. These infections are mostly related to endogenous flora and some other environmental sources in the operating theater. The deep-seated sepsis developing within 30 days after a surgery and before the wound has been dressed reflect a theater infection.[8] Some of the studies support the concept that a reduction in postoperative wound infection is directly related to increased education and awareness of its causes, and its prevention is greatly aided by critically evaluated infection control practice.[9] In the recent years, the growing incidence of *P. aeruginosa* has been of particular interest. The incidence of *P. aeruginosa* in postoperative wound infection is becoming more serious in developing countries because of lack of general hygienic measures, mass production of low quality antiseptic and medicinal solutions for treatment, and difficulties in proper definition of the responsibilities among the hospital staff.[13] The hospital-acquired nature of infections with *P. aeruginosa* has been noted and while some patients suffer endogenous infections, the vast majority is acquired from exogenous sources. So, the objective of our study was to determine the prevalence of *P. aeruginosa* in the isolates of postoperative wounds in our hospital and its antimicrobial susceptibility pattern.

MATERIAL AND METHODS

This was a single centre, hospital (in-patient) based, retrospective observational study was conducted in Bundelkhand Medical College, Sagar This is a record based study of 10 month duration. 252 patients were enrolled for the study and their post operative wound swab received were processed for identification of bacterial pathogens according to CLSI guidelines. The following media were used and tests were conducted in this study: blood agar, MacConkey agar, chocolate agar, nutrient agar, mannitol salt agar, Simmon citrate agar, peptone water, indole production test, motility test, methyl red test, voges proskauer test, catalase, coagulase, urease, and oxidase tests. All the above media and reagents were obtained from HiMedia, Mumbai, India. The media were prepared according to the manufacturers' instructions. All wound swabs collected for bacteriology investigations during the study period were treated according to the established methods of treating wound swabs. Gram stain preparations were made from one swab and culture are processed from another swab. The plates were incubated at 37°C for 18–24 hours in an incubator. The plates were read the following day but extended to 48 hours if there was no bacterial growth within 24 hours. Isolated colonies were subjected to Gram staining and biochemical tests for identification. Identification was carried out according to the standard biochemical tests.[14]

RESULTS

Out of 252 wound swabs, 80(34.7%) were *P. aeruginosa*, followed by *Escherichia coli* (52/22.6%), *Klebsiella spp.*(46/20%), *Staphylococcus aureus*(35/15.2%), *Proteus spp.*(13/5.6%), *Acinetobacter spp.* (4/1.7%). There was no growth in (22/8.7%) wound swabs.



DISCUSSION

A surgical wound infection is a postoperative complication that brings about embarrassment to the surgeon, considerable financial burden, undue discomfort to the patient, and sometimes death. Our study shows that *P. aeruginosa* was most prevalent (34.7%) among all the pathogens isolated from the surgical wound. Our results were consistent with similar studies carried out by Anupurba and colleagues which showed *P. aeruginosa* was isolated in 32% of isolates.[16] Oguntibegri and Nwobu, in their study, concluded it to be 33.3% [17] and Hani and colleagues found a prevalence rate of 27.78%.[18] Stephen and colleagues, in a similar study, reported a frequency of *P. aeruginosa* isolation rate of 18.8%.[19] We therefore report it as a significant finding which is in agreement with that obtained in other hospitals. The frequency of *P. aeruginosa* isolation was found to be maximal in patients who underwent cesarean section in the study by Oguntibeju and Nwobu[19] and in those with surgical wound infections and undergoing cesarean section in the study by Hani and colleagues.[20] In our study, it was most commonly isolated in procedures involving drainage of abscesses and diabetic foot operations, followed by cesarean section operations.

CONCLUSION

Post-operative wound infection not only burdens the patient, but also imposes a substantial burden on healthcare services in terms of morbidity, mortality, and financial costs. The prevalence of *Pseudomonas* infection seems to be extensive in healthcare facilities where cleanliness requirements are not strictly enforced, as shown in the recent study.

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