

ORIGINAL RESEARCH

Assessment of prevalence of *Pseudomonas aeruginosa* and its antimicrobial sensitivity profile among postoperative wound infections

¹Dr. Khyati Tiwari, ²Dr. Dayavanti Kumari, ³Dr. Neeti Mishra, ⁴Dr. Aditya Mishra

^{1,4}Assistant Professor, ^{2,3}Associate Professor, Department of Microbiology, T.S Misra Medical College & Hospital, Amausi, Lucknow, Uttar Pradesh, India

Corresponding Author

Dr. Khyati Tiwari

Assistant Professor, Department of Microbiology, T.S Misra Medical College & Hospital, Amausi, Lucknow, Uttar Pradesh, India

Email: khyatitiwari.kt@gmail.com

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ABSTRACT

Background: Post-operative wound infection or surgical site infection (SSI) is a significant cause of nosocomial infection among patients who have undergone surgery. The present study was conducted to assess prevalence of *Pseudomonas aeruginosa* and its antimicrobial sensitivity profile among postoperative wound infections. **Materials & Methods:** 90 post operative wound swabs of both genders were processed according to the standard microbiological techniques. The identification of bacterial isolates was done by standard biochemical and automated techniques. Antimicrobial Susceptibility Testing (AST) of the isolates was performed on Mueller Hinton agar by Kirby Bauer's disc diffusion method. **Results:** *P. aeruginosa* was seen in 32, *Escherichia coli* in 20, *Klebsiella pneumoniae* in 12, *Staphylococcus aureus* in 10 and *Proteus mirabilis* in 16 cases. The difference was significant ($P < 0.05$). Out of 20 diabetic foot specimens, *P. aeruginosa* was isolated in 6 cases, out of 36, abscess drainage, 20 had *P. aeruginosa*, out of 198 CS, 4 had *P. aeruginosa*, out of 10 bone excision, 2 had *P. aeruginosa*. The difference was significant ($P < 0.05$). Amikacin was sensitive in 85%, Aztreonam in 81%, Cefepime in 76%, Ceftazidime in 75%, Ciprofloxacin in 82% and Meropenem in 76%. **Conclusion:** There was high prevalence of *Pseudomonas aeruginosa* among postoperative wound infections. Antibiotic sensitivity profile of *P. aeruginosa* was maximum with Amikacin.

Key words: Antimicrobial, wound infection, surgical site infection

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INTRODUCTION

Post-operative wound infection or surgical site infection (SSI) is a significant cause of nosocomial infection among patients who have undergone surgery.¹ Post-operative wound infection simply means a wound infection that may originate primarily i.e during the operation or may occur secondarily i.e post operation from the sources in the ward or as a result of some complications.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.³ *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. 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 The present study was conducted to assess prevalence of *Pseudomonas aeruginosa* and its antimicrobial sensitivity profile among postoperative wound infections.

MATERIALS & METHODS

The present study consisted of 90 post operative wound swabs of both genders. All gave their written consent for enrolment in the study.

All were processed according to the standard microbiological techniques. The identification of bacterial isolates was done by standard biochemical

and automated techniques. Antimicrobial Susceptibility Testing (AST) of the isolates was performed on Mueller Hinton agar by Kirby Bauer’s disc diffusion method. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I: Distribution of micro-organism

Micro-organism	Number	P value
P. aeruginosa	32	0.05
Escherichia coli	20	
Klebsiella pneumoniae	12	
Staphylococcus aureus	10	
Proteus mirabilis	16	

Table I shows that P. aeruginosa was seen in 32, Escherichia coli in 20, Klebsiella pneumoniae in 12, Staphylococcus aureus in 10 and Proteus mirabilis in 16 cases. The difference was significant (P< 0.05).

Table II: Prevalence of P. aeruginosa isolated from different type of surgeries

Surgery	Specimens	No. of P.aeruginosa isolated	P value
Diabetic foot	20	6	0.04
Abscess drainage	36	20	
Caesarean section	18	4	
Bone excision	10	2	
Mastiodectomy	6	0	

Table II, graph I shows that out of 20 diabetic foot specimens, P. aeruginosa was isolated in 6 cases, out of 36, abscess drainage, 20 had P. aeruginosa, out of 18 CS, 4 had P. aeruginosa, out of 10 bone excision, 2 had P. aeruginosa. The difference was significant (P< 0.05).

Graph I: Prevalence of P. aeruginosa isolated from different type of surgeries

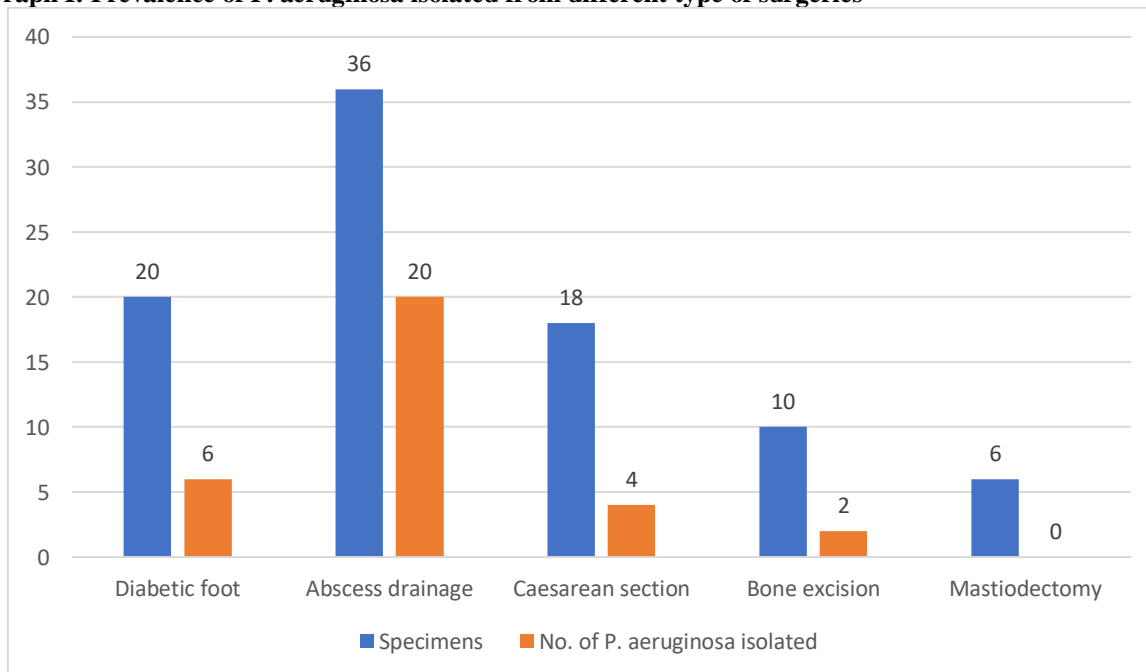


Table III: Antibiotic sensitivity profile of P.aeruginosa

Antibiotic	Sensitivity	Resistant
Amikacin	85%	15%
Aztreonam	81%	19%
Cefepime	76%	24%

Ceftazidime	75%	25%
Ciprofloxacin	82%	18%
Meropenem	76%	24%

Table III shows that Amikacin was sensitive in 85%, Aztreonam in 81%, Cefepime in 76%, Ceftazidime in 75%, Ciprofloxacin in 82% and Meropenem in 76%.

DISCUSSION

Postoperative wound infection or surgical site infection is an important cause of health care associated infections among surgical patients.⁶ Patients who develop wound infections have longer hospital stays, more expensive hospitalizations, and increased mortality. The development of wound infections depends on the integrity and protective functions of the skin. A risk factor is any recognized contribution to an increase in postoperative wound infection.⁷ 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.⁸ Primary infections are usually more serious, appearing within 5–7 days of surgery.⁹ The present study was conducted to assess prevalence of *Pseudomonas aeruginosa* and its antimicrobial sensitivity profile among postoperative wound infections.

We found that *P. aeruginosa* was seen in 32, *Escherichia coli* in 20, *Klebsiella pneumoniae* in 12, *Staphylococcus aureus* in 10 and *Proteus mirabilis* in 16 cases. Ranjan et al¹⁰ determined the prevalence of *Pseudomonas aeruginosa* in the isolates of postoperative wound and its susceptibility pattern to commonly used antibiotics. Of the 300 bacterial isolates, 89 (29.6%) were *P. aeruginosa*, followed by *Escherichia coli* (61, 20.3%), *Klebsiella* spp. (50, 16.6%), *Staphylococcus aureus* (43, 14.3%), *Proteus* spp. (19, 6.3%), *Acinetobacter* spp. (9, 3.0%), and *Citrobacter freundii* (2, 0.6%). There was no growth in 27 (9.0%) specimens.

We found that out of 20 diabetic foot specimens, *P. aeruginosa* was isolated in 6 cases, out of 36, abscess drainage, 20 had *P. aeruginosa*, out of 198 CS, 4 had *P. aeruginosa*, out of 10 bone excision, 2 had *P. aeruginosa*. Singh et al¹¹ evaluated the prevalence of *Pseudomonas aeruginosa* among the isolates of post-operative wound infection and to study their antimicrobial sensitivity profile. Among the 100 wound swabs studied, 93% revealed growth while 7% samples were sterile. *Pseudomonas aeruginosa* was isolated among highest number of infected wound swabs (26 %) and comparatively higher number (61.53 %) was detected among male patients and those that belonged to 61-80 years of age group (46.15 %). The abscess drainage was the most common type of post operative wound (38.46%) followed by surgery of diabetic foot (30.76%). *P. aeruginosa* was susceptible to colistin (96.7%) followed by meropenem (76.92%) and imipenem (73.07%).

We found that Amikacin was sensitive in 85%, Aztreonam in 81%, Cefepime in 76%, Ceftazidime in 75%, Ciprofloxacin in 82% and Meropenem in 76%. Mundhada et al¹² reported *Staphylococcus aureus* as the predominant organism in respective their studies. Studies have shown that postoperative wound infection is universal and it presents with the bacteriological profile that vary with geographic location, skin flora, clothing at the wound site and time lapse between development of wound and its bacteriological examination.

The limitation the study is small sample size.

CONCLUSION

Authors found that there was high prevalence of *Pseudomonas aeruginosa* among postoperative wound infections. Antibiotic sensitivity profile of *P. aeruginosa* was maximum with Amikacin.

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