NON-FERMENTING GRAM NEGATIVE BACILLI ISOLATED FROM SURGICAL SITE INFECTIONS CASES IN A TERTIARY CARE HOSPITAL

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Abstract-
Introduction: **Surgical site infections (SSI) result in increase in hospital stay and strain on hospital economy. Increasing number of Non-fermentative Gram-negative bacilli (NFGNB) isolates from SSI which are frequently multi drug resistant (MDR), necessitate proper identification and susceptibility pattern for effective management.**
AIM: The present study was planned to identify the nonfermenters isolated from various clinical samples, to assess anti-microbial resistance pattern.
Material and Methods: The nonfermenters were identified using a standard conventional method including motility, oxidase production; oxidation-fermentation etc. and antibiotic susceptibility testing was performed with the help of the Kirby-Bauer disc diffusion method.
Observations and Results: The most common isolates were *Pseudomonas aeruginosa* accounting for 46(17.36), followed by *A. baumanii* 39(14.72) etc.
Conclusion: *P.aeruginosa* and *A.baumanii* are most common NFGNB isolated in our study from patient of surgical site infection. *P.aeruginosa* showed good sensitivity to imipenem and pip. tazobactam. *A.baumanii* also showed good sensitivity to imipenem.

Key words: **Nonfermenter, Gram negative bacilli, Imipenem.**

INTRODUCTION:

Surgical site infections (SSI) are defined as infections which occur within 30 days post-surgery where surgery took place[1-2]. Surgical Site infections (SSIs)criteria, developed by Centre for Disease Control and Prevention (CDC) [3] defines SSls as "Infections related to the operative procedure that occur at or near the surgical incision (incisional or organ/space) within 30 days of an operative procedure or within one year if an implant is left in place". SSI are associated with increased morbidity and mortality rates, accounting for additional annual hospitals charges[4].
Non fermenting gram negative bacilli (NFGNB) are a taxonomically diverse group of aerobic, nonsporing Gram negative bacilli that either do not utilize glucose as a source of energy or utilize it oxidatively[5]. In recent years due to liberal and empirical use of antibiotics, NFGNB have emerged as important health care associated pathogens. They have been incriminated in infections like surgical site infections[6].
There are very few studies from India wherein the various NFGNB, isolated from SSI cases, have been identified and their clinical significance assessed.
Hence, this study was undertaken to identify NFGNB isolated from patients with SSI from a tertiary care hospital. The study was also done to assess their clinical significance and antimicrobial susceptibility pattern.

MATERIAL AND METHODS:

This was a descriptive (Cross-sectional) study conducted in the Department of Microbiology at a tertiary care centre in Central India from November 2020 to December 2022 with approval from institute ethical committee and informed consent was obtained from the subjects.
A total of 241 samples were collected from SSI cases with complaint of pain, swelling, redness, discharge, delayed or non-healing wound and processed as per standard microbiological techniques[7]. Antimicrobial susceptibility testing was performed as per CLSI guidelines 2020[8].

RESULTS:

Among 241 collected samples from SSI cases, 220 (91.29%) were culture positive among which 175 were monomicrobial while 90 organisms were isolated from polymicrobial growth.

Out of total 265 isolates, most common isolate among NFGNB was *Pseudomonas aeruginosa* 46(17.36%) followed by *Acinetobacter baumannii* 39(14.72%) others were Enterobacteriaceae and gram positive cocci.
Out of 46 isolates of *Pseudomonas aeruginosa*, 12(26.09%) were resistant to both Imipenem and Meropenem and 14(30.43%) to Piperacillin-Tazobactam. Other drugs like Piperacillin showed maximum resistance 42(91.30%) followed by Cephalosporins and Aminoglycosides. (Tab.1)
Among 39 *Acinetobacter baumannii* isolates, 16(41.03%) and 15(38.46) isolates were resistant to Imipenem and Meropenem respectively, which was followed by Piperacillin-Tazobactam 17(43.59%).(Tab.2)
MBL producers among *Acinetobacter baumannii* were 11(28.21%) isolates and Pseudomonas aeruginosa were 7(15.22%).(Fig.1)

DISCUSSION:
Infection of wounds after surgical operations is a real risk associated with any surgical procedure and represents a significant burden in terms of patient morbidity and mortality. NFGNB that were considered to be contaminants in the past have now emerged as important healthcare-associated pathogens[9-10]. Pseudomonas aeruginosa and *Acinetobacter species* are known to be common nosocomial pathogens [10,6].
The predominant NFGNB culture positive SSI cases in present study was *Pseudomonas aeruginosa* that were 17.36% which is comparable to the study conducted by Wassef et al[11] who reported 14.6 % and Mahesh et al[12] reported 26.22 % *Pseudomonas aeruginosa* isolates in their study.
Acinetobacter baumannii, comprised of 14.72%. It is comparable with studies carried out by Verma et al[13] and Siddiqui et al[14] who reported 2.61% and 20.33% *Acinetobacter baumannii* respectively.
Out of 46 isolates of *Pseudomonas aeruginosa* in this study, 12(26.09%) isolates were resistant to Imipenem and Meropenem followed by Piperacillin- Tazobactam 14(30.43%). Piperacillin has shown maximum resistance i.e. 42(91.30%) followed by cephalosporins and aminoglycosides. 19(41.30%) isolates of *Pseudomonas aeruginosa* were found to be resistant to Aztreonam. Similar results were reported by Budhani et al[15]and Dessie et al[16].
Out of 39 isolates of *Acinetobacter baumannii*, 16(41.03%) and 17(43.59%) were found to be resistant to Imipenem and Piperacillin-Tazobactam respectively. Negi et al [17]and Sanjay et al[18] have reported majority of *Pseudomonas and Acinetobacter isolates*, resistant to Imipenem and Piperacillin-Tazobactam.
Among the MBL producing 18 isolates, *Acinetobacter baumannii* 11(28.21%) was the predominant MBL producer followed by *Pseudomonas aeruginosa* 7(15.22%).This finding is comparable to study, by Sanjay et al[18] who reported 13.22 % of MBL producers among gram negative isolates with *Acinetobacter* spp. and *Pseudomonas* spp. as predominant MBL producers.

Conclusions:
P. aeruginosa and *A. baumannii* are the most common NFGNB isolated Their role as healthcare-associated pathogens is well-established to cause SSI. *P. aeruginosa* has shown good sensitivity to Imipenem and Meropenem. *A. baumannii* shows good sensitivity to Imipenem and Piperacillin Tazobactam. Identification of NFGNB, and monitoring their susceptibility patterns, are important for the proper management of the infections caused by them. This would avoid unnecessary usage of antibiotics and emergence of drug-resistant strains and appropriate hand hygiene may have a good impact in upcoming times ahead.

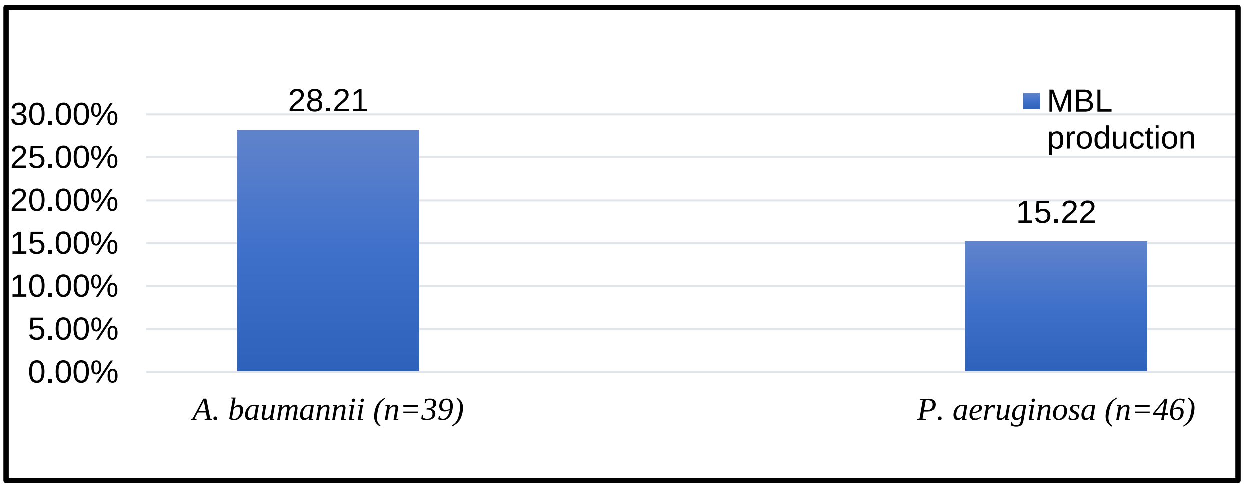
Table 1: Antimicrobial resistant in *Pseudomonas aeruginosa*

Groups	Antimicrobial agent	Pseudomonas aeruginosa (n=46)
Group A	Ceftazidime	24(52.17)
	Piperacillin- Tazobactam	14(30.43)
	Gentamicin	24(52.17)
	Tobramycin	22(47.83)
Group B	Amikacin	19(41.30)
	Aztreonam	19(41.30)
	Cefepime	27(58.70)
	Ciprofloxacin	24(52.17)
	Imipenem	12(26.09)
	Meropenem	12(26.09)
Group O	Piperacillin	42(91.30)

Table 2: Antimicrobial resistant in *Acinetobacter baumannii*

Groups	**Antimicrobial agent**	**Acinetobacter *baumannii* (n=39)**
Group A	Ceftazidime	26(66.67)
	Ciprofloxacin	27(69.23)
	Imipenem	16(41.03)
	Meropenem	15(38.46)
	Gentamicin	19(48.72)
	Tobramycin	21(53.85)
Group B	Amikacin	20(51.28)
	Piperacillin- Tazobactam	17(43.59)
	Cefepime	19(48.72)
Group O	Piperacillin	29(74.36)

Figure 1: Distribution of MBL producers



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