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Microbiology

PREVALENCE OF NONFERMENTERS AND THEIR ANTIBIOGRAM AT TERTIARY CARE HOSPITAL

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ABSTRACT **INTRODUCTION:** Non fermenting gram- negative bacilli (NFGNB) have become an ever increasing problem in recent years. They are inherently resistant to many antibiotics so the aim of present study was to identify NFGNB isolated from various clinical samples and to know their anti-microbial resistant pattern.

METHOD: NFGNB isolated from various clinical samples were identified by standard microbiological protocol. Antibiotic suspectibility testing was performed according to Clinical and Laboratory Standards Institute (CLSI) guidelines.

RESULTS: A total of 150 NFGNB were isolated from 1730 clinical specimens with isolation rate of 8.67%. The maximum NFGNBs were isolated from pus(56.67%) sample, *Pseudomonas aeruginosa*(52%) being most common. High resistance was noted to commonly used antibiotics. The prevalence of MBL among imipenem resistant isolates was 69.23%.

CONCLUSION: NFGNBs have emerged as an important pathogen and showed high resistance to commonly used antibiotics.

KEYWORDS : *Pseudomonas* , Pus , MBL

INTRODUCTION

Non-Fermenting Gram-Negative Bacilli (NFGNB) are a group of aerobic, nonsporing, bacilli/coccobacilli that are either incapable of utilizing carbohydrates as a source of energy or degrade them via oxidative, rather than fermentative pathway. They are distributed widely in nature and have been isolated from soil, water, and from medical devices as well as from clinical specimens. This group includes numerous organisms but the ones which are known to cause nosocomial infections *are Pseudomonas aeruginosa, Acinetobacter baumanii,* Burkholderia cepacia complex (BCC) *and Stenotropho monas maltophila*.[1] NFGNB can cause a wide variety of infections like pneumonia, septicaemia, urinary tract infection, surgical site infection and have the potential to spread from patient to patient via fomites or the hands of medical personnel.[2] Certain conditions or diseases predispose the patients to infection with non-fermenters like malignancies particularly of reticuloendothelial system, instrumentation, surgery, catheterizations particularly of urinary tract, intravascular catheterisation, lumbar puncture, tracheostomy, dialysis, lavages, placement of shunts, prosthesis and prolonged antibiotic usage and chronic infections. Burns, open wounds and exudative lesions are other predisposing factors.[3] NFGNB are intrinsically resistant to many antibiotics and are known to produce extended spectrum beta-lactamases and metallo beta-lactamases . The emergence of resistance to antimicrobial agents which are widely used against the non-fermenters, making them as an important healthcare associated pathogen. Development of resistance in non-fermenters is multifactorial. Factors involved are-mutations in genes encoding porins, efflux pump mechanisms, penicillin binding proteins, chromosomal beta lactamases.[4] Success of antimicrobial therapy depends on the appropriateness of the choice of antibiotics that should be used on the basis of prior knowledge of the susceptibility pattern of the agent.

AIMS & OBJECTIVES

1) To identify NFGNB isolated from various clinical samples.
2) To know their anti-microbial resistant pattern
3) To know prevalence of MBL producing NFGNB

MATERIALS AND METHODS

A retrospective study was done at the Department of Microbiology, IGGMC, Nagpur from July 2018 to December 2018. NFGNB isolated from a variety of clinical samples were included in the study. NFGNB were identified by cultural characteristics and biochemical reactions. All the organisms that grew on Triple Sugar Iron agar and produced an alkaline reaction were provisionally considered to be NFGNB and identified further by using a standard protocol for identification.[5]The isolates which were not identified by conventional methods were identified by VITEK 2 system. The sensitivity test was performed with the help of the Kirby-Bauer disc diffusion method and the results were interpreted as per the Clinical and Laboratory Standards Institute (CLSI-2018) guidelines.[6] All the imipenem resistant isolates were further tested for MBL production by Imipenem and Imipenem-EDTA disc potentiation test[6]

RESULTS

A total of 150 NFGNB were isolated from 1730 various clinical samples with incidence rate of 8.67%. Table 1 shows that *P.aeruginosa* was the most common NFGNB isolated followed by *A.baumannii* . The maximum NFGNB were isolated from pus (56.67%) sample followed by sputum (15.33%), BAL and ET aspirate (14%).

Table 1.Isolation rate & sample wise distribution of various NFGNB

Sample	TotaNo. of Isolates				Total
	P.aeruginosa	*A.baumannii*	*A.lwoffii*	BCC	
Pus	44	35	5	1	85 (56.67 %)
Sputum	18	4	1	0	23 (15.33 %)
BAL+ET	7	10	4	0	21(14 %)
Blood	1	1	1	3	6 (4 %)
Ear discharge	3	2	1	0	6 (4 %)
Urine	1	4	0	0	5 (3.33 %)
Body fluids	4	0	0	0	4 (2.67 %)
Total	78 (52 %)	56 (37.33 %)	12 (8 %)	4 (2.67%)	150 (100%)

Table 2. Antibiotic Resistance profile of isolated NFGNB

Antibiotics	*Pseudomonas aeruginosa (n=78)*		*Acinetobacter baumannii (n=56)*		*Acinetobacter lwoffii (n=12)*		Burkholderia cepacia complex *(n=4)*		TO TAL (n=150)	
	No. of isolate	%	No. of isolate	%	No. of isolate	%	No. of isolate	%	No. of isolate	%
Ceftazidime	54	69.23	48	85.71	10	83.33	4	100	116	77.33

Cefotaxime	78	100	48	85.71	10	83.33	4	100	140	93.33
Cefepime	45	57.69	38	67.85	9	75	3	75	95	63.33
Imipenem	30	38.46	35	62.5	9	75	4	100	78	52
Meropenem	30	38.46	35	62.5	9	75	2	50	76	50.66
Piperacilllin	55	70.51	50	89.28	11	91.66	4	100	120	80
Piperacillin-tazobactum	43	55.12	48	85.71	8	66.66	4	100	103	68.66
Gentamicin	38	48.71	32	57.14	7	58.33	4	100	81	54
Amikacin	32	41.02	30	53.57	6	50	4	100	72	48
Levofloxacin	35	44.87	37	66.07	7	58.33	1	25	80	53.33
Colistin	0	0	0	0	0	0	4	100	4	2.66

Table 2 shows antibiotic resistance pattern of NFGNB. High resistance was noted to cephalosporins ranging from 63.33 % to 93.33 %. Approximately 50 % isolates were resistant to imipenem, meropenem, gentamicin and amikacin where as all isolates except BCC were sensitive to colistin. Imipenem resistant isolates were tested for MBL production.

Table 3 shows distribution of isolates which are MBL producer. Out of 78 imipenem resistant isolates, 54(69.23 %) were confirmed MBL producers. The total prevalence of MBL in the present study was found to be 36%.

Table 3 : Prevalence of MBL producers

NFGNB	SCREENING TEST POSITIVE	MBL PRODUCERS (%)
P. aeruginosa (n=78)	30	17 (56.66%)
A. baumannii (n=56)	35	29 (82.85 %)
A. lwoffii (n=12)	09	06 (66.66%)
BCC (n=4)	04	02 (50 %)
TOTAL =150	78	54 (69.23 %)

DISCUSSION

NFGNB, which were only considered to be contaminants in the past, have now emerged as important nosocomial pathogens. [1] In the present study NFGNB were isolated in 8.67% of clinical samples. Similar rate of NFGNB isolation (10%) have been reported by Samanta P et al. [7] In our study *P.aeruginosa* was the most common NFGNB isolated followed by *A.baumannii*. Our results has co-related well with study conducted by Malini et al.[1] *A. lwoffii* showed the prevalence of 8% which is very close to the results reported by Kalidas et al[8] who reported it to be 5.4%. However, Juyal et al and Rajendra et al[9,10] have reported the prevalence of *A. lwoffii* as 13.8% and 9.1% respectively which is slightly higher as compared to this study. BCC showed the prevalence of 2.67 % in this study which is very near to the results reported by Jayapriya et al who reported it to be 3.2%.[11] The maximum NFGNB were isolated from pus sample(56.67%) followed by sputum(15.33%), BAL and ET aspirate (14%). These result comparable with the study done by, Malini et al.[1] However, NFGNB predominantly reported in ear swabs (36%) by Aamal et al[12] where as we reported it as 4%. This study also gives an alarming sign towards high prevalence of multi drug resistant NFGNB. Higher degree of resistance was noted to cephalosporins. Amikacin (48%), meropenem (50%),imipenem (52 %) were better drugs. Similar findings were reported by Juyal et al.[9] Among the isolated NFGNB, *P.aeruginosa* showed100 % resistance to cefotaxime followed by piperacillin (70.51%) and ceftazidime(69.23%) and less resistance to imipenem(38.46%) and meropenem (38.46%) .Both *A. baumannii* and *A.lowffii* showed high degree of resistance to piperacillin, piperacillin-tazobactum and cephalosporins .They were less resistant to carbapenems, aminoglycosides and levofloxacin. BCC showed 100% resistance to first and second generation cephalosporines, piperacillin, imipenem, aminoglycosides and colistin as they are intrinsically resistant to them. All isolates except BCC were sensitive to colistin. So it can be the best reserved drug. MBL has tremendous therapeutic consequences since these organisms also carry multidrug resistance genes and the only viable option remains the potentially toxic polymyxin B and colistin. In our study 69.23% isolates were identified as MBL producers among imipenem resistance isolates. MBL production was seen maximum with *A.baumannii* (82.85%) followed by *A.lwoffii* (66.66%) and P.aeruginosa (56.66%).Our result co-relates well with Koirala et al study.[13]

CONCLUSION

The present study highlighted the fact that NFGNBs have emerged as an important pathogen and shows resistance to commonly used antibiotics. It may be concluded that growth of NFGNB cannot be overlooked and should be confronted with high index of suspicion as NFGNBs have great ability to survive in hospital environment. Improved antibiotic stewardship, good housekeeping, equipment decontamination, strict protocols for hand washing, isolation procedures need to be implemented to prevent emergence and spread of multidrug resistant NFGNB in health care settings.

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