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PREVALENCE OF AEROBIC NONFERMENTING GRAM NEGATIVE BACILLI AND THEIR CHANGING ANTIBIOTIC PATTERN IN A TERTIARY CARE HOSPITAL IN KOTA RAJASTHAN

Microbiology

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ABSTRACT

INTRODUCTION Aerobic non fermenting gram negative bacilli are heterogeneous group of organisms that are either incapable of utilizing carbohydrates as a source of energy or degrade them via oxidatively rather than fermentative pathway.Non fermenter gram negative bacilli has emerged as a major cause of health care associated infections especially in immunocompromised hosts.

OBJECTIVE The study aims at isolation and identification aerobic of non-fermenter gram negative bacilli (NFGNB) and finding out their changing antibiotic sensitivity pattern.

MATERIAL AND METHOD NFGNB were identified by employing battery of standard test and antibiotic sensitiviity testing was performed by Kirby-Bauer disc diffusion method.

RESULTS Total of 120 NFGNB were isolated from different specimens in which 60% *Pseudomonas spp.*, 35% *Acinetobacter spp.* were commonly isolated .A high level of antibiotic resistance was recorded.Imipenem, Cefaperazone-Sulbactam, were the drugs with maximum activity.

CONCLUSION *Ps.aeruginosa* (60%) and *A.baumannii* (35%) were the two common NFGNB. Identification of NFGNB and monitoring their susceptibility patterns will help in proper management of infections caused by them. Improved antibiotic stewardship and infection-control measures will be needed to prevent or slow the emergence and spread of multidrug-resistant NFGNB in the healthcare setting.

KEYWORDS:

Nonfermenter, *Pseudomonas, Acenetobacter*

INTRODUCTION

Aerobic non fermenting gram negative bacilli are heterogeneous group of organisms that are either incapable of utilizing carbohydrates as a source of energy or degrade them via oxidatively rather than fermentative pathway. The term non-fermenter gram negative bacilli means all aerobic gram negative rods that show abundant growth within 24 hours on the surface of Triple sugar iron (TSI) medium, but neither grow in nor acidify the butt of this media. They comprise about 1/5th of all gram negative bacilli (GNB)[1]. NFGNB can cause a vast variety of infections and account for approximately 15% of all gram negative bacilli cultured from clinical specimens. Pathogenic NFGNB habitat in moist intertrigenous parts of the skin such as toe webs, groin, and antecubital fossa[2]. They are most commonly isolated from patients with serious underlying disease,prolonged surgical procedures, prolonged hospital stay, inadequate mechanical instrumentation, burns patients[3],They have been incriminated in infections such as septicaemia, pneumonia, urinary tract infections and surgical site infections[1,4]. NFGNB are resistant to many antibiotics and are known to produce extended spectrum β-lactamases and metallo β-lactamases[5].NFGNB most often cause nosocomial infections in patients who are debilitated or immunocompromised[1,5].Antim icrobial treatment of the infection caused by these agents is difficult due to its multidrug resistance (MDR)[6,7]. *Pseudomonas* and *Acinetobacter* are the most predominantly isolated NFGNB. Carbapenemase activity in *A.baumannii* is mainly due to Carbapenem hydrolyzing class D-lactamases (CHDLs) that is mostly specific for this species[8]. In case of *P.aeruginosa* the dominant mechanism of Carbapenem resistance is loss of carbapenem specific porin OprD2[9].

OBJECTIVE

Aim of the present study was to know the prevalence of NFGNB along with their changing pattern of antimicrobial sensitivity among the patients.

MATERIAL AND METHOD

This study was conducted in Department of Microbiology, Gover nment Medical College,and associated hospitals, Kota, Rajasthan during the period from June 2015 to August 2016. 120 NFGNB isolates from various clinical specimens. were including pus, urine, sputum,throat swab tracheal aspirates.

The isolates were characterized by a battery of tests as follows[10,11]:
Gram staining morphology, growth at 25°C ,37°C ,42°C motility (by hanging drop), catalase test, oxidase test, citrate utilization test, urea hydrolysis test, pigment production, indole production, lysine and ornithine decarboxylation, arginine dihydrolase test, , oxidation of 1% glucose, lactose, maltose, (Hugh and Leifson's medium),growth on 10% lactose agar.

The sensitivity test was performed by Kirby-bauer disc diffusion method using commercially available discs (Himedia) on Muller Hinton agar (MHA). Antibiotic discs were placed by lawn culture and plates were incubated at 37°C for 18-24 hrs. The results were interpreted as per the ***CLSI*** (Clinical and Laboratory Standards Institute guidelines)[12]. The strength of the disc and their zone size were according to the guidelines by ***CLSI***. *Escherichia coli* ATCC 25922 and *Pseudomonas aeruginosa* ATCC 27853 were used as control strains.

RESULTS

Among 1054 clinical specimens, NFGNB were isolated from 120 specimens accounting for an isolation rate of 11.38%.Monomicrobial growth was seen in 75(62.5%) specimens and 45(37.5%) specimens showed polymicrobial growth where nonfermenters were isolated with other organisms, of which *S.aureus, E. coli*, *K.pneumoniae* and *Citrobacter* species were common.

Nonfermenters were isolated more pronounced in pus specimens 52 (43.33%) followed by urine specimens 29(24.166%), sputum specimens 27(22.5%), and throat swab specimens 9(7.5%), Tracheal aspirates/fluid 3(2.5).In pus specimens major isolates were *Pseudomonas spp*. (66.66%) and *Acinetobacter spp.* (25%).In urine specimens major isolates were *Pseudomonas spp*.(71.66)% and *Acinetobacterspp.* (26.66%). In throat swab specimens *Acinetobacter spp.* and *Pseudomonas spp.*66.6% and 33.3% isolated respectively.

NFGNB ISOLATES FROM CLINICAL SPECIMENS

Specimen		*Pseudomonas spp.*		*Acinetobacter spp.*		*Alcaligenes spp.*		*Sphingobacter spp.*	
		N	%	N	%	N	%	N	%
Pus (52)		35	67.4	13	25.5	02	4.7	02	3.8
Urine (29)		21	72.4	07	24.1	01	3.4	0	0
Sputum (27)		14	51.8	13	48.1	0	0	0	0
Throat swab (09)		02	22.2	06	66.6	0	0	1	11.1
Tracheal aspirates/fluid(03)		0	0	03	100	0	0	0	0
Total (120)	72	60	42	35	03	2.5	03	2.5	

SENSITIVITY PATTERN OF NFGNB SPP.

Antibiotics		*Pseudomonas spp.* N	%	*Acinetobacter spp.* N	%	*Alcaligenes spp.* N	%	*Sphingobacter spp.* N	%
Piperacillin tazobactam	S	40	55.5	22	52.3	02	66.6	02	66.6
	R	72	44.5	20	47.6	01	33.3	01	33.3
Netilmicin	S	12	16.7	11	26.2	01	33.3	02	66.6
	R	60	83.3	31	73.8	02	66.6	01	33.3
Ceftazidime	S	28	38.9	12	28.5	02	66.6	01	33.3
	R	44	61.1	30	71.5	01	33.3	02	66.6
Norfloxacin	S	9	12.5	03	07.2	01	33.3	01	33.3
	R	63	87.5	39	92.8	02	66.6	02	66.6
Imipenem	S	56	77.7	28	66.6	03	100	03	100
	R	16	22.3	14	33.3	0	0	0	0
Cefaperazone Sulbactam	S	50	69.4	27	64.2	03	100	02	66.6
	R	22	30.6	15	35.8	0	0	01	33.3
Amikacin	S	42	58.3	13	31	02	66.6	02	66.6
	R	30	41.7	29	69	01	33.3	01	33.3

S – Sensitive
R – Resistant

DISCUSSION

Nonfermenters are ubiquitous in environment. Although frequently they are considered as commensals or contaminants, the pathogenic potential of NFGNB has been known [1,13]. They have emerged as important nosocomial pathogens especially in immunocompromised hosts. Resistance to antimicrobials is common and has increased over the years among NFGNB and now resistant nearly to all commonly used antibiotics[14] In the present study NFGNB were isolated in 11.66% of clinical specimens and this was parallel to the results of a study by Samanta P et al[15] where NFGNB were isolated in 10% of clinical specimens. A study by Sidhu S et al[16] reported very high isolation rate of 45.9% while another study by Vijaya D et al[17] In contrast a study by Malini et al[18] reported NFGNB to be isolated only in 4.5% of clinical species. In a study by Eltahawy et al[19] NFGNB accounted for 16% of all the gram negative bacilli isolated. A study by Bruno D et al[20] also reported a very low isolation rate of about 2.18%. S.K.Meharawal[21] in the year 2002 reported that *Pseudomonas spp*(45.5%) were the commonest followed by *Acinetobacter* spp.(39%) Alcaligenes spp. accounted for 8% and *Sphingobacter spp.* was 3.63% in urine, similarly in our study *Pseudomonas* is more pronounced (72.4%) followed by *Acinetobacter spp*. (24.1%) *Alcaligenes spp*.(3.4%).

Pseudomonas aeruginosa was the predominant 60% bacterial strain in all specimens in our study. It correlates to studies done by done by Yashodhara P et al[7] 66.95%, and in Cristane et al[22] 72.5%.

In the present study, most of the isolates showed high degree of resistance to first and second line drugs were ineffective and this further confirms the multi drug resistant (MDR) attribute of NFGNB.

In our study NFGNB displayed a variable spectrum of antibiotic sensitivity. There is no antibiotic to which all strains are susceptible. *Pseudomonas aeruginosa* showed a resistance of 44.53% % to Piperacillin-tazobactam in our study it is higher to study done by Preeti B.Mindolli[23] in which 56% resistance pattern found. Netilmicin resistance in Ps.aeruginosa in our study was 83.3%. In studies by Taneja N et al6 it was 80%.

Pseudomonas showed 22.3 % resistance to Imipenem in our study. It is lower to study done by Taneja et al[6] it showed 36% resistance *A.baumanii* showed a resistance of 47.6 % to Piperacillin-tazobactam in our study, similar to study by Jawad et al[24]. In our study resistance to Amikacin 69% for Acinetobacter spp.which is much higher than Study conducted in 2004, by Lt col KK Lahiri et al25 showed resistance to Amikacin in 12%.Study conducted by K. Prashanth et al[26] in 1999 showed resistance 48% to Amikacin.

CONCLUSION

P.aeruginosa and *A.baumanii* were the commonest NFGNB isolated in our study. The different species of NFGNB have shown a varied sensitivity pattern in our study. Therefore identification of NFGNB and monitoring their sensitivity pattern are important for proper management of these infections caused by them to avoid unnecessary usage of antibiotics and emergence of drug resistant strains.

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