



ANTIBIOTIC RESISTANCE PATTERN AND PREVALENCE OF BETA-LACTAMASES AMONG CLINICAL ISOLATES OF ENTEROBACTERIACEAE IN A TERTIARY CARE HOSPITAL IN WESTERN U.P.(INDIA).

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ABSTRACT

With the looming scenario of current antibiotics no longer becoming effective , understanding the resistance patterns and possible mechanisms of drug-resistance in the prevailing organisms of a particular region helps in deciding appropriate antibiotic therapy in order to maintain the efficacy of commonly prescribed antimicrobial drugs and check the evolution of more drug-resistant-bacteria . Present study was performed to establish the incidence of Enterobacteriaceae and identify their resistance pattern in a particular region of western U.P. The prevalent Enterobacteriaceae (58.58%) showed alarming trends of resistance to current antibiotics with ESBLs((54.77%) and Carbapenemases (16.56%) emerging profusely.

KEYWORDS : Antibiotic-resistance, Enterobacteriaceae , ESBLs' .Carbapenemases .

INTRODUCTION:

The world wide escalation in both community and hospital acquired antimicrobial resistant bacteria poses a serious challenge to the clinicians and microbiologists alike . The members of family Enterobacteriaceae possess different mechanisms of resistance to antibiotics which necessitate continuous surveillance , augmented antibiotic stewardship .and prudent therapeutic management. Emergence of drug-resistance is threatening the ability to effectively treat patients emphasizing the need for:

- (i) continued surveillance.
- (ii) more appropriate antimicrobial prescription &
- (iii) new treatment alternatives.

Epidemiological surveillance of antimicrobial resistance is indispensable for :

- (i) Empirically treating infections.
- (ii) Implementing resistance control measures an
- (iii) Preventing the spread of antibiotic- resistant-microorganisms

Knowledge of epidemiological and antibiotic resistance patterns of concerned pathogens in a given area helps to inform the choice of antibiotics.

AIMS & OBJECTIVES:

The present study was performed to establish the incidence of pathogenic bacteria of family Enterobacteriaceae isolated from clinical samples and identify their resistance patterns .

MATERIALS AND METHODS:

The study was performed on a total of 957 consecutive non duplicate clinical samples received in the microbiological laboratory of the hospital for investigation. Samples were cultured in the respective culture media for the isolation of causative organism and bacteria were identified using standard bacteriological techniques.

Antimicrobial Sensitivity Testing was performed by Kirby bauer method and antibiograms were used as per CLSI guidelines .

Sensitivity Testing

Antimicrobial sensitivity testing was performed by Kirby-Bauer disc diffusion method using standard 0.5 McFarlands bacterial suspension

Antibiograms were used as per international guidelines for the isolates(CLSI) .

Representative drugs of all effective groups were used. Antibiotic discs from Hi-Media company were used .

Interpretation of results were done following instructions supplied by manufacturer .

Esbl Reporting Criteria (only In Enterobacteriaceae) ::

1. Beta-Lactams are resistant . (Ceftazidime, Aztreonam, Ceftriaxone, Cefotaxime0	ESBL Screening positive.
2. Zone-difference between Ceftazidime(CAZ)and Ceftazidime/Clavulanic Acid(CAC)is > 5mm	ESBL Screening positive

Carbapenemase Screening Criteria :

1. If all carbapenems are resistant.(Ertapenem ,Meropenem, Imipenem)	Carbanemase screening positive.
2. If variation in susceptibility pattern of .Ertapenem ,, Meropenem, Imipenem	To withhold report of carbapenems . To release a provisional report without mentioning cabapenems . To perform vitek sensitivity for carbapenems . To reportas per vitek final report next day

Observations:

Out of the 957 isolates received , 523 were of male patients and 434 were of females. 25.5 %(x=244) of the clinical samples were found to be culture positive with 23 samples showing mixed growth of two organisms concomitantly.

Thus , a total of 268 isolates were identified .

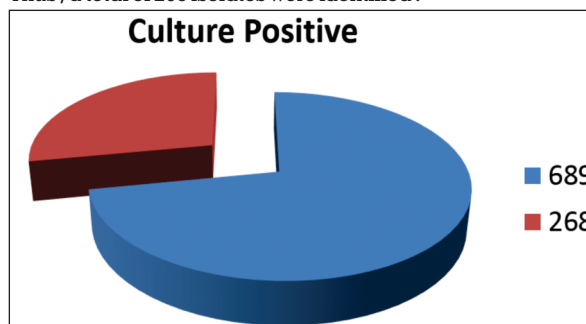


Fig no.1

Out of a total of 957 samples, 268 isolates were grown in the culture. Among them, 58.58% (n=157) bacteria belonged to family Enterobacteriaceae.

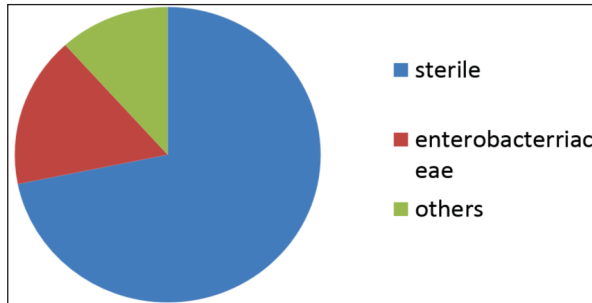


Fig no.2

sample	male	female	Total	No. of organisms
urine	197	237	434	71
sputum	104	46	150	39
pus	97	41	138	87
Endotracheal swab/aspirate	39	26	65	48
CSF	34	17	51	0

Ascitic fluid	16	6	22	3
Placental membrane	0	14	14	1
Endocervical swab	0	11	11	0
HVS	-	14	14	0
CVP	3	4	7	5
Pleural fluid	8	7	15	2
B.A.L.	5	4	9	4
Stitchline swab	0	4	4	1
ICD fluid	5	3	8	2
stool	0	3	3	1
Conjunctival swab	0	2	2	0
Soft tissue	0	1	1	1
Vitrous tube	0	1	1	0
Cornial button	1	0	1	0
SS Sinovial fluid	1	0	1	0
Peritoneal fluid	0	1	1	1
Vaginal discharge	0	1	1	0
Drain fluid	0	1	1	1
Endometrial tissue	0	1	1	0
Liver aspirate	1	0	1	0
V.P .shunt	1	0	1	1
Total	512	445	957	268

Table no.2 : Distribution of Bacteria in clinical specimens:

Specimen	E.c oli	K.pneumoniae	Acenatobacter spp.	Citrobacter spp.	K. oxytoca	Morganella spp	Pseudomonas spp	Proteus mirabilis	Proteus vulgaris	Staph aureus	C.O. N.S.	Enterococcus spp	Total
Urine	34	8	1	1	1	0	3	0	1	0	3	19	71
Sputum	10	14	4	0	2	0	9	0	0	0	0	0	39
Pus	20	14	5	3	1	3	12	11	0	5	11	2	87
Endotracheal swab/aspirate	5	10	14	2	3	0	11	1	0	2	0	0	48
CSF	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascitic fluid	2	0	0	1	0	0	0	0	0	0	0	0	3
Placental membrane	0	0	1	0	0	0	0	0	0	0	0	0	1
Endocervical swab	0	0	0	0	0	0	0	0	0	0	0	0	0
HVS	0	0	0	0	0	0	0	0	0	0	0	0	0
CVP	0	2	0	0	0	0	2	0	0	0	1	0	5
Pleural fluid	1	0	0	0	0	0	0	0	1	0	0	0	2
B.A.L.	1	1	0	0	0	0	1	0	0	1	0	0	4
Stitchline swab	0	0	0	0	0	0	0	0	0	0	1	0	1
ICD fluid	0	0	0	0	0	0	2	0	0	0	0	0	2
Stool	1	0	0	0	0	0	0	0	0	0	0	0	1
Conjunctival swab	0	0	0	0	0	0	0	0	0	0	0	0	0
Soft tissue	1	0	0	0	0	0	0	0	0	0	0	0	1
Vitrous tube	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornial button	0	0	0	0	0	0	0	0	0	0	0	0	0
Synovial fluid	0	0	0	0	0	0	0	0	0	0	0	0	0
Peritoneal fluid	0	0	0	0	0	0	0	0	0	0	1	0	1
Vaginal discharge	0	0	0	0	0	0	0	0	0	0	0	0	0
Drain fluid	1	0	0	0	0	0	0	0	0	0	0	0	1
Endometrial tissue	0	0	0	0	0	0	0	0	0	0	0	0	0
Liver aspirate	0	0	0	0	0	0	0	0	0	0	0	0	0
V.P .shunt	1	0	0	0	0	0	0	0	0	0	0	0	1
Total	77	49	25	7	7	3	40	12	2	8	17	21	268

Table no.3 : Classification Of Bacterial Isolates Grown:

Type of Isolates	NO.
Gram positive cocci	46
N.F.G.N.B.	65
Enterobacteriaceae	157
Total	268

Table No.4 : Resistance Pattern Of Enterobacteriaceae:

Resistance Pattern	No.
Total	157
E.S.B.L. producing	86

Percentage							54.77 %
Carbapenemase producing							26
Percentage							16.56 %
Antibiotic	E.c oli	K.pneumoniae	Citrobacter spp.	K. oxytoca	Morganella spp	Proteus vulgaris	
Amp	77	48	7	7	3	1	
Pi	77	46	6	7	3	1	
AMC	72	47	4	7	3	1	
A-S	73	45	5	10	1	0	
CAZ	74	45	6	7	3	1	

CTR	69	46	6	6	3	1
AT	67	43	6	7	2	0
Pi-T	61	43	5	7	0	1
Te	53	32	0	7	2	1
Ak	32	36	3	7	1	1
GEN	32	36	3	7	1	1
CPM	63	43	5	7	0	1
ETP	5	3	0	5	0	0
CIP	72	33	4	7	1	0
AZ	3	2	0	0	0	0
Tob	31	36	3	6	1	1
CFM	65	39	6	7	3	1
MRP	21	35	4	7	0	1
C	15	18	1	6	2	0
IMP	5	3	0	5	0	0

RESULTS & DISCUSSIONS:

Prevalence of family Enterobacteriaceae is higher (58.58%) as compared to other bacteria such as gram positive cocci or non fermenting gram negative bacilli.

Of the total organisms E.coli was found to be most drug resistant followed by Klebsiella. Which is in concordance with the results of a previous study (Lamichhane et al, 2014) in which 33,14% of isolates were found to be drug resistant.

These bacteria are showing alarming trends of resistance towards Ampicillin, piperacillin, fluoroquinolones and even Amoxicillin-clavulanate and Ampicillin-Sulbactam combination.

Increasing prevalence of beta-lactamases (54.77%) in the region is contributing towards higher resistance to antibiotics in family Enterobacteriaceae.

CONCLUSION:

There is need to take timely measures to curtail drug resistance due to ESBLs along with possible co-existence of additional mechanisms of resistance in Enterobacteriaceae. Empirical choice of antibiotics in treatment of infections caused by members of family Enterobacteriaceae should be decided by knowledge of prevalence of pathogenic bacteria along with patterns of their antibiotic sensitivities in that particular area rather than theoretical guidelines only in order to check the menace of drug-resistance, to treat the patients promptly and to formulate new therapeutical alternatives.

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