



TRENDS OF ANTIBIOTIC RESISTANCE PATTERN AMONG COMMON BACTERIAL ISOLATES IN A TERTIARY HEALTH CARE CENTRE OF TRIPURA: A HOSPITAL BASED STUDY.

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ABSTRACT

Introduction: Resistance to antibiotics is an extremely common phenomenon in bacteria isolated from clinical material. However there is scarcity of data on antibiotic resistance from North Eastern part of India. In this Study, we aimed to generate data to find out the trend of Antibiotic resistance among the clinical isolates. Methods: Involving both indoor and outdoor patients attending this hospital are included in this study. Culture & Microbial sensitivity were performed by 'Kirby Bauer' method and an according to current CLSI guidelines. Drug resistance pattern were analyzed among the Common clinical isolates. Results: Majority of isolated organisms were klebsiella sp and Staphylococcus sp. Cephalosporins resistance (99%) was more in Gram negative bacilli as compare to Fluoroquinolones among Gram positive cocci (85%). **Conclusion:** This pilot study from a Medical College of North East has demonstrated very high levels of resistance to commonly used antibiotics and generated data can be used to formulate antibiotic use protocols in the state.

KEYWORDS :North East, Antibiotic resistance, Cephalosporins

Introduction:

Resistance of bacteria to antimicrobial agents is not only an imminent threat to patient management throughout the world but also a global public health problem triggering the magnitude of the burden of infectious disease in developing countries and reinforcing the economic stress. Rapidly rising antibiotic resistance is a challenge to comprehensive patient care in all branches of medical science. The bacterial disease burden in India is among the highest in the world¹; consequently, antibiotics will play a critical role in limiting morbidity and mortality in the country. Every time an antibiotic is used - whether appropriately or not, in human beings or in animals- the probability of the development and spread of antibiotic-resistant bacteria is increased^{2,3}. Management of common and lethal bacterial infections has been critically compromised by the appearance and rapid spread of antibiotic-resistant bacteria. Earlier, the problem of antibiotic resistance was primarily a concern for nosocomial infections. But now, even community acquired infections are caused by organisms with high levels of antibiotic resistance⁴. 'Drug selection pressure' is the single most important factor in the evolution of drug resistance and reasons are multi factorial. The pattern of antibiotic resistance in bacteria in India shows a trend similar to the global epidemic. India is one of the highest consumers of antibiotic drugs in the world⁵ Studies from different parts of India have consistently documented an ominously rising level of resistance to all the common antibiotics⁵. Over the last decade, published data have revealed doubling or even tripling of the rate of antibiotic resistance for almost all groups of clinically important pathogens. Resistance against certain antibiotics is already at high levels in certain places in India, but the problem has remained largely unknown because relatively few studies were published and scarcity of nationwide surveillance. North Eastern state Tripura having two tertiary care medical College but there is no published data to highlight the scenario of AMR (Anti microbial Resistance) among the common bacterial isolates. In this regard the study was designed to see the trends of AMR pattern among the clinical isolates.

Material and Methods:

The study was carried out among the OPD & IPD patients attended Tripura medical College and Dr BRAM Teaching Hospital, during January-June 2017. Ethical approval was accordingly obtained from the Institutional Research and Ethical committee. Samples were collected from suspected case of clinically diagnosed patient of Urinary tract infection (UTI), Lower respiratory tract infection (LRTI), septicemia and wound infections etc. Bacteriological culture and Antibiotic sensitivity were performed by 'Kirby bauer' method and an according to current CLSI guidelines. The patients were excluded from the study who had a prior history of current uses and abuses of

antibiotics. The frank cases of all clinical patients irrespective of all age and sex were included. Urine (UTI), sputum (LRTI), Blood (septicemia) and Pus (wound infections) the major four samples were included according to the clinical basis of the disease.

Antibiotic susceptibility was tested against gram-positive bacteria with Erythromycin, Cefoxitin, co-trimoxazole, Linezolid, ciprofloxacin, Levofloxacin, Gentamicin, Vancomycin etc and for Gram negative bacteria Piperacillin, Tazobactam, Amoxycylav, Gentamycin, Amikacin, Ciprofloxacin, Levofloxacin Co-trimoxazole, Cefuroxime, Cefepime, ceftriaxone, Imipenam, Meropenam, Nitrofurantoin (urine) etc. Data was analysed in Excel sheet for further interpretation of the result.

Result:

A total of 3217 samples were received during the duration of 6 months irrespective of male 1898(59%) and female 1319 (41%). During the study period including Urine 1561, Sputum 1150, Blood 365 and Pus 141. Total OPD patients was 121 and IPD 519. Out of 3217 samples, 148 (4.6 %) showed significant growth of organisms and exhibited resistance to either single or multiple drugs. Maximum organism isolated from the middle aged group (16-35 yrs). Predominant organisms isolated from various samples among the Gram negative bacteria like Escherichia coli, Klebsiella species, Pseudomonas sp, Proteus, Acinetobacter species etc where Staphylococcus aureus (MSSA and MRSA), Enterococci as gram Positive Bacteria. Bacterial Isolation rate among urine sample was found to be 20.62% (N=321) Predominantly by Escherichia Coli 37% among UTI suspected cases followed by Gram positive cocci Enterococcus 32% however isolation rate of Klebsiella sp was 71% followed by pseudomonas sp 20% among Sputum 19.04 % (N=219) from suspected Lower Respiratory Tract Infection (LRTI). Isolation rate in blood samples was found to be 7.39 % (N=27) predominantly Klebsiella sp 42% followed by Staphylococcus aureus 31% Where as in pus samples bacterial isolates was 51.77% (N=73) majority by staphylococcus aureus 48% followed by Klebsiella sp 14% [Tables 1]. Among the commonly used antimicrobials against gram negative bacteria maximum resistance was observed with Cephalosporins, Amoxicillin Clavulanic acid followed by fluoroquinolones however Decrease trend of resistance was found among Aminoglycosides followed by carbapenem (Imipenam Meropenem), Nitrofurantoin and piperacillin Tazobactam. Regarding commonly used antimicrobials against gram positive bacteria maximum resistance was observed with fluoroquinolones, Amoxicillin clavulanic acid, Gentamicin however least resistance or the highly sensitive antibiotics to gram positive bacterial was found to be Linezolid, vancomycin and Nitrofurantoin [Table 1]. Common isolates among

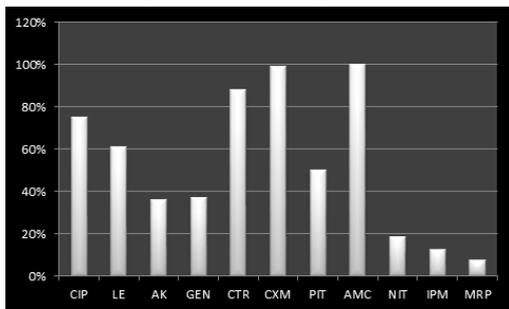
GNB's was Klebsiella compared to Staphylococcus among Gram positive cocci [Table 1]. Sample wise analysis among Gram negative

and positive organism's was mentioned in [Table no 1]

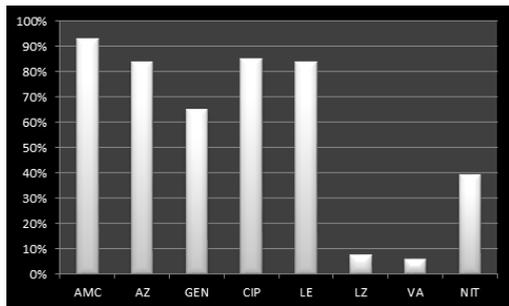
Table 1:Resistant Pattern Among Gram Negative and Gram positive Organism.

Drugs	1		2		3		4		5		6	
	CIP	LEV	AK	GEN	CTR	CXM		IMP	MRP	PIT	AMC	NIT
A	58	61	32	36	88	99		3.3	1.5	22	60	18.5
B	46	42	36.5	27.6	48.5	64		9.7	7.4	21	88.9	
C	75	61	25	37	88	95		12.5	7.5	50	100	
D	58.3	50	50	58.3	58.3	83.3		0	0	25	91.6	
A= Urine Ecoli, B= Sputum Kleb, C= Bl Klebsiella ,D= Pus Klebsiella 1= Quinolones , 2= Aminoglycosides 3= Cephalosporins , 4= carbapenems 5= Combination drugs 6= nitrofurantoin												
	1		2	3	4	5	6	7				
	CIP	LE	Gen	AZ	AMC	LZ	Va	NIT				
A	85	84	65	84	93	7.7	5.7	39.4				
B	35	38	61	84	92.55	0	0					
C	36	45	59	81	89.5	0	0					
D	31.4	51.4	31.4	42.8	91.0	0	0					
A= Urine enterococcus B= Sputum staphylococcus, C= Blood staphylococcus, D= Pus Staphylococcus. 1= Quinolones , 2= Aminoglycosides 3= Macrolides 4= Penicillins 5= Oxazolidinones 6= Glycopeptide 7=Nitrofurantoin												

Graph 1: Maximum Resistance trend of tested Antibiotics among Isolated Gram negative bacilli



Graph 2: Maximum Resistance trend of tested Antibiotics among Isolated Gram Positive cocci



Discussion:

In our data analysis over a period of 6 months, the number of infection in the received samples from hospitalized patients was higher of that from the community. Clinical isolates were more in case of male and 16-35 yrs of age got more affected. The major Gram-negatives was found to be Escherichia coli, and Klebsiella sp and Gram-positive was Enterococcus and Staphylococcus sp . Organisms isolated from hospitalized patients exhibited more resistance when compared with outpatients. This pattern is supported by the WHO community surveillance study report on pathogenic organisms, which suggest that more number of resistant organisms were observed among hospitalized patients than community acquired organisms 6 and this is mainly due to Antibiotic exposure on the bacterial strains.

Klebsiella sp found to be the most common and highly resistant organism (61%) among Gram negatives followed by Escherichia coli (33.61%) mainly in urine samples 33.61% . High percentage of drug resistant E. coli has been reported in a study done at a tertiary care hospital in Chennai 7. More number of MDR E. coli was noted in hospitalized patients than in Out Patients in our study, which is consistent with reports from many other similar studies 6,8,9 . However, less incidence of hospital acquired MDR E. coli with 8% has been reported in a study conducted at AIIMS, Delhi in 2001 10. Highest resistance by E. coli was noted against Amoxicillin clavulanic

acid , Cephalosporins mainly Cefuroxime and fluoroquinolones however none of the tested antibiotics was completely sensitive in our study. This pattern of resistance has been shown by many studies 6,8,10. A ten year study from North India has recently demonstrated rapid rise in antibiotic resistance in clinical isolates (E. coli and Klebsiella) over this ten year period 11. A very recent study from West Bengal has shown a rising trend of resistance to beta lactams, tetracyclines and cephalosporins in common urinary pathogens of Escherichia coli and Klebsiella sp 12. Resistance to nitrofurantoin was least, which is in accordance with the report from community based pilot study by WHO in Vellore, Tamil Nadu on both the phases between August 2003 and December 2005. Decrease resistance was also observed in our study by Imipenam and meropenam however Gentamycin and amikacin sensitivity was same ranged from 50-70% in contrast to higher sensitivity of 68% to amikacin and 9% to Gentamycin in a prospective study performed in a tertiary care hospital in Pondicherry during 2011 8. This supports the possibility of changing sensitivity pattern with time difference.

Among Gram positive organisms staphylococcus aureus was found to be 88.88% however overall isolation was 2.19% though MSSA was 45% but little higher incidence of 51.63% has been reported by another tertiary care hospital study done in Pondicherry 13,14. Resistance was observed mainly to azythromycin than to the fluoroquinolones in this study with minimal resistance to other drugs such as macrolides, Lenzolid, clindamycin and vancomycin. Gentamycin has been found to be more effective against MSSA like in a similar study conducted by a hospital in Pondicherry 14. MSSA having 100% sensitivity to vancomycin has been reported by another tertiary hospital in Pondicherry in the same year 2012, However we found 5.7% of staphylococcal strain which are vancomycin resistant. The lack of knowledge about the consequences of inappropriate use of antibiotics by the consumers, mainly the patients may be an important cause for the emergence of A.M.R 10. Hospital acquired organisms were proved to be more resistant than the community acquired by many studies 9,15 though development of resistance was more by gram negative organisms than by gram-positive ones.

Conclusion :

Our study is limited by the small number of samples and the duration But still, our study shows that the prevalence of antibiotic resistance in our north Eastern state is similar to other parts of India. Larger multicentric studies are needed to find the actual trend of development of resistance. This will help in formulating antibiotic use protocols. However Increasing trend of Antibiotic resistance in bacteria(Gram positive and Gram Negative) is a major threat for clinicians. Judicious use of antibiotics and frequent surveillance are needed to curb this threat and preserve the antibiotics for the future.

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