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Research Article

BACTERIOLOGICAL PROFILE AND ANTIBIOGRAM OF THE GRAM NEGATIVE BACILLI ISOLATED FROM CLINICAL SAMPLES IN RIMS HOSPITAL

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ABSTRACT

Introduction: Indiscriminate use of antibiotics has led to a state where multi drug resistant bacteria have become increasingly prevalent. The knowledge of antibiotic resistance patterns is thereby necessary to stop the emergence of multi drug resistant bacteria.
Material and methods: 1401 gram negative isolates from various clinical samples such as pus, urine, sputum, blood etc., were tested for the bacteriological profile and antibiogram in the Department of Microbiology, RIMS from April 2016 to March 2017.
Results: Gram Negative Bacilli was isolated from 1401 samples, 762 were from male and 639 were from female patients. *Escherichia coli* was the most common gram negative isolate (414), followed by Klebsiella spp(123). Fosfomycin (1.61%) were the most sensitive drug and AMC (68.5%) were most resistant in the organisms isolated from urine. Imipenem (13.34%) followed by gentamicin were the most sensitive drugs for the gram negative bacilli isolated from samples other than urine.
Conclusion: Empirical and appropriate use of antibiotics is very crucial in preventing emergence of multidrug resistant bacteria and the findings of our study will help clinicians for right and appropriate antibiotic choice in treating infections caused by gram negative organisms.

INTRODUCTION

In the past 60 years, antibiotics have been critical in achieving a dramatic rise in life expectancy and significant improvements in public health. However, disease-causing microbes have become increasingly resistant to the antibiotics, commonly in use. It has been clearly shown that use of antimicrobials leads to selection of resistant strains both in the individual and in the community and overuse or inappropriate use only increases this risk. History suggests that microbes will never run out of ways of developing resistance, but we may run out of effective antimicrobials.[1]

Resistance among Gram negative bacteria (GNB) has become a societal issue. It affects the lives and livelihoods of patients and threatens to endanger health delivery program. Much attention and emphasis was given in the past on the risk posed by Gram positive bacterial infections such as MRSA (Methicillin resistant *Staphylococcus aureus*) and VRSA (Vancomycin resistant *Staphylococcus aureus*) but the limelight has now shifted upon GNB with the rise in resistance, especially multidrug and colistin resistance among these organisms.[2] Epidemiologic surveillance of antimicrobial resistance is indispensable for empirically treating infections, implementing resistance control measures and preventing the spread of antimicrobial-resistant microorganisms.[3]

The worldwide escalation in both community and hospital acquired antimicrobial resistant bacteria is threatening the ability to effectively treat patients, emphasizing the need for continued surveillance, more appropriate antimicrobial prescription, prudent infection control and new treatment alternatives.[4] There also appears to be a significant lack of studies highlighting the susceptibility patterns of locally prevalent organisms. Knowledge of etiological agents of infections and their sensitivities to available drugs is of immense value to the rational selection and use of antimicrobial agents and to the development of appropriate prescribing policies. [5] Thus, this study aims to bridge the gap in knowledge and provide the clinician with the tools to provide safe and effective empirical therapy.

MATERIAL AND METHODS

1401 gram negative isolates from various clinical samples such as pus, urine, sputum, blood etc., were tested for their

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bacteriological profiles and antibiogram in the Department of Microbiology, Regional Institute of Medical Sciences, Imphal from April 2016 to March 2017. The clinical data was obtained from the requisition forms and from the respective units and wards of the patient. Standard operating procedures were used to collect the samples. The samples were inoculated on Nutrient agar, MacConkey and Blood agar plates and incubated aerobically overnight at 37°C. The isolates were identified by their colonial morphology, gram staining and different biochemical reactions using standard techniques.[6] The antimicrobial susceptibility testing was performed by Kirby-Bauer disc diffusion method.[7] Gram negative bacilli were tested against Amoxiclav(AMC), Ciprofloxacin(CIP), Cotrimoxazole(COT), Gentamicin(GEN), Imipenem (IPM), Piperacillin/Tazobactam (PIT),Ceftriazone (CTR), Meropenem(MRP). Nitrofurantoin (NIT) and Fosfomycin (FOS) were used for urine isolates. Colistin(COL) were used for NLF. The results were interpreted according to standard CLSI criteria.[8]

RESULTS

A total of 5564 samples were received in the Department of Microbiology, from April 2016 to March 2017, GNB was isolated from 1401 clinical samples and gram positive organisms from 647 samples, gram positive budding yeast from 178 samples and in rest there were no growth. For 1401 GNB isolates, the one from male patient was 762 and female patient was 639 with male female ratio of 1.19 :1. Samples from OPD, ward and ICU was 536,770, 95 respectively, out of which urine accounts for 710 samples; Sputum-260; Pus-136; Stool-126; Blood-34; Others-118. In the present study the most common organism isolated was *E.Coli* (780) followed by *Klebseilla* (351). Among the NLF *Pseudomonas* (112) was most common (Fig.1). Organisms isolated from urine showed highest resistance to AMC and least to Fosfomycin.

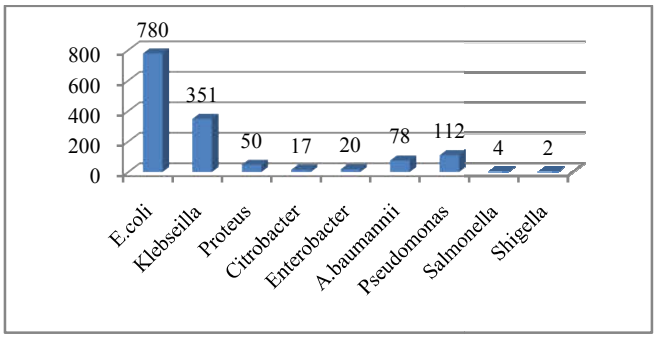

Figure 1 Number of organisms isolated

Table 1 Antibiogram of GNB isolated from different samples

	E.Coli (%)	*Klebseilla (%)*	*Proteus(%)*	*Citrobacter (%)*	*Enterobacter (%)*	*A.baumannii (%)*	*Pseudomonas (%)*	*Salmonella (%)*	*Shigella(%)*
CIP	55	37	44.18	58.82	30	46	18	100	100
GEN	9	18.42	11.62	17.64	5	28	11.60	0	0
COT	40.2	35	44.18	58.82	20	47.64	26.32	100	100
CTR	47.34	33.53	44.18	47.05	25	26.05	16.86	0	0
AMC	73	45.31	44.18	64.70	15	-	-	-	-
NIT	6.18	18.48	94.44	50	20	42.30	15	-	-
FOS	0.85	1.68	5.55	0	0	-	-	-	-
IMP	3.53	2.35	6.66	4	6.66	-	-	-	-
PIT	20.49	20.75	13.33	4	20	20.5	28.57	25	0
MRP	-	-	-	-	-	26.92	14.28	50	0
COL	-	-	-	-	-	0	1.20	-	-

And in sample other than urine Imipenem was least resistant. Majority of the gram negative organisms isolated were found to be sensitive to Gentamicin Table 1 .Organisms isolated from ICU patients were most resistant followed by that from ward and OPD for organisms isolated from samples other than urine (Table 3). Organisms isolated from ward patients are more resistant as compare with OPD and ICU patients in case of organisms isolated from urine sample. Meropenem, Fosfomycin, Nitrofurantoin and Gentamicin are least resistant for gram negative bacterial isolates from urine sample. For the organisms isolated from sample other than urine Gentamycin, Imipenem, Meropenem and Colistin were very effective.

Table 2 Resistance pattern of the organisms isolated from urine from OPD, ward and ICU

Antibiotic	OPD (%)	Ward(%)	ICU(%)
CIP	40.63	45.27	40
GEN	8.83	13.61	13.33
COT	37.45	56.38	33
CTR	33.56	45.83	33
NIT	8.48	13.61	6.66
FOS	1.41	1.38	0
AMC	51.94	63.61	46.66
PIT	18.18	14.28	18
MRP	11.42	15.35	23.06
COL	0	0	16.66

Table 3 Resistance pattern of the organisms isolated from sample other than urine from OPD, ward and ICU

Antibiotic	OPD(%)	Ward(%)	ICU(%)
CIP	24.75	45.42	57.5
GEN	2.91	9.45	30
COT	17.47	26.82	60
CTR	21.35	43.29	52.5
IMP	1.45	4.87	12.5
PIT	12.13	22.86	42.8
AMC	39.32	44.20	70
MRP	0	2.12	5.88
COLISTIN	0	0	0

DISCUSSION

The study was undertaken to evaluate resistance pattern and to determine the effectiveness of prescribed drugs for treatment of infections, Male to female ratio was 1.19 :1. The most common organism isolated was *E.Coli* (780) followed by *Klebseilla* (351). (Reddy S *et al* has similar findings).[9] This finding is also similar to the studies conducted in Coimbatore and Kathmandu. Among the NLF *Pseudomonas aeruginosa*(112) was the most common non-fermenter, accounting for 53.8%, followed by *Acinetobacter baumannii* (22.2%) A Malini *et al*[10] has similar findings. Organisms isolated from urine showed highest

resistance to AMC and least to Fosfomycin.(similar findings was observed by Sardar A *et al*.).[11] And in sample other than urine Imipenem was least resistant (Similar finding by Rao *et al*).[12] As seen in studies by Balan K *et al*[13], Panta *et al*, majority of the gram negative organisms isolated were found to be sensitive to Gentamicin.[14] Organisms isolated from ICU patients were most resistant followed by that from ward and OPD (Japoni A *et al* similar findings)[15], however in GNB isolates from urine sample, resistant was more from those belonging to ward.

CONCLUSION

E.coli was the most predominantly isolated organism. Bacterial isolates exhibited moderate levels of resistance against different classes of antibiotics. Organisms isolated from ICU patients are more resistant. Data from this report may be worth consideration while implementing treatment strategies for infections cause by GNB. Appropriate and judicious selection of antibiotics would limit the emerging drug resistant strains in the future.

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