



Microbiology

A STUDY ON EXPANDING RESISTANCE PATTERN AMONG PYOGENIC BACTERIAL ISOLATES IN A TERTIARY CARE HOSPITAL, VIJAYAWADA, ANDHRA PRADESH.

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ABSTRACT **BACKGROUND:** The emergence of antibiotic resistance and its rapid spread among the bacterial isolates is considered as grave threat to the public health. Among the clinical settings the gram negative isolates were increasingly associated with pyogenic infections. Emerging resistant strains poses a serious threat in the control infections. The objective of this study is to characterize the most common bacterial isolates and their antibiotic resistance pattern in the pus samples. **MATERIALS AND METHODS:** Inoculation was done on Blood agar, MacConkey agar and identification of organism was done through routine biochemical tests. Antibiotic sensitivity testing was done on Muller Hinton agar by Kirby bauer disk diffusion method as per CLSI guidelines 2021. **RESULTS:** Out of 647 pus samples, 173 (26.7 %) samples yielded positive cultures. Of the total isolates, 131 (75.7%) were gram negative organisms with Klebsiella spp. 34 isolates (25.9%), Pseudomonas aeruginosa 33 (25.2 %), Escherichia coli 24(18.3%). Among gram positive organisms Staphylococcus aureus was commonest organism isolated. The antibiotic resistance pattern of common gram negative isolates was high for Co-Amoxycylav ranging from 78.9 % to 100 %, followed by Cephalothin (68.4 - 100 %), Ciprofloxacin (45.5 - 100%) and Cefotaxime (47.4 - 87.5 %). **CONCLUSION:** Bacterial isolates exhibited moderate to high levels of resistance against different classes of antibiotics. The continuous monitoring and reporting of antibiotic resistance from clinical microbiology lab is worth consideration for implementing empiric treatment strategies for pyogenic infections, to formulate strict health policies and to restrict the unsupervised antibiotic use.

KEYWORDS :

INTRODUCTION

The emergence of antibiotic resistance and its rapid spread among the bacterial isolates is considered as grave threat to the public health worldwide due to the limited treatment options and lukewarm discovery of new classes of antibiotics. Among the clinical settings the gram-negative isolates are increasingly associated with pyogenic infections. The most common pathogens E.coli, Klebsiella spp, Pseudomonas spp, with emerging resistant strains poses a serious threat in the infection control. Knowledge of the causative agents and its antibiotic sensitivity patterns have proved to be helpful in the selection of empirical therapy, in implementing infection control measures and in formulating rationales of antibiotic policy. The purpose of this study is to identify the most common bacterial isolates and their antibiotic resistance pattern in the pus samples.

AIMS AND OBJECTIVES

To isolate and identify the bacterial agents from pus samples. To study the antibiotic resistance pattern of the isolates

METHODOLOGY

A descriptive cross sectional study was done in the Department of Microbiology, Siddhartha Medical College, Vijayawada for a period of 7 months (Jan-July 2022). All the pus samples received to Microbiology lab were included in the study and a total of 647 pus samples were received to the laboratory in the study period. All samples were inoculated on Blood agar & MacConkey agar and the plates were incubated aerobically at 37°C for 24 hrs. The isolated organisms were identified phenotypically by Gram stain, Motility and Biochemical tests. Antibiotic susceptibility by Kirby-Bauer Disc Diffusion method on Mueller Hinton agar as per CLSI guidelines 2021.

INCLUSION CRITERIA

All pus samples received to Microbiology laboratory

EXCLUSION CRITERIA

Leaky specimens/Improperly labeled

RESULTS

Table 1: Distribution of Positive and Negative cultures

Total no of pus samples received	647
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Positive Cultures	173 (26.7%)	GRAM NEGATIVE	131 (75.7%)	GRAM POSITIVE	42 (24.3%)
MONO BACTERIAL	121				32
POLY BACTERIAL	10				10
Negative cultures	474 (73.2%)				

Figure 1: Distribution of Various Bacterial isolates

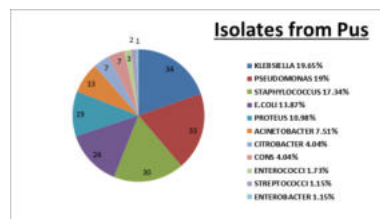


Table 2: Distribution of Gram Negative Isolates

S.No	Gram Negative bacteria	Isolates(%)
1	KLEBSIELLA spp	34 (25.9%)
2	PSEUDOMONAS spp	33 (25.2%)
3	ESCHERICHIA COLI	24 (18.3%)
4	PROTEUS spp	19 (14.5%)
5	ACINETOBACTER spp	13 (9.9%)
6	CITROBACTER spp	7 (5.3%)
7	ENTEROBACTER spp	1 (0.7%)

Table 3: Distribution of Gram Positive Isolates

S.No	Gram Positive bacteria	Isolates(%)
1	STAPHYLOCOCCUS AUREUS	30 (71.4%)
2	CONS	7 (16.6%)
3	ENTEROCOCCI	3 (7.1%)
4	STREPTOCOCCUS PYOGENES	2 (4.7%)

Table 4: Resistance (%) pattern among gram negative isolates

Organism	AMC	CEP	CIP	CTX	GEN	PB	PIT
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KLEBSIELLA (34)	91.2	82.4	79.4	85.3	61.8	52.9	44.1
PSEUDOMONAS (33)	100	87.9	45.5	57.6	45.5	39.4	18.2
ESCHERICHIA COLI (24)	100	75	79.2	87.5	41.7	66.7	45.8
PROTEUS (19)	78.9	68.4	68.4	47.4	73.7	78.9	10.5
ACINETOBACTER (13)	100	69.2	69.2	69.2	53.8	38.5	46.2
CITRO(7)	100	100	100	71.4	71.4	28.6	57.1
ENTEROBACTER(1)	-	Nil	Nil	-	Nil	100	Nil

DISCUSSION:

Culture positivity was 26.7% in our study which correlates with the study done by Khanam et al., (38.2%).

The present study reported 88.4% monomicrobial culture positive isolates which correlates with S Mohanty et al., (85.8%) and Anshu Sharma et al., (84.83%).

Klebsiella was the most common organism isolated (19.65%) which correlates with Shivra Batra et al., (19.7%) and Jamatia et al., (17.5%). Khanam et al., (1.5%), Anshu Sharma et al., (4%), and Mudassar et al., (5%) reported lesser incidence of Klebsiella spp whereas Rozina Arshi Khan et al., (36.2%) reported higher incidence.

Pseudomonas aeruginosa was isolated in 19 % culture-positive cases which correlates with Mudassar et al., (19%), Jamatia et al., (21.02%), Raghav Rao et al., (21.49%), Khanam et al., (23.66%), and Shivra Batra et al., (33.6%). However, studies done by Rugira Trojan et al., (5.8%) and Pandeya et al., (6.1%) reported lesser incidence of Pseudomonas aeruginosa.

Staphylococcus aureus was the most common gram positive organism isolated in our study (17.34%). Similarly was seen with studies done by Manmeet Kaur Gill et al., (20.47%), Rugira Trojan et al., (21%), Rozina Arshi Khan et al., (21.7%), Raghav Rao et al., (24.29%). Whereas, Maharjan N et al., (48.3%), S Mohanty et al., (38%), Anshu Sharma et al., (37.5%), Pandeya et al., (32.3%), Jamatia et al., (30.1%), Ahsan Tameez-ud-Din et al., (29.6%), reported a higher incidence and Shivra Batra et al., (10.15%) reported lesser incidence of Staphylococcus aureus.

In our study, Escherichia coli accounted for 13.87 % culture-positive isolates which coincides with the studies done by Maharjan N et al., (16.3%), S Mohanty et al., (17.4%), Anshu Sharma et al., (17%), Mudassar et al., (18%), Rugira Trojan et al., (51.2%) reported a higher incidence.

Proteus spp. accounted for 10.98 % of culture-positive isolates, which correlates with the studies by Raghav Rao et al., (7.47%) and Jamatia et al., (6.25%). But Anshu Sharma et al., (1%) and Maharjan N et al., (1.1%) reported lesser incidence of Proteus spp.

The present study reported 7.51% incidence of Acinetobacter spp. which correlates with the studies done by Khanam et al., (7.6%), Ahsan Tameez-ud-Din et al., (7.7%), Manmeet Kaur Gill et al., (8.66%) and S Mohanty et al., (10.2%). However, Anshu Sharma et al., (1%) and Mudassar et al., (2%) reported lesser incidence of Acinetobacter spp.

Incidence of Citrobacter spp isolates (4.04%) correlates with the studies done by Mudassar et al., (4%), Rugira Trojan et al., (3.5%), and Jamatia et al., (3.4%), Pandeya et al., (4.3%), Anshu Sharma et al., (6%).

In our study, Coagulase-negative staphylococcus was isolated in 4.04% culture-positive cases which correlates with the studies done by Maharjan N et al., (5.5%) and S Mohanty et al., (5.5%). Anshu Sharma et al., (13%), Shivra Batra et al., (10.05%), Raghav Rao et al., (9.35%), and Pandeya et al., (9.1%) reported higher incidence of Coagulase-negative staphylococcus.

Enterococcus spp accounted for 1.73% incidence among total culture-positive isolates which is in line with the studies done by Anshu Sharma et al., (3%), and Mudassar et al., (3%), Shivra Batra et al., (3.36%), Maharjan N et al., (3.7%), Pandeya et al., (7.3%).

In our study, *Streptococcus* spp accounted for 1.15% incidence among total culture-positive isolates which correlates with the studies done by Anshu Sharma et al., (2%), Rugira Trojan et al., (2.3%), Pandeya et al., (2.4%), and Maharjan N et al., (2.9%). Of the isolates, gram-positive organisms were resistant to Gentamicin and fluoroquinolones and coincides with studies by Rozina Arshi Khan et al., Upendra et al., and Anshu Sharma et al.,

Most of the gram-negative organisms in this study were resistant to Co-Amoxycylav, Cephalosporins and fluoroquinolones which coincides with the studies done by Manmeet Kaur Gill et al., Rashida Akter Khanum et al., Rugira Trojan et al., and Anshu Sharma et al.,

Bacterial isolates in our study exhibited moderate to high levels of resistance against different classes of antibiotics. So, the continuous monitoring and reporting of antibiotic resistance from clinical Microbiology lab is worth consideration for implementing empiric treatment strategies for pyogenic infections, to formulate strict health policies and to restrict the unsupervised antibiotic use.

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