



## AEROBIC BACTERIOLOGICAL PROFILE FROM PUS SAMPLES AND THEIR ANTIBIOGRAM IN PATIENTS ATTENDING TERTIARY CARE HOSPITAL, KURNOOL.

**Dr. G Mounika**

Third-year postgraduate, Department of Microbiology, Kurnool medical college, Kurnool, Andhra Pradesh.

**Dr. A Renukadevi\***

Professor, Department of Microbiology, Kurnool medical college, Kurnool, Andhra Pradesh. \*Corresponding Author

**Dr. B Shanthi Reddy**

Associate Professor, Department of Microbiology, Kurnool medical college, Kurnool, Andhra Pradesh.

**ABSTRACT** **Introduction:** Pyogenic infections are an important cause of sepsis. Despite advances in the control of infections, the development of drug resistance among organisms states the importance of periodic studies to determine their antibiogram for proper management of patients. This study aims at the frequency and distribution of pathogens in pus samples along with their antibiotic susceptibility pattern.

**Methods:** A prospective study was conducted from October 2018 to October 2019 in the Department of Microbiology, Kurnool medical college, Kurnool. 1068 pus samples were cultured and their antibiogram was observed using the Kirby – Bauer disc diffusion technique under CLSI guidelines.

**Results:** Out of 1068 pus samples, bacterial growth of Gram-negative organisms predominates over Gram-positive organisms. Gram-negative organisms isolated are 67.6% among this Klebsiella is the main pathogen isolated of (41.4%) followed by Escherichia coli(13.06%) and Pseudomonas of (14.02%). Gram-positive organisms isolated are 23.2% among this Staphylococcus aureus predominantly isolated of (21.4%) followed by Coagulase-negative staphylococci organisms(3.71%). Among these, 16.06% are ESBL producing organisms where Carbapenem is the most effective antibiotic for ESBL's, and all pseudomonas are sensitive to polymyxins and carbapenems. 25.8% are Methicillin-resistant Staphylococcus aureus which is susceptible to Vancomycin & Linezolid.

**Conclusion:** This study indicates the prevalence of resistance to different classes of antibiotics in bacterial isolates from pus infection. Hence there is a need for effective surveillance on implementation of strict health policies like antibiogram guided antibiotic prescription, restrict the use of unsupervised antibiotics which helps to minimize drug resistance organisms.

**KEYWORDS :** Multidrug-resistant organisms, ESBL, MRSA.

### INTRODUCTION

The human skin and soft tissue infections caused by microbial pathogens during or after trauma, burn injuries, and surgical procedures result in the production of pus, which is a white to yellow fluid comprised of dead WBCs, cellular debris, and necrotic tissues. Pyogenic infections are characterized by several local inflammations, usually by the multiplication of microorganisms. These infections may be endogenous or exogenous which is an important cause for sepsis. Both aerobic and anaerobic bacteria have been implicated in pus formation which commonly occurs in hospital environments resulting in significant morbidity, prolonged hospitalization, and huge economic burden<sup>1</sup> Monitoring of resistance patterns in the hospital is needed to overcome these difficulties and to improve the outcome of serious infections in hospital settings<sup>2</sup>. Despite advances in the control of infections, the rapid emergence of multidrug-resistant bacteria poses a serious threat to public health globally due to the limited treatment options, and the discovery of new classes of antibiotics<sup>3,7</sup>. This states the importance of periodic studies to determine their antibiogram for the proper management of patients. Therefore present study aims to assess the frequency and distribution of pathogens in pus samples along with their antibiotic susceptibility pattern.

### MATERIALS AND METHOD

A Prospective cross-sectional study was conducted in the Department of Microbiology, Kurnool medical college, Kurnool.

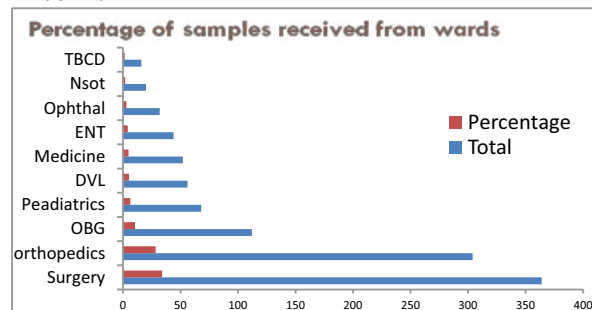
#### Study Period And Sample Processing:

This study was done from October 2018 to October 2019. A total of 1068 Pus samples were aseptically collected using sterile swab in a test tube and inoculated onto blood agar and MacConkey agar plates and then Plates were incubated at 37°C for 24 hours. Organisms were identified by a series of biochemical reactions following standard procedures<sup>1</sup>.

Antimicrobial susceptibility testing was performed using Muller-Hinton agar plates by disc diffusion method following Clinical and Laboratory Standards Institute (CLSI) guidelines<sup>15</sup>. For gram-negative organisms, Piperacillin – Tazobactam (100/10µg), ceftazidime (30 µg), levofloxacin(5µg) amikacin (30µg) gentamicin (10µg) ciprofloxacin (5 µg), cefepime(30µg), Imipenem (10 µg),

polymyxin-B(300units), colistin(10µg), ceftazidime clavulanic acid(30/10µg) were used. For gram-positive isolates, Vancomycin(30µg), Linezolid (30µg), Amoxiclav clavulanic acid(30µg), Clindamycin (2µg), Erythromycin (15µg), Gentamycin(10µg), Amikacin(30µg), Cefoxitin(30µg) were used.

### RESULTS-



Note - Nsot-Neurosurgery OT

Total samples processed were 1068, direct smear showed 67.6%(722) Gramnegative, 23.2%(248)Gram-positive, 9.2%(98) were smear-negative. Culture positivity of the study population showed a Growth of 970 samples and no growth of 98 samples. On the assessment of culture study,722 were Gram-negative culture isolates among them 402(41.44%) were Klebsiella species, 134 (13.06%)were Escherichia coli, 136(14.02%) were Pseudomonas species, 40(4.12%) were Proteus species,6(0.618%) were Citrobacter species and Acinetobacter were 4 (0.412%). Gram-positive Organisms isolated were 248 among them 208 (21.4%) were Staphylococcus aureus 36(3.71%) were Coagulase-negative staphylococci and Enterococcus were 4(0.412%).

#### Antibiotic Sensitivity Pattern Of Gram-negative Isolates

Antibiotic	Klebsiella	E.Coli	Pseudomonas	Proteus
Piperacillin tazobactam	24.3	25.6	28.3	73
Ceftazadime	29.58	33.3	32	36.3
levofloxacin	35.3	22	22	28.9

amikacin	15.4	32.7	-	30
gentamycin	15.4	30.6	-	32
ciprofloxacin	-	-	25	-
cefipime	-	-	27.6	-
Imepenam	96-99	96-99	96-99	96-99
Polymyxin -B	-	-	98-99	-
Colistin	-	-	98-99	-
ceftazadime clavulanic acid	32.6	45.6	38.2	52.7

#### Antibiotic Sensitivity Pattern Of Gram-positive Organisms

Antibiotics	Staphylococcus aureus	CONS
Vancomycin	98-99	98-99
Linezolid	98	98
Amoxiclav clavulunicacid	19.2	27.25
Clindamycin	67.3	48.2
Erythromycin	25.9	30.4
Gentamycin	32.6	31.8
Amikacin	21.1	15.2
Cefoxitin	6.7	4.7

Among the total isolates, ESBL producing organisms are 16.06%, Multidrug-resistant organisms were 11.6% and methicillin-resistant organisms were 25.8%.

#### DISCUSSION

Pyogenic infections are characterized by inflammation with pus formation. Loss of skin integrity provides colonization and growth of microorganisms. In a traumatic wound, there is an increased chance of infection compared to a clean wound where growth is minimal. In the present study, Gram-negative bacteria were more isolated than gram-positive bacteria. A similar study was done by Vijetha Sharma, Geetha Parihar, Roopa et al.<sup>2</sup> also showed *Klebsiella pneumoniae* most commonly isolated among Gram-negative organisms and *Staphylococcus aureus* most commonly isolated among Gram-positive organism. **The present study reveals the incidence of infections due to *Klebsiella* and their tendency towards antibiotic resistance.** Multidrug-resistant bacteria are emerging worldwide which causes major public health problems and challenges to health care. In the present study *Klebsiella pneumoniae* is 99% sensitive to Imepenam, 35.3% to Levofloxacin, 24.3 % to Piperacillin and tazobactam, 15.4% to Amikacin and Gentamycin. The next commonly isolated organism was *Staphylococcus aureus* and it was 99% sensitive to Vancomycin, 98% to Linezolid, 67.3% to Clindamycin, 32.6% to Gentamycin, 25.9% to Amikacin<sup>8</sup>. *Pseudomonas aeruginosa* showing 99% sensitivity to Imepenam, Polymixin -B, colistin<sup>9</sup>. The emergence of extended-spectrum beta-lactamase-producing isolates has an impact on clinical and therapeutic implications that confer resistance to most commonly used beta-lactam antibiotics. In the present, study 16.06% of isolates were ESBLs producers, the highest among is *Klebsiella pneumoniae* followed by *Escherichia coli*. Multidrug resistance organisms are defined as resistant to more than three classes of antibiotics like beta-lactams/beta-lactamase inhibitor combinations, 3<sup>rd</sup> generation cephalosporins, fluoroquinolones, aminoglycosides. In the present study, 11.6% were MDR of which *Klebsiella pneumoniae* is highest-numbered. This present study and their antibiotic sensitivity patterns emphasize the need for antimicrobial susceptibility testing to be carried out on pus isolates before starting chemotherapy to avoid the selection of drug-resistant strains.

#### CONCLUSION

Pyogenic infections were found prevalent in the tertiary care hospital among them *Klebsiella* isolates showed the highest incidence followed by *S. aureus*, *E. coli*, *P. aeruginosa*, *Proteus*. Bacterial isolates exhibited high to moderate levels of resistance against different classes of antibiotics. Hence there is a need for effective surveillance on implementation of strict health policies like antibiogram-guided antibiotic prescription, restrict the use of unsupervised antibiotics, Update the knowledge of antimicrobial susceptibility profiles of isolates, continuous monitoring, and reporting of antibiotic-resistant organisms. This assists in designing the most appropriate dose-regimen and treatment schedule against pus infection which helps to minimize the infections due to drug-resistant organisms.

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