



## ANTIBIOTIC RESISTANCE PATTERNS OF *ESCHERICHIA COLI* AND *KLEBSIELLA SPP.* FROM PUS SAMPLES IN A TERTIARY CARE HOSPITAL IN NORTH, RAJASTHAN

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### ABSTRACT

**BACKGROUND:-** The skin and soft infections (SSTIs) is one of the most common complications after trauma, burn, and surgical procedures resulting pus, which is a collection of dead WBCs, necrotic tissues, and cellular debris. Mostly Pyogenic infection caused by Enterobacteriaceae member such as *E.coli* and *Klebsiella spp.* The emergence of resistance necessitates periodic studies to determine their antibiogram. The objective of this study is to characterize the pyogenic bacteria and to determine their antibiotic susceptibilities.

**MATERIALS AND METHODS-** Pus samples from National institute of medical science (NIMS) Hospital was collected and processed as per CLSI guidelines.

**RESULTS-** Analysis of 325 pus samples showed 73.81% culture positivity. The most common organism was *E.coli* (33.87%) followed by *Klebsiella Spp.* The most resistance drug in Gram negative bacteria were resistance to in *E.coli* and *Klebsiella spp.* The most Resistant drug in *Escherichia coli* was Ampicillin (83.3%) closely followed by Ciprofloxacin (79.2%), Cefotaxime (79.2%), and *Klebsiella spp.* was Levofloxacin (85.7%), Ceftriaxone (82.1%), Ciprofloxacin (82.1%) and 100% resistance is Ampicillin because it is intrinsic resistance for *Klebsiella spp.*

**CONCLUSION-** Rapid emergence of multidrug-resistant bacteria poses a serious threat to public health globally due to the limited treatment options however the changing trends of antimicrobial susceptibility in bacterial isolates from pus can serve as a vital tool for clinicians to start empirical treatment of patients at the earliest.

### KEYWORDS :

#### INTRODUCTION

The human skin and soft tissue infections (SSTIs) caused by microbial pathogens during or after trauma, burn injuries, and surgical site infection procedures result in the production of pus, a white to yellow fluid and bad smell comprised of dead WBCs, cellular debris, and necrotic tissues<sup>1-3</sup>. Aerobic and anaerobic bacteria have been implicated in wound infections which commonly occur under hospital environment conditions and result in significant morbidity, prolonged hospitalization, and substantial economic burden<sup>4</sup>. The emergence of antibiotic resistance and its rapid spread among pathogenic bacteria isolates are considered grave threats to public health worldwide. Multidrug-resistant Gram-positive bacterial strains such as Methicillin-Resistant Staphylococcus aureus (MRSA) and Gram-negative bacterial strains such as *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *E. coli* infections were increasingly associated with pus discharge under nosocomial infections and improper hospital settings due to extensive misprescription and inadequate dose regimen of antibiotics<sup>5-7</sup>. Pyogenic infections are characterized by local and systemic inflammation generally formed wound and pus. These may be exogenous or endogenous. A break or trauma in the skin can provide entry to the surface bacteria which thereby start at multiplying localized area. The body's defense mechanism includes bringing immune cells into the area to fight against bacteria. The accumulation of these cells produces pus which is a thick whitish liquid<sup>8,9</sup>. These infections result in delayed healing and may cause several complications like wound dehiscence or wound breakdown<sup>10,11</sup>.

#### MATERIAL & METHOD

This was a cross-sectional study conducted in the Department of Microbiology National Institute of Medical science and research Jaipur. In the present study, a total of 325 Pus samples received and total isolates of 152 positive samples. The data including the pus culture-positive reports were analyzed for a period of one year from September 2018 to September 2019. Received pus samples and processed on Chocolate Agar, Blood Agar, MacConkey Agar, and Nutrient Agar media and incubated at 37° C under the aerobic condition in the incubator and the organisms were identified by

biochemical reactions, Gram stain, and motility test by hanging drop method. The antimicrobial susceptibility testing was done by Kirby Bauer's Disk Diffusion method and interpreted as per Clinical Laboratory Standard Institution (CLSI) guidelines<sup>12,13</sup>. Standard antibiotics like Meropenem (10 mcg), Imipenem (10 mcg), Ceftriaxone (30 mcg), Ampicillin (10 mcg), Cefotaxime (30 mcg), Ceftazidime (30 mcg), Ciprofloxacin (5 mcg), Levofloxacin (5 mcg), Gentamycin (10 mcg), Amikacin (30 mcg) were tested<sup>14</sup>. Results obtained were analyzed by counts and percentages using MS Excel, 2007 version.

#### RESULT:-

A total of 325 pus culture reports were analyzed between September 2018 to September 2019. Total Positive pus sample 152 (46.8%) were and total Negative 173 (53.2%) (Fig. No-1). Among samples, 48 (64.9%) were male patients and 26 (35.1%) were female patients with predominance in 46-60 in this age group (Fig.No-2 & 3). Among the isolates, *Escherichia coli* (30.3%) was the most predominant organism but *Klebsiella spp.* isolated were (18.4%) (Fig. No-4). The most Resistant drug in *Escherichia coli* was found to be Ampicillin (83.3%) closely followed by Ciprofloxacin (79.2%), Cefotaxime (79.2%) and *Klebsiella spp.* were Levofloxacin (85.7%), Ceftriaxone (82.1%), Ciprofloxacin (82.1%) and 100% resistance is Ampicillin because it is intrinsic resistance for *Klebsiella spp.* (Fig.-No-5)

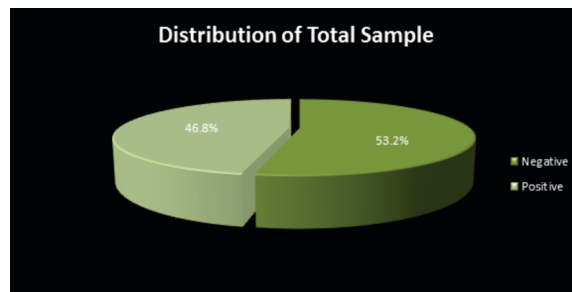


Fig. No:- 1 Distribution of Total positive and Negative sample

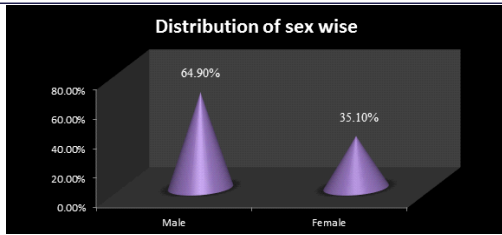


Fig. No:- 2 Distribution of sex wise ( Male & Female)

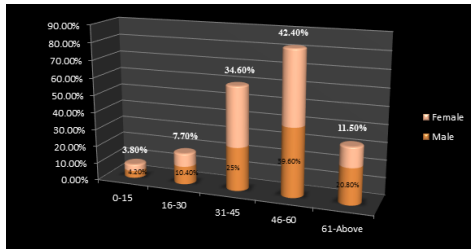


Fig. No:- 3 Distribution of age group wise ( Male & Female)

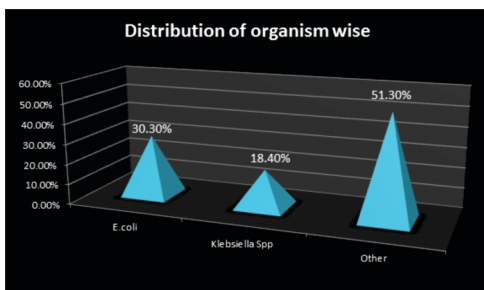


Fig. No:- 4 Distribution of Organism wise ( E. coli & Klebsiella spp.)

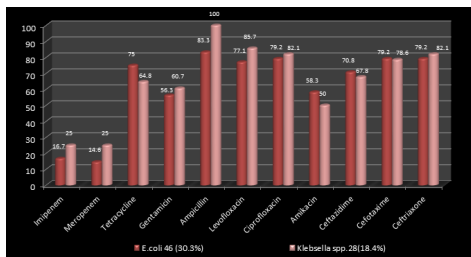


Fig.-No.-: 5 Resistant pattern of E. coli & Klebsiella spp.

**DISCUSSION**

Among the culture reports obtained, commonly organism was found to be *E.coli* (33.87%) & *Klebsiella spp.* (29.03%). Our study compares with previous studies done in various parts of India by Karia JB *et al* has shown a higher frequency of *E.coli* (26%) and *Klebsiella spp.* (20%) isolates from pus culture reports and the study<sup>15</sup>. The present study revealed that the male infections were higher than the female distribution of pus isolates to be which closely collaborates with the study by Pappu A.K. *et al* <sup>16</sup>. In over study, most of the patients who were positive for pus culture were in the age group of 46 to 60 years in male patients, which was 19 (39.6%), followed by female patients in the age range of 46 to 60 years, which was 11(42.4%); more prevalent of female than male is low prevalence rate in this study. *Escherichia coli*, *Klebsiella spp.* are the common causative agents of various pyogenic infections in hospital settings. The most frequent resistant genes in such bacteria by various mechanisms are a matter of concern in Enterobacteriaceae family. In our study, the dominance of *Escherichia coli* over *Klebsiella spp.* bacteria as the causative agent of pyogenic infection is seen which is supported by Zubair *et al* <sup>17</sup>. In our study found it *E.coli* and *Klebsiella spp.* produced highest resistance against Ampicillin, Levofloxacin, Ciprofloxacin, Ceftriaxone, and Cefotaxime showed higher resistance rates against. This finding was similar to another report in 2009 at Nigeria by *Nwachukwu et al.*, (2009), other reports by *Agnihotri et al.*, (2004)<sup>18,19</sup>. Every effort needs to be made to carefully select antibiotics, balancing the need for a broad spectrum of empiric coverage of potential microorganisms with the need to preserve available antibiotics for when they are absolutely necessary<sup>20</sup>.

**CONCLUSION:**

The results of the above study exemplify that there is an increasing need for gaining knowledge about the pattern of microbes and their antibiotic sensitivity and resistance, which varies geographically. The isolates from this study showed that *E.coli* was the most isolated organism from the pus culture reports followed by *Klebsiella spp.* Our study thereby will guide the clinician in choosing appropriate antibiotics that not only contribute to best to best treatment but there judicious use will also help in preventing emergence of resistance to the drug which are still sensitive.

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