International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Isolation of Aerobic Bacteria from Pus Sample and their Antibiotic Sensitivity Pattern in a Tertiary Care Hospital in Western Odisha

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Abstract: ***Background and objective: Pus produced in various pyogenic infections is a common sample received at microbiology laboratory. In view of burden on financial resources, pyogenic infection is a major healthcare concern and hence, it requires a cost-effective management. Here, our objective is to identify pus isolates and their antibiotic sensitivity pattern. Materials and methods: 356 Pus samples were collected aseptically in a period of 6 months (June 2021-November 2021) and processed. Bacteria were isolated aerobically using conventional methods and their antibiotic sensitivity pattern was detected by Kirby-Bauer's disc diffusion method as per CLSI guidelines. Results: Out of 356, 292 (82.02%) cases showed positive culture growth, either alone or in mixed cultures. Out of the positive cases, 59.2% were male, 40.8% were females. Maximum belonged to 17-45 years of age. From 292 culture positive cases, 315 aerobic bacteria were isolated, out of which gram negative bacteria were predominant (80.2%). Klebsiella (29.8%) was the most common gram negative bacteria followed by pseudomonas (23.9%), and acinetobacter (10.3%). Most of the gram negative organisms were sensitive to imipenem and resistant to cephalosporins. Out of total Gram positive bacteria (19.8%) isolated, Staphylococcus aureus (14.2%) was the most common showing maximum sensitivity to vancomycin. Conclusion: In our study, gram negative bacteria found to be highly prevalent that showed high rates of multi-drug resistance (MDR) to commonly used antibiotics. Hence, continued surveillance and rational use of antibiotics should be undertaken to prevent further emergence of MDR pathogens.***

Keywords: Pyogenic infection, pus, antibiotic sensitivity, drug resistance, klebsiella, pseudomonas, staphylococcus aureus, CONS

1. Introduction

Pyogenic infection is characterized by several local inflammation, usually with pus formation, generally caused by one of the pyogenic bacteria, which can produce the accumulation of dead leukocytes and infectious agent commonly known as pus. Pyogenic infections may be endogenous or exogenous. A break or abrasion in the skin can provide an entryway for these surface bacteria into the body, and they stick very well to the moist edges of a cut. The bacteria begin to multiply and extend into the cut. The body's defense mechanism includes bringing immune cells into the area to fight against the bacteria. Eventually, accumulation of these cells produces the thick whitish liquid that we call pus. Coagulase positive Staphylococcus aureus has been found to be more dominant organism in pus followed by Streptococcus.

The emergence of high anti - microbial resistance among bacterial pathogens due to routine use of antibiotics has made the management and treatment difficult. Our aim was to identify and isolate aerobic bacteria from pus samples and to study antibiotic profile of isolated aerobic bacteria.

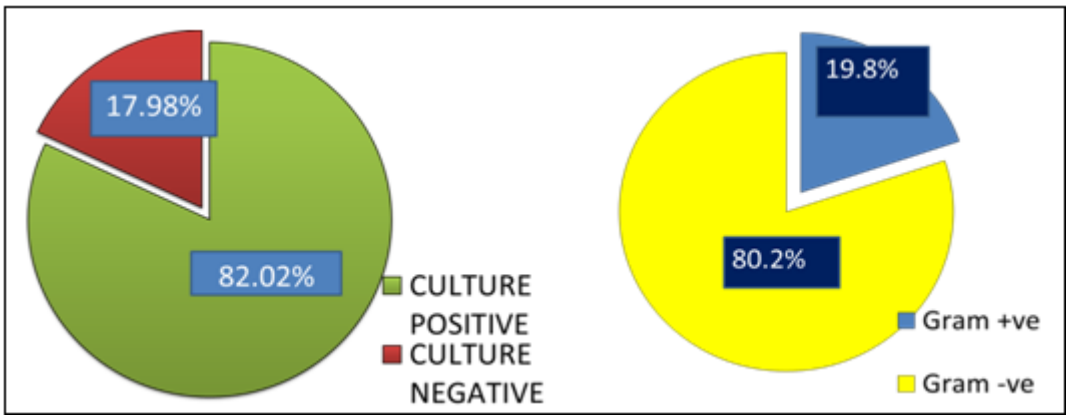
2. Materials and Methods

A total number of 356 pus samples received for aerobic culture and sensitivity from different IPDs & OPD sin Microbiology laboratory of VIMSAR, Burla, Odisha during a period from June 2021 to November 2021 were included in the study. Received pus samples were processed on Blood Agar, MacConkey's Agar and Nutrient Agar media and incubated at 37^{o} C under aerobic condition in incubator and the organisms were identified by biochemical reactions, Gram stain and motility test as applicable as per stand ardoperative procedure. The antimicrobial susceptibility testing were done by Kirby Bauer's Disk Diffusion method and interpreted as per Clinical Laboratory Standard Institution (CLSI) guideline. Standard antibiotics like ampicillin (10mcg), amikacin (30 mcg), amoxyclav (20/10mcg), vancomycin (30 mcg), cefoxitin (10 mcg), ceftriaxone (30 mcg), Linezolid (10 mcg), ceftazidime (30mcg), cefoperazone (30mcg), imipenem (10mcg), ciprofloxacin (5 mcg) were tested.

3. Results

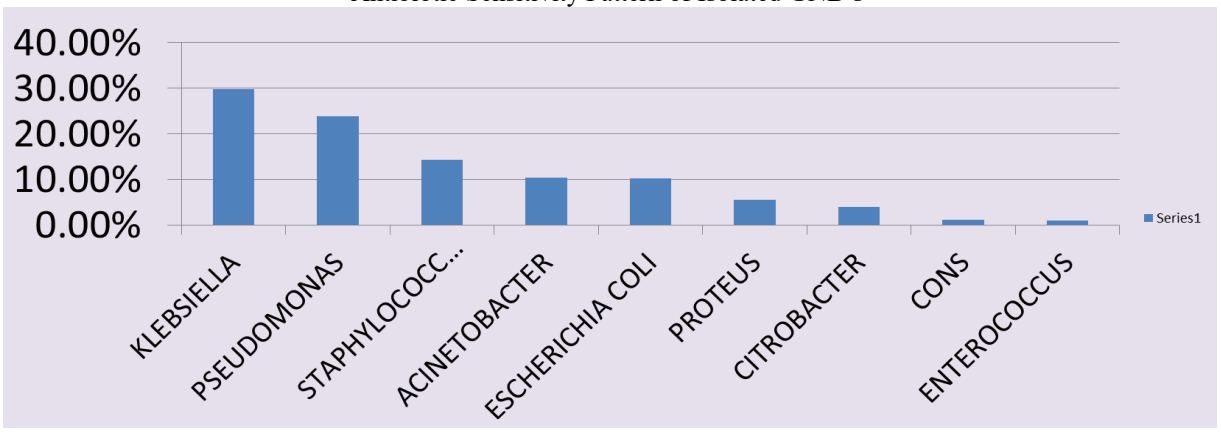
Out of 356, 292 (82.02%) cases showed positive culture growth, either alone or in mixed cultures. Out of the positive cases, 59.2% were male, 40.8% were females. Maximum belonged to 17 - 45 years of age. From 292 culture positive cases, 315 aerobic bacteria were isolated, out of which gram negative bacteria were predominant (80.2%). *Klebsiella* (29.8%) was the most common gram negative bacteria followed by *pseudomonas* (23.9%), and *acinetobacter* (10.3%). Most of the gram negative organisms were sensitive to imipenem and resistant to cephalosporins. Out of total Gram positive bacteria (19.8%) isolated, *Staphylococcus aureus* (14.2%) was the most common showing maximum sensitivity to vancomycin.

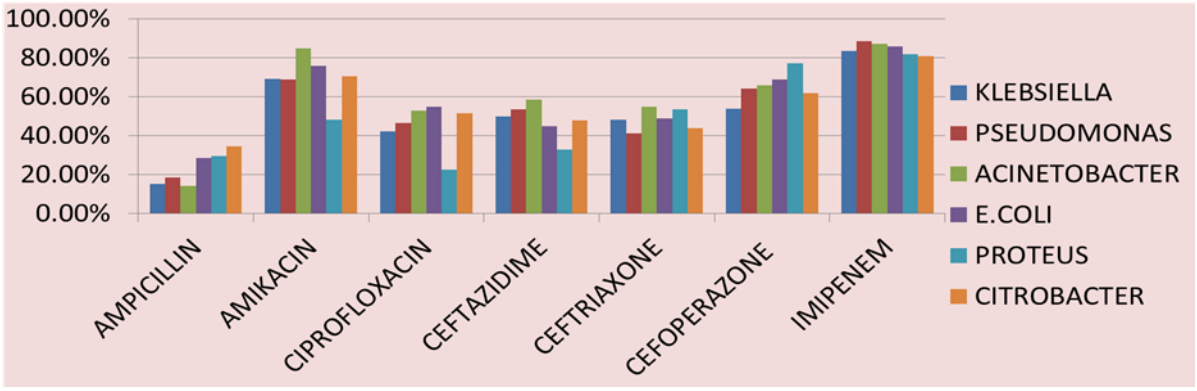
Distribution of Bacteria in Culture



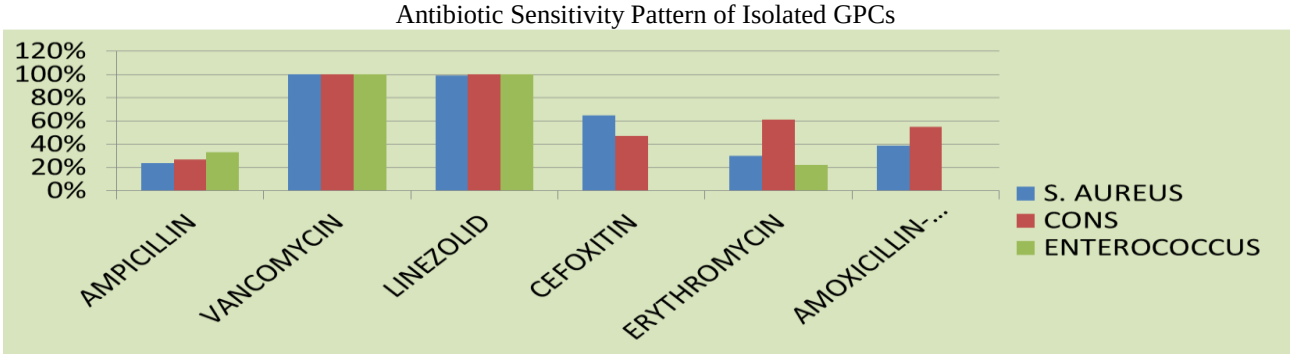
Type of Bacteria Isolated

Antibiotic Sensitivity Pattern of Isolated GNB's





Antibiotic Sensitivity Pattern of Isolated GPCs



4. Discussion

The present study revealed *Klebsiella spp.* to be the most commonly occurring pathogen in pus sample followed by *Pseudomonasspp*. among Gram Negative Bacilli (GNB) isolated from the pus samples in our study. Such GNB dominance in the aerobic growth in pus culture. *Staphylococcus aures* was the most common bacteria among total gram positive bacteria isolated.

The present study revealed that the male: female distribution of pus isolates to be 1.45: 1. The Department wise distribution of pus samples revealed that surgery dept. was the highest contributors (36.29%), followed by Orthopaedics (28.42%), Gynae & Obs. (12.76%), Medicine (9.80%), Skin (6.85%) and ENT (5.88%) departments. The Antibiogram of Gram Positive cocci revealed that the Vancomycin (100%) was the most susceptible drug followed by Linezolid (98.89%) and cefoxitin (63.07%). Gramnagetive Bacilliare susceptible to Imipenam (82.01%), Amikacin (71%), Cefoperazone (67.28%), Ceftazidime (44.08%).

5. Conclusion

Pyogenic infection has been the major cause of morbidity since long. Emerging multidrug resistant strains is of major concern to treat these conditions. Even though gram negative bacteria are being increased significantly but still *Staphylococcusaureus* is being continued as a major etiological agent of pyogenic infections. Changing antimicrobial resistance pose challenge in treating these conditions. Appropriate and judicious selection of antibiotic by using antibiotic sensitivity data would limit the emerging drug resistant strains in the future to treat these clinical conditions successfully. Our study thereby will guide the clinician in choosing appropriate antibiotics which not only contribute to better treatment but their judicious use will also help in preventing emergence of resistance to the drug which are still sensitive.

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