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RESEARCH ARTICLE

STUDY OF PATHOGENS CAUSING BLOODSTREAM INFECTIONS WITH THEIR ANTIBIOGRAM IN A TERTIARY CARE HOSPITAL.

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Abstract

Introduction: Bloodstream infection is the most common health care associated infection and a significant cause of mortality and morbidity. Early and appropriate antibiotic therapy is crucial in the treatment of BSI. In the current era of improper use of antibiotics, there is a rise of antimicrobial resistance in bloodstream infections. Policies should be devised to control this by the proper and effective use of antibiotics.

Aim and Objectives: To study the etiological microbial agents of bloodstream infections and their susceptibility pattern in a tertiary care centre over a period of one year.

Materials and Methods: 467 blood culture samples received from different departments of GGH, Vijayawada, A.P, from October 2016 to September 2017, were processed as per standard microbiological procedures. Antimicrobial susceptibility testing was done as per CLSI guidelines.

Results: Out of 467 blood culture samples, 104(22.2%) were culture positive, 363 were culture negative. Among culture positives, 43(41.3%) were *Staphylococcus aureus*, 17(16.67%) *Klebsiella* species, 4 *Escherichia coli*. On repeated subcultures 35(34.3%) Coagulase negative *Staphylococcus*, 3(2.9%) *Pseudomonas* species were isolated. Gram-positive isolates were mostly sensitive to Vancomycin, Amoxycillin plus Sulbactam and resistant to ampicillin and cefotaxime. Gram negative isolates were mainly sensitive to Piperacillin Tazobactam, Imipenem and resistant to Levofloxacin, Cefotaxime.

Conclusion: The present study shows that *Staphylococcus aureus* and *Klebsiella* species are the most common causative agents and most effective antibiotics are vancomycin and Piperacillin tazobactam, Imipenem, respectively.

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Introduction:-

Blood is a connective tissue which is essential for proper functioning and survival of human life, and it is sterile fluid unless proved otherwise. Bloodstream infections contribute to significant mortality such as shock, disseminated intravascular coagulation, multiple organ failure and even death. Bloodstream infection may be transient bacteremia which is an indication of real systemic infection or contamination from skin. Bloodstream infection is the most

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common health care associated infection and a significant cause of mortality and morbidity around the globe. Blood culture is the standard test for the detection of the causative bacteria and antibiotic sensitivity providing essential information for the evaluation of a variety of diseases like endocarditis, pneumonia, pyrexia of unknown origin and helpful particularly in patients with suspected sepsis allowing for successful recovery of bacteria in 99% patients with bacteremia. Early and appropriate antibiotic therapy is crucial in the treatment of bloodstream infections. In the current era of improper use of antibiotics there is a rise of antimicrobial resistance in bloodstream infections, and hence policies should be devised to control this by proper and effective use of antibiotics.

Methods:-

A total of 467 blood culture samples were received from different departments of Government General Hospital, Vijayawada, Andhra Pradesh, from October 2016 to September 2017.

Blood culture: Venous blood 5ml from adults and 2ml from children was obtained aseptically and inoculated into brain heart infusion broth. In suspected cases of enteric fever, bile broth was used and incubated at 37°C for 24 hours. Blind subculture was done on to fresh 5% sheep blood agar and Mac Conkey's agar. A negative result was followed up by examining the broth daily and doing a final subculture at the end of 7th day or at the appearance of turbidity, gas production or the presence of microcolonies over the clot whichever was earlier. Where ever necessary second blood culture was taken. In Subacute bacterial endocarditis, 3 consecutive blood samples were taken. Organisms were identified by cultural characters, morphology and standard biochemical tests. Antibiotic susceptibility testing was performed by the Kirby-Bauer disc diffusion methods, and results were interpreted as per Clinical and Laboratory Standards Institute (CLSI) guidelines.

Results:-

Of the 467 blood culture samples, 104 (22.26%) were culture positive, and 363 (78%) were culture negative. Among culture isolates 43(41.3%) were *Staphylococcus aureus*, 17(16.3%) were *Klebsiella* species, and 4(3.92%) were *Escherichia coli*.

35(33.7%) cultures of Coagulase negative *Staphylococcus*, 3(2.9%) *Pseudomonas* strains were isolated and confirmed by repeat cultures. Gram-positive isolates were mostly sensitive to linezolid(95%) , vancomycin(90%), ciprofloxacin(80%), ceftazidime(75%), and resistant to penicillin, doxycycline, Amoxycillin and Erythromycin. Gram negative isolates were mostly sensitive to imipenem(99.2%), cefoperazone & sulbactam (88%), amikacin(82.8%), Piperacillin & Tazobactam(78%) gentamycin(78%), cefixime(76%) and resistant to Ceftriaxone, Levofloxacin and Ceftazidime.

Discussion:-

Bloodstream infection is a serious medical problem, and sometimes it may be life-threatening; therefore timely detection, identification, and antimicrobial susceptibility testing of blood-borne pathogens are one of the essential functions of the diagnostic microbiology laboratory.

In the present study blood culture positivity was seen in 22 % of cases which corresponds to Arora et al. (20.2%) and V.N. Venkatesh et al. (25.89%). Studies by Mehdiinjab et al. (5.6%), Amit Banik et al. (14.24%), Karunakaran et al. (16.7%), and Shilpi Gupta et al. (16.5%) reported lower culture positivity rates, whereas Nikita et al. (31.2%) and Vijay Prakash Singh et al. (30.83 %) reported higher culture positivity rates. Among the culture positive specimens Majority of the organisms are gram positive (78 %), Gram negatives contributed to 25% of culture positive organisms. It is in line with Nikita et al. (63%) and Amith Banik et al. (60.3%) which reported predominant gram positive organisms whereas Vijay Prakash Singh et al. (70.27%) and Shilpi Gupta et al. (58.34 %) reported predominant gram negative organisms in their studies. In the gram positive spectrum *Staphylococcus aureus* is most commonly isolated (41.3%) followed by CONS (33.7%). The findings of the present study are in line with the study by Amith Banik et al. and Arora et al. which also reported *Staphylococcus aureus* as the most common organism, Followed by CONS whereas Karunakaran et al. reported the majority of Gram positive organisms as CONS (33%) followed by Staph (10.4 %). A study by V.N. Venkatesh et al. reported Staph. aureus(17.33%) and CONS(17.33%). In the gram negative spectrum *Klebsiella* is the predominant organism (16.3%) followed by *E. Coli* (5.8%) and *Pseudomonas*(2.9 %). It is in line with Mehdiinjab et al. study which reported *Klebsiella* as predominant gram negative organism whereas studies by Vijay Prakash Singh and Shilpi Gupta reported *E. Coli* as predominant gram negative organism in their studies. In the present study gram, positive organisms are majorly sensitive to

linezolid and resistant to Penicillin. This corresponds to the studies by Mehdiijab et al., Vijay Prakash Singh et al. and Nikitha et al. In the present study gram negative organisms are sensitive to imipenem, while resistant to ceftriaxone. Various researchers studied different antibiotics in studies by V.N. Venkatesh et al., Nikita et al., and Vijay Prakash Singh Gram negative bacteria are sensitive to Colistin and resistant to ampicillin.

Conclusion:-

The present study indicates *Staphylococcus aureus* and *Klebsiella* species are the most common causative agents of bloodstream infections. The effective antibiotics are linezolid and vancomycin for *Staphylococcus aureus* and Imipenem, cefoperazone & sulbactam for *Klebsiella* species. The prevalence of multi drug resistant organisms among etiologic agents of bacterial sepsis is on the rise. There is a need for monitoring pathogen trends and microbial susceptibility patterns. This study emphasised the need for the development of antibiotic policies which can prevent the circulation of multi drug resistant bacteria in the hospitals as well as in the community.

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Fig 1:- Percentage of Culture Positives

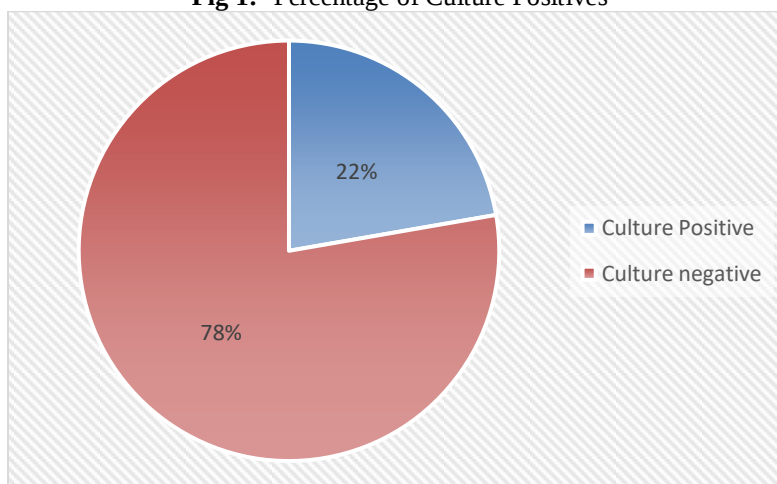


Fig 2:- Organisms isolated in blood culture

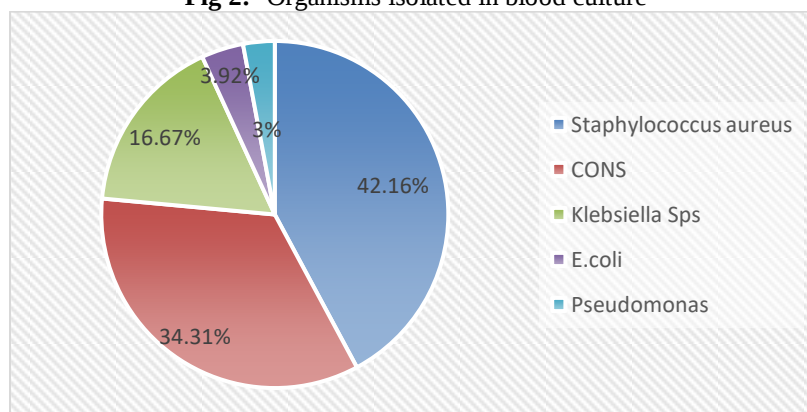
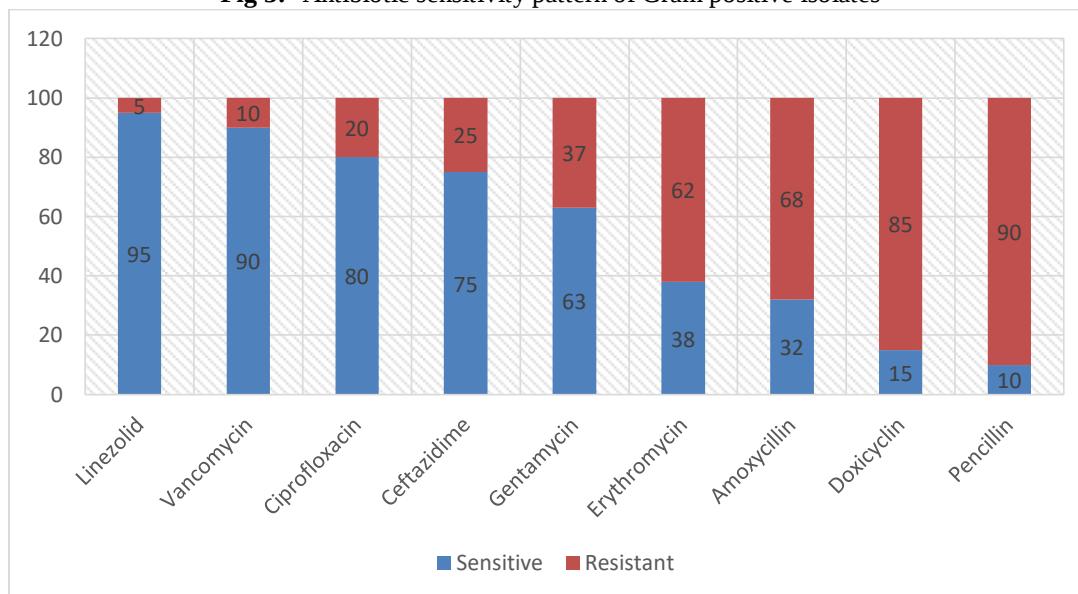
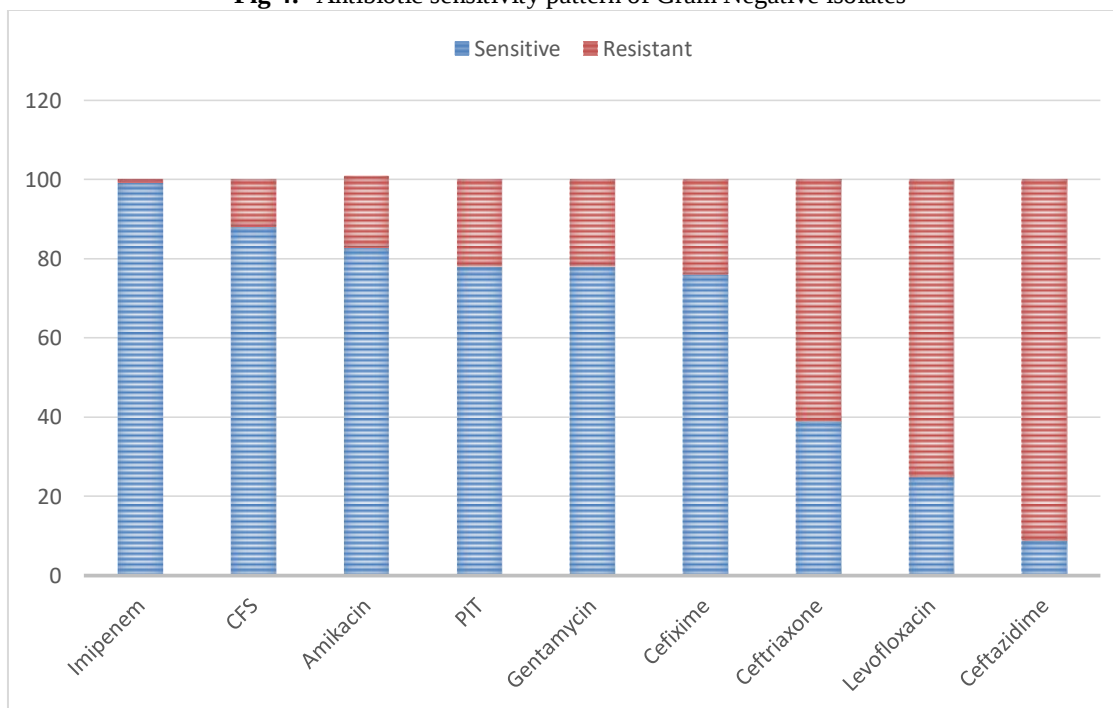


Fig 3:- Antibiotic sensitivity pattern of Gram positive isolates**Fig 4:-** Antibiotic sensitivity pattern of Gram Negative isolates**References:-**

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