

“Aerobic Bacteriological Profile and Antimicrobial Susceptibility Pattern of the Isolates from Pyogenic Infections in A Tertiary Care Hospital: A Retrospective Analysis”

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Abstract

Introduction: Pyogenic infections are an important cause of sepsis. These infections are difficult to treat because of the pathogens with increasing antibiotic resistance. It is important to know the pathogens causing the infections and its antibiotic susceptibility for proper management of the patients.

Material & Methods: A retrospective analysis of 50 pus culture samples received in the Department of Microbiology from various departments in the hospital between June 2020 to Dec 2020 was performed. Data regarding the pathogen isolated and its antimicrobial susceptibility were collected and analyzed. The specimens were primarily processed and Identified as per standard methods. Antibiotic susceptibility testing was done according to CLSI guidelines 2020.

Results: Out of 50 total samples analyzed, 28 were culture positive with gram negative being 15(53.57%) and gram positive being 13(46.42%). The predominant organism of pyogenic infection was *Pseudomonas aeruginosa* (40%) followed by *E.coli* (26%), *Klebsiella* spp(20%), and *Acinetobacter* spp(13%). Among gram positive, the most common organism was Methicillin-Resistant *Staphylococcus aureus* (MRSA 53.84%). Pyogenic infections were predominant in males and mono microbial was common over poly microbial infections. Extended Spectrum Beta Lactamases (ESBL) was seen highest in *Escherichia coli* at the rate of 33.33% and Multi-Drug Resistance (MDR) was high among *Klebsiella* species and non-fermenting Gram Negative Bacilli (GNB) *Pseudomonas* spp and *Acinetobacter* spp. . . . All the multidrug resistant *Staphylococcal* isolates were 100% sensitive to Vancomycin, Teicoplanin & Linezolid. Among the MDR strains of GNB were 100% sensitive for Polymixin B and Colistin.

Conclusion: There is a changing trend with gram negative organisms being the commonest cause of pyogenic infections as evidenced across India. Spurious use of drugs would help in reducing the spread of drug resistant isolates. Antibiotic policy formulation would help in empiric therapy with reduction in infection rates

Key Words: Pyogenic, multidrug resistant, *E.coli*.

Introduction

The Pyogenic infection is characterized by the local inflammation with pus formation, caused by pyogenic bacteria, which can lead to the accumulation of dead leukocytes and infectious agent. Accumulation of these cells produces the thick yellowish liquid called Pus [1] Bacterial infections always cause serious problems in the successful treatment of wounds which eventually results in complications sometimes leading to sepsis [2,3] with high morbidity and mortality.

These infections are difficult to treat because of the pathogens with increasing antibiotic resistance [4]. The indiscriminate use of antibiotics has also lead to the increase in multi-drug resistant organisms (MDRO) [5]. In the present ear infections have become the leading cause of morbidity in patients of surgery, trauma etc

[6]. It is important to know the pathogens causing the infections and its antibiotic susceptibility for proper management of the patients [7]. The present study aims to find out the frequency of aerobic bacteria in pus samples and study their antibiogram in our setup. A retrospective analysis of 50 pus culture samples received in the Department of Microbiology, RMCH&RC, Mandhana from various departments in the hospital between June 2020 to Dec 2020 was performed. Pus samples were collected using sterile techniques and transferred to sterile containers to avoid contamination. These samples were plated onto Blood Agar, MacConkey Agar, Nutrient Agar and Chocolate Agar and incubated at 37°C overnight under aerobic conditions. Later the organisms were identified by performing Gram staining, biochemical reactions and motility test and colony morphology as per standard protocols. Data regarding the pathogen isolated and its antimicrobial susceptibility were collected and analyzed and the specimens were primarily processed and Identified as per standard methods. Antibiotic susceptibility testing was done according to CLSI guidelines 2020 [8].

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Results

Out of 50 total samples analysed, 28 were culture positive as shown in [Table no: 1 & Fig 1] with gram negative being 15(53.57%) and gram positive being 13(46.42%). The predominant organism of pyogenic infection was *Pseudomonas aeruginosa* (40%) followed by *E.coli* (26%), *Klebsiella* spp (20%), and *Acinetobacter* spp (13%) shown in [Table no:2]. Among gram positive, the most common organism was Methicillin-Resistant *Staphylococcus aureus* (MRSA-53.84%). Pyogenic infections were predominant in males and mono microbial was common over poly microbial infections. Extended Spectrum Beta Lactamases (ESBL) was seen highest in *Escherichia coli* at the rate of 33.33% and Multi-Drug Resistance (MDR) was high among *Klebsiella* species and in non-fermenting Gram Negative Bacilli (GNB) *Pseudomonas* spp and *Acinetobacter* spp. All the multidrug resistant *Staphylococcal* isolates were 100% sensitive to Vancomycin, Teicoplanin & Linezolid. Among the MDR strains of GNB were 100% sensitive for Polymixin B and Colistin.

[Table/Fig-1]: Showed the Culture Positive and Negative Samples

No. of Samples	Positive Cultures	Negative Cultures
50	28	22

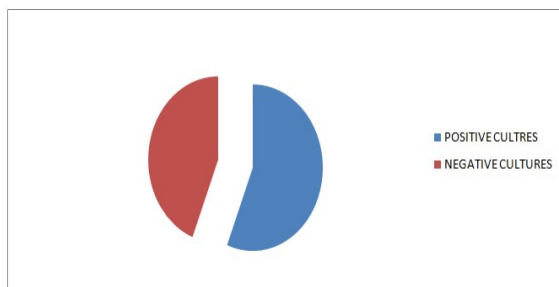


Table2: Percentage of the Isolated Bacteria.

Isolated organism(N=15)	Percentage (100%)
<i>Pseudomonas aeruginosa</i>	40%
<i>E.coli</i>	26%
<i>Klebsiella</i> spp	20%
<i>Acinetobacter</i> Spp	14%

Discussion

The results of current study are important as it give evidence of different pathogens causing pyogenic infections and their sensitivity pattern from a local hospital setup. Out of 50 total samples analysed, 28 were culture positive with gram negative being 15(53.57%) and gram positive being 13(46.42%). The predominant organism of pyogenic infection was

Pseudomonas aeruginosa(40%) followed by *E.coli*(26%), *Klebsiella*spp(20%), and *Acinetobacter* spp(13%) which was similar to the studies conducted by other authors [9,10]. Another study by Basu S. et al [11]also reported *Pseudomonas* and *E. coli* spp. to be the most commonly occurring pathogens in wound infections, in that order. Among gram positive, the most common organism was Methicillin-Resistant *Staphylococcus aureus* (MRSA) [12]. Pyogenic infections were predominant in males and monomicrobial was common over polymicrobial infections which corroborates with the study by Pappu A.K. et al [13]. Extended Spectrum Beta Lactamases (ESBL) was seen highest in *Escherichia coli* at the rate of 33.33% and Multi-Drug Resistance (MDR) was high among *Klebsiella* species and non-fermenting Gram Negative Bacilli (GNB) which correlates with the study Sudhaharan S. where *E. coli* being predominant in 38.6% and 68.3% (257/403) were ESBL producers. *K. pneumoniae* was isolated in 17.17% of cases, other than *Pseudomonas* spp and *Acinetobacter* spp [14]. All the multidrug resistant *Staphylococcal* isolates were 100% sensitive to Vancomycin, Teicoplanin & Linezolid correlated with studies by Sudha et al [12]. Among the MDR strains of GNB were 100% sensitive for Polymixin B and Colistin correlated with studies by Sukanya et al [14].

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 *Staphylococcus aureus* is being continued as a major etiological agent of pyogenic infections.

The development of resistant strains of pathogens can be limited by the judicious use of antibiotics. The present study guides the clinicians about the common pathogens encountered in pus samples further more it helps clinician to select and treat patient with proper antibiotics in order to limit their hospital stay and decrease mortality and morbidity.

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