

Aerobic Bacteriological Profile and Antimicrobial Susceptibility Pattern of Pus isolates in a Teaching Hospital, Lahore, Pakistan

Sahar Mudassar¹, Sofia W Khan², Mudassar Ali³, Faheem Mahmood⁴

ABSTRACT

Introduction: To determine the antibiotic sensitivity patterns of common pathogens in pus samples from different wounds.

Material and Methods: A total of 110 positive pus samples were selected for the study. These samples were received in the Microbiology laboratory of Arif Memorial Teaching Hospital, Lahore, from July to December 2017. These samples were processed and identified by standard protocols of aerobic culture and sensitivity. Antibiotic susceptibility test was done according to CLSI guidelines.

Result: Among the total 110 positive cases, 70 (64%) were male and 40 (36%) were females admitted in different departments of the hospital during the study time. Nine different organisms were isolated. Among them, *Staphylococcus aureus* was the most common isolate followed by *Pseudomonas aeruginosa*, *Escherichia coli* and *Klebsiella pneumoniae*. *Citrobacter*, *Proteus* and *Enterococcus* contributes were less common. The sensitivity of *Staphylococcus aureus* was highest with Vancomycin and Gentamycin, whereas *Pseudomonas* and *Enterbacteriaceae* were sensitive with Imipenem.

Conclusion: Antimicrobial resistance always pose challenge for clinicians in treating pyogenic infection. The development of resistant strains of pathogens can be limited by the judicious use of antibiotics. Proper knowledge of antibiotics in treating pyogenic infection leads to patient satisfaction and short hospital stay.

Key words: Bacteria, Antimicrobial Susceptibility, Pus

INTRODUCTION

Pyogenic infection is characterized by 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. Different studies shows that coagulase positive *Staphylococcus aureus* has been found to be the most common organism isolated in pus followed by *Pseudomanoas aeruginosa* and *Enterobacteriaceae*.^{2,4} *Staphylococcus aureus* and *Pseudomonas* both account for 20-40% of all nosocomial, post-surgical and burn infections. After abdominal surgeries in immune-compromised patients, pathogens like *Enterococci* and *Enterobacteriaceae* have also been implicated.⁵ Studies regarding bacterial profile in pyogenic wounds infections help the clinician to start empirical antibiotic cover rather than waiting for the culture reports.² Microbes mutate into new forms and become dominate strain due to inappropriate

antibiotic therapy. Nowadays antimicrobial resistance is a major public health concern in human medicine both in the community and in hospitals.⁶

The present study aims to find out the frequency of aerobic bacteria in pus samples and study their antibiogram in our setup.

MATERIAL AND METHODS

It was a prospective study, conducted at Microbiology Labortarory of Arif Memorial Teaching Hospital affiliated with Rashid Latif Medical College, Lahore, Pakistan. The duration of this study was Six months from July to December 2017. Before commencement of study, the research protocol was approved by the ethical committee of Rashid Latif Medical College and Arif Memorial teaching Hospital, Lahore.

The samples were collected from the patients admitted to the hospital for surgeries or injuries and had signs of wound infections. Total 110 positive samples were selected for the study. Samples with mixed growth were not included. 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, motility test and colony morphology as per standard protocols. Kirby bauer's Disk Diffusion method was used to test antimicrobial susceptibility and interpreted by Clinical Laboratory Standard Institution (CLSI) guidelines.⁷ Standard antibiotics like Penicillin, Vancomycin, Gentamycin, Ciprofloxacin, Clindamycin, Azithromycin, Cefoxitin were used for Gram positive bacteria while Piperacillin, Ceftazidime, Gentamycin, Cotrimoxazole, Ticarcillin, Imipenem and Cephalothin were

¹Assistant Professor, Department of Pathology, ²Assistant Professor, Department of Pathology, ³Assistant Professor, Department of Physiology, ⁴Assistant Professor, Department of Physiology, Rashid Latif Medical College, Lahore, Pakistan

Corresponding author: Sahar Mudassar, Sofia W Khan, Mudassar Ali, Faheem Mahmood. Aerobic bacteriological profile and antimicrobial susceptibility pattern of pus isolates in a teaching hospital, Lahore, Pakistan

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used for Gram negative bacteria (Abtek).

STATISTICAL ANALYSIS

Results obtained were analyzed by means and percentages with the help of Microsoft office 2007.

RESULTS

A total of 110 positive pus samples were processed, which were received for culture and sensitivity in the Microbiology laboratory of Arif Memorial Hospital. Among culture positive pus samples, a total number of nine organisms were isolated.

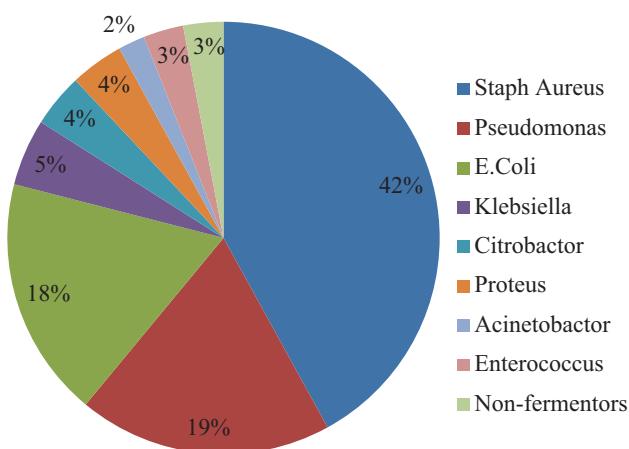


Figure-1: Aerobic Bacteria isolate From 110 Pus Samples

Antibiotic	Sensitive %	Resistant %
Penicillin	19	81
Vancomycin	89	11
Gentamycin	86	14
Ciprofloxacin	54	46
Clindamycin	79	21
Azithromycin	66	34
Cefoxitin	82	18

Table-1: Antibiotic Susceptibility Patterns of Staphylococcus aureus (n=46)

Antibiotic	Sensitive %	Resistant %
Piperacillin	55	46
Ceftazidime	51	49
Gentamycin	28	72
Cotrimoxazole	1	99
Ticarcillin	26	74
Imepenem	97	03

Table-2: Antibiotic Susceptibility Patterns of Pseudomonas aeruginosa (n=21)

Antibiotic	E.Coli (n=20)		Klebsiella (n=6)		Citrobacter (n=5)	
	Sensitive %	Resistant %	Sensitive %	Resistant %	Sensitive %	Resistant %
Cephalothin	-	-	65	35	21	79
Ceftazidime	42	58	32	68	51	49
Gentamycin	55	45	36	64	39	61
Ciprofloxacin	36	64	72	28	50	50
Cefoxitin	38	62	56	44	21	79
Imepenem	88	12	99	1	100	0

Table-3: Antibiotic Susceptibility Patterns of Enterobacteriaceae (n=31)

Demographic data was collected in which 70 (64%) were male patients and 40 (36%) were females patients, admitted in different departments. Among the culture positive pus samples *Staphylococcus aureus* was 46 (42%), *Pseudomonas aeruginosa* was 21 (19%), *Escherichia coli* was 20 (18%), *Klebsiella pneumoniae* was 6(5%), *Citrobacter* 5(4%), *Proteus* 4(4%), *Acinetobacter* 2(2%), *Enterococcus* 3(3%) and Non Fermentors 3(3%) (Figure -1). The Antibiogram of *Staphylococcus aureus* (Table-1) revealed that the Vancomycin (89%) was the most susceptible drug followed by Gentamycin (86%), Cefoxitin (82%), and resistant to Penicillin. The antibiogram of *Pseudomonas* revealed that it was more sensitive to Imepenem (97%) and resistant to Cotrimoxazole (Table-2). Enterobacteriaceae were sensitive to Imipenem (Table-3).

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. Among the hospital acquired infections the most common and serious complication is wound infection.⁸ Which in turn increase the length of hospital stay and increase the mortality rate up to 70–80%.⁹

The results of the present study are in accordance with other studies reported in the literature so far. The incidence of wound infection was higher in males (46%) than in females (36%) which could be explained by the fact that men in our setup are involved in professions which make them more vulnerable to trauma and injuries, also reported by Ibrar et al.⁵ In the present study the most common pathogen isolated from pus samples were *Staph aureus* also reported by Rao DR², Rai S et al,³ Tiwari P et al,¹⁰ and Chauhan M.¹¹ The reason may be that the sources of *Staph aureus* are the health care workers, and other patients in a hospital setup. Endogenous infections with *Staph aureus* are also possible as it is present in the normal flora of the human body. *Staph aureus* is followed by *Pseudomonas* as also reported by Rai S et al³ and Chauhan M¹¹ whose findings are in accordance with the present study. Mohammad A¹², study from Nigeria also reported the same pathogens in their study as reported by us. Gram negative bacteria are also found to be dominant in pus samples as reported by Chauhan M.¹¹ Rai S et al³ reported that *Staph aureus* was highly sensitive to Cefoxitin and Gentamycin, which is in accordance with our study. In our study Gram negative bacteria were more sensitive to

Imepenem, same observations were also reported by Rao DR.² Further studies with large sample size are needed in our setup. Molecular level analysis should be performed to confirm the results, which was difficult for us because of resource constraints.

CONCLUSION

Antimicrobial resistance always pose challenges for clinicians in treating pyogenic infections. The development of resistant strains of pathogens can be limited by the judicious use of antibiotics. Self usage of antibiotic is a common practice in our region. Inappropriate selection of antibiotics allows microbes to survive treatment. 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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