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RETROSPECTIVE STUDY ON SUSCEPTIBILITY PATTERN OF MICROORGANISMS ISOLATED FROM PUS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

BACKGROUND: Antimicrobial resistance is not only a global threat it alarms the depletion of antimicrobial resource to treat complications. To preserve antimicrobial resource at institutional level , monitoring of antimicrobial susceptibility pattern is mandatory to plan for antibiogram. This would create awareness among clinicians to plan and treat appropriately.

Methodology: It was a retrospective descriptive study . The data was collected from the Department of Microbiology laboratory register by using WHONET software between January 2018 to December 2018 . Samples were processed as per CLSI 2017 guidelines. The antimicrobial susceptibility testing was done by modified Kirby Bauer disc diffusion method.

Results: 1934 pus samples analysis revealed 49% of pathogenic microorganisms. Majority of the pus samples received from surgery department. Males (62%) were predominant than females (38%). Staphylococcus aureus 442 (46.3%) was the highest pyogenic organism followed by E.Coli (17 %) , pseudomonas aureginosa (8%) , klebsiella pneumoniae (7%), enterococcus spe. (6%), proteus mirabilis (4%) and acietobacter (2.5%).

Conclusion: Gram positive organisms were highly susceptible to chloramphenicol , tetracycline , vancomycin , linezolid, teicoplanin and aminoglycosides. Gram negative organisms developed resistance against beta lactam antibiotics , fluroquinolones, chloramphenicol and sulfonamides. Carbapenems , colistin and aminoglycosides are the drugs of choice for Gram negative organisms. Institutional level monitoring of antimicrobial use , rational prescription and fixed dose administration of drugs might help to preserve the antimicrobial resource.

KEYWORDS : AMR – ANTI MICROBIAL RESISTANCE , AMA - ANTIMICROBIAL AGENTS.

INTRODUCTION

Discovery of antimicrobial agents during the early half of twentieth century created a confidence and belief of international medical community that they have a remedy for microbes. Development and increase of AMR for the past thirty years revealed that the war against microbes to be continued more effectively (1,2) . In 2011 WHO defined AMR is the most serious threat to global public health and the worrying factor is not limited to particular pathogen or specific geographical area (3). USA and European centre for Disease Prevention and control have reported the annual increased number of deaths 23,000 and 25,000 respectively and also increase the economical burden of the country(4).

In developing countries , the easy availability and higher consumption of antimicrobial agents have led to greater levels of resistance compared to developed countries (5). Inappropriate and irrational use of antimicrobial agents against infectious disease in India, the development of antimicrobial resistance also is being steadily increasing (6).

AMR prolongs hospital stay and requires expensive antimicrobial agents use results in increased morbidity and mortality (7). The resistance pattern of pathogen varies in different regions . Therefore each institution should have their own local susceptibility and resistance pattern of microorganisms for appropriate antimicrobial use.

The present study was done to monitor the bacterial profile and susceptibility pattern of pus samples in our institution. This would create awareness and guide the clinicians to plan the treatment appropriately and to revise empirical therapy.

METHODS

It was a retrospective descriptive study . The data was collected from the Department of Microbiology laboratory register by using WHONET software. Pus samples received from in patients and out patients departments of Mahatma Gandhi Memorial government hospital attached to K.A.P.V. Government medical college, between January 2018 to December 2018 were included in this study.

Samples were processed as per CLSI 2017 guidelines. Pus samples were received in two sterile swab sticks or in sterile container. First swab stick is used for gram staining and second one is used for culture. Received pus samples were processed on blood agar , MacConkey agar, Nutrient agar media and incubated at 37^0C under aerobic condition and the organisms are identified by Gram stain, motility testing , biochemical reactions using standard microbiological methods. The antimicrobial susceptibility testing was done by modified Kirby Bauer disc diffusion method.

The following standard antibiotic discs were used for the isolates, amikacin (AMK), amoxicillin (AMX), ampicillin (AMP), azithromycin (AZM), cefotaxime (CTX), ceftazidime (CAZ), ceftriaxone (CRO), cephalexin (CEP), chloramphenicol (CHL), ciprofloxacin (CIP), erythromycin (ERY), gentamicin (GEN), gentamycin high (GEH), meropenem (MEM), oxacillin (OXA), penicillin (PEN), piperacillin (PIP), tazobactum (TZP), tetracycline (TCY), tobramycin (TOB), cotrimaxazole (SXT), vancomycin (VAN), doxycycline (DOX), teicoplanin (TEC), cloxacillin (CLO), levofloxacin (LEX), cefoxitin (FOX), cefipime (FEP), ertapenem (ETP), minocycline (MNO), colistin (COL), linezolid (LNX), clindamycin (CLI), imepenam (IPM) and cefaperazone sulbactum (CSL) .

RESULTS

Between January to December 2018 , 1934 pus samples were received. Analysis revealed 21% (395) no growth ,30% (586) samples contained only normal flora and microorganisms were isolated from 953 (49%) samples (fig .1). 52% of the pus samples received from surgery department. 18% of samples from medicine , 12 % and 9% from orthopaedics and OBG respectively . Males (62%) were predominant than females (38%).

Fig 1. Distribution of pus samples

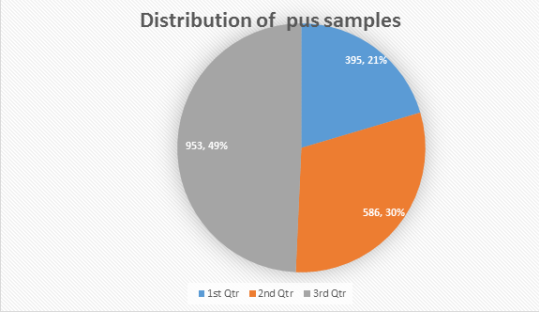
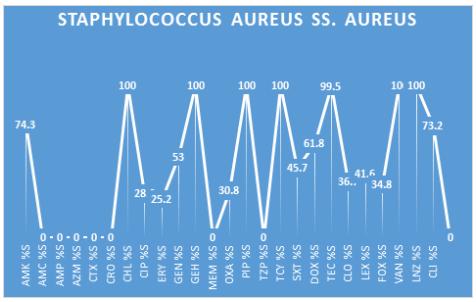


Table 1. Distribution of organisms isolated from pus

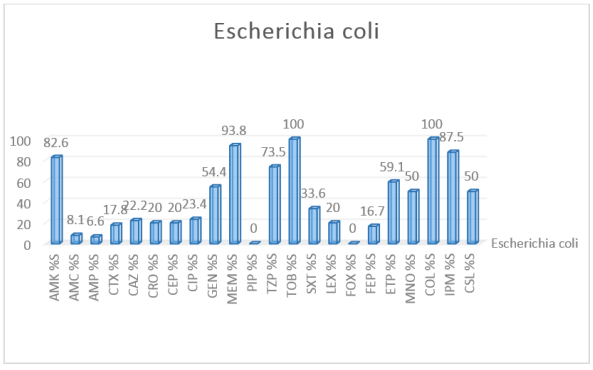
ORGANISM	PERCENTAGE
Staph. aureus	46.3%
E.Coli	17 %
Pseudomonas aurgenosa	8%
Klebseilla pneumonia	7%
enterococcus	6 %
Proteus mirabilis	4 %
acinetobacter	2.5%

Fig: 2 . Susceptibility Pattern Of Staph. Aureus



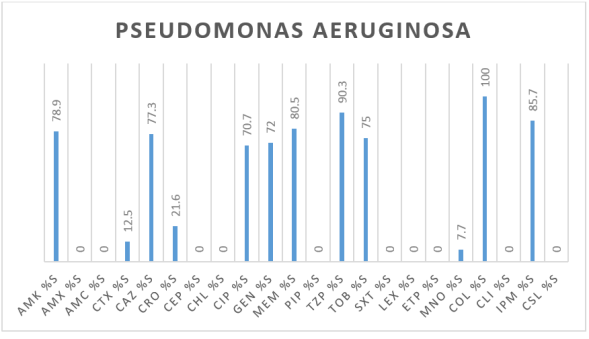
100% susceptibility to chloramphenicol, high dose of gentamicin, pipracillin, tetracycline, vancomycin and linezolid. 99.5 % susceptibility seen with Teicoplanin.

Fig. 3. Susceptibility pattern of E. Coli



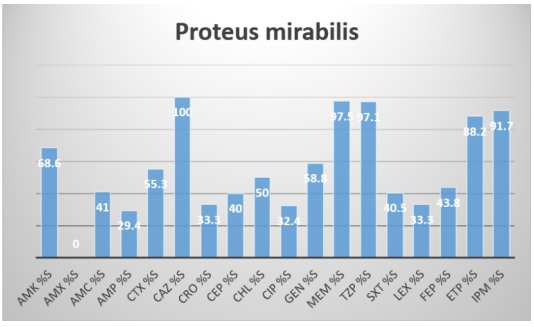
High susceptibility against E.coli seen with tobramycin (100%), meropenam (93.8%), colistin (100%) , imepenam 87.5% , amikacin (82.6%) and tezobactum 73.5%.

Fig 4. Antimicrobial susceptibility pattern of p.aeruginosa



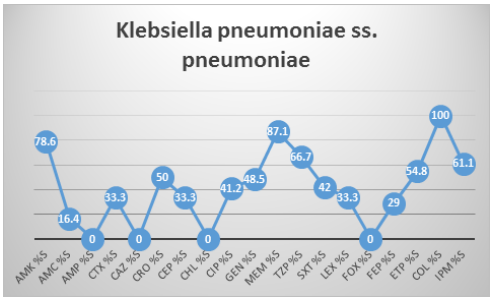
Pseudomonas aeruginosa was highly sensitive to colistin 100%, tezobactum90.3%, imepenam 85.7%, meropenam 80.5%, amikacin 78.9%, ceftazidime 77.5% and tobramycin 75%. Resistant seen against amoxacillin, amoxy calavulinic acid, cephalexin , chloramphenicol, pipracillin, cotrimaxazole, levofloxacin, ertepenam , cefaperazone sulbactum and clindamycin.

Fig 5. Susceptibility pattern of Proteus mirabilis



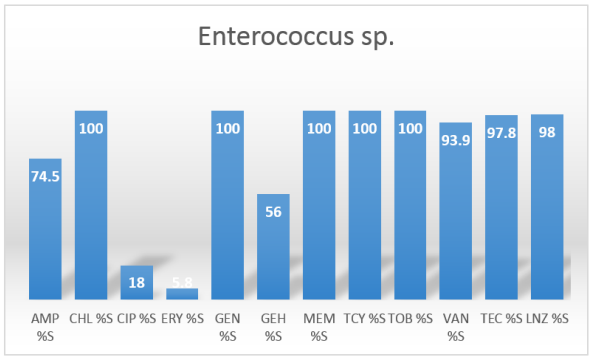
High susceptibility to ceftazidime 100%, meropenam , tezobactum 97.5%, imepenam91.7% and ertapenam 88.7%.

Fig 6. Susceptibility pattern of Klebsiella pneumoniae



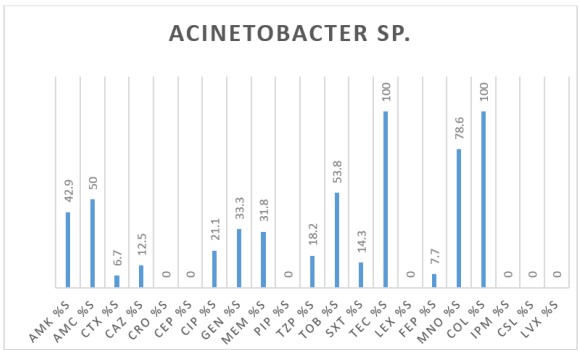
Colistin (100%) was highly sensitive , meropenam 87.1% and amikacin 78.6% also showed sensitivity against k.pneumoniae. Total resistance was reported with ampicillin , ceftazidime, chloramphenicol and cefoxitin.

Fig 7. Susceptibility pattern of enterococcus



100% susceptibility seen with chloramphenicol , gentamycin , meropenam , tetracycline and tobramycin. Vancomycin , teicoplanin and lenezolid were also highly sensitive to enterococcus species.

Fig 8. Susceptibility pattern of Acinetobacter



Acinetobacter sp. Were highly sensitive against teicoplanin , colistin (100%) and minocycline 78.6%.

DISCUSSION

Analysis of 1934 samples , 21% (395) showed no growth , 30% (586) contained only normal flora and microorganisms were isolated from 49% (953) samples . Majority (52%) of the pus samples received from surgical ward. 18% of samples from Medicine , 12 % and 9% from Orthopaedics and OBG respectively . Males (62%) were predominant than females (38%). This study results were coincide with other studies reported from the same state and other parts of India (8,9,10). All these studies males were predominant than females and the major contribution of samples from Surgical ward .

Staphylococcus aureus 442 (46.3%) was the highest pyogenic organism followed by E.Coli (17 %) , pseudomonas aureginosa (8%) , klebsiella pneumoniae (7%), enterococcus spe. (6%), proteus mirabilis (4%) and acietobacter (2.5%).

Staphylococcal aureus was the commonest pathogen reported in the state but it differs with Swati Duggal et al. where pseudomonas aureginosa was the highest organism but Rozina arshi khan et al. reported that klebsiella pneumoniae was the common organism.

Staph. aureus susceptibility pattern of our study was comparable with Asati Rakesh kumar, high susceptibility seen with linezolid , vancomycin , chloramphenicol , tetracycline and gentamicin (11). Zerfie Taddesse et al. Ethiopia study also reported the similar susceptibility pattern (12).

E.coli was the second common organism reported in our study. Resistance developed against penicillins , cephalosporins and showed low susceptibility to fluroquinolones. E.coli susceptibility and resistance pattern is comparable with Rozina arshi khan et al. study , colistin was not used in their study .

High susceptibility to pseudomonas aureginosa seen with colistin, tezobactam and carbapenem , moderate susceptibility to third generation cephalosporins and aminoglycosides. Similar pattern was observed in diabetic foot infections (13).

Colistin, carbapenem and aminoglycosides are the antimicrobial therapy for klebsiella. sarath babu et al. study also confirms amikacin susceptibility against klebsiella (14).

Proteus susceptibility pattern is comparable with Nithya study , third generation cephalosporins and carbapenem are sensitive against proteus (15).

Broad spectrum antimicrobial agents chloramphenicol, tetracycline, aminoglycoside , carbapenem, vancomycin , linezolid and teicoplanin were highly susceptible to enterococci.

Acinetobacter was susceptible to teicoplanin, colistin and minocycline. Muhammad fayaz et al. study reported acinetobacter sensitivity was high against doxycycline (16).

CONCLUSION

India represents the highest bacterial disease burden in the world (17). Easy availability and irrational use of antimicrobial agents lead to the development of antimicrobial resistance. In our study , Gram positive organisms were highly susceptible to broad spectrum antimicrobial agents chloramphenicol and tetracycline(which drugs are less frequently prescribed) , vancomycin , linezolid, teicoplanin and aminoglycosides. Gram negative organisms developed resistance against beta lactam antibiotics, fluroquinolones, chloramphenicol and sulfonamides. Carbapenems , colistin and aminoglycosides are the drugs of choice for Gram negative organisms. Colistin use is restricted due to its nephrotoxic and neurotoxic effects. carbapenems are costly and the only group of drugs which are susceptible against gram negative organisms. Frequent use of these drugs also paves way for emergence of resistance. Rational drug use and Fixed combination therapy can help to prevent or slow the development of resistance since there is no new novel antimicrobial agent available (18). This study also emphasize strict vigilance on antimicrobial use at the institutional level to preserve antimicrobial resource which is the only weapon available to treat complications.

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Conflicts of interest

There is no conflicts of interest.

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