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Antibiotic susceptibility pattern of bacterial pathogens to third generation cephalosporins

Jyothsna. K[*1], Madhavi S[2] and Rama Rao MV[2]

[1]*Department of Pharmacology, Bhaskar Medical College, Yenkapalli, Moinabad, R.R (Dt), Hyderabad, India*
[2]*Department of Microbiology, Bhaskar Medical College, Yenkapalli, Moinabad , R.R (Dt), Hyderabad, India*

ABSTRACT

The present study was undertaken to assess the antibiotic susceptibility pattern of bacterial pathogens to third generation cephalosporin in rural setup, in India. Due to significant changes in microbial genetic ecology, as a result of indiscriminate use of antimicrobials, the spread of antimicrobial resistance is now a global problem. . The commonest isolates were Klebsiella, E.coli, Staphylococcus aureus(Staph.aureus) and Pseudomonas spp. in the order of 36.8%, 36.8%, 17.9% and 12.9% of isolates respectively. It was detected that there were resistance trends to cephalosporin. Cefotaxime and ceftriazone showed better susceptibility than other third generation cephalosporin.

Key words: Antibiotic susceptibility, resistance, cephalosporin.

INTRODUCTION

Multiple antibiotic resistance in bacterial population is a growing clinical problem, which is recognized as a threat to public health[1]. World wide distribution of infectious diseases is causing morbidity. Respiratory tract, urinary tract and gastrointestinal tract are lined by mucous membrane[2]. When immunity is decreased or humans are attacked by virulent bacteria resulting in respiratory tract infection, urinary tract infection and gastrointestinal infection[3].

Antimicrobials like third generation cephalosporines are used to cure these infections. These drugs are highly active against gram-negative cocci, gram-negative bacilli and anaerobes. Thus these have excellent activity against N.gonorrhoeae, N.meningitidis, E.coli, Enterobacter, H.influenzae, Klebsiella pneumonia, and Proteus mirabilis[4].

Hence, there is a need to conduct area specific infections and their resistance patterns, so as to generate data that would help clinicians to choose the correct therapy. Wide spectrum of infections leads to substantial morbidity in immunocompromised patients[5]. Therefore, the present study was undertaken to find out the antibiotic susceptibility patterns of pathogenic isolates from various infections.

MATERIALS AND METHODS

It is prospective cohort study undertaken at Bhaskar Medical College, Andhra Pradesh, India between January 2011 to June 2011. One hundred and eighty four samples obtained from sputum, throat, blood, urine, pus, stool and ear swab. Among them 84 were reported the presence of bacterial infection.

Bacterial growth was identified based on colony characteristics, gram's stain and biochemical reactions. Culture examination was carried out using blood agar and MacConkey's medium. Antibiotic susceptibility was done by disk diffusion technique on Muller-Hinton medium, performed according to the Clinical Laboratory Standard Institute (CLSI) guidelines[6,7]. with Third generation cephalosporins: Cefotaxime, ceptazidime, cefoprazone, and ceftriazone. They were incubated at 37^0C and also 5-10% CO_2 enriched environment (candle jar). With these sensitive and resistance pattern were identified based on CLSI guidelines.

Susceptibility data were compared by using percentages, mean$\pm$SD

RESULTS

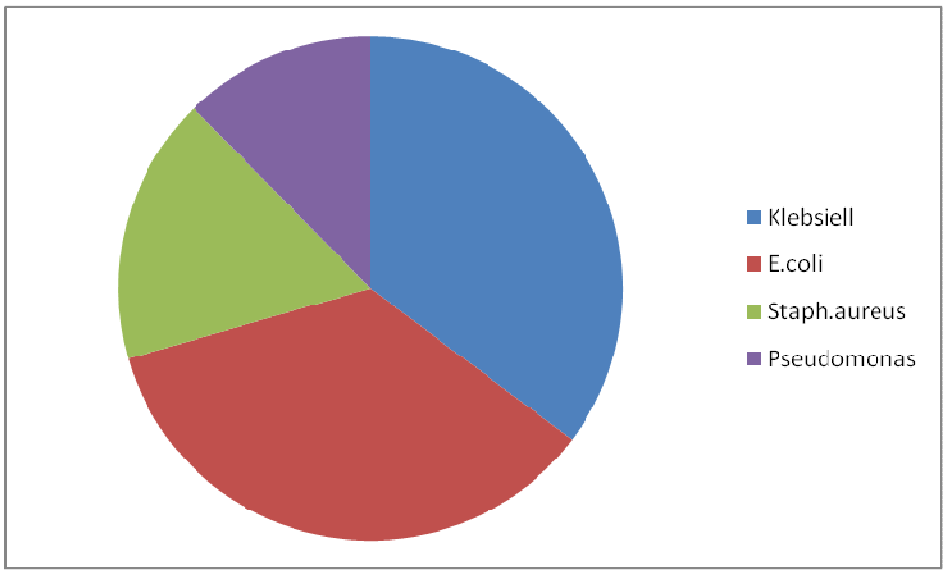
A total of 74 patients are included in study, 40 were males and 34 were females. The study group had mean age of 34.12$\pm$8.15 years. The commonest isolates were Klebsiella, E.coli, Staphylococcus aureus and Pseudomonas spp. (These represented 36.8%, 36.8%, 17.9% and 12.9% of isolates respectively). Figure.1

Klebsiella and E.coli were the major causative organism in all infections. Sensitivity of Staph.aureus in sputum samples to third generation cephalosporin was in the order of 100% sensitivity with Cefotaxime and 100% sensitivity with Cefoparazone. Staph.aureus in sputum is resistant 100% with Ceptazidime and Ceftriazone each.

Sensitivity of Staph.aureus in pus samples was in the order of 100% sensitive with Cefotaxime, 50% sensitive with Ceptazidime, 50% sensitive with Cefoparazone and 50% sensitive with Cefotriazone. Staph.aureus in pus is resistant by 50% with Ceptazidime, Cefoparazone and Cefotriazone, each.

Sensitivity of Klebsiella in sputum samples was in the order of 66.67% sensitive with Cefotaxime, 50% sensitive with Ceptazidime, 66.67% sensitive with Cefoparazone and 50% sensitive with Cefotriazone. Klebsiella in sputum is resistant by 33.33% with Cefotaxime, 50% with Ceptazidime, 33.33% with Cefoparazone and 50% with Cefotriazone.

Figure 1: Percentage of bacterial isolates



Sensitivity of Klebsiella in pus samples was in the order of 100% sensitive with Cefotaxime, 50% sensitive with Ceptazidime, 50% sensitive with Cefoparazone and 50% sensitive with Cefotriazone. Klebsiella in pus is resistant by 50% sensitive with Ceptazidime, 50% with Cefoparazone and 50% with Cefotriazone.

Sensitivity of Klebsiella in urinary samples was 66.67% with Ceptazidime, 50% sensitive with Cefoparazone and 83% sensitive with Cefotriazone. Klebsiella in urine is resistant by 33.33% with Ceptazidime, 50% with Cefoparazone and 17% with Cefotriazone.

Sensitivity of Pseudomonas in sputum samples was in the order of 100% sensitive with Cefotaxime, 100% sensitive with Ceptazidime, 100% sensitive with Cefoparazone and 100% sensitive with Cefotriazone.
Sensitivity of Pseudomonas in pus samples was in the order of 50% sensitive with Cefoparazone and 50% sensitive with Cefotriazone. Pseudomonas in pus is resistant by 100% with Ceftaxime 100% sensitive with Ceptazidime, 50% with Cefoparazone and 50% with Cefotriazone.

Sensitivity Pseudomonas in earswab samples was in the order of 100% sensitive with Cefotaxime, 100% sensitive with Ceptazidime, 100% sensitive with Cefoparazone and 100% sensitive with Cefotriazone.

E.coli in sputum is sensitive by 100% with Cefotaxime, Cefoparazone and Cefotriazone.
Sensitivity of E.coli in urinary samples was in the order of 44.44% sensitive with Cefotaxime, 66.66% sensitive with Ceptazidime, 55.56% sensitive with Cefoparazone and 50% sensitive with Cefotriazone. E.coli in urinary samples was resistant by 66.67% with Cefotaxime, 33.33% sensitive with Ceptazidime, 44.44% with Cefoparazone and 50% with Cefotriazone.

E.coli in pus cells are 100% resistant to above cephalosporins.

Table:1: Antibiotic susceptibility pattern of bacterial isolates to third generation cephalosporines

Organism	Cefotaxime	Cefoparazone	Ceptazidime	Ceftriazone
Staph.aureus Sputum				
S	100%	100%	0	0
R	0	0	100%	100%
Staph.aureus Pus				
S	100%	50%	50%	50%
R	0	50%	50%	50%
Klebsiella Sputum				
S	66.67%	66.67%	50%	50%
R	33.33%	33.33%	50%	50%
Klebsiella Pus				
S	100%	50%	50%	50%
R	0	50%	50%	50%
Klebsiella Urine				
S	0	50%	66.67%	83%
R	100%	50%	33.33%	17%
Pseudomonas Sputum				
S	100%	100%	100%	100%
R	0%	0%	0%	0%
Pseudomonas Pus				
S	0	50%	0	50%
R	100%	50%	100%	50%
Pseudomonas Ear swab				
S	100%	100%	100%	100%
R	0%	0%	0%	0%
E.coli Sputum				
S	100%	100%	0	100%
R	0%	0%	100%	0%
E.coli Urine				
S	44.44%	55.56%	66.67%	50%
R	55.56%	44.44%	33.33%	50%
E.coli Pus				
S	0	0	0	0
R	100%	100%	100%	100%

DISCUSSION

The common pathogens isolated in Odelowo EOO et al.were Staph.aureus(35.8%), Pseudomonas spp(21.8%), E.coli(15.3%), and Klebsella spp(13.4%)[8]. 83.5% of wound swabs in study cultured positive for bacterial pathogens. The low rate of request and isolation rate in intensive

care unit as against the normal trend may be due to the fact that this unit is quite small and requests were therefore correspondingly small.

Escherichia coli was still the major causative organism in all infections. E.coli in urinary samples was sensitive in descending order with Ceptazidime, Cefoperazone, Cefotrizone and Cefotaxime. E.coli in pus was 100% resistant to third generation cephalosporin.
Klebsiella in sputum samples was highly sensitive to Cefotaxime(66.67%) and Cefoparazone(66.67%). Klebsiella developed resistance to Cefotriazone by 50%.

Klebsiella in pus samples was highly sensitive to Cefotaxime(100%). Klebsiella in pus was resistant to Ceptazidime(50%), Cefoparazone(50%) and Cefotriazone(50%).

Sensitivity of Klebsiella in urinary samples was highly sensitive to Cefotriazone(83%). Staph.aureus in sputum samples was highly sensitive to Cefotaxime(100%) and Cefoperazone(100%). Staph.aureus in sputum was highly resistant to Ceptazidime(100%) and Ceftriazone(100%)

Staph.aureus in pus samples was highly sensitive to Cefotaxime(100%). Staph.aureus in pus was resistant by 50% with Ceptazidime, Cefoparazone and Cefotriazone, each[10].

Pseudomonas in sputum samples was highly sensitive to Cefotaxime, Ceftazidime, Cefoparazone and Cefotriazone. Pseudomonas in pus is highly resistant to Ceftaxime and Ceftazidime, and 50% with Cefoparazone[11,12].

Pseudomonas in ear swab samples was highly sensitive to Cefotaxime, Ceftazidime, Cefoparazone and Cefotriazone[13].

In Taiwo.S.S. et al., susceptibility pattern of organisms heavily favoured the Quinolones, particularly Ciprofloxacin, and new macrolides, Azithromycin, which were effective but expensive antibiotics in the treatment of wound infections in this environment. 60% of gram negative organisms were sensitive to Gentamicin[14]. Cefotaxime and Cefotriazone were highly active againt Staph.aureus, Klebsella, E.coli and Pseudomonas. Thus having broad spectrum of action. Ceftazidime was active against Staph.aureus and Pseudomonas. Cefoperazone was highly active against Pseudomonas in respiratory, skin-soft tissue, gastro-intestinal and ear infections. It was also highly active against Staph.aureus in respiratory infections. It had weaker activity against Klebsella and E.coli. Thus bacteria were highly sensitive to third generation cephalosporin.

Thus antibiotic sensitivity pattern is intended to provide, clinicians and surgeons, valuable information upon which empiric antimicrobial therapy of infection can be predicted.

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REFERENCES

[1] Deurden BI, Reids TMS, Jewsbury JM, Turk DC (eds). *Edward Arnold London*. **1987**.
[2] *The Ibadan Surgeons*.**1992**:19(4):113-16.
[3] Balows A, Hausler WJ jr.Hermann RL, et al(eds). *Washington DC*.**1991.**
[4] Hughes JM, Culver DH, White JW, et al. *CDC Surveillance Summaries*.**1983**:32(Spec. Supp 1.4)1SS-16SS.
[5] Cheesborough M(ed) Medical Laboratory Manual for Tropical Countries. Vol.II Microbiology *Cambridge University Press* **1984**.
[6] Bauer AW, Kirby QMM, Sherris JC et al. *Am.J.Clin Path*.**1966**;45:493-96.
[7] Wayne PA;NCCLS documents M2-A6,Approved Standard 6th edition;**1997**.
[8] Odelowo EOO, Onile BA;*E.Afr.Med.J*;**1990**;67(3);172-81.
[9] Castiglia M, Smego RA jr.Textbook of Diagnostic Microbiology W.B.Saunders Co;**1995**;970-91.
[10] Ogunsola FT, Oduyebo O, Ireglou KC, et al. *J.Nig.Infect.Contr.Ass*;**1998**:1(1):14-20.
[11] Ayliffe GAJ, Lowsbury EJI, Geddes AM, Williams JD(eds);*Control of Hospital Infection*:London:**1992**.
[12] Dixon RE;*Ann.Intern.Med*.**1978**:89:749-53.
[13] Couper RG, Summer C;*Med.J.Aust*:**1970**:2;1110-1113.
[14] T aiwo.S.S, Okesina.A.B, Onile.B.A; *AFR J CLIN EXP MICROBIOL*;**2002**
[15] Upendarrao Golla et al., *Der Pharmacia Sinica*;**2011**:2(4):33-39.
[16] S.Shah N.N. et al., *Der Pharmacia Sinica*;**2011**:2(5):69-73.
[17] Sanjiv Arora. et al., *Der Chemica Sinica*;**2011**;2(5):75-86.
[18] Bhausaheb K.Magar et al., *Der Chemica Sinica*;**2011**;2(5):147-151.
[19] Oluwaseye Adedirin et al.,*Der Chemica Sinica*;**2011**;2(5):157-172.