

Original article:

“Hospital based infections of Gram negative organisms: Study Report.”

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Abstract:

Introduction: The discovery of the antibiotics in 1928 revolutionized the practices of medicine. This fact raises a significant problem with respect to antimicrobial chemotherapy. The present study was planned to study the hospital based infections events of specially gram negative organisms.

Study Design: The present prospective study was conducted in a large tertiary care hospital during 2007-2008. 300 serial isolates of gram negative bacteria from various clinical samples from indoor patients were included. They were from pus, sputum, blood, urine, CSF, other fluids and secretions like pleural fluid, tracheal secretion.

Observations & Results: out of 1546 samples screened, 300(19.40%) of them were carbapenem resistant. Amongst the carbapenem resistant isolate obtained. Pseudomonas aeruginosa was the maximum with 53.96%. Patients admitted to ICU with MBL producing isolates had more mortality than similar patients in the ward. Also patients harboring Acinetobacter.spp showed the highest mortality in the groups (Wards & ICUs)

Conclusion: From present work we may conclude that the MBLs have already established as a major resistance factor amongst gram negative organisms in our region.

Keywords: Gram negative bacteria, ICU

Introduction: The discovery of the antibiotics in 1928 revolutionized the practices of medicine. ¹Man used these antibiotics as an effective weapon to kill the bacteria and it was felt that man had won the fight. The acquisition by gram- negative bacteria of MBLs which are often included by mobile genetic elements such as cassettes inserted into integrons confers a multidrug resistance profile against clinically important β - lactams as well as other

Study Design: The present prospective study was conducted in a large care hospital during 2007-2008.

antimicrobial agents. This fact raises a significant problem with respect to antimicrobial chemotherapy, since metallo β - lactamases (MBLs) can hydrolyze a very wide range of broad -spectrum β - lactams, including carbapenems which are the last resort for control of infections caused by multidrug - resistant gram negative bacteria. With this background we planned to study the hospital based infections events of specially gram negative organisms.²

300 seriál isolates of gram negative bacteria from various clinical samples from indoor patients were

included. They were from pus, sputum, blood, urine, CSF, other fluids and secretions like pleural fluid, tracheal secretion.

Sample Collection and Transport: All the specimens were collected using strict aseptic precautions and were immediately processed without any delay. Detailed histories of risk factors were taken into account and recorded

Observations & Results:

Table 1 : Total samples resistance to Carbapenems by Modified Kirby- Bauer's disc diffusion method. (MKBDD)

| Organism | Total no of isolates tested | No. of isoletes resistant to carbapenem | (%) Resistant |
|---------------------|-----------------------------|---|----------------|
| P. aeruginosa | 265 | 143 | 53.96 |
| Acinetobacter . spp | 313 | 125 | 39.94 |
| Esch. coli | 400 | 20 | 5 |
| K. pneumoniate | 248 | 12 | 4.84 |
| Citrobacter. spp | 100 | 0 | 0 |
| Protus. spp | 220 | 0 | 0 |
| Total | 1546 | 300 | 19.40 |

(Total out of 1546 samples screened, 300 of them were carbapenem resistant 19.40%. Amongst the carbapenem resistant isolets obtained. Pseudomonas aeruginosa was the maximum with 53.96%.)

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Table 2 : Outcome of patients with MBL producing strains.

| Organism | No. of cases in Ward | | | No. of cases in ICU | | | P value |
|-----------------------|----------------------|---------------------|---------------|---------------------|---------------------|---------------|---------|
| | Expired No. % | Discharged No. % | Total No.% | Expired No. % | Discharged No. % | Total No.% | |
| P. aeruginosa | 1 (6.25) | 15 (93.75) | 16 (100) | 6 (33.33) | 12 (66.67) | 18 (100) | <0.05 |
| Acinetobacter. spp | 4 (44.44) | 5 (55.56) | 9 (100) | 5 (35.71) | 9 (64.29) | 14 (100) | <0.05 |
| Esch. coli | 0 | 0 | 0 | 1 (100) | 0 | 1 (100) | 0 |
| K. pneumoniae | 0 | 0 | 0 | 0 | 1 (100) | 1 (100) | 0 |
| Total No. (%) | 5 (20) | 20 (80) | 25 (100) | 12 (35.29) | 22 (64.71) | 34 (100) | >0.05 |

The table highlights the outcome of the patients with MBL producing isolates.

Patients admitted to ICU with MBL producing isolates had more mortality than similar patients in the ward. Also patients harboring Acinetobacter.spp showed the highest mortality in the groups (Wards & ICUs)

Discussion:

The emergence of multi-drug resistant bacteria is a phenomenon of concern to the clinicians because it is the major cause of treatment failure in infectious diseases.⁴ Antibiotic resistance varies depending upon the socioeconomic status of the patients, policy

of antibiotic uses and organism. These as Gram negative bacilli (GNB) have at their disposal a plethora of resistance mechanisms that they can sequester, and/or can evince, eluding the action of almost all β - lactams well as the carbapenems. In this study, a total of 1546 gram negative clinical isolates were screened for presence of resistance to imipenem by the CLSI screening criteria (2007). The isolates showing resistance to imipenem, (a carbapenem group of drug) were chosen for further processing.⁵

A total of 300 (19.40%) isolates were found to be resistant to imipenem by the Modified Kirby-Bauer Disc diffusion technique (MKBDDT). They

mainly consisted of *P. aeruginosa* 143(53.96%), *Acinetobacter* spp 125(39.94%), *Esch.coli* 1(5%) and *K. pneumoniae* 1 (4.84%). In this study, remaining 241 (80.33%) isolates which were carbapenem resistant but MBL non-producers. This could be attributed to lower permeability of the outer membrane protein (OMP) or a highly efficient drug efflux mechanism. Further detailed studies are needed to find out the role of these factors in the carbapenem resistance.

ICUs have emerged as the epicenter for multi-drug resistant organisms, including the MBL producing organisms compared to the wards or the Outpatient departments. The present study also

revealed a higher number of MBL producers from the ICUs (57.63%) as compared to wards (42.37%). Lee et al also an isolation of 31.7% of MBL producers from ICUs in Korean hospitals. However Sekar U while studying an Indian hospital showed a prevalence of 14% for the MBL producers in the ICU. This might be because of lower sample size (only 100) in this study which might not have reflected the true prevalence of such organisms in the ICUs.^{6,7}

Conclusion: From present work we may conclude that the MBLs have already established as a major resistance factor amongst gram negative organisms in our region.

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