

Prevalence of extended spectrum β - lactamases in *Klebsiella pneumoniae* in a tertiary care hospital.

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Abstract: Purpose: To know the prevalence of extended spectrum β - lactamases (ESBL) in multidrug resistant strains of *Klebsiella pneumoniae* from various clinical samples. **Material and Methods:** A total of 97 strains of *Klebsiella pneumoniae* were selected for the study, screened for ESBL and confirmed by phenotypic confirmatory disc diffusion test (PCDDT) **Results:** 92(94.84%) of isolates were resistant to one or more 3rd Generation cephalosporins (3GC) and which were confirmed for ESBL production by using the PCDDT method. **Conclusion:** Our study shows high prevalence of ESBL production. PCDDT is a simple and cost effective test which can be done as a routine in our microbiology labs.

Key words: ESBL, *Klebsiella pneumoniae*, PCDDT.

I. Introduction

Microbes are remarkably adaptable and amazingly versatile. Through the course of evolution, they have developed sophisticated mechanisms for preserving genetic information and disseminating it efficiently in the interests of their survival. They recognize no boundaries. The resistance developed in one part of the country, or indeed in the world, can be disseminated readily. [1]

Emergence of resistance to β -lactam antibiotics began even before the first β -lactam, penicillin was developed. The first β - lactamase was identified in *Escherichia coli* prior to release of penicillin for use in medical practice.[2]

Over the last 20 years, many new β -lactam antibiotics have been developed that were specifically designated to be resistant to the hydrolytic action of β -lactamases. However, with each new class that has been used to treat patients, new β -lactamases emerged that caused resistance to that class of drug. Presumably, the selective pressure of the use and overuse of new antibiotics in the treatment of patients has selected for new variants of β -lactamase. Because of their increased spectrum of activity, especially against the oxyimino cephalosporins, these enzymes were called Extended Spectrum β -Lactamases. (ESBLs). [3]

II. Material and Methods

The present study was carried out in the department of Microbiology, Government Medical College and Hospital, Aurangabad from February 2013-April 2013. A total of 97 multi drug resistant strains of *Klebsiella pneumoniae* were selected for the study, as it is the most common bacteria isolated in our hospital.

The bacteria were identified by conventional methods. Antimicrobial susceptibility tests were performed as per CLSI guidelines and screened for the presence of ESBL. [4]

CLSI : ESBL Confirmatory Method: For confirmation of ESBL, discs of cefotaxime and ceftazidime alone and those containing a combination of clavulanic acid with these antibiotics were used as per CLSI guidelines. Following control strains were used for ESBL detection.

Positive control for ESBL-*Klebsiella pneumoniae* ATCC : 700603.

Negative control for ESBL-*Escherichia coli* ATCC : 25922.

Organism was considered ESBL producer if there was more than 5mm increase in zone diameter for ceftazidime and cefotaxime tested in combination with clavulanic acid versus its zone when tested alone.[4]

III. Results

Out of the 97 processed samples, 92(94.84%) were resistant to one or more third generation cephalosporins; and which were confirmed for ESBL production using the PCDDT. The number of strains which tested positive by the screening test were also found to be positive by the phenotypic confirmatory test (100%).

IV. Discussion

Klebsiella pneumoniae is an important pathogen which causes pneumonia, urinary tract infections and intra abdominal infections in hospitalized, immunocompromised patients with severe underlying diseases. It is naturally susceptible to extended spectrum cephalosporins. However, strains resistant to these antibiotics mediated by extended-spectrum β -lactamases (ESBLs) have now spread worldwide [5, 6] From India and abroad high prevalence of ESBL producing *Klebsiella* species is reported which has gone up to 100% in 3 decades !!!

Banerjee et al (1993) conducted a study for the detection of *Klebsiella pneumoniae* during nosocomial outbreak occurred in nursery of medical college, hospital. *Klebsiella pneumoniae* was recovered from 70.2% cases [7]

Jain Amita et al (2003) studied cases of neonatal septicemia. ESBL was detected in 86.6% of *Klebsiella* species. [8]

Rastogi et al (2010) studied the presence of extended spectrum β -lactamase (ESBL) in the clinical and environmental strains. Microbiological sampling of the NICU and labour room (LR) environment yielded 12 *Klebsiella pneumoniae* isolates. 100% clinical strains were confirmed ESBL positive [9].

In our study all the *Klebsiella* strains screened for ESBL were also confirmed by PCDDT (100%). Similar results were observed by Rastogi et al.

We can prevent the infection in wards by infection control precautions like barrier nursing, cohorting of patients and nurses, contact precautions through the use of disposable gloves, gowns and strict attention to hand washing are essential to limit its spread. [6]

We are all aware of the importance of hand hygiene in the prevention and control of nosocomial infections. Such practice can reduce if not eliminate hospital acquired infections.

Awareness of the local prevalence of pathogens and their antimicrobial sensitivity patterns is essential for clinicians to re-evaluate the antibiotic policies.

Molecular based methods for detection of ESBL producers offers the potential for faster diagnosis and earlier epidemiology information for outbreak control.

V. Conclusion

-The high levels of ESBLs among *Klebsiella* isolates is alarming and warrants special attention from clinicians and microbiologists.

-We as microbiologists should readily identify these isolates, so that proper therapy can be instituted to avoid misuse or overuse of antibiotics.

-A genotypic confirmation of ESBL gene needs to be done to evaluate the efficacy of phenotypic confirmatory test to identify ESBL production of bacterial isolates in our hospital.

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