

Bacteriology 2019- phenotypic detection of extended spectrum beta-lactamases(esbl) in uropathogens. An experience from qazi hussain ahmed medical complex nowshera- Dr Hamzullah khan- Nowshera Medical College- Nowshera

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Abstract:

Objectives: to determine the phenotype and frequency of Extended Spectrum Beta Lactamase in uropathogens isolated on culture in a tertiary care hospital of Nowshera.

Material and methods: This Prospective cohort study was performed in the clinical pathology laboratory of Qazi Hussain Ahmed Medical Complex Nowshera from 1stJan 2019 to 30th May 2019. A total of 192 urine samples were received for Culture and sensitivity out of which 56 cases reported to be ESBL phenotypically positive (29.16%). Relevant information were recorded on a predesigned proforma prepared as per CLSI Recommendation for data collection.

Explanation:

Beta-lactamase provides antibiotic resistance by separating the [antibiotics'](#) structure. These antibiotics all have a common element present in their molecular structure: a four-atom ring known as a [β-lactam](#). By the process [hydrolysis](#), the enzyme lactamase separates the β-lactam ring open, deactivating the molecule's antibacterial properties. Beta-lactam antibiotics are generally used to treat a broad spectrum of [Gram-positive](#) and [Gram-negative](#) bacteria. Beta-lactamases are usually secreted produced by Gram-negative organisms, especially when antibiotics are present in the environment

Members of the family commonly has plasmid-encoded β-lactamases which grant resistance to penicillins but not to expanded-spectrum cephalosporins. A new group of enzymes that is

extended-spectrum β-lactamases (ESBLs), was detected in the mid-1980s. The frequency of ESBL-producing bacteria have been increasing gradually in acute care hospitals. ESBLs are beta-lactamases that will hydrolyze extended-spectrum cephalosporins with an oxyimino side chain. These cephalosporins include cefotaxime, ceftriaxone, ceftazidime and also oxyimino-monobactam aztreonam. Thus ESBLs give out multi-resistance to these antibiotics and related oxyimino-beta lactams. In typical conditions, they derive from genes for TEM-1, TEM-2, or SHV-1 by mutations that alter the amino acid organization around the active site of these β-lactamases. A broader set of β-lactam antibiotics are receptive to hydrolysis by these enzymes. An increasing number of ESBLs not for TEM or SHV lineage have recently been listed. The ESBLs are mostly plasmid encoded. Plasmids responsible for ESBL production generally carry genes encoding resistance to other drug classes. Therefore, In the treatment of ESBL-producing organisms antibiotic options are extremely limited. Carbapenems are mostly used for the treatment of serious infections due to ESBL-producing organisms, yet carbapenem-resistant segregates have recently been reported. ESBL-producing organisms may appear receptive to some extended-spectrum cephalosporins. However, high failure rates are associated with treatment with such antibiotics

A urinary tract infection (UTI) is general infection that affects urinary tract. Uropathogens are the pathogens of urinary tract. If the lower urinary tract is affected then it is known as a bladder infection otherwise called cystitis and when if the

upper urinary tract is infected then it is known as a kidney infection also known as pyelonephritis. Symptoms include pain with urination, frequent urination, and feeling the need to urinate despite having an empty bladder. fever and flank pain are usually Symptoms of a kidney infection in addition to the symptoms of a lower UTI. sometimes the urine may appear bloody. In the very old and the very young, symptoms may be uncertain or non-specific. The main cause of infection is Escherichia coli, though sometimes other bacteria or fungi may sometimes be the cause. Risk factors include female anatomy, sexual intercourse, diabetes, obesity, and genetic history. Although sexual intercourse is a risk factor, UTIs does not come under sexually transmitted infections (STIs). Kidney infection, if it causes, usually follows a bladder infection but can also result from a blood-borne infection. Diagnosis in young healthy women can be based on symptoms only. In those with uncertain symptoms, diagnosis may be difficult because bacteria may be present without symptoms being an infection. In complicated cases or if treatment fails, a urine culture may be tested for further examination

Results:

A total of 192 urine samples were received for Culture and sensitivity out of which 56 cases reported to be ESBL phenotypically positive (29.16%). 39(69.9%) were females and 17(30.4%) were males. The age range of the patient was from 3 months to 63 years of age, with mean age of 30 years with ± 5.4 SD Frequency of ESBL producing uropathogens was; 51(91%) E-Coli, 4(7.1%) Klebsilla pneumonia and 1(1.8%) Proteus mirabillus. 29(51%) cases ESBL positive were reported from samples received from the Medical Unit, 11(19.6%) from Surgery/Gyne unit and 8(14.3%) from Paeds Medicine respectively. Out of total ESBL positive cases 20(35.7%) were

sensitive to (Ak,Mem,IPM,SCF,TZP, F, Fos,) 8(14.3%) cases to (Ak,Mem,IPM,SCF,TZP, F, Fos,) 7(12.5%) to (Ak,Mem,IPM,SCF,TZP), 5(8.9%) TO (CIP, Levo, Ak,Mem,IPM,SCF,TZP) and 4(7.1%) to (CIP, Levo, Ak,Mem,IPM,SCF,TZP , Out of 39 ESBL producing uropathogen in Female gender, EColi-ESBL producing strains were isolated in 35patients , Kliebsilla Pnemonia in 3 patients and in one case was of Proteus marbillus-ESBL. In male gender, 16 cases with EColi-ESBL were reported and one case ofKliebsilla Pnemonia ESBL.

Conclusion:

The prevalence of ESBL producers in our study was 29.16% which is quit alarming and challenging the clinician in treating urinary tract infections. Females are more prawn to ESBL type of resistant infections as compared to males. E-coli strain is commonly producing ESBL type of resistant infections as compared to other gram negative bacteria. These infections are commonly resistant to all types of conventional antibiotics that is all types of penicillins, all types of cephalosporins and monobactams. To treat such types of resistant infections is very challenging. The sensitivity pattern commonly recorded for treating such like infection is (Ak,Mem,IPM,SCF,TZP, F, Fos). ESBL phenomenon can also be seen in UTI caused by Kliebsilla Pnemonia and Proteus marbillus. These type of resistant infection are now a challenge to the clinician to treat and a public health threat that needs accumulative response through advocacy, communication and social mobilization.

Key words: ESBL, Urinary Tract Infection, Challenging infections.