Beta-lactamases in a Nepalese hospital: Wake up before the "biological quake" destroys you

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Background: In this era of modern medicine, antimicrobial resistance has emerged as a major health catastrophe. Emergence of drug resistance mechanisms like Extended-spectrum beta-lactamases (ESBLs), AmpC beta-lactamases and metallo-beta-lactamases (MBLs) can be regarded as “biological quake” posing therapeutic challenge to the health care settings. Therefore, this study was designed to determine the prevalence of ESBL-, MBL-, AmpC-producing bacteria in hospital-admitted patients.

Methods & Materials: A prospective study was conducted among the inpatients of Medicare National Hospital in central Kathmandu for four months (April-July, 2015), a period when the hospital was engaged with “Nepal Earthquake 2015” victims too. Different clinical specimens were collected, processed and the isolates were identified following standard methodology. Antibiotic sensitivity test was done by Kirby-Bauer disc diffusion method. ESBL was detected by standard combination disc method. Besides, tests for ESBL, AmpC, and co-production of ESBL and AmpC were done by MASTDISCS™ ID AmpC and ESBL Detection Discs, as well as ESBL and AmpC detection Ezy MIC™ Strip (HiMedia, India). EDTA-Imipenem combination disc method was followed for MBL detection.

Results: Among the total 75 gram-negative bacterial isolates resistant to third generation cephalosporin, ESBL was seen in 30.6% (n=23). Similarly, MBL and AmpC production were seen in 8% (n=6) and 1.3% (n=1) respectively. Interestingly, ESBL-AmpC co-production was found in 4% (n=3). Escherichia coli was the most frequent ESBL-producer (n=20). E. coli was found to produce MBL (n=4), AmpC (n=1), and ESBL-AmpC combination (n=2) as well. Two isolates of P. aeruginosa were ESBL-AmpC co-producers. Out of 23 ESBL-producer, 78.2% (n=18) were from intensive care unit patients. The ESBL-producing bacteria showed sensitivity to different antibiotics as follows- meropenem (n=21, 91.3%), amikacin (n=20, 86.9%), and cefoperazone-sulbactam (n=19, 82.6%). Consistent results were found with different methods employed for detection of ESBL and AmpC.

Conclusion: ESBL-producing bacteria were more commonly seen though AmpC- and MBL-producers were relatively less frequent. Special strategy like antibiotic stewardship should be followed in our setting before the situation turns out to be havoc. Identification, characterization and surveillance of antibiotic susceptibility profile of beta-lactamase-producing organisms can lead to successful infection control.

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