Rate of positivity, associated factors and phenotypic detection AmpC beta-lactamase among clinical isolates of *E. coli, Klebsilla* and *Proteus* species at the National Hospital of Sri Lanka

Introduction

Plasmid-mediated AmpC beta lactamases which are derived from chromosomally encoded genes in *Enterobacteriaceae* have been described in certain bacterial species like *E. coli, K. pneumoniae* and *Proteus mirabilis*. They confer resistance to penicillins, narrow-spectrum cephalosporins, oxyimino-β-lactams, and cephamycin. They lack susceptibility to beta-lactamase inhibitors such as clavulanic acid, sulbactam, and tazobactam.

Objectives

To describe the rate of positivity and associated factors for AmpC beta-lactamase production in *Enterobacteriaceae* and to describe the AmpC/ ESBL co-existence, in the National Hospital of Sri Lanka, and to compare the phenotypic methods for AmpC detection.

Methodology

A total of 141 isolates of *Escherichia coli, Proteus* species and *Klebsiella* species were identified using a rapid identification system (Remel RapID ONE–USA). All isolates were tested for AmpC production using two screening tests and four confirmatory tests as described in the literature. They were compared with the test which had the highest specificity, cefoxitin-cloxacillin double disc test with 100% specificity and 97.2% sensitivity. ESBL producers were detected according to the CLSI-2016. Patients' demographic and clinical details were collected using a data extraction sheet.

Results

Out of 141 isolates 34 (24.11%) were AmpC producers. Twenty six percent of blood cultures isolates and 14.8% isolates from the other samples were positive. AmpC and

ESBL co-existence was found to be 20.6% of the total isolates and 31.87% of the ESBL positives.

Being in an ICU, having a hospital acquired infections and presence of recurrent infections or recurrent hospitalizations showed statistically significant co-relation with AmpC production ($P < 0.05$).

The Cefoxitin disc test showed 100% sensitivity and cefotetan disc test showed 91.18% sensitivity. They both had 95.33% specificity. Out of the confirmatory tests EDTA disc test had the highest specificity of 100% with 91% sensitivity and cefoxitin and cefotetan – boronic combination tests gave an equal specificity 99% with 100% and 91% sensitivity respectively.

Conclusion

A high prevalence of AmpC beta lactamases production in *Enterobacteriaceae* is observed in the clinical setting. AmpC co-exists in about one third of ESBL positives. Cefoxitin is a better screening test and EDTA test is a good confirmatory test for AmpC.