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ZERO RESISTANCE TO THE CARBAPENEMS AMONG EXTENDED SPECTRUM BETA LACTAMASE PRODUCING *KLEBSIELLA PNEUMONIAE* IN A NIGERIAN UNIVERSITY HOSPITAL

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ABSTRACT

This study aimed to identify if Carbapenemase producing *Klebsiella pneumoniae* exists among extended spectrum beta lactamase (ESBL) producing *K. pneumoniae* recovered from clinical samples in the University of Benin teaching hospital, Benin City, Nigeria. 67 ESBL positive *K. pneumoniae* isolates were tested for their susceptibility to two Carbapenems (Imipenem and Ertapenem) using the Kirby-Bauer method. All ESBL producing isolates were found to be 100% susceptible to Imipenem and Ertapenem. With strict guidance, the Carbapenems should be used as a drug of choice in treating infections due to ESBL producing *Klebsiella pneumoniae* in our hospital.

Key words: Extended spectrum beta lactamase, *Klebsiella pneumonia,* Kirby-Bauer method, Carbapenemase.

INTRODUCTION

Extended spectrum β-lactamase (ESBL) producing organisms are now being recognized as one of the major threats to effective management of patients in medical institutions, especially in the less developed nations **[1]**. Carbapenems are the most powerful tools against ESBL producing Gram negative bacteria. Due to the extensive misuse of these antibiotics, studies from other parts of the world has shown that a good proportion of some gram negative bacteria have developed Carbapenem resistant mutations **[2, 3, 4]**. A survey of prevalence of ESBL producing *K. pneumoniae* in clinical samples from patients in University of Benin teaching hospital, Benin City, Nigeria by Osazuwa and Osazuwa., **[5]**, recorded a high rate of resistance to the Cephalosporin's and other commonly used antibiotics. This study thus reports on the susceptibility rate of ESBL producing *K. pneumoniae* to two Carbapenems (Imipenem and Ertapenem) in the University of Benin teaching hospital, Benin City, Nigeria.

MATERIALS AND METHODS

This study was carried out at the University of Benin teaching hospital (UBTH), Benin City Nigeria, in the period January to July, 2010. 183 *K. pneumoniae* isolates were recovered from 1474 clinical samples received at the Medical microbiology laboratory of UBTH.183 clinical isolates of *K. pneumoniae* were isolated from five different clinical specimens namely: wound (23), Blood (60), Urine (36), Ear (13) and Vagina/Endocervix (40). The antibiotic susceptibility of all ESBL positive *K. pneumoniae* isolate was tested using the Kirby-Bauer disc diffusion method for their susceptibility to two Carbapenems (Imipenem and Ertapenem).

Detection of ESBL production

ESBL was detected by the double disc Synergy test. Synergy was determined between a disc Augmentin (20µg amoxicillin + 10µg Clavulanic acid) and 30µg of Cefotaxime and Ceftazidime placed 15mm apart on Muller Hinton agar (Oxoid, UK).

The test organisms were considered to produce ESBL if the zone size around the test antibiotic disc were more than 5mm and above towards the Augmentin disc. This increase occurs because the Clavulanic acid present in the Augmentin disc inactivates ESBL enzymes produced by the test organism.

Antibiotic susceptibility testing

The susceptibility of *K. pneumoniae* to Imipenem (10µg) and Ertapenem (10µg/ml) was studied by the Kirby-Bauer disc diffusion method (CLSI, 2008). Isolates were considered resistant to Imipenem and Ertapenem if the zone of inhibition was ≤ 13 mm, intermediate when the zone was 14–15 mm and sensitive when the zone was ≥ 16 mm, per CLSI guidelines **[6]**.

Table 1: Antibiotic Susceptibility Pattern of *Klebsiella pneumoniae* producing ESBL to the Carbapenems

ANTIMICRO-BIAL AGENT	% SUSCEPTIBILE	% RESISTANT
Ertapenem	**67 (100)**	**0**
Imipenem	**67 (100)**	**0**

RESULTS AND DISCUSSION

67(36.6%) *K. pneumoniae* were found to be ESBL positive, 41(61.2%) were isolated from blood, 11(16.41%) from urine, 7(10.5%) from HVS/ECS, 5(7.5%) from wound and 3(4.5%) from Ear. All ESBL positive *K. pneumoniae* isolates were susceptible to Imipenem and Ertapenem.

The prevalence of ESBL-producing strains among clinical isolates of *Klebsiella pneumoniae* has been on steady increase over the past few years and thus accounts for about 17% of all nosocomial infections. Extensive use of broad spectrum antibiotics in hospitalized patients has led to both increased carriage of *K. pneumoniae* and subsequently, the development of multidrug resistant strains that produce ESBL **[7]**. In our study, ESBL producing *K. pneumoniae* isolates were found to be entirely susceptible to the Carbapenems. Carbapenem are effective alternative antibiotics against ESBL-producing bacteria, this is supported by previous reports **[8, 9]**. Though, an earlier study in Enugu metropolis, Nigeria, found a 3% resistance to Imipenem by ESBL producing *K. pneumonia* **[10]**, it should be noted that Carbapenemase producing *K. pneumoniae* has not emerged in

University of Benin teaching hospital, Benin City.

CONCLUSION

Our study uncovers a high prevalence of ESBL-producing *K. pneumoniae* strains in patients in this hospital. ESBL-producing *K. pneumoniae* were found to be entirely susceptible to Imipenem and Ertapenem. Carbapenem should be used as a drug of choice in treating infections due to ESBL producing *Klebsiella pneumoniae* in our hospital in the interim with strict guidance.

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