Resistance Patterns to Beta-lactams and Aminoglycosides of Enterobacteria Strains Isolated From Wounds Infections at University Hospital Center of Brazzaville

INTRODUCTION

The hospital ecosystem is a favorable environment for the emergence of 

Among the frequently isolated germs, enterobacteria prominently. They are a group of Gram-negative bacteria, anaerobic optional aerobic fermentation of lactose or not. Their natural habitat is the colon of warm-blooded animals. Enterobacteriaceae include several genera with several species, the most predominant is Escherichia coli [7, 8, 9, 10]. The enterobacteriaceae are responsible for many infectious diseases, these infections can are sometimes fatal to humans. Since the discovery of antibiotics, diseases caused by enteric bacteria such as salmonellosis, shigellosis, and bloody diarrhea have been successfully eradicated. However, today we are witnessing a resurgence of these diseases linked not only to poor hygiene, but also the resistance of these bacteria to common antibiotics [11, 12, 13]. It is in this light that we were interested in the study of resistance to beta-lactams and aminoglycosides, antibiotics commonly used in our country.

MATERIALS AND METHODS

The Biological material consisted of pus sores taken inpatient, meeting the definition of nosocomial infection [5, 15, 16, 17, 18, 19]. The specific culture media following elective or selective were used: Hecktöen, Mac conkay, EMB, indole urea, citrate simmons, Kliggler Hajna. The antibiotics tested were the follows: Beta-lactam antibiotics: amoxicillin (AMX), Amoxicillin + clavulanic acid (AMC), cephalothin (CF), carbenicillin (CAR), ceftazidime (CAZ) Cefuroxime (CXM), cefotaxime (CXT), Imipenem (IMP), Ceftriaxon (CRO). Aminoglycosides streptomycin (S), kanamycin (K), tobramycin (T), gentamicin (GM), amikacin (Ak), netilmicin (Net).

RESULTS AND DISCUSSION

Isolation and Identification

113 gram negative bacteria were isolated; from these bacteria 76 belonged to the Enterobacteriaceae group. The Identification gave the distribution of the 76 strains of enterobacteria as follows: 23 strains of Escherichia coli (30.26%), 22 strains of Proteus (28.95%), 12 strains of Klebsiella (15.78%), 8 strains of Enterobacter (10.53%), 6 strains of Citrobacter (7.89%), and 5 strains of Providencia (6.57%). The figure 1 represents the frequency of the Enterobacteriaceae identified.

Among the enterobacteria Escherichia coli ranked first in the hospital wound infections followed by Proteus, Klebsiella, Enterobacter, Citrobacter and Providencia. Several studies have demonstrated E.coli was string head among the enterobacteria isolated in hospitals [15,16,17,18,19]. The frequency of isolated Klebsiella is greater than that obtained by Akujobi, Rossilini et al. [20, 21]. As for the percentage of strains of Enterobacter and Citrobacter obtained, they have slight differences [20, 22, 23].
Resistance to antibiotics of *The Enterobacteriaceae* identified to Beta-lactams antibiotics

The results of the beta-lactam sensitivity tested show a high resistance to most beta-lactam antibiotics tested. Amoxicillin, amoxicillin + clavulanic acid have been inactivated by all *Enterobacteriaceae* strains to more than 80%. Cephalothin has a mean activity on *Proteus*. A good activity was observed for Ceftazidime on strains of *E. coli, Klebsiella, Enterobacter* and *Providencia*. It is the same for imipenem which showed good activity against all enterobacterial strains with the exception of *Klebsiella* strains that have presented more than 80% of resistance. The Figure 2 gives the results of sensitivity tested to beta-lactams.

*E. coli* strains have very high resistance of frequencies with respect to the majority of the tested beta-lactams. Of these beta-lactams imipenem and ceftazidime were most active with respective sensitivity rate of 95.7% and 69.6%. These results are in conformity with the results of some studies [16, 18, 23]. This result can be explained by changing the binding protein to penicillin (PLIC) which confers resistance to their most beta-lactam antibiotics [16, 27, 28]. As for the first and second generation cephalosporins, high strength is noted that might be due to the production of cephalosporinases as suggested by Bertrand et al. Then Melano et al. Then Sirot et al. [16, 34, 35]. An average activity of beta-lactam antibiotics has been observed in strains of *Proteus, Klebsiella* and *Enterobacter* particular with ceftazidime, imipenem and ceftriaxone. These results are consistent with those of Boukadida et al. and those of Hamze et al. [16, 31]. A remarkable activity of ceftazidime and imipenem on the strains of *Proteus* of 96 to 100% sensitivity was observed. The sensitivity of these strains to ceftazidime rates are comparable to those obtained by Petra et al. [35].

**Résistance à Aminoglycocide antibiotiques**

Aminoglycoside resistance tests showed high activity of amikacin, and netilmicin on *Proteus* and *Klebsiella*. As for gentamicin and tobramycin, they have an average activity of strains of *Enterobacter, Citrobacter* and *Providencia*. Higher sensitivity rate of tobramycin, gentamicin and kanamycin screw opinion of *Proteus* and *Klebsiella* strains were obtained par Djell et al., Hamze et al., Larabi et al. [16, 29].

The determination of resistance phenotypes Figures 4 and 5 give enteric bacteria resistance phenotypes to beta-lactams and aminoglycosides.

The beta-lactam resistance mechanism is the production of beta-lactamase (penicillinase and cephalosporinase) [20, 21, 22, 23]. The mechanism of resistance to aminoglycosides is enterobacteria enzyme production inactivating aminoglycosides [16, 18, 25].

**CONCLUSION**

Isolated enterobacteria of wounds in hospitals have profiles of high resistance to beta-lactams and aminoglycosides. However, there are within these two families a few more active specialties such bacteria as amikacin, ceftazidime and imipenem that can be used to address infections caused by these bacteria.


