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RESEARCH ARTICLE

RESISTANCE PROFILE OF ENTEROBACTERIACEAE ACQUIRED IN URINARY TRACT INFECTIONS IN A REGIONAL HOSPITAL IN TANGIERS NORTHERN MOROCCO.

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Abstract

Urinary tract infections are the most recorded infections in the microbiology laboratory. The enterobacteria are the most commonly isolated bacteria in these types of infections. The present work aims to study the frequency of isolated strains of Enterobacteriaceae cytobacteriological urinalysis from the microbiology laboratory of Mohamed V Tanger hospital and determine their resistance patterns to antibiotics. This is a retrospective study, which took place over a period of 24 months (January 2013 to December 2014) on 2716 urine samples, 410 examinations met the criteria for urinary tract infection including 325 (11.9%) Enterobacteriaceae strains were isolated. The identification was done by API 20 E galleries, sex ratio female / male was 1.69, Isolated bacterial species are dominated by Escherichia coli with 259 (83%), at its enterobacterial strains resistance to amoxicillin was 88.6%, and 68.3% in the protected amoxicillin, resistance to trimethoprim + sulfaméthoxazoles was equal to 33.2%, resistance to fluoroquinolones (ciprofloxacin) was 20.3%, aminoglycosides (Gentamycin) is 14.15%, fosfomycin was 11.7%, while the sensitivity to 3rd generation cephalosporins (ceftazidime) was 7.7%. 14 cases of resistance to beta lactamase extended spectrum (ESBL) was recorded which represents 4.3%, while for cases (1.2%) of resistance to carbapenems were recorded among these isolated Enterobacteriaceae strains. This study appears to reinforce other studies that shed light on antibiotic resistance, which is an issue of growing concern which leads us to recommend a more focused use of antibiotics.

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Introduction:-

Urinary tract infection is among the most common infections encountered in medical diagnosis with an annual global incidence of almost 250 million [1, 2], this infection is more or less formidable depending on the germ contracted, and on the immune field of the patient passing through a common germ infection susceptible to a chronic incurable infection sometimes fatal in case of multidrug-resistant infection in a vulnerable subject

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Our work is a 24-month retrospective epidemiological study of enterobacteria detected in cytotbacteriological examinations of urine in the microbiology laboratory of Mohamed V regional hospital in Tangier, northern Morocco.

Material and methods:-

This is a 24-month retrospective study conducted between January 2013 and December 2014 on 2716 cytotbacteriological examinations of urine in the microbiology laboratory of the Tangier Regional Hospital Center, urine is collected from the various hospitalization departments as well as samples sent by different consultation structures attached to the hospital center. 325 Enterobacteriaceae isolated, ie 11.9% of all cytotbacteriological examinations of urine (ECBU), seeding was carried out on CLED and EMB media for cultures and Muller-Hinton medium for the study of antibiograms, the inoculum is carried out according to the recommendations of CLSI 2013 [3]. E. coli strain ATCC 25922 was used as an internal quality control. The thresholds of bacteriuria adopted were 105 UCF / ml [3, 13], the identification of enterobacteria was made based on the 20E gallery (BioMerieux, France) and other phenotypic test (image1), detection of BLSE bacteria is carried out based on the study of synergy (image 2) and the detection of producer carbapenemase strains is carried out through the modified Hodge test according to the recommendations of CLSI 2013 and the French health safety agency [3]. , 5, 6]



Image 1:-Api 20 E mini-gallery used for the identification of Enterobacteriaceae in this work.

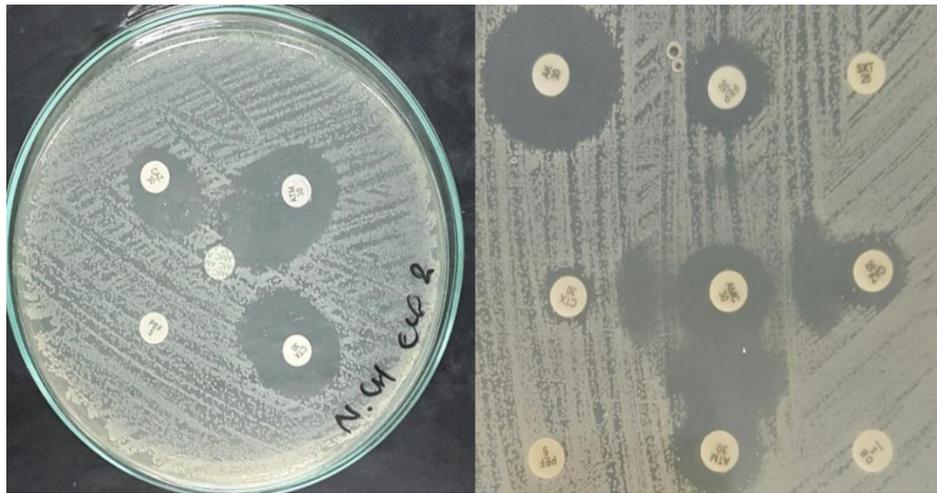
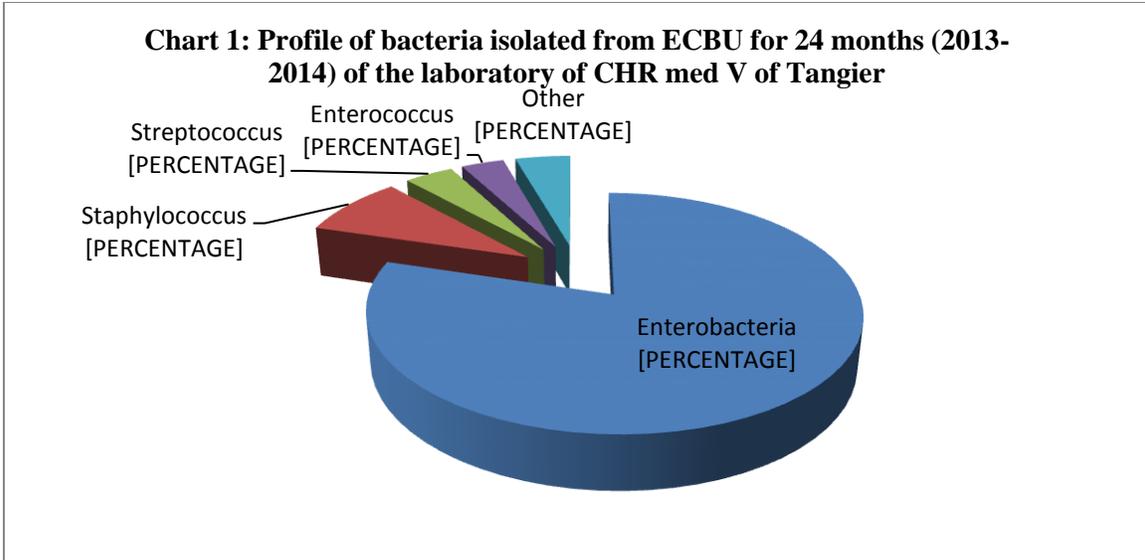


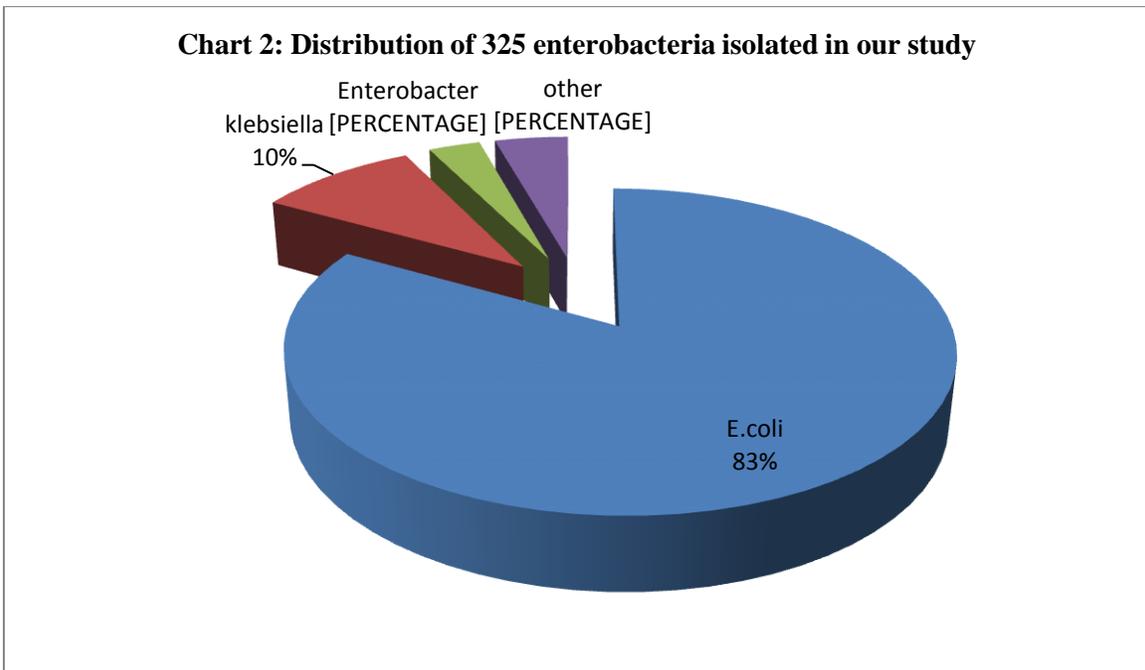
Image 2:-A positive synergy tests used for ESBL detection in this work

Résultats:-

Of 2716 examinations performed, 410 were positive, 15.1% of all examinations, with 325 (80%) enterobacteria, 35 (9%) staphylococci, 16 (4%) streptococci, 14 (3%) enterococci, and 18 (4%) other (Chart 1)



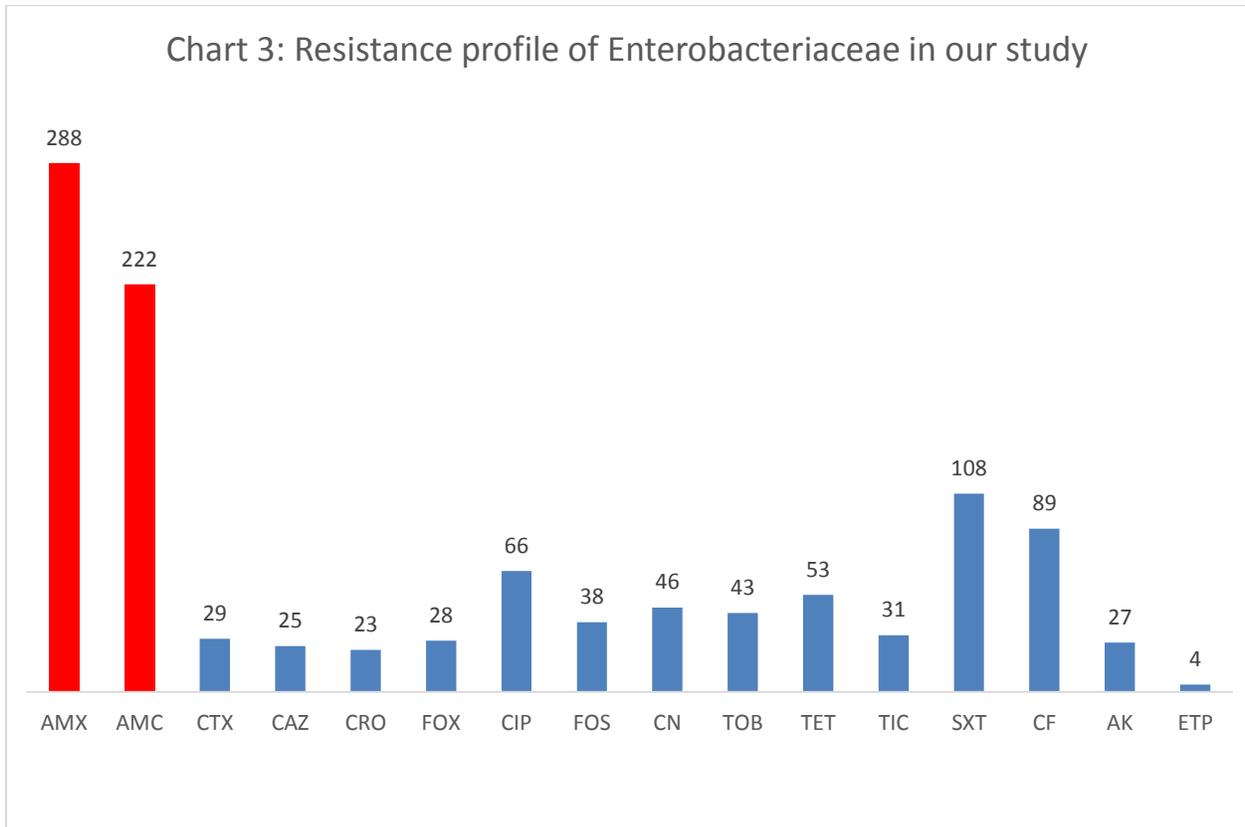
The gender ratio was 1.69, for Enterobacteriaceae, the most isolated bacterium is Escherichia coli with 259 (83%) and the genus Kleibseilla with 37 (10%), 12 Enterobacter (3%) and 17 (4%).other Enterobacteriaceae (Graph 2)



The resistance pattern in isolated enterobacteria(Chart 3), resistance to amoxicillin after 88.6%, and 68.3% in protected amoxicillin, resistance to sulfamethoxazoles + trimethoprim was 33.2%, fluoroquinolones (ciprofloxacin) was 20.3%, aminoglycoside (Gentamycin) 14.15%, fosfomycin was 11.7%, while sensitivity to cephalosporins 3rd generation (ceftazidime) was 7.7%. 14 broad-spectrum lactamases (ESBL) were recorded at 4.3% while they did record 4 (1.2%) cases of resist carbapenems, this resistance is mediated by the production of carbapenemases (figure 3).



Image 3:-Phenotypic Confirmation of Carbapenemase Production by the Modified Hodge Test



Discussion:-

Urinary tract infection is defined by microbial multiplication in the urinary tract, associated with a local inflammatory reaction, the diagnosis of urinary tract infection is made by the combination of urinary symptoms as well as the biological test [2], two biological tests are important in helping to diagnose urinary tract infection: enumeration of bacteria and enumeration of leukocytes in urine.

Several studies have tried to define the thresholds of bacteriuria and leucocyturia allowing the confirmation of a urinary infection, thus the microbiological criteria of urinary infection retained was defined by bacteriuria greater than or equal to 10⁵ CFU / ml or bacteriuria greater than or equal to 10³ CFU with leucocyturia greater than or equal to 10⁴ / ml for enterobacterial infections [14], all take into consideration sex, age and pathological history as appropriate. [1, 3, 4, 7, 8, 13, 2]

Noted that the threshold of positivity of a urine sample is variable according to several parameters: the presence of clinical signs, the method of collecting urine, the presence or absence of pyuria, the nature of the pathogenic germ involved in an infection; thus, the threshold of bacteriuria in our study for enterobacterial infections is 10³ CFU / ml [14, 15].

After cells counting at the Mallassez cell, counting of the bacteria is done by inoculation of a determined quantity of urine using a calibrated loop (usually 10 µl) on an agar culture medium and counting after 16 colonies culture visible.

The bacteria most often implicated in a urinary infection according to several studies conducted in this direction are in descending order: *Escherichia coli*, *Enterococcus*, other enterobacteria (KES), and staphylococci [9]. Also in our study *Escherichia coli* dominates the epidemiological profile with 83% of total enterobacteria recorded, which is consistent with national studies as is the case in the Lahlouandall [12, 19] and international study. The case in the study of Stammand all who found in his studies that 80% of urinary tract infections are caused by *E. coli* [16]. *Klebsiella*, occupies the second place in urinary tract infections in our series with 10% enterobacteria which is consistent with several studies menu in Morocco such as the study of Lahlouand all at Military Hospital Meknes who found a similar figure to the one described by our study and the study of Tlamcaniand all at the University Hospital of Rabat and the studies of El Bouamriand all carried out at the Mekkarch University Hospital except that the percentages 28 and 22% respectively described by his studies exceed largely the 10% described in our study. [19, 11].

Regarding the resistance of Enterobacteriaceae to antibiotics what is remarkable is a resistance that exceeds 83% of enterobacteria against amoxicillin and a resistance that exceeds 68% against amoxicillin + clavulanic acid which is consistent with the studies conducted by E. Bergogne- Bérézin [9] and that conducted by Schito [17] but the resistance recorded by our study far exceeds that recorded by the study of Farjaniand all, which describes a 59.8% resistance of enterobacteria to amoxicillin and a 34% resistance to amoxicillin + clavulanic acid [22]. Also note the emergence of several resistance against antibiotics such as sulfamethoxazoles + trimethoprim was equal to 33.2%, cephalosporins of the 1st generation and even quinolones with a resistance of 20% [10, 18] while it keeps always sensitive to other antibiotics such as aminoglycosides, fosfomycin and carbapenems.

A considerable rate of 4.3% of the ESBL recorded, which is consistent with the figures quoted in other studies in Morocco such is the case of the study carried out at the University Hospital of Marrakech and another study carried out at the Military Hospital of Meknes [11, 12, 20]. ESBLs are increasingly described in the world and regional literature, which leads us to sound the alarm when faced with this resistance knowing that they are characterized by a capacity to hydrolyze most antibiotics, in this case the carbapenems remaining only therapeutic remedies in most cases as described by Zowawiand all [23].

Most disturbing is the emergence of carbapenem resistance among Enterobacteriaceae isolated from urinary tract infections (1.2%), the four carbapenem-resistant Enterobacteriaceae isolated were phenotypically and molecularly studied, which confirms the production of carbapenemases.

Conclusion:-

This work was able to designate the Enterobacteriaceae most present in the ECBUs analyzed in our bacteriology laboratory, it has also drawn up the resistance profile of its enterobacteria, concluding that they have a very remarkable resistance to certain types of antibiotics which we to recommend good practices for the management of urinary tract infections defined by learned societies, as well as a warning against the misuse of antibiotics in this type of infection.

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