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Research Article

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Prevalence of bacterial infections and antibiotic resistance profile in an outhospital environment

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Abstract

Introduction: Bacteria are the most commonly reported etiological agents in infections. As a result, antibiotic resistance is a real public health problem. The objective of this study is to evaluate the frequency of isolation of bacteria and the sensitivity of the most frequent antibiotic bacteria to the outhospital environment.
Materials and Methods: It is a prospective study of descriptive type. It was carried out at the 4 medical analysis laboratories of Rabat city over a period of six months. Inclusion criteria were all positive specimens: urinary examination, vaginal swab, urethral swab, pus, sputum, sperm. The exclusion criteria concerned patients with negative examinations and other microorganisms (viruses, mycoses and parasites). Data collection was done using a fact sheet. An antibiogram is performed for the study of resistance. The exploitation of the data was performed and analyzed statistically.
Results: Of a total of 3689 samples, 900 isolated strains were responsible for bacterial infections and meeting the inclusion criteria. 608 strains were enterobacteria with a frequency of 67.2%. The bacteriological profile was largely dominated by *Escherichia coli* (47.1%), followed by *Klebsiella pneumoniae* (12.4%) and *Staphylococcus agalactiae* (8.1%)... The results of the cytobacteriological examination showed that pathogenic bacteria affect women more than men with 70% of cases, the elderly are the most affected by bacteria with 31.8% of cases. For enterobacteriaceae, the weakest sensitivities in an extra-hospital environment were recorded with Amoxicillin followed by Ticarcillin, Cefalotin, and Amoxicillin+clavulanic acid, respectively. On the other hand, the highest sensitivities in extra-hospital settings were observed for Imipenem, Colistin, Furan, Aminoglycosides.
Conclusion: The overall results showed an increase in the resistance of certain bacteria. This elevation could be related to the selection pressure due to the misuse of antibiotics. Regular monitoring is essential to define effective and appropriate therapeutic strategies, limiting the emergence and spread of highly resistant strains.

Keywords: Frequency, Extramural, Sensitivity, Resistance

Introduction

Bacterial resistance to antibiotics has reached dangerously high levels in all regions of the world in recent years. New resistance mechanisms are emerging and spreading, rendering the treatment of infectious diseases ineffective. For an increasing number of infections, such as urinary tract infections and pneumonia, treatment becomes more difficult, if not impossible, due to the loss of effectiveness of antibiotics. Bacteria resistance profiles to antibiotics are likely to vary in space and time, hence the importance of regular monitoring at the locality level. However, there are few studies on the sensitivity profile of bacteria to antibiotics carried out in the city. The World Health Organization has seen antibiotic resistance as a serious threat to human health and modern medicine, a public health problem that is emerging exponentially in some countries. Given the importance of the subject, we were led to undertake this study, which aims to assess the frequency of community bacterial infections as well as establish a profile of the susceptibility of bacteria isolated to antibiotics.

Materials and Methods

This is a prospective, descriptive study. It was conducted in an outpatient setting in 4 city laboratories of medical biological analyses. This study was conducted on a population comprising all age and gender categories. It spanned a period of 6 months. This study, which was conducted in an epidemiological and statistical framework, was the subject of a period extending from September 1, 2017 to March 30, 2018. The inclusion criteria applied to all isolated strains responsible for human bacterial infections from different types of samples. The isolation of these different strains was carried out on the following samples: Urinary cytobacteriological examination (ECBU), vaginal sampling (PV), pus, sputum, semen, urethral sampling (PU). The exclusion criteria were for patients with negative examinations of those samples and other microorganisms and other microorganisms that will not be isolated from the samples received (viruses, fungi and parasites). The data was collected using a fact sheet containing the following information (Age, Sex, Nature of Sampling, Bacterial Identification, Results and Antibiotics). An antibiotic is performed on positive identifications according to EUCAST. Antibiotics used in this study are: Amoxicillin (AMX), Ticarcillin (TIC), Amoxicillin+clavulanic acid (AMC), Cefalotin (KF), Cefotaxim (CTX), Imipenem (IMP), Amykacine (AK), Netilmicin (NTM), Ciprofloxacin (CIP), Tetracyclin (TET), Colistin (CT), Furanes (FUR), Chloramphenicol (CHL), Sulfamethoxazole-trimethoprim (SXT). The data was collected using an operating sheet that contains information: age and gender of the patient, nature of sampling, bacterial species. The data was used on Excel and a statistical analysis on the SPSS version 10 software at the risk of 5%. Different tests were applied according to the qualitative or quantitative variables.

Results

Out of a total of 3689 samples, 2779 were negative samples and 900 strains were positive. Predominance is represented by the female sex with a total of 630 (70%) male-dominated samples of 270 (30%) Levies. The sex ratio is 2.33. The total positivity rate was 24.4%. The distribution of isolates in relation to samples showed a predominance of urinary examen with 1076 (68.8%), vaginal samples 195 (12.5%), urethral samples 111 (7.1%), sputum 105 (6.7%), sperm crops 36 (2.3%), pus 28 (1.8%) and other various levies 14 (0.8%) ***Figure 1.***

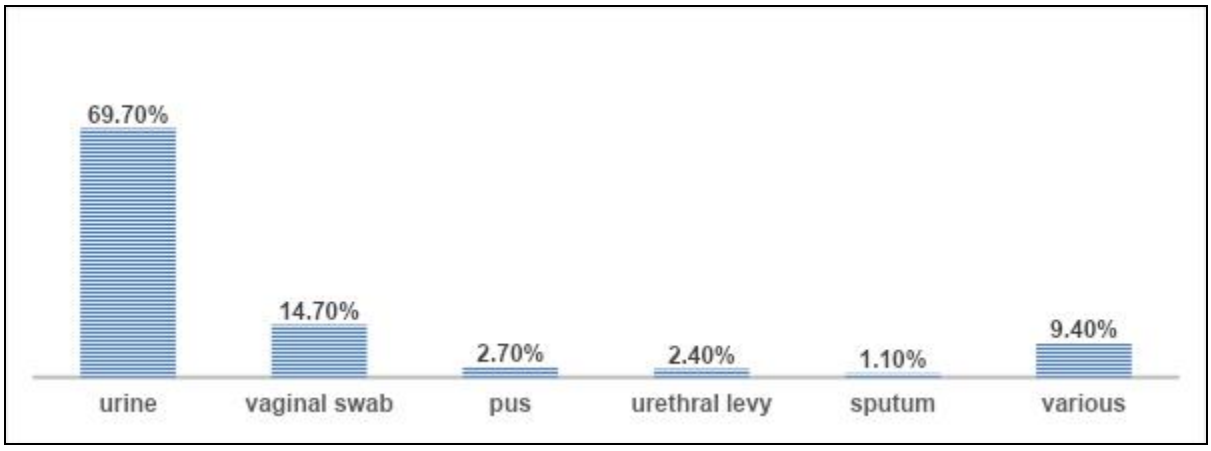

Figure 1 Distribution of positive levies by nature of levy

The frequency of request for cytobacteriological examinations of urine and cytobacteriological examinations of vaginal secretions is greater than other bacteriological examinations.

The distribution of isolated bacteria showed a predominance of enterobacteriaceae represented by *Escherichia coli* (*E. coli*). The latter is the first agent responsible for bacterial infections with a frequency of 47.1% followed by *Klebsiella pneumoniae* 12.4%, *Staphylococcus with negative coagulase* 8.2%, *Streptococcus sp*. 8.1%, *Staphylococcus aureus 7.3%*, *Enterococcus sp.* 5%, *Proteus mirabilis* 3.1%, *Pseudomonas sp.* 2.6%, *Enterobacter sp*. 1.4% and other 4.8%. ***Figure 2.***

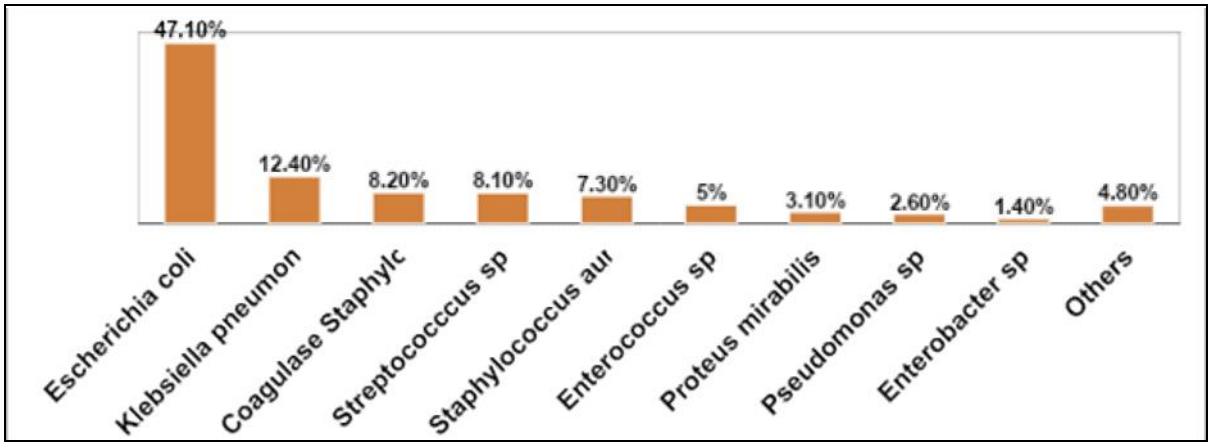

Figure 2 General distribution of isolated bacterial strains

The sensitivity profile of enterobacteriaceae to antibiotics is shown in ***Figure 3***, which showed low sensitivity for AMX which was around 14.7%, TIC with 32.2%, AMC with 46.6%, KF with 39.7%, CTX of 79.7%, IMP with 99%, AK with 87%, .4%, NTM with 84.9%, CIP 66.6%, TET with 33.5%, CT with 94.4%, FUR with 89.5%, CHL 82.7% and SXT with 60%. There were 1% of enterobacteriaceae resistant to Imipenem (2 strains of *Klebsiella pneumoniae* and 3 strains of *Escherichia coli*).

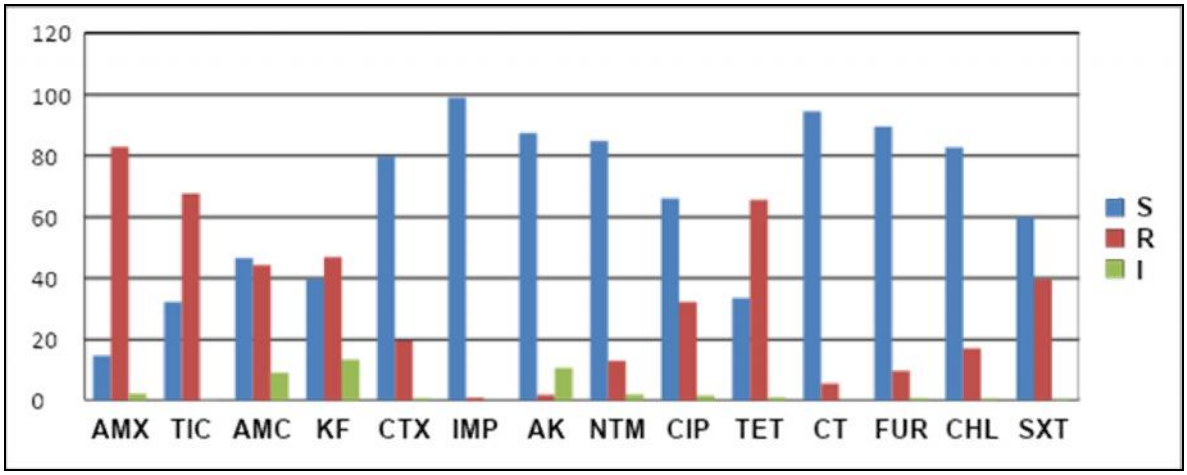

Figure 3 General sensitivity of enterobacteriaceae to antibiotics

According to this study, the sensitivity profile of the three bacteria in the enterobacteriaceae family showed that *E. coli* had a decreased sensitivity to AMX by 17.4%, a 45.8% AMC, a 35.9% TET, a KF 39%, SXT 60.2% , and an increased sensitivity to IMP of 99.1%, CT by 99.7%, FUR by 96.7% and CIP by 64.2%., With regard to *Klebsiella pneumoniae*, there was a low sensitivity to CTX of 70.9%, CIP 66.1%, AMC by 42%, KF by 40.4%, TET by 32.9% and SXT by 43%. Other antibiotics keep a good action on this bacterium with 2 strains producing carbapenemase ***Figure 4.***

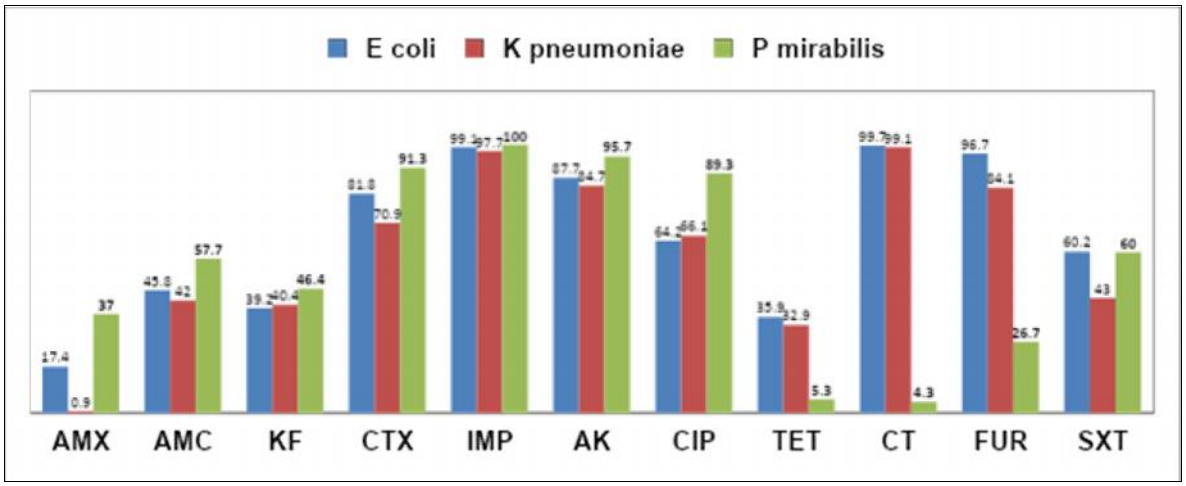

Figure 4 Antibiotic Sensitivity of Bacteria

Discussion

The frequency of bacterial infections varies by country, hospital and service. It remains influenced by various risk factors. This study shows that urinary bacterial infections are very common. In fact, they are the second reason for consultation after bronchopulmonary infections [1]. The total positivity rate was 24.4%. Compared to the studies carried out, the positivity rate in Mauritania [2], Tunisia [3], France [4] and Iran [5] are 18.4%, respectively; 15,4%; 19.2% and 6.3%. There was a major difference in gender distribution, with 30% affecting men versus 70% of women (sex-ratio F/H-2,33). Studies in different countries, notably Iran [5,] the USA-Canada [6] recorded an F/H sex ratio of 5.5%, 3.8% respectively. In America, it has been confirmed the predominance of *E. coli* 57.6% in the US and 56.9% in Canada [6], which is very close to what was reported in the study. Urinary samples are at the top of these samples requested with 68.8% followed by vaginal samples with 12.5%. These results are still lower than those found at the hospital level in differents countries. Our study shows a clear prevalence of enterobacteriaceae that were represented by *E. coli* with a frequency of 47.1% followed by *K. pneumoniae* with 12.4%. This can be explained by ascending pathophysiology as well as the strong colonization of the perineum by enterobacteriaceae of digestive origin, and in particular *E. coli* [7]. A study carried out in France confirmed the prevalence of *E. coli* 79.8% in urinary tract infections [8]. As well as another study in Brazil that revealed 87.3% of *E. coli* isolated from community urinary tract infections [9]. Another study in Mauritania confirmed the prevalence of the same bacterium with 64.4% followed by *K. pneumoniae* with 24.1%. Thus, we find the same bacteria with variable frequencies, *E. coli* remains at the head of the thread. This study revealed antibiotic sensitivity rates of the main bacteria involved in bacterial infections. The high sensitivity of enterobacteriaceae is recorded compared to CTX (79.7%), IMP (99%), AK (87.4%), NTM (84.9%), IPC (66.6%) CT (94.4%), FUR (89.5%) and CHL (82.7%). A decrease in germ sensitivity was observed compared to AMX (14,7%), TIC (32.2%), AMC (46.6%), KF (39.7), TET (33.5) and SXT (60%). In France, sensitivity rates relative to the CMA are around 25.4%, the CIP keeps a good activity on *E. coli* [10]. In Iran, the sensitivity to CIP is 68.1%. Sensitivity to SXT is low with a percentage of 38.2%.

Conclusion

Antibiotic resistance is a major public health, development and safety problem. If left unchecked, bacterial resistance is likely to have social, economic and health security implications, which will influencing the development of countries. This study, conducted in various laboratories of city medical analyses, provided an idea of the frequency of isolation of bacteria, which are responsible for bacterial infections, as well as an idea of the sensitivity of the antibiotic bacteria. However, the etiological and antibiotic sensitivity profiles of bacteria responsible for bacterial infections are likely to vary in space and time, hence the importance of regular monitoring at the locality level. The results of this study and their comparisons showed an increase in the resistance of several bacteria, *Escherichia coli* lead. This increase could be related to selection pressure due to the misuse of antibiotics in the medical field and to missing statistical data relating to the outpatient environment. Control of antibiotic resistance should be regular in order to determine effective and appropriate therapeutic strategies, limiting the emergence of highly resistant strains.

Conflicts of interest

The authors do not declare any conflict of interest

Bibliographic References

[1]Société de Pathologie Infectieuse de Langue Française, "Antibiothérapie des infections urinaires". Med Mal Infect 1991; 21 : 51-4.

[2] Hailaji N, Salem M O , Ghaber S, "La sensibilité aux antibiotiques des bactéries uropathogènes dans la ville de Nouakchott–Mauritanie". Progrès en Urologie 2016; 26 : 346-352.

[3] Khalifa A B H, Khedher M, "fréquence et résistance aux antibiotiques des bactéries uropathogènes à l'hôpital universitaire tahar sfar de Mahdia". Revue Tunisienne d'Infectiologie 2010; 4:57-61.

[4] Tassain J, N'Guyen Y, Batalla A S, Duval V, Guillard T, De Champs C, et al, "Différences d'espèces en cause et de résistance aux fluoroquinolones des souches isolées dans les bactériuries selon leur caractère nosocomial, lié au soin ou communautaire". La Presse Médicale 2012; 41:e586-e593.

[5] Kashef K, Djavid G E , Shahbazi S, "Antimicrobial susceptibility patterns of community-acquired uropathogens in Tehran, Iran". The Journal of Infection in Developing Countries 2010; 4:202-6.

[6] Zhanel G G , Hisanaga T L, Laing N M, DeCorby M R, Nichol K A , Palatnick L P , et al, "Antibiotic resistance in outpatient urinary isolates: final results from the North American Urinary Tract Infection Collaborative Alliance (NAUTICA)". International journal of antimicrobial agents 2005; 26:380-8.

[7]Janvier J, Mbongo-Kama DE, Mérens A, Cavallo J D , "Les difficultés d'interprétation de l'examen cytobactériologique des urines". Revue Francophone des laboratoires 2008; 2008:51-59.

[8] De Mouy D, Fabre R, Cavallo J D, "Infections urinaires communautaires de la femme de 15 à 65 ans: sensibilité aux antibiotiques d' E. coli en fonction des antécédents: étude AFORCOPI–BIO 2003". Médecine et maladies infectieuses 2007; 37:594-8.

[9]Teichmann A, de Cunha Agra H N, de Souza Nunes L, da Rocha M P, Renner J D P, Possuelo L G , et al, "Antibiotic resistance and detection of the sul2 gene in urinary isolates of Escherichia coli in patients from Brazil". The Journal of Infection in Developing Countries 2014 8 : 039-43.

[10] Lobel B, Valot A, Cattoir V, Lemenand O, Gaillot O, "Comparaison de la sensibilité aux antibiotiques de 1 217 isolats consécutifs de Escherichia coli responsables d'infections urinaires féminines en ville et à l'hôpital". La Presse Médicale 2008; 37:746-750.

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