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RESEARCH PAPER

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Evaluation of the Total Coliforms Antibiotic Resistance Degree of Hospital Wastewater

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ABSTRACT

Microbial resistance has become a hot topic. People are realizing more and more that the ingesting antibiotics, antiviral or antiparasitic is not the solution to all medical problems caused by germs (infectious diseases). Some unfamiliar with the limitations of these drugs, others swear by them, or drugs are eliminated in wastewater than the parent compounds or their metabolites may persist in the environment, ultimately resulting in biomagnification and bioaccumulation. Our study aims to assess the degree of resistance of hospital wastewater revealed during a year (2012). Analyses of the resistivity of bacteria to antibiotics show a significant difference between the levels of resistance, the percentage of Total Coliform bacteria resistant shows differences between 6 antibiotics resistance Amoxicillin reached 60% on average is higher than OFL 15 %, the lowest were observed for the CIP 13%. Cotrimozole 40%, for Tetracycline reaches a maximum value of 56.66% and the minimum resistance is 3.33% to ceftazidime and amoxicillin-acid clavulanque resistance is 6.66%. These results illustrate how the frequency of fecal bacteria resistant increases with exposure to antibiotics of their host. According to the results bacteriological and antibiotic resistance allowed us to classify the effluents from the provincial hospital in Sidi Kacem in the bracket of poor to very poor.

Keywords: Microbial resistance, Antibiotic Resistance, Waste Water, Coliforms, biomagnification and bioaccumulation.

INTRODUCTION

In Morocco the drug consumption rate is increasing, whether the drugs are an essential component of the current healthcare system, as they contribute to improve our health, our quality of life and life expectancy. The average consumption of antibiotics of a hospitalized patient is of the order of 10 times greater than the average consumption in city. Or the unmetabolized fraction antibiotics consumed are excreted via urine and feces and results in wastewater.

Results of recent studies indicate the presence of low concentrations of antibiotics in municipal wastewater effluent and surface water [Hartmann et al., 1998], [Hirsch et al., 1999], [Hartig et al., 1999], [Meyer et al., 2000], [Alder et al., 2000], [Nipales et al., 2000] and [Frick et al., 2001].

The objective of the study is to carry an inventory of current knowledge on hospital discharges, to estimate the impact of these discharges on water environments and on human health and finally to bring a reflection on solutions to consider for preserving this invaluable resource is water, and to assess the risks associated with these types of contaminants, it will study the concentrations of antibiotics and antibiotic resistant bacteria an indicator of faecal contamination.

MATERIALS AND METHODS

Study Milieu

The provincial hospital is located in Sidi Kacem province of Sidi Kacem who is in the region of Gharb- Chrarda-Beni-Hssen, bounded by the provinces of: Chefchaouan and Larache in the north, south Meknes, Kenitra to west and the province of Taounat east. It is largely located in the Gharb plain. We also note a result of peri-Rif hills posing as an arc stretching Had Kourt to Zegotta.



Fig 1: Map locating the hospital in Sidi Kacem (Morocco).

METHOD STUDY

The method used to determine antibiotic resistance is the distribution of discs is a standardized method advocated by the French Committee of the Antimicrobial. Practically, it is to isolate first of *Escherichia coli* strains from boxes of starter cultures for each sample. The study was carried out on 30 Petri dishes for the three antibiotics (amoxicillin, Ciprolaxacine and Ofloxacin) to determine the degree of resistance (resistant, intermediate and susceptible) of Total Coliforms.

RESULTS AND DISCUSSION

The resistance of fecal coliform to Amoxicillin Ciprolaxacine and Ofloxacin Figure 2 shows the percentage of resistant bacteria Coliform Totals three antibiotics tested (Amoxicillin Ciprolaxacine and Ofloxacin) plotted as a function of the abundance of the content of *E. coli* as an indicator of recent fecal contamination for water samples waste of the provincial hospital in Sidi Kacem.

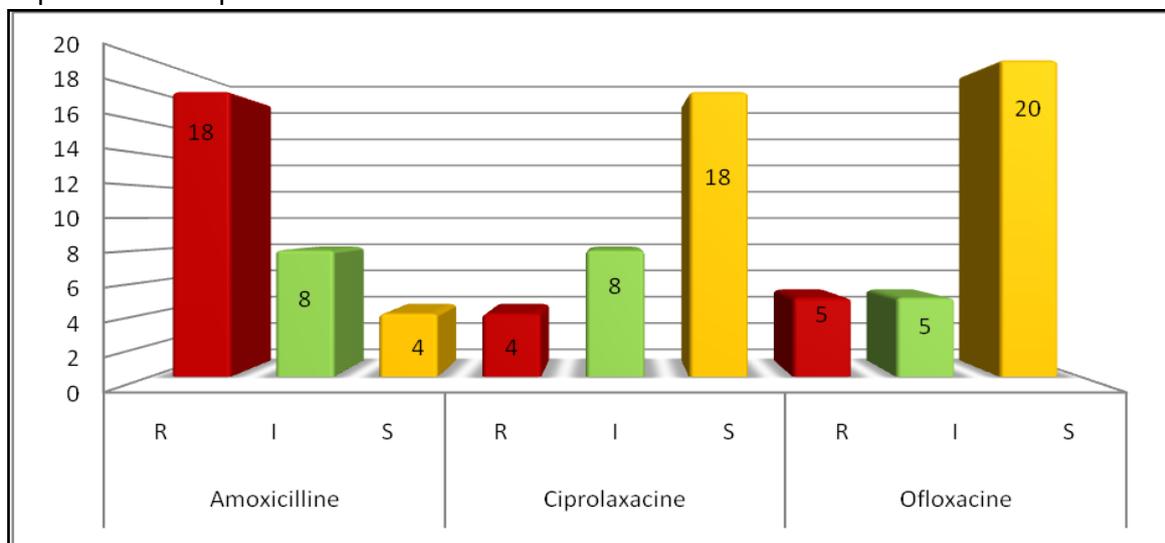


Fig 2. Assessment of resistance level of total coliforms to three antibiotics.

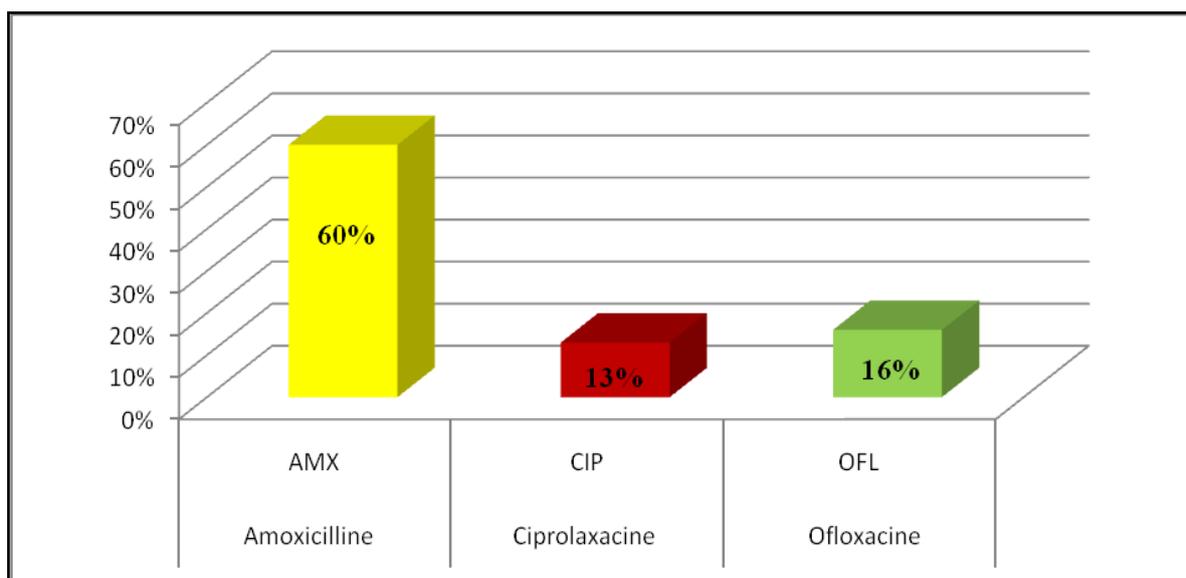


Fig 3. The study of the percentages of the resistivity of Total Coliforms three antibiotics.

Analyses show that there is a significant difference between the levels of bacterial resistance to three antibiotics, the percentage of resistant bacteria Coliform Totals shows a clear difference between the three antibiotics (Figure 3), the resistance to amoxicillin reaches 60 % higher than that of Ofloxacin which is 16% and the lowest percentage was observed for the antibiotic Ciproloxacin 13%. E. coli bacteria of hospital effluents are predominantly attributable to human faeces. These results illustrate how the frequency of fecal bacteria resistant to antibiotics increases with their host exhibition.

Many campaigns have succeeded to limit the systematic use of antibiotics. Many prescriptions can indeed contribute to the development of strains of bacteria resistant to these drugs. But in a study published on the website Plos Genetics and whose findings have revealed that researchers have demonstrated the presence of low doses of antibiotics in wastewater from hospitals. However, "even at very low doses, antibiotics can increase the emergence of resistance in pathogenic bacteria.

Now these resistant bacteria are a real impasse for researchers, especially in hospitals where they are mostly involved in nosocomial infections. It is therefore necessary to fight against this new resistance vector. Bacteria face a dose of antibiotic, even very low, will trigger a stress response.

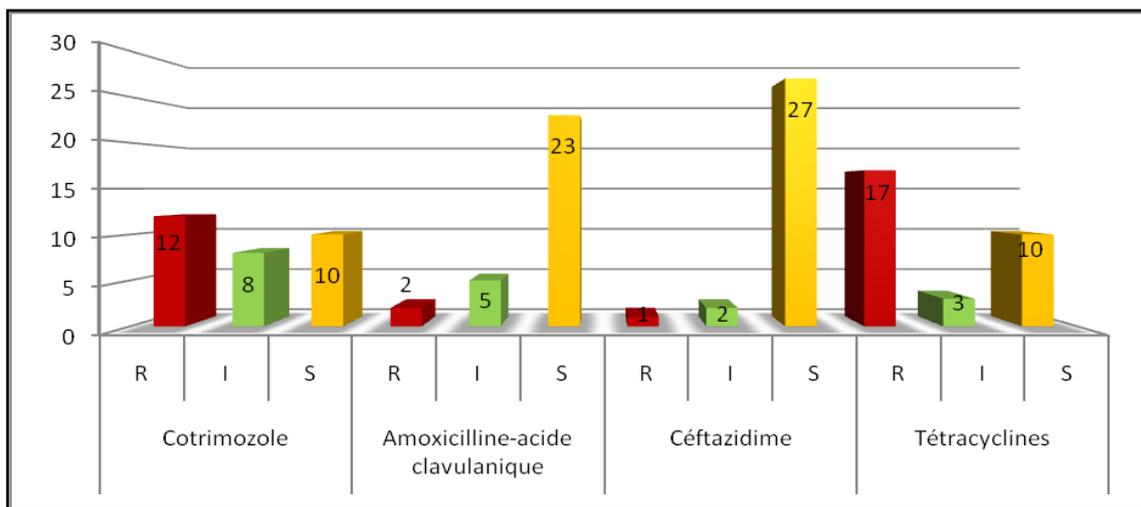


Fig 4. The study of the resistance of the four antibiotics Fecal Coliforms.

Figure 4 shows the difference in resistivity of the bacteria studied on Cotrimozole antibiotics, amoxicillin-clavulanic acid, ceftazidime and Tetracyclines.

MAZEL D, 2013, author of the study recommends that the outgoing wastewater from hospitals therefore must undergo special treatment. So far, these waters are treated and recycled before being released into the environment, spreading low doses of antibiotics in nature. "Perhaps it would trap the antibiotics present in the water at the exit of hospitals, before mixing these liquids with other wastewater.

The resistance of fecal coliform to Cotrimozole, amoxicillin-clavulanic acid, ceftazidime and Tetracyclines.

Microbes involved, mainly bacteria, develop coping treasures for us and contaminate bypass treatments. Fortunately, dynamic research studies their operation to find flaws in their system of colonization of our bodies. "Of the prostheses, eg, bacteria form what are called

biofilms, explains Mazel Didier, 2013. They produce these kinds of mesh to continue to grow and resist antibiotics. Currently, much research is conducted to understand how these biofilms are organized and find treatments. Other projects are concerned with such bacteria propagation modes in hospitals by aerosols or by water. Quinolones and tetracyclines are susceptible to photodegradation [Torniainen et al., 1996] [Davies et al., 1979]. Currently little information is available for abiotic reductive or oxidative transformation of antibiotics in the aquatic environments.

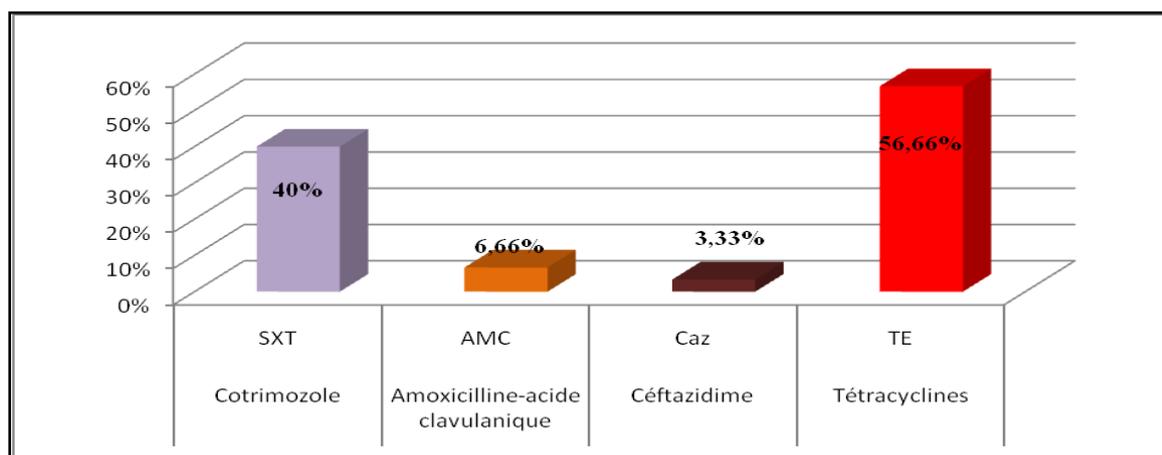


Fig 5. The percentage of the resistance of bacteria to antibiotics four.

Resistance to the antibiotic Coliforms Cotrimozole is 40%, for Tetracycline reaches a maximum value of 56.66% and a minimum resistance value of 3.33% for ceftazidime for Amoxicillin acid Clavulanque resistance to this antibiotic is 6.66%. The previous studies indicate that b-lactam antibiotics were not detected in most environmental waters other classes such as Fluoroquinolones [Hartmann et al., 1998], Macrolides [Hirsch et al., 1999] and sulfonamides [Hirsch et al., 1999], [Hartig et al., 1999] have been detected in wastewater effluent and surface water.

CONCLUSION

Our study aims at evaluating the quality of wastewater from the provincial hospital in Sidi Kacem by conducting analyzes of bacteriological resistance during twelve months, it can be concluded that hospital wastewater studied are quality poor to very poor. This requires the treatment of the wastewater before discharge into the sewer system the city of Sidi Kacem. We hope in the light of the results from this study have prompted a real awareness of the authorities on the need to develop in the area of structures for the treatment of wastewater.

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REFERENCES

- Hartmann, A., A. C. Alder, T. Koller and R. M. Widmer (1998).** Identification of Fluoroquinolone Genotoxicity in Native Hospital Wastewater. *Environnemental Toxicology and Chemistry*: 17, 377-382.
- Hirsch, R., T. Ternes, K. Haberer and K.L. Kratz (1999).** Occurrence of Antibiotics in the Aquatic Environment. *The Science of the Total Environment*: 225, 109-118.
- Hartig, C., T. Storm and M. Jekel (1999).** Detection and Identification of Sulphonamide Drugs in Municipal Wastewater by Liquid Chromatography Coupled with Electrospray Ionisation Tandem Mass Spectrometry. *Journal of Chromatography A*: 8541, 163-173.
- Meyer, M. T., J. E. Bumgarner, J. L. Varns, J. V. Daughtridge, E. M. Thurman and K. A. Hostetler (2000).** Use of Radioimmunoassay as A Screen for Antibiotics in Confined Animal Feeding Operations and Confirmation by Liquid Chromatography/Mass Spectrometry. *Science Of The Total Environment*: 248, 181-187.
- Alder, A. C., E. Golet, S. Ibric and W. Giger (2000).** Fate of Fluoroquinolone Antibiotics during Municipal Wastewater Treatment, Abstracts of Papers of *The American Chemical Society*, San Francisco, CA: 219, 32-ENVR.
- Nipales, N. S., C. S. McArdeell, E. Molnar and W. Giger (2000).** Occurrence of Macrolide and Sulfonamide Antibiotics in the Aquatic Environment of Switzerland, Abstracts of Papers of *The American Chemical Society*, San Francisco, CA: 219, 33-ENVR.
- Frick, E. A., A. K. Henderson, D. M. Moll, E. T. Furlong and M. T. Meyer (2001).** Presence of Pharmaceuticals in Wastewater Effluent and Drinking Water, Metropolitan Atlanta, Georgia, July-September 1999. Proceedings of the 2001 Georgia Water Resources Conference, Athens, GA; Carl Vinson Institute of Government, The University of Georgia: 282.
- Torniainen, K., S. Tammilehto and V. Ulvi (1996).** The Effect of pH, Buffer Type, and Drug Concentration on the Photodegradation of Ciprofloxacin *International Journal of Pharmaceutics*: 132, 53- 61.
- Davies, A. K., J. F. Mckellar, G. O. Phillips and A. G. Reid (1979).** Photochemical Oxidation of Tetracycline in Aqueous Solution. *Journal of Chemical Society. Perkins II*: 369-375.
- Hartmann, A., A. C. Alder, T. Koller and R. M. Widmer (1998).** Identification of Fluoroquinolone Antibiotics as the Main Source of umu C Genotoxicity in Native.

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