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Hospital effluents and antibiotic resistance genes : a threat to water bodies in Benin

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1. Introduction

(Hinnilo, 2021)

Hospital effluents are the various liquid wastes produced in a healthcare facility. (Sanaa *et al*., 2019)

Source of multidrug-resistant bacteria. (Sanaa *et al*., 2019)

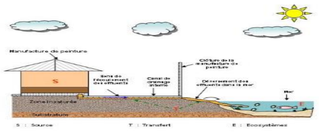
- The burden of hospital effluents containing pathogenic bacteria and antibiotic residues poses a threat to public health and the environment (Perry et *al*., 2021).

This study aims to explore the role of hospital effluents in the dissemination of resistance genes in major water bodies in Benin.

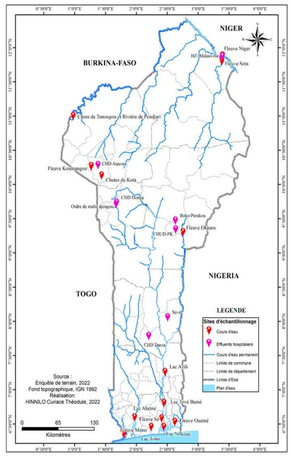
To determine the resistance profiles of strains isolated from hospital effluents and water bodies in Benin;

To identify resistance genes present in bacterial strains isolated from hospital effluents and water bodies in Benin;

To assess the infectious risk associated with hospital effluents and water bodies in Benin.



2. Methodology



72 hospital effluents (Peter *et al*., 2017)

104 Samples

32 water bodies in Benin (Taylor, 2021)

Figure 1 : Map of sample collection of hospital effluents and watercourses in Benin.

Collection of effluent from septic tanks/cesspools in 400ml sterile plastic containers from the pediatric, maternity, operating room/emergency, and laboratory departments of each hospital included in the study. Also included are watercourses near hospitals or medical centers.

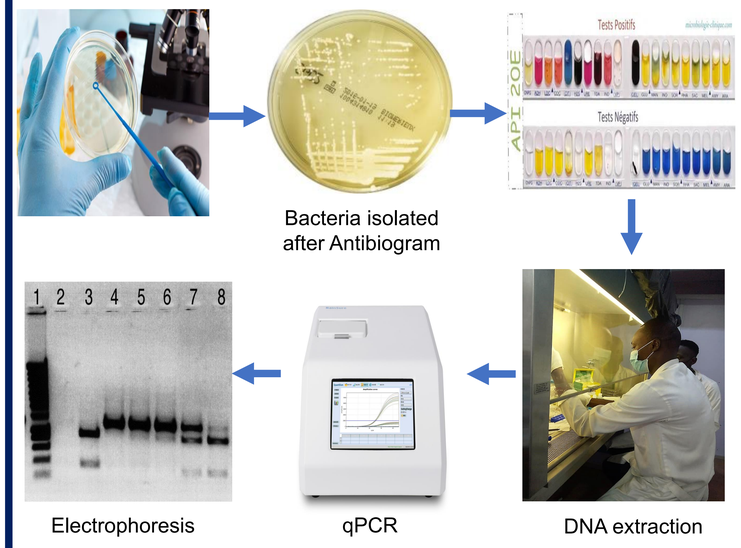


Figure 2 : Different microbiological and molecular technical phases

3. Results and Discussion

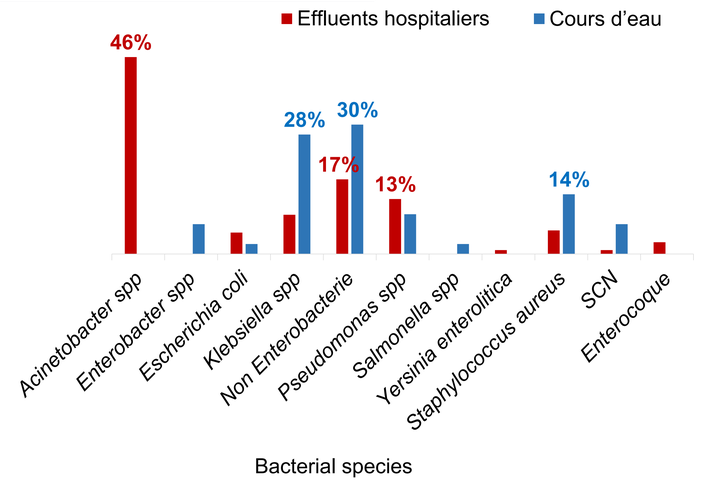


Figure 3 : Resistance profile of bacteria isolated from hospital effluents and the main watercourses of Benin.

Klebsiella spp, non-enterobacteries, Pseudomonas spp, Staphylococcus aureus, hospital effluents and watercourses of Benin in different proportions.

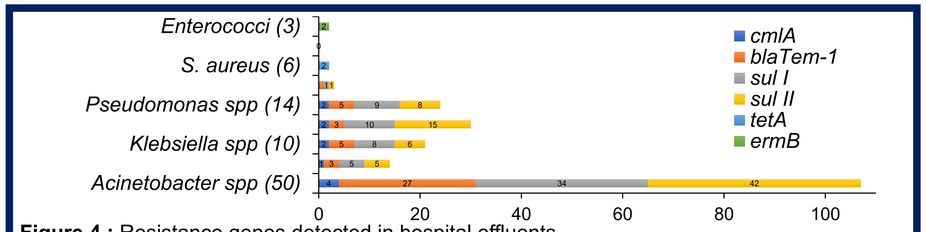


Figure 4 : Resistance genes detected in hospital effluents.

sul II was present in all isolated Gram-negative bacilli but absent in Gram-positive cocci, with a proportion of 70,64%

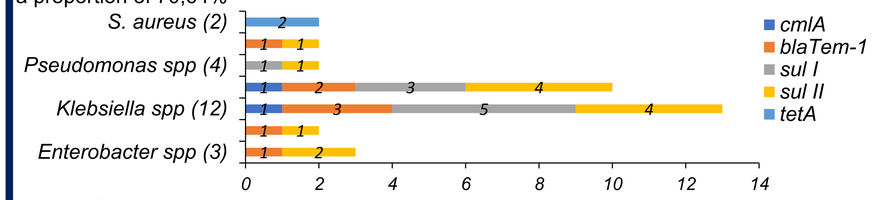


Figure 5 : Resistance genes detected in waterways.

sul II was present in all isolated Gram-negative bacilli but absent in Gram-positive cocci, with a proportion of 36,11%

Microbiological and molecular analyses revealed the presence of major resistant pathogens (*Klebsiella spp*., *non-Enterobacteriaceae*, *Pseudomonas spp*., and *Staphylococcus aureus*) in hospital effluents and Beninese watercourses, with the *sul II* resistance gene widely detected in Gram-negative bacilli at higher proportions in hospital effluents (70.64%) than in waterways (36.11%).

4. Conclusion

- Hospital effluents, a potential source of dissemination of resistant bacteria into environmental water sources.
- Implementation of an eco-designed biofilter system based on bio-sourced activated carbon.
- Creation of a national genomic biosurveillance platform for hospital effluents.

5. References

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