ECA 2023

The 3rd International Electronic Conference on Antibiotics

Rise of Antibiotic Resistance: Mechanisms Involved and Solutions to Tackle it

December 1-15, 2023

Epidemiology, Prevalence and Mechanisms of Microbial Resistance

Prevalence of antibiotic resistance of uropathogenic bacteria isolated from contaminated urine

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Introduction

The prevalence of uropathogenic bacteria resistance to antibiotics constitutes a major health problem and it is the subject of much research [1]. The inhibition of the uropathogenic bacteria by lactic acid bacteria is the subject of a number of studies [2].

Isolats	Gram stain	Oxydase Test	Catalase Test	Vitek identificaion
UI 1	Bacille à Gram -	-	/	*E. coli*
UI 2	Bacille à Gram -	-	/	*E. coli*
UI 3	Bacille à Gram -	-	/	*Klebsiella pneumoniae*
UI 4	Bacille à Gram -	-	/	*Klebsiella pneumoniae*
UI 5	Bacille à Gram -	-	/	*Enterobacter cloacae*
UI 6	Bacille à Gram -	-	/	*Serratia marcescens*
UI 7	Cocci à Gram +	/	-	*Streptococcus agalactiae*
UI 8	Cocci à Gram +	/	+	*Staphylococcus aureus*
UI 9	Cocci à Gram +	/	+	*Staphylococcus saprophyticus*
UI 10	Bacille à Gram -	+	/	*Pseudomonas aeruginosa*

Table 1. Physicochemical and Vitek identification of uropathogenic bacteria isolated from urines samples

Uropathogenic bacteria \ LAB strains	CM9	H3	LBM2
E. coli UI 1	35	32	30
E. coli UI 2	38	30	35
Klebsiella pneumoniae UI 3	27	34	29
Klebsiella pneumoniae UI 4	35	37	35
Enterobacter cloacae UI 5	40	-	-
Serratia marcescens UI 6	32	30	28
Streptococcus agalactiae UI 7	29	20	-
Staphylococcus aureus UI 8	30	30	32
Staphylococcus saprophyticus UI 9	34	33	32
Pseudomonas aeruginosa UI 10	30	30	25

Table 2. Inhibition of uropathogenic bacteria by the three Lactic acid bacteria strains

Methodology

The identification and the resistance of uropathogenic bacteria to antibiotics was accomplished by the Vitek 2 Compact using an adequate card and was performed as the standard procedure [3].

The inhibition of the uropathogenic bacteria by the lactic acid bacteria strains was performed using the streak agar test described by Ayeni et al. [4].

Results

Ten uropathogenic strains from urine samples obtained from patients with urinary tract infections were isolated, which were identified as: *Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Serratia marcescens, Staphylococcus aureus, Staphylococcus saprophyticus, Sterptococcus agalactiae* and *Entrobacter cloacae*. The antibiogram test revealed that *K. pneumoniae* UI4 was the most resistant to antibiotics, while *E. coli* UI1 and UI2 was the most sensitive. The study also showed that *E. faecium* CM9, *E. faecium* H3 and *L. brevis* LBM2 had a strong antimicrobial activity against the uropathogen bacteria isolated.

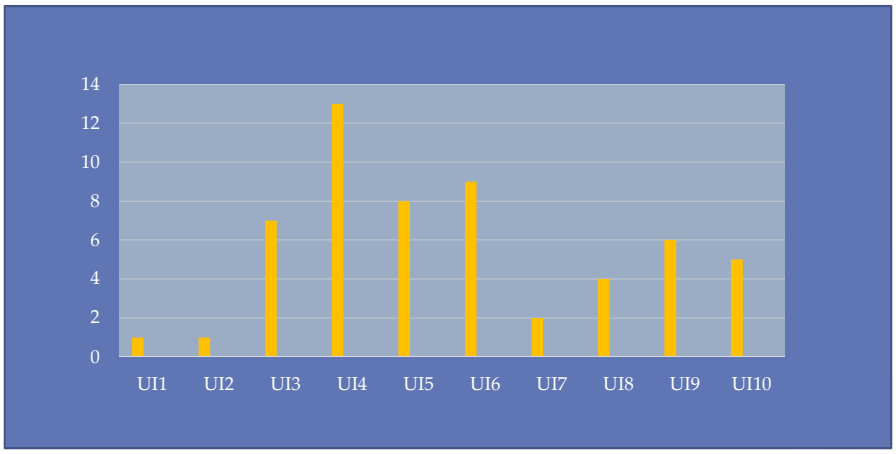

Figure 3. Antibiotics resistances of uropathogenic bacteria

Summary

In this study, we evaluate the resistance and the susceptibility of some bacteria isolated from contaminated urine and their inhibition by three lactic acid bacteria (LAB) isolated from feed: *Enterococcus faecium* CM9, *Enterococcus faecium* H3 and *Lactobacillus brevis* LBM2. The resistance of uropathogenic bacteria to antibiotics was evaluated by the Vitek 2 Compact using an adequate card and was performed as the standard procedure. The inhibition of the uropathogenic bacteria by the LAB strains was performed using the streak agar test described by Ayeni et al. [4].

Ten uropathogenic strains from urine samples obtained from patients with urinary tract infections were isolated, which were identified as: *Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Serratia marcescens, Staphylococcus aureus, Staphylococcus saprophyticus, Sterptococcus agalactiae* and *Entrobacter cloacae*. The antibiogram test revealed that *K. pneumoniae* was the most resistant to antibiotics, while *E. coli* was the most sensitive. The study also showed that *E. faecium* CM9, *E. faecium* H3 and *L. brevis* LBM2 had a strong antimicrobial activity against the uropathogen bacteria.

This research work has shown an alarming antibiotic resistance patterns of some uropathogenic bacteria isolated. Thus, it is imperative to rationalize the use of antibiotics, improve hygiene in hospitals and establish a system for continuous monitoring bacterial resistance.

References

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