

THE ANTIMICROBIAL ACTIVITY OF COPPER ALLOYS AGAINST NOSOCOMIAL PATHOGENS ISOLATED FROM AN HEALTHCARE FACILITY: AN IN-VITRO STUDY

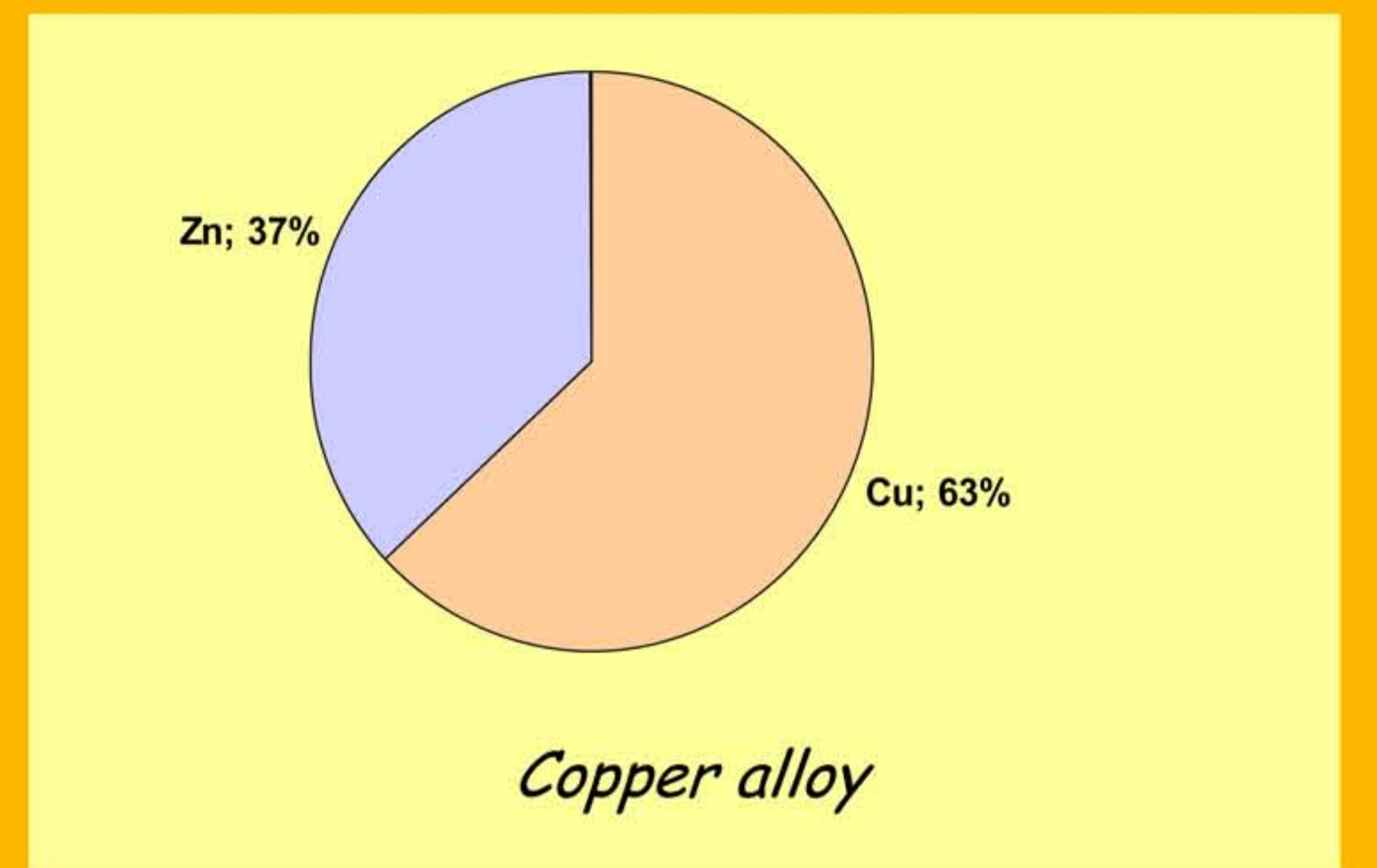
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Introduction: The emergence of multi-resistant bacteria against powerful antibiotics and their transborder transmission constitute some of the most threatening public health problems of the recent years. Metallic copper alloys have recently attracted attention as a new antimicrobial agent, able to minimize environmental contamination by pathogenic bacteria.



Aim: The investigation of the efficacy of a copper alloy (Cu63%-Zn37%) in relation to aminoglycosides (gentamycin) against nosocomial pathogens isolated from an healthcare facility.



Material - Method: Multi-resistant bacteria, isolated from blood culture of patients with signs of infection or fever appearing any time after 8 days of admission to ICU, were selected. The samples were cultured on suitable media and bacterial isolates were identified using standard methods. The isolated bacteria were: *Escherichia coli*, *Klebsiella spp*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Enterococcus faecium*.

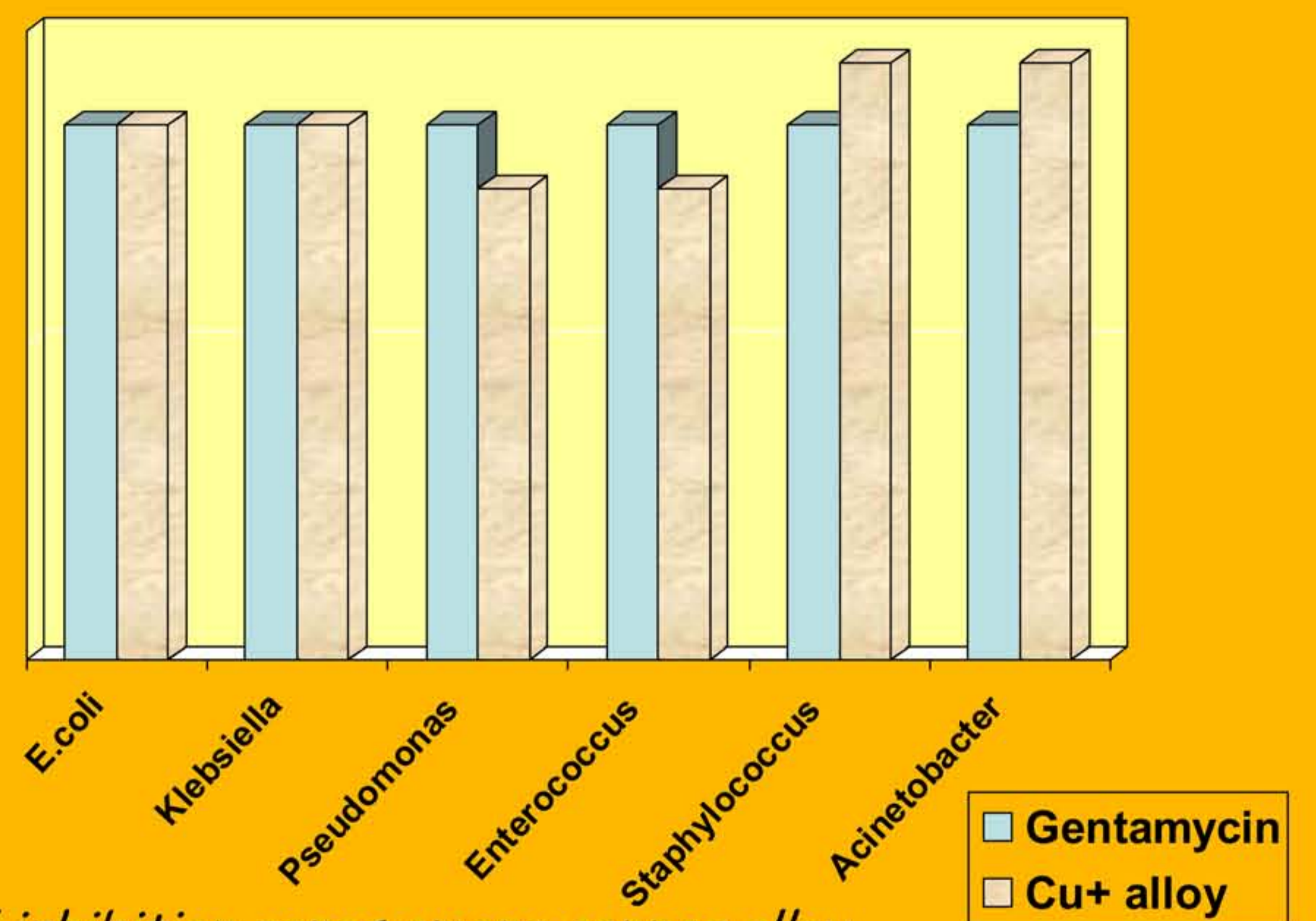
Resistance genes were detected for up to 10 antibiotics, evaluated with VITEK 2 System (bioMérieux) for identification and antimicrobial susceptibility test and the Minimum Inhibitory Concentration (MIC) to determine the antimicrobial activity of a material against specific bacteria and to control the activity of new antimicrobiological factors were recorded and compared.

In the above procedure we used coupons (1x1cm) of copper alloys containing (Cu63%-Zn37%) and Aminoglycoside discs.

Susceptibility testing was conducted by Kirby Bauer disc diffusion method on "Miller Hinton Agar" in which an aminoglycoside disc was placed at 3cm distance from the copper coupon. This procedure was followed for each isolated pathogen.

After 24 and 48-hour incubation periods, the inhibition zone bacteria around the antibiotic disc, as well as around the copper coupon were recorded.

Results: The inhibition zones of antimicrobial copper were equal to those of aminoglycosides for *E. coli* and *Klebsiella spp*, were smaller for *Pseudomonas aeruginosa*, and *Enterococcus faecium* and larger for *Staphylococcus aureus* and *Acinetobacter baumannii* respectively.



Comparison of inhibition zones among copper alloy and gentamycin

Discussion: The copper alloy exhibited antimicrobial activity against all multidrug resistant bacteria studied. The inhibition zone of our specific copper alloy was increased, compared to that of aminoglycosides for *Staphylococcus aureus* and *Acinetobacter baumannii*. It should be noted that the reduction of bacterial load in the hospital environment where antimicrobial copper is used, may lead to drastic reduction of antibiotic use.



Copperized ICU