

# **Comparative study of Antimicrobial Activities of Ag and Cu Nanoparticles against the Pathogenic Strain of *Acinetobacter baumannii***

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## **Abstract:**

**Background:** The use of metal nanoparticles can be effective to eliminate the bacterial infections, as an alternative to antibiotics. The aim of this study was to detect the antibacterial properties of 0.01, 0.5 and 1% nano-Ag and nano-Cu against *Acinetobacter baumannii* as a major and prevalent pathogenic bacterium.

**Materials and Methods:** *Acinetobacter baumannii* was cultured in liquid and agar nutrient medium to evaluate the antibacterial effects of 0.01, 0.5 and 1% of both nano-Ag and nano-Cu via the optical density (OD) and log CFU/ml measurements.

**Results:** Non-significant effect was seen for 0.01% of both nano-specimens. While, 0.5 and 1% of both nanoparticles showed considerably decreased bacterial number. A 4.9 and 2.3 times decrease in the OD value was found in the presence of 1 and 0.5% nano-Ag, respectively ( $P < 0.01$ ). 1.9 and 3.8 times decreased OD was seen in the presence of 0.5 and 1% nano-Cu, respectively, as compared to control ( $P < 0.01$ ). In the second study, 6.3 log CFU/ml of *Acinetobacter baumannii* were present in the cultures treated with 1% nano-Ag and Cu at 4 °C in water. Control *Acinetobacter baumannii* cells survived for 15 days while complete cell death was seen when 1% nano-Ag was applied for 14 hours as compared to 1% nano-Cu, which showed complete cell death after 19 hours. In the third study, *Acinetobacter baumannii* was grown in the agar medium with and without both nanoparticles and suppressed growth (4.8 and 5.9 times;  $P < 0.01$ ) was seen in the presence of 1% nano-Cu and -Ag, respectively.

**Conclusion:** In spite of the fact that both nanoparticles showed bactericidal activity, nano-Ag has proven to be more efficient antibacterial agent as compared to nano-Cu.

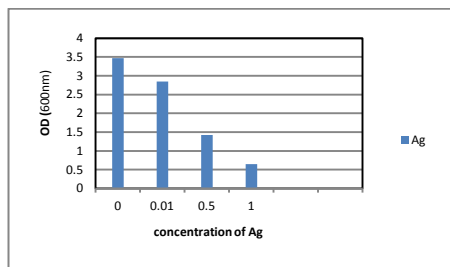
**Keywords:** Nano-particles, antibacterial, *Acinetobacter baumannii*

## **References:**

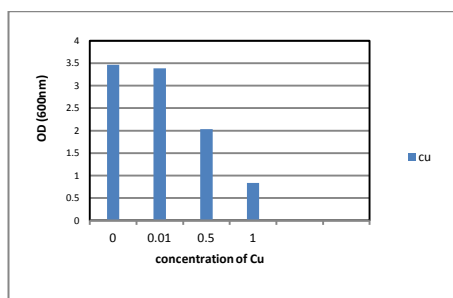
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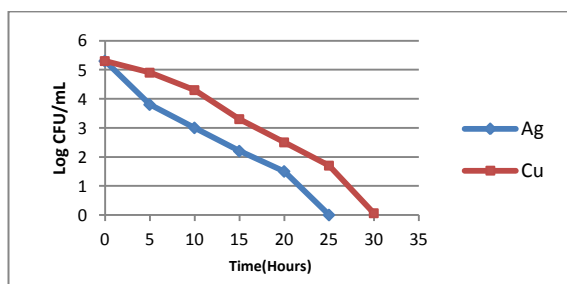
**Figures:**



**Fig. 2:** *Acinetobacter baumannii* concentration dependence upon different concentrations of Ag in the culture medium.



**Fig. 2:** *Acinetobacter baumannii* concentration dependence upon different concentrations of Cu in the culture medium.



**3:** Comparative killing kinetics of 1% Ag(▲) and Cu (●) on the *E. coli* cultures