The effect of silver nanoparticles on Gram-negative bacilli Resistant to Extended-Spectrum B-Lactamase Enzymes

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Abstract:

Background and objectives: Antibiotic resistant to Antimicrobial agents is one of the most important concerns in hospitals, which can lead to increased costs, treatment fails and mortality rates. The aim of this study was identification of Gram-negative bacilli resistant to extended-spectrum β-lactamase Enzymes (ESBLs) and determination of the effect of silver nanoparticles on them.

Materials & Methods: Of 276 clinical samples referred to three hospitals of Isfahan city, 186 gram negative bacilli were studied. To recognize ESBLs production, the bacilli was assessed by disk diffusion method and confirmed by DDT and Double Disk approximation Test. The ESBL producing bacteria were subjected to increasing concentrations (12.5, 25, 50,100,200,400 and 500 ppm) of silver nanoparticles, prepared in Tehran Nano Pars Company, and Inhibitory zone diameter was measured.

Results: Of 186 isolates, 140 (%75/3) are gram-negative bacilli producing ESBLs and 46 (24.7%) of them without this capability. Most of ESBLs bacteria are belonged to urine infections and the most prevalent bacterium is *Klebsiella pneumonia.* All samples are sensitive to the nano silver solution with density of 100 ppm. *Enterobacter aerogenes* (24 mm) and *Pseudomonas aeruginosa* (23mm) have the greatest Inhibitory zone diameter in the presence of 500 ppm of silver nanoparticles.

Conclusion: It seems that silver nanoparticles have inhibitory effect on all studied gram negative bacilli. The inhibitory effect of silver nanoparticles against ESBL producing Gram negative bacteria is dose depended.

Keywords: Gram-negative bacilli, ESBLs, silver nanoparticles.