Comparison of the Antibacterial Effects of Nanosilver With 18 Antibiotics on Multidrug Resistance Clinical Isolates of *Acinetobacter baumannii*

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Background: *Acinetobacter baumannii* plays a significant role in nosocomial infections. Multidrug-resistant *A. baumannii* is recognized to be among the most difficult antimicrobial-resistant Gram-negative bacilli to be controlled and treated. For this reason we examined the efficacy of nanosilver material with strong disinfectant properties against different types of bacteria.

Objectives: The purpose of this study was to examine the antibacterial activity of silver nanoparticles and compare them with some antibiotics against clinically isolated *A. baumannii* bacteria.

Materials and Methods: 60 *A. baumannii* strains were isolated from clinical specimens of university hospitals in Tehran province of Iran. The susceptibility test against 18 different antibiotics was investigated by disk diffusion methods. Colloidal nanosilver with about 6-34 nm particle size was prepared by chemical method. The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) effect of nanosilver on *A. baumannii* were assessed at serially diluted nanosilver concentrations and compared to different antibiotics.

Results: The findings showed a 100% resistance of *A. baumannii* to different antibiotics, including piperacillin, cefixime, ceftazidime, ceftizoxime, cephepim and clavulanat, and more than 90% resistance against imipenem, cefotaxime, ceftriaxone, ciprofloxacin and cotrimoxazole and lower resistance was seen against nitrofurantoin (62.8%), gatifloxacin (56.85%), levofloxacin (55.18%), gentamycin (29.32%), piperacillin/tazobactam (13.34%), meropenem (13.16%) and amikacin (12.07%). MIC and MBC mean value of nanosilver dilutions were determined as 27.34 ppm and 54.68 ppm, respectively. All isolates (100%) were susceptible to more than MIC of nanosilver in contrast showed high resistance to multiple classes of antibiotics.

Conclusions: We conclude that nanosilver is a strong bactericidal agent to Multidrug resistant *A. baumannii* bacteria, so it can be useful to prevent a variety of nosocomial infections.

Keywords: Acinetobacter baumannii; Antibacterial; Emotions; MBC

1. Background

The genus *Acinetobacter* includes Gram-negative coccobacilli, with a DNA G+C content of 39 to 47 mol%, which are strictly aerobic, nonmotile, catalase positive and oxidase negative and has been divided into16 genome species (1, 2). *Acinetobacter* species are capable of colonizing and infecting human beings. They have been involved in a variety of nosocomial infectious diseases. *Acinetobacter baumannii* has become a particularly important organism in the Intensive Care Unit (ICU) (3). Infections occur in the respiratory and urinary tract, peritoneum, surgical wounds, skin and eyes. Bacteremia and secondary meningitis with mortality rates from 20% to 27% were seen in several cases (1). They have been reported to be thecommon agents of nosocomial pneumonia, particularly ventilator-associated pneumonia (VAP) in hospital ICUs (3, 4).

A. baumannii were shown to have the propensity to tolerate drying and resist multiple classes of antibiotics and

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Implication for health policy/practice/research/medical education:
Acinetobacter baumannii play a significant role in nosocomial infections. Multidrug-resistant *A. baumannii* is recognized to be among the most difficult antimicrobial-resistant Gram-negative bacilli to control and treat. For this reason we examined the efficacy of nanosilver material with strong disinfectant properties against different types of bacteria. This Paper was the result of research on nanosilver products for prevention and treatment of some infectious disease.