

Original Paper

# Minimum inhibitory concentration of silver nanoparticle against *Staphylococcus aureus* and its relation with Methicillin resistance and bacterial source of isolation

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## Abstract

**Background and Objective:** The rise of antibiotic resistance particularly Methicillin resistance in pathogenic bacteria such as *Staphylococcus aureus* is found to be an emerging threat to human health especially in hospitals. Heavy metal nanoparticles such as Ag used for inhibition of this bacterium. This study was done to determine of minimum inhibitory concentration (MIC) Ag nanoparticle against *Staphylococcus aureus* which isolated in Gorgan, north of Iran and its relation with Methicillin resistance and source of bacteria.

**Methods:** In this descriptive – analytical study, the MIC Ag nanoparticle in 183 isolates of *Staphylococcus aureus* by microdilution method was determined. 30 isolates, based on *mecA* gene was considered as MRSA. Samples were collected from patients, nose of healthy carriers and foods. Compare the MIC of isolates based on Methicillin resistance, source of the bacteria and resistance to other antibiotics were assessed.

**Results:** Out of 183 samples MIC was varied from 1 to 16 µg/ml, and mean±std was 2.9±1.89 µg/ml. MIC mean of silver nanoparticles in isolated from foods were 2±0.7, isolated from healthy carriers were 4.1±2.4 and from patients were 3.4±2.1 µg/ml and were statically significant (P<0.05). MIC mean of silver nanoparticles in MSSA isolates are 3.9±2.3 and in MRSA isolates are 2.4±1.4 µg/ml that were statically significant (P<0.05). MIC mean of gentamycin resistant isolate were lower than sensitive one. But between MIC of silver nanoparticles and other antibiotics resistance was not significant statistically.

**Conclusion:** There is a relation between silver nanoparticle MIC, source of sample isolation, Methicillin and gentamycin resistance. Since MIC of silver nanoparticles on isolates of Methicillin resistant is low, the possibility of its use in the control of MRSA in hospital infections can be considered as a prime attention the Gentamycine.

**Keywords:** *Staphylococcus aureus*, Silver nanoparticle, Minimum inhibitory concentration, *MecA* gene

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