

The Study of effect Nano-Titanium Dioxide on Multi Drug Resistance (MDR) *Klebsiella pneumoniae* and *Staphylococcus aureus*

Rezvan Ayati^{1*}, Monir Doudi², Marziyeh Karami³

1-Ms Student, Department of Microbiology, Falavarjan Branch, Islamic Azad University, Isfahan, Iran

2- Assistant Professor, Department of Microbiology, Falavarjan Branch, Islamic Azad University, Isfahan, Iran

3- Department of Microbiology, Young Researchers Club Islamic Azad University, Falavarjan, Isfahan, Iran.

*Corresponding author. E-mail: drayati@yahoo.com

Background and Purpose

Klebsiella pneumoniae and *Staphylococcus aureus* (MDR) are of major hospital pathogens that are the potential causes of severe infections, especially in the intensive care unit and is among the many patients. On the other hand nanoparticles of titanium dioxide has a very strong antibacterial activity against most bacteria. The main objective of this research is study the effects of TiO₂ nanoparticles on the bacteria resistant to multiple antibiotics (MDR) is listed.

Material and Methods

The research project initially were collected 102 isolate Multi Drug Resistance *Klebsiella pneumoniae* and *Staphylococcus aureus* in several hospitals in Isfahan (Gharazy, Sina and Alzahra) and were identified using the differential and specific biochemical test and were affect disks impregnated with nanoparticles of TiO₂ (10 µgr / disc and 30 µgr / disc) that possess characteristics such as size 10-15 nm (100 g/m²) SSA, spherical shape and white, with 1 ppm concentrations, the antibacterial properties of these nanoparticles were evaluated after 24 hours under 37 ° C, and inhibition zone diameter was measured. It is worth noting that invivo part of the research is being done on Balb/C mice.

Results

The results showed that TiO₂ nanoparticles disks containing 10 µgr / disc does not have any antibacterial properties on Multi Drug Resistance *Klebsiella pneumoniae* and *Staphylococcus aureus* (MDR) after 24 h at 37 ° C. But the affected disks containing 30 µgr / disc after 24 hours at 37 ° C, *Klebsiella pneumoniae* (MDR) inhibition zone diameter was 9 mm and but the inhibition zone diameter of *Staphylococcus aureus* (MDR) was seen 18 mm.

Conclusion

The findings from this study, high concentrations of TiO₂ nanoparticles up 30 mgr / disc can prevent Multi Drug Resistance *Klebsiella pneumoniae* and *Staphylococcus aureus* (MDR) bacteria growth. But since these results are related to invitro conditions, generalize these results for human uses must be assessed of non-toxic effects of these nanoparticles in invivo terms.

Keywords

Titanium dioxide nanoparticles, MDR, *Klebsiella pneumoniae*, *Staphylococcus aureus*