OP 5

TiO_2 21 nm nanoparticles as a photocatalytic antimicrobial agent against *Escherichia coli, Candida albicans* and Methicillin resistant *Staphylococcus aureus*: A comparison

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Objectives: To determine and compare the antimicrobial activity of 21 nm TiO_2 nanoparticles against *Escherichia col*i, *Candida albicans* and Methicillin resistant *Staphylococcus aureus* (MRSA).

Methods: Titanium dioxide (TiO_2) 21 nm anatase nanoparticles (13.9 g/l) were suspended in miliQ (MQ) water, sonicated (35 MHz for 1 hour) and autoclaved. Sterile glass petriplates were treated with TiO_2 suspension or sterile MQ(control). Overnight cultures of *E.coli* MRSA and *C. albicans* were added to TiO_2 coated plates and control plates and kept at room temperature. Viable counts were obtained by spread plate method at 0 hours and 24 hours; before and after sunlight exposure for 30 minutes. Colony forming units (CFU) / ml was calculated to determine percentage reduction of CFU in presence of TiO_2. Experiments were done in triplicates.

Results: TiO_2 nanoparticles demonstrated antimicrobial activity against *E.coli*, MRSA and *C. albicans*. Estimated percentage CFU reduction in *E.coli* (13±8.4), MRSA (12±6.6) and *C. albicans* (36±4.9) was observed at 0 hours of contact in the supernatant. The bactericidal effect was enhanced on exposure of the plates to sunlight. Estimated percentage CFU reductions are *E. coli* (46±7.9), MRSA (99±0.2) and *C. albicans* (99±0.4). The results for 24 hours were (95±1), (35±2.1) and (83±4) reduction for *E. coli*, MRSA and *C. albicans* respectively. When the 24 hour plates were exposed to sunlight (99±0.6), (99±0.6) and (99±0.2) reduction was seen for *E.coli*, MRSA and *C. albicans* respectively.

Conclusion: Anatase 21 nm TiO_2 nanoparticles show enhanced antimicrobial activity against the tested microbial strains following photoactivation by sunlight. Antimicrobial activity against three different types of microbial strains has varying effects.