



كلية البنات للآداب والعلوم والتربية

قسم النبات

جامعة عين شمس

دراسة تأثير مضادات الميكروبات المصنعة من الفضة النانوية على عدوى المستشفيات

رسالة

مقدمة للحصول على درجة الدكتوراه في فلسفة العلوم (الميكروبيولوجي)

مقدمة من

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ماجستير علوم الميكروبيولوجي (٢٠٠٨)

قسم النبات

كلية البنات للآداب والعلوم والتربية

جامعة عين شمس

٢٠١٨



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قسم النبات
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Faculty of Women for Arts,
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Study the antimicrobial effects of synthesized promoted nano-silver on nosocomial infections

A Thesis
Submitted for the degree of Ph.D
in **Microbiology**

By
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M.Sc. of Microbiology (2008)

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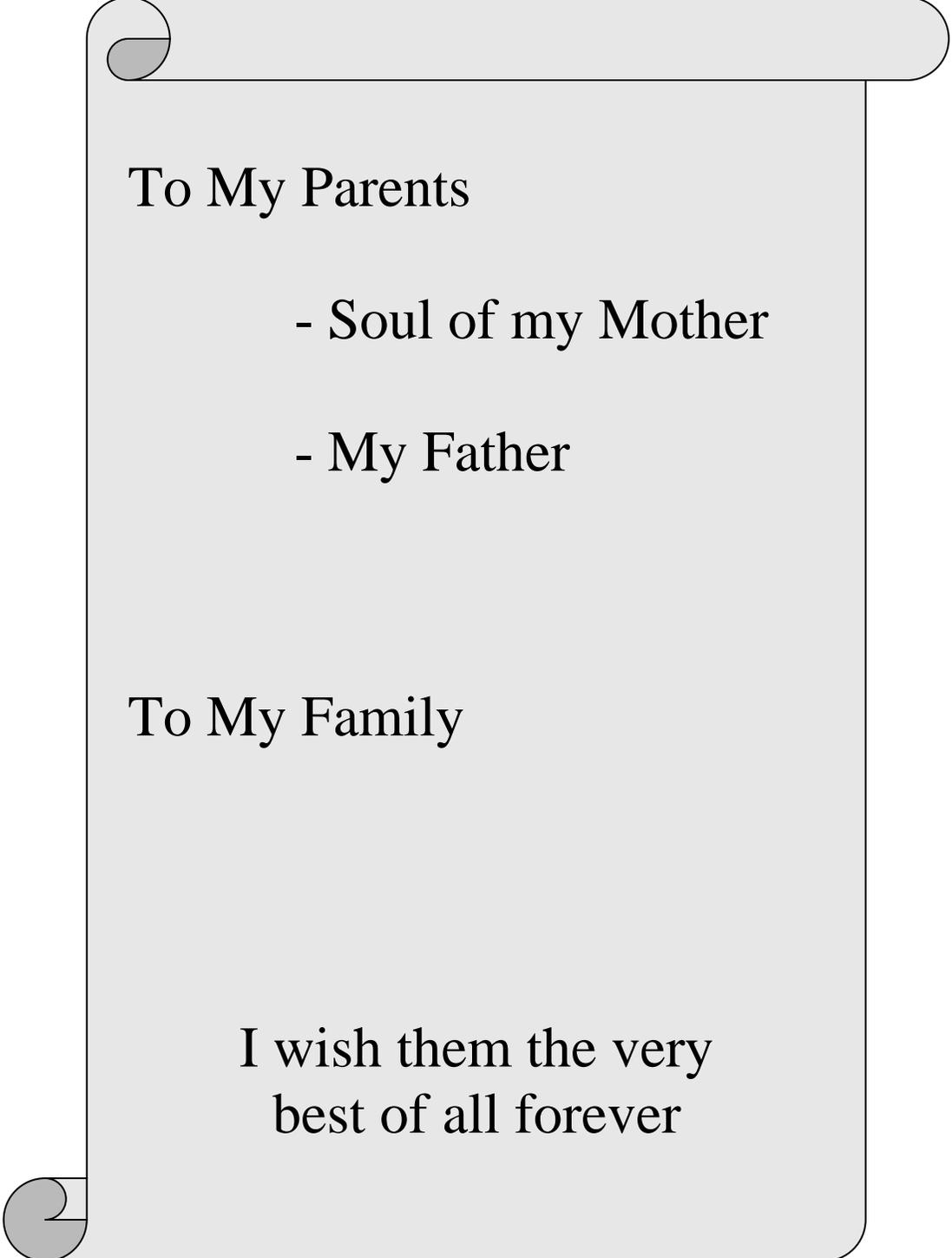
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To My Parents

- Soul of my Mother
- My Father

To My Family

I wish them the very
best of all forever

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ABSTRACT

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In perspective study including 100 consecutive hospitalized patients from five hospitals (ICU) with Nosocomial infections (NI) that are acquired in a hospital setting. From a total 100 specimens, 56 samples developed bacteria and the other 44 samples gave no growth.

Synthesis of silver nanocomposites (AgNPs@MMT) were fabricated with different silver nanoparticles to montmorillonite clay (MMT) ratios using microwave-assisted synthesis method, and silver nitrate was used as the precursor of silver nanoparticles.

The antibacterial activity of the prepared AgNP@MMT nanocomposites was tested. The Nanocomposite with different Ag concentration (1%, 3%, 5%) were most active against *S.aureus* (2.9, 3.9 and 4.5 cm) respectively, than that of *P. aeruginosa* (1.0, 2.5, 3.7 cm) respectively.

The prepared nano-composites were characterized by N₂ adsorption-desorption isotherms, X-ray diffraction (XRD), field emission scanning electron microscope, high-resolution transmission electron microscope (FETEM), X-ray fluorescence spectroscopy and Fourier transform infra-red spectroscopy.

Data revealed the 5% AgNP@MMT nanocomposite is much more effective than silver nitrate and shows strong antibacterial activities. The efficiency of antibiotics increased when combined with 5% AgNP@MMT

nanocomposite against both the tested strains. The increase in fold areas was higher in case of *P. aeruginosa* than *S.aureus*.

Overall, the synergistic effect of antibiotics and nanoparticles clearly revealed that nanoparticles can be effectively used in combination with antibiotics in order to improve their efficiency against various pathogenic microbes.

Protein profile of the tested resistant bacteria (*S.aureus* and *P.aeruginosa*) which treated with AgNP@MMT (1%, 3%, 5%) gave change of the M.WT of the protein profile into the treated bacteria compared to the untreated one.

The results of the current study revealed that alternative approaches other than conventional antibiotic therapy are in need to treat biofilm and that achieved by anti-biofilm contains on modifying the surface of medical devices (urinary catheter). Antibiofilm effect of the biogenic silver nanoparticles coated catheter by using a super hydrophilic coating from a mixture of nanosaturated silica colloids against *S.aureus* and *P.aeruginosa* decrease the adhesion by two bacteria and prevent biofilm formation and hence, decreasing the burden of the multidrug resistance phenomena.

The cytotoxicity assay of 1%,3% and 5% AgNP@MMT, the cell viability assays indicated that AgNPs had inhibitory effects on McF-7 cell line more effectively than HePG-2 cell line. Also, cytotoxicity assay indicated that bactericidal concentrations of AgNPs/Ps/2%MMT against the tested bacteria, were not harmful to normal human lung fibro blast cells.

Keywords:

Polymer, coatings catheter, Nosocomial infections, silver nanoparticles montmorillonite clay (MMT), Nanocomposite materials, biofilm, nanotoxicology.

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