SUMMARY

CONTROL OF BACTERIAL CONTAMINATION OF NURSERY INCUBATORS AND OPERATING ROOMS

This study concern with bacterial infections in operating rooms and nursery incubators. Samples were collected from nursery incubators and operating rooms of Zagazig University hospitals, different bacterial isolates collected by sterilized swap from nursery incubator and from operating rooms. Also samples were taken from operating tables, floor, instruments, beds, lamps and windows. The bacterial isolates identified as *Klebsiella* spp , *Pseudomonaus* spp , *E. coil* , *Proteus* spp and *S.aureus* . Bacterial strains cause nosocomial infection in hospital, so antibacterial effects of antibiotics, essential oils, combination between antibiotics and essential oils and radiations by were studied on these bacterial isolates . Also the effect of different essential oils on the ultrastructure of bacterial isolates by using using Transmission Electron Microscope (TEM) were studied .The obtained results summarized as the following : -

1- Different morphological , physiological and biochemical tests were used to identify bacterial isolates , the dominant bacterial isolates were *E. coil* , *Pseudomonas* spp , *Klebsiella* spp , *Proteus* spp and *S. aureus* .

2- Antibacterial effect of antibiotics show that impinem and ciprofloxacin very effective on Gram negative bacteria with percentage 97.5 % and 87.5 % respectively , gentamycin have moderetley effect 32 % on Gram negative bacteria but piperacillin, clindamycin and choloramephnicol have very low or no effect on bacterial isolates with percentages of 2.5, 0 and 0.5 % respectively. Also impinem and ofloxacin were very effective on Gram positive bacteria with percentage 100 % for both while choloramephnicol show 60 % .ampicillin, sulphamethoxazole and erythromycin have no any effect on Gram positive bacterial isolates .

3 – In the experiment for determination MIC and MBC for impinem and ciprofloxacin show that MIC for impinem less than ciprofloxacin against *Pseudomonas* spp , *E. coil* , *Proteus* spp .

4 – Different essential oils was studied on both Grams negative and Gram positive bacteria , The results show that thyme and rosemary inhibit the growth of Grams negative bacteria, Caraway have no effect on *Pseudomonaus* spp and have weak effect on another Gram negative bacteria where chamomile have not any effect on Gram negative of bacterial isolates. The effect of essential oils showed that the thyme , cloves , pepper , rosemary and chamomile inhibit growth of *S. aureus* while caraway, lemon, jasmine and anise have low effect on *S. aureus* .

Also garlic had any effect on on *S.aureus* .

5 – Combination between antibiotics and essential oils become effective against different bacterial isolates than using both individually .

6 –The effect of ultraviolet radiation (254 nm) was studied on the survival of bacterial isolates of viable cells after exposure for different periods (0, 1,2,3,4,5, 6,7,8,9,10,11,12 minutes) at 20 cm distance from UV lamp. UV radiation inhibit growth of different bacterial isolates , after 8 and 9 minutes of exposure to ultraviolet , the total counts of survival cells was very low . The lethal time for *E. coil* , *Proteus* spp and *Pseudomonas* spp was 10, 8 ,11 minutes respectively .

7- Gamma irradiation has antibacterial effect on different bacterial isolates , increasing gamma irradiation doses decreased the total number of viable bacterial cells of bacterial isolates , the lethal doses for *E. coil* , *Proteus* spp and *Pseudomonas* spp was 4,4 and 5 KGy respectively

8 - X radiation reduce the total number of viable bacterial cells and increasing of X radiation doses decreased that total number of viable bacterial cells. The lethal dose was 3, 4 and 4.5 KGy at which there was no survival cells for *E.coli Proteus* spp and *Pseudomonas* spp respectively .

9 - Effect of both thyme and jasmine oils on ultrastrcture of *Pseudomonaus* spp using Transmission Electron Microscope (TEM) show that thyme oil cause damage to cell wall and damage for cytoplasm while jasmine had no effect on ultrastrcture of *Pseudomonas* spp .

CONCLUSION AND RECOMMENDATION

Infections acquired in the healthcare setting raise a great risk for patients, leading to high rates of morbidity and mortality. Many of the 90,000 deaths caused by nosocomial infections could be prevented by following evidence-based guidelines and consensus statements on preventive strategies . Several institutions have implemented campaigns to enhance the quality of health care and patient safety by focusing on measures to reduce the four most common nosocomial infections: urinary tract infection, surgical site infection, pneumonia, and intravascular device-related bloodstream infection, which comprise approximately 80% of all nosocomial infections .The single most effective preventive measure for all nosocomial infections is appropriate hand hygiene, and all efforts to reduce the rate of nosocomial infection must focus on enhancing compliance with this measure, which currently averages approximately 30% to 50% .

From this study the most bacteria responsible for nosocomial infection in operating rooms are were *Klebsiella* spp, *Pseudomonas* spp, *E. coil* , *Proteus* spp and *Staph aureus* .The most effective antibiotics were impinem , ciprofloxacin and ofloxacin for different bacterial isolates. Essential oils gave best results against different bacterial isolates especially rosemary, thyme and clove. Also combination between antibiotics and essential oils become effective against different bacterial isolates than using both individually. Ultraviolet radiation (254 nm) after 10 minutes destroy different bacterial cells. Gamma irradiation result of our study capable of destroy most bacterial cells after exposure to 3 KGy. X rays radiation result in this study inhibit growth of different bacterial cells after exposure to 3.5 KGy.

From this study we can recommended that :

Staff and all hospital personnel must follow wash hands with either a no antimicrobial soap and water or an antimicrobial soap and water. Essential oils was natural product can inhibit growth of different bacterial cells so it can be used for

sterilization operating rooms and nursery incubators. Also the combination between essential oils and antibiotics become useful than using both individually and can reduce the side effect of antibiotics. Ultraviolet radiation must be used in sterilization of operating rooms hence it can destroy bacterial growth. We recommend hospitals can include small unit of gamma or X rays, this can be useful in sterilization medical equipment, nursery incubator and operating rooms after each use.