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RESEARCH PAPER

Evaluation of Efficiency of some Disinfectants and Antibacterial Agents on Bacterial Pathogens Isolated from Post-operative Wounds

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ABSTRACT

The most likely organisms to infect clean operation wounds in hospital are Staph. aureus, Pseudomonas. aerugionsa, and Eschericia.coli, as with accidental wounds local treatment often sufficient.Evaluation the effects of plant extracts of Myrtus communis, Eucalyptus, and Nerium oleander on the types of bacteria , in comparison with the standard antibiotics .A total of 40 specimens were collected from surgery units of teaching Hospital, and AL-Basrah General Hospital during Sep 2007 to April 2008. Four disinfectants :Hibitan, Septol, providine Iodine, and savlon, plant extracts of Myrtus communis, Eucalyptus, and Nerium oleander, in comparison with the standard antibiotics were testing against bacterial pathogens associated with postoperative wounds. From a total of (40) post operative wounds 72.5% are positive cultured cases, while 27.5% are negative cultured cases.Staph. aureus and pseudomonas spp are bacteria in percentage (75.86), while protease is the lowest isolated from (20.68%) from all positive cases.Four disinfectants (Hibitan, Septol, Iodine, and savlon), and three plant extracts of Myrtus communis, Eucalyptus, and Nerium oleander, and eight standard antibiotic were used for determine antibacterial activity of its.Most diluted concentration of disinfectants, lowest con. Of extracts, and some antibiotics are not effective on the bacterial types effects plant extracts are locate within the limits of studied antibiotics that give inhibition zones between 10-30 mm against all bacterial pathogensThere are avariety of effects of various disinfectants in comparison with plant extracts and antibiotics against bacterial pathogens associated with postoperative wounds.

***KEY WORDS**: postoperative wounds ,bacteria , disinfectants , plant extracts , antibiotics*

INTRODUCTION

Wound infection has been defined as wound with pus visible to the necked eye, whether or not organisms could be cultured from the purulent material [1].

Open injuries whether caused a laceration, a crash injury or a penetrating missile wound have three facets in common and differ only in a matter of degree. All are considered to be primarily contaminated by microorganisms, all may contain foreign babies and all are likely to contain a significant amount of devitalized or necrotic tissue[2].

The most likely organisms to infect clean operation wounds in hospital are *Staph. Aureus, ps. aerugionsa, and E.coli*, as with accidental wounds local treatment often sufficient[3].

If infection is deep- seated or becomes generalized appropriate systemic treatment must be administered [4].

In addition, the entry site should be cleansed daily and treated with one of the antiseptics such as centaulon, Hibitane, and quinolines [5].

A vast amount of work has done over the post 50 years in attempts to explain the infection that can follow “clean” surgical operation, but still no complete satisfactory solution (s) has been documented. There is still uncertainly as to how often a wound is infected in the operating room, and how often at a later data during the healing of the wound [4].

There are those who deny that air in the operating theatre is an important source of infection because bacterial pathogens from only a minute fraction of colonies grown from the air. In the ward, on the other hand, the aerial route for post-operative cross-infection is regarded as a potent one [6,7].

The present study aimed to Isolate the major bacterial types associated with postoperative infected wounds, evaluate the efficacy of four disinfectants on the major bacterial types, and evaluate the

effects of plant extracts of *Myrtus communis, Eucalyptus, and Nerium oleander* on the types of bacteria , in comparison with the standard antibiotics .

MATERIALS AND METHODS

Post-operative wounds

A total of 40 specimens were collected from surgery units of teaching Hospital, and AL-Basrah General Hospital during Sep 2006 to April 2007.

Bacteriology Study

Sterile swabs used for collect the sample and inoculate in Blood agar base (oxoid) MacConkey agar (oxoid), and nutrient agar (Difco).

The identification of various bacterial types carried depend routine laboratory techniques [8].

All cultures are incubate aerobically in incubator for 24 hrs on 37 ^{0}C. All media sterilized by autoclave qaz`1(1.5 pond/ cm^{3}) for 15 minutes. All Glassware's sterilized by oven (180-200 0C) for 2 hrs.

Disinfectants

Four disinfectants are used in this study Hibitan, Septol, providine Iodine, and savlon.

Table –1-: two concentrations of each disinfectant are used susceptibility test (100% & 50%).

Disinfectants	Scientific name	Commercial Conc.
Hibitan	Chlorhexidine gluconate	5%
Septol	Chloroxylenol	5%
Providine Iodine	Iodine	10%
Savlon	Chlorhexidine Cetrimide	0.3% Chlorhexidine 3% Cetrimide

Plant extracts

Three medicinal plants were used in our study: *Myrtus communis* L. (myrfaceac) Comm. Name: *Yass tree Eucalyptus* L. (Myrtaceas): Comm. Name: Camphor tree, *Nerium oleander* L. (apocynaceae) Comm. Name: Diflla tree.

Various aqueous concentrations (100,500, and 1000 meg/ml) of leaves extract from each plants were prepared by superior (Ihsan AL-Saimary), and sterilized by filtration (Millipore filter 0.45 Mm 25mm).

Antibiotics

Eight standard antibiotics (as antibiotic disc) were used for comparison effects: Penicillin G (P) iounite), Chloramphenical (C) 30 meg, Cephalexin (CE) 30 meg), Bactrim Sxt (25 meg), Tetracycline TE (30 mcg), Erythromycin E (15 mg), Kanamycin K (30 mcg), and Gentamicin CN (10 mcg).

Evaluation of the antibacterial activity

Plate (Agar diffusion) methods was used to evaluated the antibacterial activity of disinfectants, plant extracts and antibiotics on growth of bacterial types isolated from post operative wounds: to determine Inhibition zones (mm) by a sing Mueller- Hinten Agar MHA (Oxoid).

The present study was carried out with improvement and agreement of Ethical & Medical Committee in College of Medicine and Al-Sadder Teaching Hospital and General Basrah Hospital – Basrah

RESULTS

Presence percentage of major bacterial types are showed in Table-2- from 40 bases, 29 cases (72.5%) yielded positive culture results, while II cases (27.5%) are negative cultured cases (no growth).

From positive cases: the following types of bacteria and their percentages may show:

Staph. aureus and *Pseudomonas* (22 cases 75.86%) *Staph. epidermidis* (16 cases 65.16%). E.cdil (14 cases 48.27%) ,β-hemolytic streptococci (13 cases (44.82%)), α- hemolytic streptococci (10 cases 34.48%)), *Klebsiella* (8 cases 27.58),and *Proteus* (6 cases 20.68).

Total number of isolated (106) bacterial types from all positive cases.

Result of Antibacterial activity of disinfectants, plant extracts and antibiotics determine by Agar

diffusion (plate) method (Determine growth inhibition zones (mm) are listed below:
The greatest effects are for 100% concentration of all disinfectants and for meg/ml of plant extracts while most others 50% of disinfectants and 100 meg/ml of extracts are not effective of the genera of bacteria. We can summarized the biggest inhibition zones as follow:

- (8,10,8,6, NE,12,10,12) mm for 100% Septol.
- (10,12,10,NE,8,12,11,10) mm for 100% Iodine.
- (16,15,8,11,9,12,10)mm for 100% Savlon.
- (20,15,14,13,15,12,11,14) mm for 1000 mcg/ ml for extract of Eucalyptus
- (12,11,13,9,12,11,12,11)mm for 100 cimeg/ml for extract of Myrtus communis
- (18,20,14,11,13,10,12,11)mm for 100 mcg/ml for extract of *Nerium oleander* on growth of *E. coli*, *Klebsiella*, *Proteus*, *Pseudomonas*, *Staph aureus*, *Staph. Epidermidis*, α--hemolytic streptococci, and β-hemolytic streptococci respectively.

In comparison with standard antibiotics, the ranges inhibition zones are between 10-30 mm, while some antibiotics are not effective some bacterial types.

(NE : Mean not estimated)

Table –2- Percentage of bacterial types isolated from post-operative wounds (40 cases)

Bacterial types	No. cases	% from total No. of +ve cases (29)	% from total No. of isolates (106)
Escherichia coli	14	48.27	13.2
Klebsiella	8	27.58	7.5
Proteus sp.	6	20.68	5.6
Pseudomonas sp.	22	75.86	20.7
Staph. aureus	22	75.86	10.3
Staph. Epidermidis	16	75.86	20.7
α- hemolytic streptococci	10	34.48	9.4
β-hemolytic streptococci	13	44.82%	12.2
		% from total	
Total no. of +ve cultured cases	29	72.5	
Total no. of +ve cultured cases	11	27.5	
Total no. of isolates	106		

DISCUSSION

Our result revealed a highly infected percentages of post-operative wounds with a many bacterial types, only 11 cases 27.5% are negative cultured, these facts may indicate a high contamination of post operative wound with aerobic and anaerobic bacteria depend on many factors, such as careless of patents, poor nursing services, highly diluted disinfectants, contamination of surgical instruments, contamination of theater room, not give a suitable antibiotics in treat a infected post operative wound and other factors [9, 10].

The problem of hospital infection is a real one. Antibiotic-resistant *Staph.aureus* and various Gram-negative bacilli-inespecially. *Pseudomonas* have played a predominant role[7].

Self-infection (endogenous) may be due to bacteria causing infection (e.g. from boils) or carried by the patients without any systems on the skin, in the nose, mouth, or in the intestinal tact [11].

Cross-infection and infection from the environment (exogenous may occur with organisms transferred from patients or members of staff by contact or via airborne routs. Infection may be transferred on hands, or clothing of staff, visitors, or ambulant patients, on inadequately sterilized instruments, on fomites or in fluids (e.g. *Ps. aeroginosa* in cetrimide containing disinfectant) etc. [2, 13].

Also many another studies [12, 4, 5] show that nurses, doctors and others who attend to many patients can transfer infective organisms from one patient to another, visitors may transfer their own

microorganisms. Airborne transfer may occur through the dispersal of minute skin scales or minute droplets from the mouth, wound dressings dust or nebulisers serves as a potential source of airborne infection.

Disinfection solutions contaminated with Gram negative bacilli are a particular hazard in hospital and infections originating from them have been reported [13].

Contamination is usually due to inappropriate disinfectants, the use of weak solutions, or "topping up" of containers [3].

Our study approved results of above and other studies, we found that many disinfectants in 50% of dilution and some of concentrated solution 100% are not effective against some bacterial types.

The hospital staff responsible for buying and using environmental disinfectants are often poorly trained in control of infection techniques and have little knowledge of microbiology. All disinfectants are more or less equally effective, irrespective of concentration, and no bacteria will survive in a disinfectants solution. If a surface is treated with a disinfectants, bacteria will continue to be killed even after the surface has dried [7, 11, 13].

Extracts of *Myrtus commanis*, Eucalyptus, and Neriam oleander give a useful effects on bacterial types, these may be due to a highly concentrated antibacterial agents present in these plants, therefore, some of them used in Arabic medicine for treating of many infections diseases, but little acknowledge or information available in word about antibacterial properties of these extracts. So, some of them using in mummification, preservation, and other important process, such as in Egyptian civilization employed variety of balsams, camphoroil, which contained natural preservative. Natron, a crude of native sodium carbonate, was also used to preserve the bodies of human and animal alike, also wine, vinegar and honey were used on dressing and as cleansing agents for wounds, and it is interesting to note that diluted acetic acid has been recommended comparatively recently for the topical treatment of wound and surgical lesions infected by *Pseudomonas aeraginesa* and *Staph. Aureas* [14, 6, 10].

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