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Bacterial pathogens from wound infection and their susceptibility against different antibiotics

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The present study pertains the isolation of aerobic microorganisms from wound infection and to study its antibiogram. From the collected 20 wound samples 10 isolates were identified. *Pseudomonas aeruginosa* (24%) was the predominant isolate followed by *Staphylococcus aureus* (20%) and *Escherichia coli* (20%). Antobiogram study reveals that all the isolates were sensitive to Ciprofloxacin and Sporidoxin.

Key words : Wound Pathogenic Bacteria, Antibiogram Endogenous and Exogenous.

INTRODUCTION

Wounds are injuries to body tissues caused by disease processes or events such as burns, punctures, and human or animal bites. Wounds or abscesses also occur within body tissues as a result of surgery or dental procedures. Wounds become infected when microorganisms from the outside environment, or from within the person's body, enter the open wound and multiply. A wound that is red, painful, swollen, and draining pus is probably infected.

Nearly 10 million patients with traumatic wounds are treated annually in the United States. Infections of the skin and skin structures in these patients frequently occur in surgical wounds, burns, and other exposed tissues (Pruitt *et al*., 1998). These infections are responsible for significant human mortality and morbidity and often result in prolonged hospital stays and/or increased health care costs (Green and Wenzel, 1977). Both gram-negative and gram-positive microorganisms cause these infections.

Infectious disease is the number one cause of death accounting for approximately one-half of all deaths in tropical countries. Besides, incidents of epidemics due to drug resistance, resistant microorganisms pose enormous public health concerns (Jensen *et al*., 1996 and Guyoi, 1996).

Perhaps it is not surprising to see that infectious disease mortality rates due to drug resistant microbes are actually increasing in developed countries. Wound infection may be endogenous or exogenous. Endogenous or auto infections are caused by organisms that have leading to commensal infection. Bacteriological studies reveals that Staphylococcus aureus, a member of normal flora of skin are associated with uninflamed wounds (Topley Wikllson, 1984). Microorganisms can enter body through cuts, abrasions and wounds. In case of wounds infected outside the hospitals, the patients are the main source of infection. Whether harmful or harmless colonization occurs depend on the virulence of the organisms and the local resistance of the host. A knowledge of the patients general and local condition is, therefore, important in assessing significance of bacteriological findings (Mackie and MacCartney, 1984). Human infection caused by fungi and bacteria have become a formidable therapeutic challenge. A study was conducted in Government Hospital, Velur for 20 cases of wound infection which include both outpatients and inpatients.

Much of the exploration and utilization of natural products as antimicrobials arise from microbial sources. It was the discovery of penicillin that led to later discoveries of antibiotics such as Streptomycin, Aureomycin and Chloromycetin. (Trease and Evans, 1972). Despite significant value of antibiotics, the increase of bacterial resistance has restricted their clinical application (Yurdakok *et al*., 1997 and Neu, 1992). The development of drug resistance in human pathogens against commonly used antibiotics has necessitated a search for new antimicrobial substances from other sources including plants (Erdogrul, 2002).

The development of wound infection depends on the integrity and protective function of the skin (Calvin, 1998) It has been shown that wound infection is universal and the bacterial type varies with geographical location, resident flora of the skin, clothing at the site of wound, time between wound and examination. In recent years, there has been a growing prevalence of Gram negative

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organisms which have almost replaced *Staphylococcus aureus* in nosocomial infection. Of the Gram negative bacilli, Pseudomonas aeruginosa has been of particular interest, the incidence of which in wound infection has increased compared to a decade back study (Joshi *et al*., 1984) It has also been observed that 28% of healthy people in hospital environment are carrier for *P. aeruginosa* (Kolmos *et al*., 1997).

The present study pertains to isolation and identification of aerobic bacterial pathogen and their susceptibility to different antibiotics.

Materials and Methods

The specimen used in this study was pus sample. Pus swab and wound swabs were collected from both out patients and inpatients of Govt. Hospital, Velur. A total of 20 swabs were collected.

Nutrient agar, Blood agar and Mac Conkey agar were used for the isolation procedure. Peptone water, MR-VP broth, Simmon citrate agar, Urease agar base, TSI agar, were used for identification tests. For testing the sensitivity of antibiotics the Mueller Hinton Agar was used. An Identification of the bacterial pathogen was done by the following routine cultural practices and biochemical tests (Aneeja, 1996). Antibiotic discs of Ciprofloxacin (Cf), Sporidoxin (Sp) Chloramphenicol (C), Gentamycin, (G) Cephlexin (Ce), Streptomycin (S) and Bacitracin(O).

Collection of specimen:

From deep open wounds, the wound margins were decontaminated with surgical soap and 70% alcohol and two deep swabs were collected without touching the adjacent skin. The swabs were transported to laboratory in peptone water (Shilletti *et al*., 1997)

Isolation and identification:

Bacteria from the sample were isolated by standard isolation techniques which include culturing on Nutrient agar, blood agar and MacConeky agar. The isolates were identified by staining techniques and standard biochemical tests like IMVIC, Urease, TSI and carbohydrate fermentation tests etc. (Kannan, 1996).

Antibiotic sensitivity test:

The isolated organisms were swabbed on Mueller Hinton agar surface and different antibiotic discs were placed on the inoculated plate. Then the plates were incubated and the zone of inhibition is measured (Baur *et al.*, 1966) and tabulated the result. The sensitivity pattern was fixed using the Hi media standard antibiotic charts.

Results and Discussion

A total of ten organisms were isolated from twenty samples. The microorganisms isolated and their percentage of availability were given in Table 1. The predominant isolate was *Pseudomonas aeruginosa* which include 24% of total isolates. *Staphylococcus aureus* and *Escherichia coli* constitute 20 % of total isolates. The rarely found organism was *Citriobacter freundii* which constitute 2% of total isolates, 14% of *P. valgaris* were isolated from the samples, *Klebsiella pneumoniae* were found in 6%, *Proteus mirabilis* were found in 4.5% and others were available in 4.5% to 2% of total isolates.

Table 1: Microorganisms isolated from wound samples

Sr. No	Name of Microorganism	Total isolates
1.	*Citrobacter freundii*	2%
2.	*Enterobacter aerogens*	4%
3.	*Escherchia coli*	20%
4.	*Klebsiella pneumoniae*	6%
5.	*Proteus mirabilis*	4.5%
6.	*Proteus vulgaris*	14%
7.	*Pseudomonas aeruginosa*	24%
8.	*Pseudomonas maltophila*	3%
9.	*Staphylococcus aureus*	20%
10.	*Staphylococcus epidermids*	2.5%

Table 2 shows the antibiotic sensitivity pattern of the pathogenic isolates from wound sample. The predominant organism *Pseudomonas aeruginosa* showed resistance to all antibiotics except Ciprofloxacin and Sporidoxin. *Escherichia coli* was sensitive to all antibiotics except Ciprofloxacin and Sporidoxin. Most of the organisms showed resistance to Bacitracin.

The Chloramphenicol showed sensitivity zone

Table 2 : Sensitivity pattern of isolated organisms

Name of the pathogen	B	C	Ce	Cf	G	S	Sp
Citrobacter freundii	S	S	S	S	I	I	S
Enterobacter aerogens	I	S	R	S	S	I	S
Escherchia coli	R	S	S	S	S	S	S
Klebsiella pneumoniae	R	I	R	S	I	R	S
Proteus mirabilis	I	S	S	S	S	I	S
Proteus vulgaris	R	S	I	S	S	R	S
Pseudomonas aeruginosa	R	R	R	S	R	R	S
Pseudomonas maltophila	I	S	S	S	S	R	S
Staphylococcus aureus	R	S	R	S	R	R	S
Staphylococcus epidermids	R	R	I	S	S	S	S

B- Bacitracin, C- Chloramphenicol, Ce – Cephalexin,
Cf -Ciprofloxacin,G - Gehtamicin, S - Sporidoxin.

except *P. aeruginosa* and *Staphylococcus epidermids* were Resistant and *Klebsiella pneumoniae* showed intermediate. Sporidoxin showed resistance zone against *K. pneumoniae, P. valgaris, P. aeruginosa, P. maltophila* and *Staphylococcus epidermids*. The other test organisms were intermediately controlled by this antibiotic.

Rode *et al*. (1989) has reported that Methicillin-resistant *Staphylococcus aureus* strains (MRSA) have become increasingly prevalent as nosocomial pathogens. Of the Gram negative bacilli, *Pseudomonas aeruginosa* has been of particular interest, the incidence of which in wound infection has increased compared to a decade back study (Joshi *et al*., 1984) It has also been observed that 28% of healthy people in hospital environment are carrier for *P. aeruginosa* (Kolmos *et al*., 1997)

Severe wound infection may lead to deformation and finally lead to death. Immediate identification and treatment is necessary to reduce the mortality rate. Chemotherapy was found to be the effective remedy for wound infection. However, development of resistance pathogenic microorganisms is a problem. Nowadays, the common pathogens develop resistance to most antibiotics. Thus, there is need to search and find out new effective remedies against the wound infecting organisms.

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