Original Article

Detection of Organisms and Antibiotic Resistance Pattern of Predominant Organism Isolated from Wound Infection

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Abstract:
Wounds are caused by the external damage to intact skin that include surgical wounds, bites, burns, minor cuts, abrasions and traumatic wounds. Wounds infections may occur due to various microorganisms. The aim of this study was to identify the microorganisms and the antibiotic resistance pattern of predominant organism isolated from the wound infection. A total number of 141 wound swab samples were collected from different wound infections from Dhaka National Medical College and Hospital, Dhaka, Bangladesh. Among the collected wound swab samples 89 (63.12%) showed bacterial growth. The isolated microorganisms were Escherichia coli 43 (48.32%), Staphylococcus aureus 33 (37.33%), Pseudomonas spp. 06 (6.75%), Klebsiella spp. 05 (5.62%), Streptococci 01 (1.12%) and Enterococcus 01 (1.12%). Escherichia coli is the most predominant isolated microorganisms and showed antibiotic resistance pattern to Amoxycillin 42 (97.68%), Cephradine 38 (88.37%), Ceftriaxone 29 (67.44%), Cotrimoxazole 34 (79.07%), Gentamicin 22(51.16%), Doxycycline 25 (58.14%), Ciprofloxacin 25 (58.14%), Cefuroxime 32 (74.42%), Aztreonam 38 (88.37%), Ceftazidime 38 (88.37%), Erythromycin 37 (86.05%), Amikacin 06 (13.95%) and Imipenem 05 (11.63%).

Key words: Wound infection, Antibiotic Resistance Pattern

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Introduction:
From the Microbiological perspective, the primary function of normal intact skin is to control the microbial populations that live on the skin surface and to prevent underlying tissue from becoming colonized and invaded by potential pathogens[1,2].

Exposure of subcutaneous tissue following a loss of skin integrity due to any kind of wounds like surgical wounds, bites, burns, minor cuts, abrasions and traumatic wounds, provides a moist, warm and nutritious environment. This environment is very much conductive to microbial colonization and proliferation[3,4,5].

The presence of foreign material and devitalized tissue in the traumatic wound further facilitates the microbial proliferation[6,7,8]. So, it is very much important to identify the pathogenic organisms as well as their antibiotic resistance pattern to avoid complication. It is also required for early diagnosis and proper treatment of the condition of the patient.

Materials and Methods:
This is a prospective study that was done in the department of Microbiology, Dhaka National Medical College and Hospital, Dhaka, Bangladesh, during the period of one year. The aim of this study was to identify the microorganisms and the antibiotic resistance pattern of predominant microorganism isolated from the different wound infection.

A total number of 141 wound swab samples were collected from the inpatient and outpatient department of the Dhaka National Medical College and Hospital, Dhaka, Bangladesh. All of the wound swabs were inoculated in Blood agar and MacConkey agar media. Then, all the plates were incubated at the temperature of 37°C aerobically for the duration of 24 hours. After the incubation period, wound swab plates were checked for presence of suspected pathogenic microorganism. All of the microorganisms were identified by their colony morphology, staining characteristics, pigment production, motility and other related biochemical test[9].

All of the bacterial isolated colony were tested for the antibiotic susceptibility by the disc diffusion method using Mueller Hinton agar media against different antimicrobial agents[10].

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The antibiotics that were used for antibiotic susceptibility testing were Amoxycillin, Cephradine, Ceftriaxone, Cotrimoxazole, Gentamicin, Doxycycline, Ciprofloxacin, Cefuroxime, Aztreonam, Ceftazidime, Erythromycin, Amikacin and Imipenem.

The collected data were categorized and analyzed by the software statistical package for social science (SPSS) version 21.

Results:

A total number of 141 wound swab samples were collected from the wound infections. From the 141 samples 89 (63.12%) were isolated (Table-I).

Table-I: Distribution of samples of the study.

Sample	Number of tested samples studied	Number of isolated bacteria
Wound swab from infected wounds	141	89 (63.12%)

From Table-II, 85 (63.91%) out of 133, bacteria were isolated from surgical wound, 03 (60%) out of 05, bacteria were isolated from burn wound and 01 (33.33%) out of 3, bacteria were isolated from traumatic wound.

Table-II: Distribution of samples from organisms are isolated.

Sample	Total Number	Isolated Organisms (n=89)
Surgical wound	133	85 (63.91%)
Burn wound	05	03 (60.00%)
Traumatic wound	03	01 (33.33%)
Total	141	89

Among the isolated bacteria 43 (48.32%) were *E. coli*, 33 (37.08%) were *Staphylococcus aureus*, 06 (6.75%) were *pseudomonas spp.*, 05 (5.62%) were Klebsiella spp., 01 (1.12%) were *Streptococci* and 01 (1.12%) were *Enterococci* (Table-III).

Table-III: Distribution of isolated bacteria in from wound infections.

Isolated bacteria	Number of Organisms (n=89)
Escherichia coli	43 (48.32%)
Staph. Aureus	33 (37.08%)
Pseudomonas spp.	06 (6.75%)
Klebsiella spp.	05 (5.62%)
Streptococci	01 (1.12%)
Enterococci	01 (1.12%)

From Table-IV *E. coli* showed high degrees of resistance to Amoxycillin 42 (97.68%), Cephradine 38 (88.37%), Aztreonam 38 (88.37%), Ceftazidime 38 (88.37%), Erythromycin 37 (86.05%), Cotrimoxazole 34 (79.07%), Cefuroxime 32 (74.42%), Ceftriaxone 29 (67.44%), Doxycycline 25 (58.14%), Ciprofloxacin 25 (58.14%), Gentamicin 22 (51.16%), Amikacin 06 (13.95%) and Imipenem 05 (11.63%) respectively.

Table-IV: Antibiotic resistance pattern of *Escherichia coli* in wound infections to different antibiotics (n=43).

Antibiotics	Number of Resistance
Amoxycillin	42 (97.68%)
Cephradine	38 (88.37%)
Ceftriaxone	29 (67.44%)
Cotrimoxazole	34 (79.07%)
Gentamicin	22 (51.16%)
Doxycycline	25 (58.14%)
Ciprofloxacin	25 (58.14%)
Cefuroxime	32 (74.42%)
Aztreonam	38 (88.37%)
Ceftazidime	38 (88.37%)
Amikacin	06 (13.95%)
Erythromycin	37 (86.05%)
Imipenem	05 (11.63%)

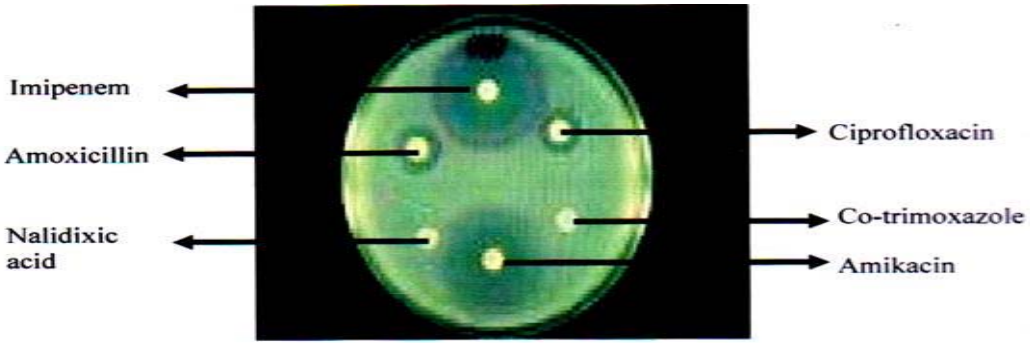

Figure-1: Antibiotic resistance pattern of *E. coli* on Mueller Hinton agar media.

Discussion:
Wounds infections occur in both male and female and different age groups following superficial operations, burns and trauma. Wounds infections involve the exposed tissue, which under normal circumstances would be sterile. The common isolated organisms are *Escherichia coli* followed by *Staphylococcus aureus* and *Pseudomonas spp*[11].

So, identification of organisms from wound infections and their antibiotic resistance pattern are essential for proper diagnosis and treatment of the patient suffering from wound infections[12,13].

In the present study, the most common isolated microorganisms were *Escherichia coli* 43 (48.32%), *Staphylococcus aureus* 33 (37.08%), *Pseudomonas spp.* 06 (6.75%), *Klebsiella spp.* 05 (5.62%), *Streptococci* 01 (1.12%) and *Enterococci* 01 (1.12%) respectively. *Escherichia coli* and *Staphylococcus aureus* were detected in the majority of the wounds, whereas *Streptococci* and *Enterococci* were observed less frequently. In this study, *Escherichia coli* showed high degrees of resistance to Amoxycillin 42 (97.68%), Cephradine 38 (88.37%), Ceftazidime 38 (88.37%), Aztreonam 38 (88.37%) and Cotrimoxazole 34 (79.07%) respectively. These findings are similar to several studies done worldwide[14,15,16].

Conclusion:
Early identification of pathogenic microorganisms and their antibiotic resistance pattern are important for proper treatment and to avoid complications. This study would also help the physicians to make judicious choice of antibiotics and would be helpful for formulation of an antibiotic policy.

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