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Original Research Article

Current Microbial Isolates from Wound Swab and Their Susceptibility Pattern in Rajshahi Medical College Hospital

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Abstract: ***Background*:** Wound infection is one of the major health issues that are caused and aggravated by harmful microorganisms where empiric treatment is routine. **Objective:** To find out current microbial isolates from wound swab and their susceptibility pattern in Rajshahi Medical College Hospital. ***Materials and Method:*** A total of 409 wound swab and pus samples were collected during the period from July 2024 to December 2024 at Rajshahi Medical College Hospital, Rajshahi, Bangladesh. Swabs from the wound were inoculated on appropriate media and cultured and the isolates were identified by standard procedures as needed. Antimicrobial susceptibility testing was performed by disk diffusion method according to 'The Clinical and Laboratory Standard Institute' guidelines. ***Results:*** In this study 266 bacterial isolates were recovered from 409 samples showing an isolation rate of 65%. The predominant bacteria isolated from infected wounds were Staphylococcus aureus 96 (36%) followed by Pseudomonas aeruginosa 64(24%), Escherichia coli 58 (22%), Klebsiella 28 (11%), CoNS 11(4%) and Proteus 9 (3%). Staphylococcus aureus was sensitive to Vancomycin (100%), Doxycycline (99.5%), Linezolid (97.1%). Among the Gram-negative Pseudomonas aeruginosa was predominant and showed sensitivity to imipenem (100%), piperacillin and tazobactam (79.6%), amikacin (70.39 %) and E coli showed sensitivity to imipenem (94.52%), levofloxacin (93.58%) Amikacin (88.1%). ***Conclusion:*** Staphylococcus aureus was the most frequently isolated pathogen from wound swab and the antibiotic sensitivity pattern of various isolates help to assist the clinician in appropriate selection of empirical antibiotics against wound infection.

Keywords: Wound Swab, Microbial Isolates, Antimicrobial Sensitivity Pattern.

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Introduction

A wound is the damage or disruption of living tissue of cellular, anatomical and functional continuum.[1] Wound infection resulting from the invasion and proliferation by one or more species of microorganism. Among various studies common bacterial isolates of wound swab were bacteria, fungi, parasites, and viruses in which bacteria are predominant. From various studies, Staphylococcus aureus has been found to account for 20-40%. Escherichia coli, Klebsiella spp. (species), Pseudomonas aeruginosa, and Acinetobacter spp. are other prevalent microorganisms isolated from both monomicrobial and polymicrobial wound infection. Candida spp. also responsible for wound infection.[2] Now a days, the resistance of the hospital strains of S. aureus to methicillin is increasing frequently. VISA is also a burden concern. So, the control of wound

infections has become more challenging. As a result of indiscriminate use of antimicrobial agents, significant changes occur in microbial genetic echology. [3] The aim of the present study was to find common bacterial pathogens responsible for wound infection and to determine their antimicrobial susceptibility pattern in our community. It would assist the clinicians in appropriate selection of antibiotics especially against hospital acquired infections.

Materials and Method

This study was carried out by collecting wound swabs and pus samples from patients attending at Rajshahi Medical College and Hospital, Rajshahi, Bangladesh from July 2024 to December 2024. All the samples were cultured on blood agar and MacConkey agar media incubated overnight at 37ºC. Organisms were identified by standard microbiological procedures including colony characters, Gram staining and biochemical reactions. All the isolates were tested for antimicrobial susceptibility by the disc diffusion technique according to the Clinical Laboratory (2024).

Results

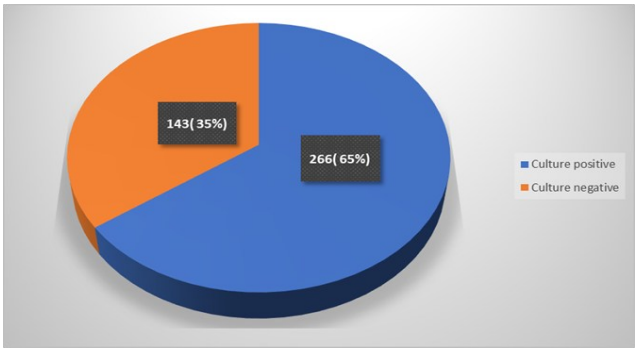

Figure 1: Frequency of Culture Positive and Negative Cases (N=409)

Table 1: Pattern of Bacteria Isolated from Wound Swab (N=266)

Bacteria		Number of Patients	Percentage (%)
Gram positive	Staphylococcus aureus	96	(36%)
	CoNS	11	(4%)
Gram negative	Pseudomonas aeruginosa	64	(24%)
	Escherichia coli	58	(22%)
	Klebsiella	28	(11%)
	Proteus	9	(3%)

A total number of 409 isolates were obtained, among which 266 (65.03%) were culture positive cases (Figure-1). Among the isolated organism's predominant bacteria was Staphylococcus aureus 96 (36%) followed by Pseudomonas aeruginosa 64(24%), Escherichia coli 58 (22%), Klebsiella spp.28 (11%), CoNS11(4%) and Proteus spp 9 (3%) (Table 1).

Among the Gram-negative isolates Pseudomonas aeruginosa was the predominant organism followed by Escherichia coli and Klebsiella. The sensitivity of Pseudomonas to imipenem was 100%, Piperacillin + Tazobactam79.6%, amikacin 70.39 %, Ciprofloxacin 70.2% and low level of sensitivity was found to Cefixime 20.41 % Azithromycin 20.92% Aztreonam 40.2 %.

Table 2: Antibiotic Susceptibility Pattern of Gram-Positive Cocci (N=107)

Antibiotics	Staphylococcus aureus (%)	CoNS (%)
Azithromycin	14.3	33.33
Ceftriaxone	47.2	66.66
Cefuroxime	80.1	33.33
Co-trimoxazole	87.5	66.66
Clindamycin	88.2	89.3
Levofloxacin	71.3	85.6
Linezolid	97.1	86.66
Vancomycin	100	100
Ciprofloxacin	73.2	66.66
Doxycycline	98.5	66.66

All the bacterial isolates were tested for antimicrobial susceptibility. Among the Gram-positive isolates Staphylococcus aureus was the predominant organism and were found highly sensitive to Vancomycin (100%), Doxycycline (98.5%), Linezolid (97.1%), Clindamycin (88.2%), Cotrimoxazole (87.5%), Cefuroxime (80.1%). And low sensitivity was found in commonly used antibiotics like ciprofloxacin (73.2%), Levofloxacin (71.3%). ceftriaxone (47.2%), Azithromycin (14.3%). CoNS showed highest sensitivity to, vancomycin 100% Clindamycin 9.3 %. Linezolid 86.66%. Lowest sensitivity 33.33% was found to Azithromycin, cefuroxime (Table 2).

Table 3: Antibiotic Susceptibility Pattern of Gram-Negative Bacilli (N=159)

Antibiotics	Pseudomonas aeruginosa (%)	E. coli (%)	Klebsiella (%)	Proteus (%)
Imipenem	100	94.5	95	60
Pipracillin + Tazobactam	79.6	81.1	70	40
Amikacin	70.39	88.1	91.5	80
Ciprofloxacin	70.2	79.23	65	60
Levofloxacin	70.1	93.58	87	80
Cefuroxime	50.5	86.21	56	40
Amoxiclav	50.5	80.23	85	60
Ceftriaxone	50.1	55.91	52	20
Aztreonam	40.2	86.12	71	40
Azithromycin	20.92	70.23	50	40
Cefixime	20.41	86.1	75	40

E coli showed lowest sensitivity to almost all the drugs except Imipenem was 94.5 % sensitive. Almost similar sensitivity was shown to Levofloxacin 93.58 % and Amikacin 88.1%. Klebsiella showed lowest sensitivity to almost all the drugs except Imipenem was 95%. Almost similar sensitivity was shown to Amikacin 91.5 %, Levofloxacin 87 %. Proteus showed lowest sensitivity to almost all the drugs except Amikacin and Levofloxacin was 80% (Table 3).

Discussion

Wound infection with bacteria, especially in surgical site in the hospital, is a serious problem. To handle the wound infection appropriate management, proper identification of the organisms is needed. Changing patterns of isolated organisms and their antimicrobial sensitivity varies from hospital to hospital and region to region. In our study, Staphylococcus aureus was the most predominant pathogenic bacteria. Pseudomonas aeruginosa was the next common organism followed by Escherichia coli, Klebsiella, proteus and CoNS from wound sample which was similar to the other studies done by Giacometti *et al.*[4, 5] In our study, Staphylococcus aureus was the predominant organism and were found highly sensitive to vancomycin (100%), doxycycline (98.5%), linezolid (97.1%), clindamycin (88.2%), cotrimoxazole (87.5%) and low sensitivity were found in commonly used antibiotics like ciprofloxacin (72.3%), ceftriaxone (47.2%), azithromycin (14.3%) which was similar to a study by Shahin *et al.*, showed Staphylococcus aureus was 94.38% sensitive to linezolid, 87.64% to vancomycin, 74.15% to amikacin and less sensitivity were found in ciprofloxacin (32.58%), cloxacillin (28.08%), ceftriaxone (28.08%).[6] A study had shown 100% sensitivity to linezolid and vancomycin followed by gentamicin (88.88%). Another study by Mitra *et al.*, showed complete sensitivity to vancomycin, linezolid, and amikacin and low activities against co-trimoxazole, ciprofloxacin, tetracycline and erythromycin.[7]

Remarkable susceptibility of Staphylococcus aureus to vancomycin, linezolid, amikacin and gentamicin may be due to the less use of this antibiotic in this hospital. Low activities of commonly used antibiotics such as cotrimoxazole, cloxacillin, ceftriaxone, ceftazidime, cephalexin cephradine and cefixime may be due to increased consumption of a particular antibiotic which leads to the development of resistance resulting from mutation at drug target sites resulting they have lost their efficacy in the treatment of wound infection.[8] Among gram negative isolates Pseudomonas aeruginosa isolates were susceptible to imipenem (70.58%), amikacin (73.52%) and E. coli were 94.5 % sensitive to Imipenem. Almost similar sensitivity was shown to Levofloxacin 93.58 % and Amikacin 88.1%. Klebsiella showed the highest sensitivity to Imipenem which was 95%. Almost similar sensitivity was shown to Amikacin 91.5 %, Levofloxacin 87 % which was like the study done by Nasrin *et al.*, among gram negative isolates Pseudomonas aeruginosa were found highly sensitive to Imipenem (93.54%), Piperacillin-Tazobactum (87.09%), Cefepime (80.64%) and Amikacin (77.42%).[9] Low sensitivity of Pseudomonas aeruginosa to Aztreonam (35.48%) and Ceftazidime (51.61%). Isolated Escherichia coli was highly sensitive (98%) to Imipenem, Amikacin and showed lowest sensitivity to almost all of the other drugs. The findings of our study show that Staphylococcus aureus was found to be the predominant among all of the isolates of

wound infections and showed highest sensitivity to highly sensitive to Vancomycin (100%), Doxycycline (98.5%), Linezolid (97.1%). Most of the Gram-negative isolates were highly sensitive to imipenem was 100%, Piperacillin + Tazobactam79.6%, Amikacin 70.39 %. We should use these drugs rationally to keep the efficacy of treatment of wound infection.[10] Conclusion: By this study it is recommended, culture of wound swab and antibiotic susceptibility testing should be done before starting antibiotics, which will guide medical practitioners for empirical treatment of wound infection to prevent antimicrobial resistance.

Conclusion

Culture of wound swab and antibiotic susceptibility testing should be done before starting antibiotics, which will guide medical practitioners for empirical treatment of wound infection to prevent antimicrobial resistance.

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Conflict of Interest: None declared.
Ethical Approval: Taken.

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