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Original Research Paper

Bacteriological Study of the Prospective Wound samples and antibiotic Sensitivity pattern of isolates

Microbiology

KEYWORDS: Gram positive bacteria, Gram negative bacteria, Antibiotic sensitivity pattern, Antibiotic resistance pattern, Mueller Hinton Agar.

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ABSTRACT

Introduction: Antibiotic treatment is given to protect from infection against different microorganisms,however, routine use of empirical treatment has resulted in widespread antibiotic resistance and development of antibiotic resistant genes. Objective: To identify the bacterial pathogens isolated from various wound sample and to determine their antibiotic sensitivity and resistance pattern against the commonly used standard antibiotics. Materials & Methods: All the wound sample submitted to microbiology laboratory were processed as per standard microbiological procedures and antibiotic sensitivity tests were performed on the isolates as per guidelines of clinical and laboratory standards institute (CLSI). Result: From 300 total specimen 154 positive specimens were isolated from all specimens, out of which 106 were Gram positive and 48 were Gram negative bacteria. Conclusion: High frequency of resistance against commonly used antibiotics such as penicillin as shown in the present study indicates a serious problem in the treatment of infections by gram positive and negative organisms. Therefore continuous surveillance is needed and treatment based on antibiogram report is essential.

INTRODUCTION:

Antibiotic therapy is usually given to protect from infection against various organisms and a wide generation of antibiotics are available for treatment. Prophylactic antibiotics play a significant role in the control of infections. However routine use of empirical treatment in both medical and veterinary medicine has resulted in widespread antibiotic resistance and development of antibiotic resistant genes.[1]

Human skin acts as an excellent barrier to infection, provided it is not breached. A wound is a type of injury in which the skin is torn, cut or punctured (open wound) or where blunt force trauma causes a contusion (closed wound). Wounds can further be classified as accidental, pathological or post-operative according to its nature (Collier, 2003). Certain parasites(for example,Hook-worm larvae) and bacteria (Treponemapallidu) can penetrate intact skin, but certain primary skin infections like impetigo is caused by Streptococcus pyogenes or S.aureus, or both gain access throug habrasions,as minor trauma to skin is a part of everyday life (Bhatt and Lahkey, 2007)(2-3) Wound is defined as break in the normal continuity of the skin or a body structure caused by injury [4]. Wound infection can be defined as the presence of organisms in a wound that are multiplying and elucitinga host reaction. In laboratory terms, it is often defined as an organism counts of greater that 10^5 gram of tissue [5].

Surgical wound infection, acute soft tissue infection, bite wound infection, burn wound infection, pyogenic wound infection, leg and decubitus (pressure) ulcer infections are the categories of wound infection [6]

Contamination of the wound is present to some extent in all incisions. A setback in recovery such as malnutrition, cardiac failure, or decreased oxygen to the tissues will deteriorate the individual and allow the infection to take hold. [7,8,9]

Materials & methods

A hospital based prospective study was conducted from August to October 2016, and wound specimens submitted to the department of microbiology were included in the study. All the collected specimens were cultured on blood agar and MacConkey agar and incubated aerobically at 37oC for 24 – 48 hours. Growth on culture plates were identified by culturecharacteristics, gram's staining and standard biochemical test.[10]

The antimicrobial susceptibility test was performed on Mueller Hinton agar (Blood agar in case of Streptococcus pyogenes) by Kirby Bauer Disc diffusion method[11], and zone diameters in millimeters were recorded after incubation at 37oC for 24 hours as per guidelines of clinical and laboratory standards institute (CLSI) using antibiotic discs (HiMedia Laboratories, India).

RESULT

A total of 300 samples were included in the study, out of which 154 showed positive bacterial growth and 146 were negative for any bacterial growth. Out of 154 isolated organisms, 106 were gram positive and 48 were gram negative bacteria [table 1].

As shown in table 1, maximum organisms were isolated from wound samples , Gram positive bacteria isolated were Staphylococcus aureus(42.8%), Streptococcus pyogenes(25.9%) , whereas gram negative bacterial isolates were Escherichia coli(11.6%) , Pseudomonas aeruginosa (5.8%), Citrobacter species (4.5%) and Klebsiella species (9.09%) [Table 1].

Antibiotic sensitivity test of all the clinical isolates was performed as per CLSI and sensitivity pattern was noted. Amikacin (81.8%) showed high degree of sensitivity, whereas, penicillin (57.5%) showed high degree of resistance among gram positive bacteria. Amikacin (83.3%) showed high degree of sensitivity, whereas, ceftazidime(66.6%) showed high degree of resistance in gram negative bacteria [Table 2 and 3].

TABLE 1: ISOLATED ORGANISM FROM WOUND SAMPLEISOLATED ORGANISMSNO. OF ORGANISMS%

ISOLATED ORGANISMS	NO. OF ORGANISMS	%
Staphylococcus aureus	66	42.8%
Streptococcus pyogenes	40	25.9%
Escherichia coli	18	11.6%
Pseudomonas aeruginosa	9	5.8%
Klebsiella species	14	9.09%
Citrobacter species	7	4.5%
TOTAL	**154**	

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TABLE 2: Antibiotic sensitivity pattern of gram positive isolates

ANTIBIOTICS	Staphylococcus aureus (N=66)		Streptococcuss pyogene (N=40)	
	S	R	S	R
Amikacin	54	12	NT	NT
Clindamycin	45	21	34	6
Levofloxacin	32	34	35	5
Chloramphenicol	50	16	NT	NT
Cefoxitin	47	19	NT	NT
Gentamicin	54	12	NT	NT
Erythromycin	30	36	38	2
Penicillin	28	38	18	22
Co-trimoxazole	54	12	NT	NT

TABLE 3: Antibiotic sensitivity pattern of gram negative isolates

ANTIBIOTICS	Escherichia coli (N=18)		Pseudomonas aeruginosa (N=9)		Klebsiella spp.		Citrobacter spp. (N=7)	
	S	**R**	**S**	**R**	**S**	**R**	**S**	**R**
Amikacin	15	3	9	0	12	2	7	0
Gentamicin	12	6	7	2	7	7	5	2
Ampicillin	7	11	NT	NT	NT	NT	1	6
Ceftazidime	6	12	7	2	5	9	5	2
Cefepime	9	9	9	0	4	10	4	3
Piperacillin	15	3	4	5	6	8	3	4
Colistin	NT	NT	5	4	NT	NT	NT	NT
Aztreonam	16	2	6	3	4	12	1	6

DISCUSSION

The discovery of antibiotics revolutionized the management of infectious diseases. However, the overuse and misuse of antibiotics is leading to the emergence of resistance to these life saving drugs.Resistance due to adulteration of the antibiotics has also been reported. The microbial pathogens, as well as their antibiotic sensitivity patterns may change from time to time and place to place. Hospital antibiograms are commonly used to help guide empirical antimicrobial treatment and are an important tool for detecting and monitoring trends in antimicrobial resistance.[12,13] Keeping this in mind the present study was done to evaluate the sensitivity and resistance pattern of various clinical isolates.

A total of 300 samples were submitted in the microbiology laboratory, out of which 154 showed positive bacterial growths. The prevalence of gram positive cocci was higher (68.8%) than the gram negative rods (31.1%). These findings are similar to those of other worker who also reported higher growth of gram positive bacteria (51%) as compared to gram negative bacteria (49%) from clinical samples.[14-18]

In the present study it was found that most of the isolates of gram positive cocci were highly sensitive to amikacin (81.8%) whereas, most of them were found to be resistant to penicillin (57.5%). This finding is similar to another study which also reported high susceptibility of Staphylococcusto amikacin. [19]

Conclusion

High frequency of resistance against commonly used antibiotics such as penicillin as reported in the present study indicates a serious problem in the management and treatment of infections caused by gram positive and negative organisms. To overcome this problem of drug resistance, continuous surveillance is needed and treatment based on antibiogram report is essential.

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