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BACTERIAL PATHOGEN ISOLATED FROM WOUND AND ANALYSIS ANTIBACTERIAL ACTIVITY

Nirmala, G — PG Extension Center, Bharathidasan University, Kurumbalur, Perambalur, Tamilnadu, India – 621 107.

Diwakar.V — PG Extension Center, Bharathidasan University, Kurumbalur, Perambalur, Tamilnadu, India – 621 107. Corresponding author

ABSTRACT *In this present study wound samples were collected from different hospital, individuals Thanjavur. From the samples bacterial species were isolated and they were identified based on the cultural, morphological and biochemical characteristics. The isolated bacterial species were Escherichia coli, Klebbsiella pneumonia, Staphylococcus aureus and Streptococcus pyogenes. The antibiotic sensitivity of isolated bacterial species to the commercial antibiotic tests was analyzed by disc diffusion method. The ciprofloxacin and levofloxacin have maximum antibacterial activity against all bacterial isolates when compared to other antibiotics. At the same time maximum inhibitory activity observed against Escherichia coli.*

KEYWORDS : Wound, Bacterial Infection, Antibiotic Sensitivity

INTRODUCTION

Skin and gut normally harbor certain bacteria and fungi in a commensal relationship with the host that serves to limit invasive, pathogenic microorganisms. When epithelial barrier is breached, the normal host response is a series of concerted, physiologic cascades that result in local inflammation (Patel *et al.,* 2000). Data from the *National Nosocomial Infections Surveillance System* reveals that the most common nasocomial pathogens are *Staphylococcus aureus*, *Enterococcus* species, coagulasenegative *Staphylococcus*, Enterobacteriaceae, *Pseudomonas* species, and anaerobes (Horan *et al.,* 1988). Microbial factors that influence the establishment of a wound infection are the bacterial inoculum, virulence, and the effect of the microenvironment. When these microbial factors are conducive, impaired host defenses set the stage for enacting the chain of events that produce wound infection (Serafinska *et al.,* 1966). World War I (WWI) resulted in new types of wounds from high-velocity bullet and shrapnel injuries coupled with contamination by the mud from the trenches. Alexander Fleming performed many of his bacteriological studies during WWI and is credited with the discovery of penicillin. Impetigo is a common infection in children that may also occur in adults. It is generally caused by either *Staphylococcus aureus* or *Streptococci* (Dagan and Bar-David, 1992). The most common post-operative microorganisms are *Staphylococcus aureus, Streptococcus pyagens, Escherichia coli, Klebsiella aerogenes, Proteus sp.* and *Pseudomonas sp.* (Mackie and Cartney, 1992). In the present study were carried out the isolation and identification of bacteria from wound swab specimens and antibacterial sensitivity of commercial antibiotic disc was also analyzed against isolated organisms.

MATERIAL AND METHODS

The wound swaps were collected from various Hospital, Thanjavur. The collected swab specimens were stored on specific aseptic container for further study. The collected swab specimens were inoculated on prepared Macconkey and nutrient agar plates and then incubated at 37°C for 24 hrs. After incubation developed Bacterial colonies were initially characterized by morphology and microscopic examination and identified further by biochemical tests (Norris and Ribbons, 1972). The commercially available antibiotic disc such as Piperacillin, Ampicillin, Erythromycin, Vancomycin, Gentamicin, Ciprofloxacin, Clindamycin, Carbenicillin, Chloramphenicol, Penicillin G, Levofloxacin, Maxifloxacin, Tetracycline, Netillin, Cephalothin, Cefuroxime, Azithromycin and Clarithromycin used for bacterial culture. The antibiotic disc were purchased from high media chemical Pvt. Ltd, Mumbai. The antibiotic sensitivity of isolated bacterial species to the commercial antibiotic tests was analyzed by disc diffusion method (Bauer *et al.,* 1996). The results obtained in the present investigation were subject to statistical analysis like Mean ($\bar{x}$) and Standard Deviation (SD) by Zar (1984).

RESULTS AND DISCUSSION

In the present study four different bacterial colonies were noted. The isolated bacterial colonies were identified using cultural, morphological and biochemical characteristics. The investigated results were presented in Table – 1. The finding results were compared with Bargey,s manual of systematic bacteriology. Based on the comparison the isolated bacterial strains tentatively named as *Escherichia coli, Klebsiella pneumoniae, Staphylococcus aureus and Streptococcus pyogenes* respectively. Similar results reported by Lee, (2003) Escherichia coli is a bacterium that lives in the colon; it is an extensively studied model organism and probably the best understood bacterium of all. Certain mutated strains of these gut bacteria do cause disease. Totally eighteen commercial antibiotics were tested against bacterial isolates in the present studies. The ciprofloxacin and levofloxacin have maximum antibacterial activity against all bacterial isolates when compared to other antibiotics. At the same time maximum inhibitory activity observed against *Escherichia coli*. *Escherichia coli* has maximum sensitivity was observed in ciprofloxacin whereas minimum range of sensitivity was showed by *Streptococcus pyogenes* (Table 2).

The antibiotic susceptibility pattern of microorganisms isolated from infected sample was studied which showed that the most effective antibiotics against all isolates was Ciprofloxacin. The reason is that it is one of the most effective antibiotics against corform bacteria, *Escherichia coli* and aerobic Gram positive cocci inhibitory the lower urinary tract (Shah, 1976; Ronald, 1983). In the present study the Piperacillin was most effective antibiotics against bacteria. Kapoor and Aggarwal, (1997) illustrated more than 50% of *Escherichia coli* shows sensitivity to Amikacin, Ciprofloxacin and Gentamicin. And resistance to seen to Tetracycline and Ampicillin, which correlates with Obi *et al.,* (1996). In this present study the *E. coli* is sensitivity to Gentamicin, Tetracycline, Piperacillin and Rifampicin. Puzova *et al.,* (1994); Bonaventura, (1998) shows the *Streptococcus pyogenes* resistance to Tetracycline and Ampicillin. In the present study *Staphylococcus aureus* was sensitivity (7mm) to Tetracycline. In this study Erythromycin showed moderate zone of inhibition against *Staphylococcus aureus* and *Streptococcus pyogenes.* According to Sabiha Karim and Khalid Idress Khan, (1994), the Erythromycin showed minimum zone of inhibition against *Staphylococcus aureus* and *Staphylococcus epidermidis.*

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Table 1. Morphological and biochemical characteristics of wound isolates

S. No.	Morphological & Biochemical characteristics	*Escherichia coli*	*Klebsiella pneumoniae*	*Staphylococcus aureus*	*Streptococcus pyogenes*
1	Gram Staining	Gram -	Gram -	Gram +	Gram +
2	Shape	Rod	Rod	coccus	coccus
3	Motility	Motile	Non-motile	Non motile	Non-motile
4	Indole	+	-	-	-
5	Methyl red	+	-	+	+
6	Voges proskauer	-	+	±	-
7	Citrate	-	+	-	-
8	Urease	-	-	-	-
9	Catalase	+	+	+	-
10	Oxidase	-	-	-	-
11	Lactose Dextrose Sucrose	AG AG A±	AG AG AG	A A A	A A A
12	Starch hydrolysis	-	-	+	-
13	H_2S production	-	-	-	-

"+" – Positive, "–" – Negative, "AG" - Acid/Gas "A" - Acid "±" - variable

Table 2. Assay of antibacterial activity against commercial antibiotic discs

S. No.	Antibiotics	*Zone of Inhibition (mm in diameter) (M±SD)*			
		Escherichia coli	*Klebsiella pneumoniae*	*Staphylococcus aureus*	*Streptococcus pyogenes*
1	Piperacillin	-	-	-	-
2	Ampicillin	-	-	-	-
3	Erythromycin	-	11±0.82	13±0.54	11±0.78
4	Vancomycin	16±0.72	-	7±0.86	-
5	Gentamicin	14±0.64	14±0.70	25±0.80	16±0.67
6	Ciprofloxacin	8±0.76	27±0.52	35±0.78	23±0.56
7	Clindamycin	11±0.82	13±0.73	-	-
8	Carbenicillin	-	-	-	-
9	Chloramphenicol	21±0.78	23±0.92	14±0.70	18±0.64
10	Penicillin G	-	-	-	-
11	Levofloxacin	11±0.56	20±0.45	24±0.43	22±0.76
12	Maxifloxacin	10±0.75	18±0.79	19±0.50	21±0.56
13	Tetracycline	09±0.77	13±0.59	11±0.98	18±0.45
14	Netillin	17±0.84	15±0.91	17±0.87	-
15	Cephalothin	-	-	-	24±0.63
16	Cefuroxime	-	14±0.90	-	22±0.65
17	Azithromycin	12±0.76	15±0.89	19±0.56	16±0.23
18	Clarithromycin	-	7±0.67	11±0.43	-

Mean ± Stranded Deviation

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