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RESEARCH ARTICLE

ANTAGONISTIC RESPONSE OF SELECTED ANTIBIOTICS AGAINST SURGICAL WOUND INFECTIONS

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Abstract

Thirty suppurated samples were accrued from surgically afflicted convalescents to assess the presence of despicable wound borne bacteria, unequivocally *Acinetobacter baumannii*, *Escherichia coli*, *Staphylococcus aureus, Streptococci species and Pseudomonas aeruginosa*. Out of all, ten festered samples owed the impulsive bacteria in which *Acinetobacter baumannii* authenticated to be anti- sensitive while *Group A Streptococci* and *Staphylococcus aureus* were ancillary sentient by engendering pellucid zone of inhibition more than the indentured expanse in reprisal to efficacious antibiotics. Assuaged antibiotics perpetration subdues the growth of *Escherichia coli* and *Pseudomonas aeruginosa*.

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INTRODUCTION

Epidermal layer of homo-sapiens are credible first line of defenses against septicity. Surgical site incisions abbreviated as SSI bust these safeguarding chassis and predispose infection serendipity. Penurious handling and SSI practices escalate menace related to nosocomial infections. Naturally prevailing dermal microflora also hand in the reinforcing frequency of disease. Appraised 14-16% of nosocomial infections cases are reported in United States (Emori et al., 1993). Convicted bacteria that pose a substantial hazard in time of surgeries are *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Acinetobacter baumannii* etc. (Hsiao et al., 2011). These micro-organisms are accountable for ascending mortality and morbidity rates. Estimated 77% cases per annum perish world wide due to surgical mutilate infections (Mangram and Kirkland, 1999). Claimed by documented survey, clinical manifestations of infected surgical laceration comprehend purulent drainage, erythema, unsustainable throbs, redness and tenderness complemented with systematic prodromes (Richards et al., 1999).

Based on the microbiological verity, the fact findings were forged in two moments. Firstly, to discern and segregate fabled wound borne bacteria responsible for maim sepsis specifically *Acinetobacter baumannii, Escherichia coli, Staphylococcus aureus*, *Streptococci species* and *Pseudomonas aeruginosa*. Secondly, to assess sensitivity of stipulated ten antibiotics viz. Amikacin, Ceftazidime, Imipenem, Piperacillin, Gentamicin, Ceftriaxone, Polymixin B, Cotrimoxazole, Tetracycline and Ciprofloxacin against identified iniquitous bacteria.

MATERIALS AND METHODS

SAMPLE COLLECTION

Purulent drain samples were cumulated utilizing sterile swabs from 30 patients abiding infected surgical ailments.

BACTERIAL CULTURING AND CHARACTERIZATION

The pus containing swabs were streaked on sterile Mckonkey Agar, Chocolate Agar, Sabouraud dextrose agar, Mannitol salt agar and Columbia-CNA agar plates evenly in the aseptic environment of laminar flow hood as per described bacterial streaking protocols (Cappuccino et al., 2008). Then all the petri-plates were placed in inverted orientation in incubator under 37°C for 24 hours. Later on the culture status was observed morphologically. Further these bacterial colonies were subjected to procession of bacterial identification tests including Gram staining, Catalase test, Coagulase test, Oxidase test, Indole test, Mannitol test and Methyl red test in order to characterize infective wound borne bacteria distinctively *Acinetobacter baumannii, Escherichia coli, Staphylococcus aureus, Streptococci species* and *Pseudomonas aeruginosa*.

ANTIBIOTIC SENSITIVITY TESTING

Pure bacterial cultures are prepared plying autoclaved Muller-Hinton agar medium subsequent to identification. Sorted out ten bacteriostatics and bactericides to wit Amikacin, Ceftazidime, Imipenem, Piperacillin, Gentamicin, Ceftriaxone, Polymixin B, Cotrimoxazole, Tetracycline and Ciprofloxacin were designated on to the pure cultured plates as per described Kirby-Bauer antibiotic testing protocol (Mohanty, 2010). These plates were then placed in incubator at 37°C for 24 hours. On the following day, lucid zones of inhibitions were noted disposing antibiotic sensitivity against the selected bacteria.

RESULTS

BACTERIAL CULTURING AND CHARACTERIZATION

Bacterial cultures from the amassed pus samples were characterized to isolate sterling colonies of major wound borne bacteria. From the results it was perceptible that out of all infected pus samples, 10 cases exhibited notorious *Acinetobacter baumannii, Escherichia coli, Staphylococcus aureus, Streptococci species* and *Pseudomonas aeruginosa*. Bacterial characterization results prior to biochemical tests i.e. Gram staining, Catalase test, Coagulase test, Oxidase test, Indole test, Mannitol test and Methyl red test are summarized in (Table 1). Subsequent to bacterial characterization, the inmate bacteria was speculated that were responsible for surgical site septicemia in patients. The presence of summoned infectious bacteria in the purulent culverts of wound samples is summarized in (Table 2).

Table 1: List of depicted wound borne bacteria's isolated from suppurated samples

List Of Bacteria	Characterization							
	Shape	Gram Staining	Catalase Test	Coagulase Test	Oxidase Test	Indole Test	Mannitol Test	Methyl Red Test
A. baumannii	Coccobaccilli	–	+	–	–	–	–	–
E. coli	Rods	–	+	–	–	+	–	+
Group A Streptococci	Cocci	+	–	–	–	+	–	+
S. aureus	Cocci	+	+	+	–	–	+	+
P.aeruginosa	Rods	–	+	–	+	–	–	–

(+) signs represents positive result, **(-)** sign represents negative result

Table 2: List of depicted wound borne bacteria's accountable for seriate infection

List of Bacteria	Bacteria Isolated From Test Samples									
	Number of Samples									
	1	2	3	4	5	6	7	8	9	10
A. baumannii	–	–	–	–	+	+	–	–	–	–
E. coli	–	+	–	+	–	+	+	–	–	–
Group A Streptococci	–	–	–	–	–	–	–	–	–	–
S. aureus	+	+	+	–	–	–	–	–	+	+
P.aeruginosa	–	–	–	–	–	–	+	+	–	–

(+) signs represents presence of selected bacteria, **(-)** sign represents absence of bacteria

ANTIBIOTIC SENSITIVITY TESTING

Disc antibiotic sensitivity tests against cloistered bacterial colonies unveiled that *Acinetobacter baumannii* was the most hostile bacterium as the antibiotics ebbed to induce sufficient inhibitory zone as proclaimed. Splendid sensitivity was validated against *Group A Streptococci* and *Staphylococcus aureus*. *Escherichia coli* and *Pseudomonas aeruginosa* evidenced moderate sensitivity as a unit against the elated antibiotics. Sensitivity results are summarized in (Table 3).

Table 3: List of depicted antibiotic sensitivity against isolated and characterized wound borne bacteria

List of Bacteria	Antibiotic Sensitivity Tests									
	Antibiotic Discs									
	Amikacin	Ceftazidime	Ceftriaxone	Cotrimoxazole	Ciprofloxacin	Gentamicin	Imipenem	Piperacillin	Polymixin B	Tetracycline
A. baumannii	R	R	R	R	R	R	R	R	S	R
E. coli	S	S	R	R	R	R	S	S	S	S
Group A Streptococci	S	S	S	S	S	S	S	S	S	S
S. aureus	S	S	R	S	S	S	S	S	S	R
P.aeruginosa	S	R	R	S	S	S	S	R	S	S

(S) represents bacterial sensitivity towards selected antibiotic, **(R)** represents bacterial resistance towards selected antibiotic

DISCUSSIONS

From the review speculated earlier, it was acknowledged that *Staphylococcus aureus*, *Pseudomonas aeruginosa, Streptococcal species*, *Klebsiella pneumonia* and *Proteus vulgaris* were predominant pathogenic nosocomial entities located at surgical sites that roots sepsis (Goswami, 2011; Goldman, 1978). Gram negative *Acinetobacter baumanii* and *Acinetobacter lwoffii* were isolated from hospital units and were manifested to be contaminative surgical site bacteria. But infection rate can be coped by exploitation of antibiotics such as Ciprofloxacin and Imipenem respectively (Constantiniu et al., 2004). Hospitals survey in Japan explored that pathogenic *E.coli* species are also primary infectious agents. They are major contaminants of surgical sites due it vague and pervasive nature. *E.coli* species are responsive towards multitude antibiotics such as Cefmenoxime, Gentamicin, Imipenem, Latamoxef, and Ofloxacin but are resistant to Cefazolin (Shinagawa et al., 1996).

CONCLUSION

From the illustrated experimentation, we concluded that hiking antibiotic resistivity cases escalates the epidemics of surgical site infections annually. Therefore, the antibiotic use should be superintended heedfully to avoid bacterial mutations via antibiotics that grow them more resistant. Immaculate surgical practices and instruments should be employed in order to nether nosocomial infection plagues.

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