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ISOLATION AND ANTIBACTERIAL ACTIVITY OF AIR BORN BACTERIA FROM HOSPITAL ENVIRONMENT IN PERAMBALUR, TAMILNADU

Biological Science

KEYWORDS: Air born bacteria, Nosocomial infection, Antibacterial activities, ciproflaxcin

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ABSTRACT

The air born bacteria were collected from the three different hospitals at Perambalur, Tamilnadu by the open plate method. The bacterial isolated were identified with the help of cultural morphological and biochemical characteristics. The bacterial isolates were confirmed as Bacillus cereus, Enterobacter aerogenes, Escherichia coli and Klebsiella pneumoniae. Antibacterial activities of commercial antibiotics were assay against the bacterial isolates by the methods of disc diffusion. In bacteria the maximum zone of inhibition was noted in ciproflaxcin when compared with others. Finally we concluded that it is important to evaluate the quality of the air we breathe whether indoors or out door, especially in the hospital environments. The number and type of air borne microorganisms can be used to determine the degree of cleanliness as well as to determine the source of human discomfort.

INTRODUCTION

An infection acquired in a hospital. Approximately 5-10% of patients admitted to acute care hospitals in developed countries and more than 25% of such patients in developing countries, have been found to acquire infection which were not present or incubating at the time of admission in the USA it has been estimated that 1.5 million such infection occur annually, causing 15000 deaths, such as hospital acquired, or nosocomial infection add to the morbidity mortality and costs that one might expect from the underlying illness alone, this is tragic since it is believed that as many as 20% of nosocomial infection in developed countries and 40% in developing countries are preventable. Moreover, in developing countries 5-10% of such infection occurs as part of an epidemic or cluster (Weinstein, 1991). The most common nosocomial infections are of the urinary tract, surgical site and various pneumonias (Klevens et al., 2007). The most effective technique of controlling nosocomial infection is to strategically implement QA/QC measures to the health care sectors and evidence-based management can be a feasible approach. For those VAP/HAP diseases (ventilator-associated pneumonia, hospital-acquired pneumonia), controlling and monitoring hospital indoor air quality needs to be on agenda in management (Leung and Chan, 2006) whereas for nosocomial rotavirus infection, a hand hygiene protocol has to be enforced (Trarb-Dargatz et al., 2006) . Keeping the above view in mind the present work has been carried out isolation of air borne bacteria from different hospital in Perambalur, Tamilnadu by open plate methods and antimicrobial activity of isolated bacteria against ten commercial antibiotics.

MATERIALS AND METHODS

The study was carried out in three-selected hospital one government and two private hospitals. The sample of study was collected from the three units in the hospitals, these including General ward, bed and reception.

Isolation and Identification of bacteria

The prepared Macconkey and nutrient agar plates were exposure on noted various places of hospital for the period of 15 minutes. The plates were incubated at 37°C for 24 hrs and the total number of colony forming units (cfu) was enumerated and converted to organisms per cubic meter air. Bacterial colonies were initially characterized by morphology and microscopic examination and identified further by biochemical tests (Norris and Ribbons, 1972).

Assay of Antibiotic Sensitivity

The commercially available antibiotic disc such as Amikacin, Ampicillin, Norfloxacin, Rifambicin, Erythromycin, Vancomycin, Streptomycin, ofloxacin Ciprofloxacin and Tetracyclin 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).

RESULTS AND DISCUSSION

In this study air borne pathogenic bacteria were isolated from the hospital samples and analysis the antibiotic sensitivity of isolates against different antibiotic discs. Four different bacterial isolates were observed after 24 hrs incubation from Nosocomial samples. Culture, morphological and biochemical characteristics results were compared with Bergey's manual of systematic bacteriology. Based on the comparison the isolated colonies were identified as *Bacillus cerus, Enterobacter aerogens, Escherichia coli* and *Klebsiella pneumonia* respectively. Several researchers have reported that the environmental surfaces of hospitals are contaminated by various kinds of microbes (Schaal, 1991; Kitashima *et al.,* 1996; Hanazono *et al.,* 1996). In this study hospital environments were contaminated by these organisms *Escherichia coli, Pseudomonas aeruginosa, Bacillus cereus, Klebsiella pneumonia* caused the nosocomial infection. Askarian and Hosseini, (2004) also reported the wound infection as the most common cause of nosocomial infection was followed by blood stream infection and Urinary tract infection

The ciprofloxacin have maximum antibacterial activity against all bacterial pathogens when compared to other antibiotics but Ciprofloxacin doesn't inhibitory effect to *Escherichia coli.* The medium level antibacterial activity was shown by Ampicillin, Tetracycline and Amikacin against all bacterial isolates. At the same time Ampicillin does not inhibit the growth of *Escherichia coli.* Low level antibacterial activities were observed in oflaxacin, Rifampicin, Vancomycin, and Erythromycin. At the sometime vancomycin have no effect on the growth of *Bacillus cerus* and *Escherichia coli.* Erythromycin has no effect on the growth of *Escherichia coli.*

CONCLUSION

Finally we concluded that it is important to evaluate the quality of the air we breathe whether indoors or out door, especially in the hospital environments. The number and type of air borne microorganisms can be used to determine the degree of cleanliness as well as to determine the source of human discomfort. Ciprofloxacin is recommended to nosocomial infection caused by bacteria.

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TABLE-1
BIOCHEMICAL TEST FOR BACTERIAL ISOLATES

S. No.	Bacteria	Gram stain		Indole	MR	VP	TSI	Citrate	Urease	Catalase	Oxidase	Sugar fermentat		
												L	D	S
		G (+) Rod												
1	B1	G (-)	-	-	-	±	A/K	-	-	-	+	-	A	A
2	B2	Rod	+	+	+	-	A/A	-	-	+	-	AG	AG	A
3	B3	G (-)	+	-	-	+	A/A	+	-	+	-	AG	AG	A
4	B4	Rod	-	-	-	±	A/A	+	-	+	-	AG	AG	AG
		G (-)												
+		- Rod		Positive										

-	-	Negative
±	-	Variable
A/K	-	Acid butt and alkaline slant
A/A	-	Acid butt and acid slant
K/K	-	Alkaline butt and Alkaline slant
A	-	Acid
AG	-	Acid and Gas

TABLE - 2
ANTIBACTERIAL ACTIVITY OF ISOLATED ORGANISMS

S. No.	Antibiotics (mcg)	Zone of inhibition mm in diameter			
		Bacillus cerus	Enterobacter aerogens	Escherichia coli	Klebsiella pneumoniae
1	Ampicillin(30)	19	11	-	7
2	Rifampicin(5)	7	9	7	10
3	Amikacin(30)	10	7	8	13
4	Ciprofloxacin(5)	21	15	-	15
5	Streptomycin(10)	11	15	-	15
6	Vancomycin(30)	-	11	-	10
7	Norfloxacin(10)	11	9	-	10
8	Ofloxacin(5)	7	-	7	8
9	Tetracycline(30)	13	15	9	15
10	Erythromycin(15)	19	9	-	13

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