

**REVIEW OF RESEARCH** 

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# BACTERIAL LOAD AND ANTIBIOTIC SUSCEPTIBILITY PATTERN OF ISOLATES IN GOVERNMENT HOSPITAL OF PARBHANI CITY (MAHARASHTRA, INDIA)

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# **ABSTRACT**:

Hospital is an important environment responsible for spread of airborne pathogens. A diverse range of microbial population is found in hospital indoor air. Present study was carried outto determine bacterial contamination of indoor air and susceptibility pattern of the isolates to commonly used antibiotics. Government Hospital, Parbhani was chosen for study due to high number of persons visiting to hospital from Parbhani city as well as nearby villages. Highest bacterial count i.e.  $6.01 \times 10^2 \text{c.f.u./m}^3$  was found in maternity ward whereas lowest count i.e.  $3 \times 10^2 \text{c.f.u./m}^3$  was found in burning ward. *Staphylococcal* count was found to be highest i.e.  $2.49 \times 10^2 \text{ c.f.u./m}^3$  in burning ward while lowest count was recorded in children ward i.e.  $0.86 \times 10^2 \text{c.f.u./m}^3$ . Bacterial isolates were tested for their susceptibility to Penicillin, Ciprofloxacin, Erythromycin, Streptomycin, Tetracycline and Methicillin. Many isolates were found to be resistant to Penicillin, Ciprofloxacin and Methicillin whereas all the isolates exhibited sensitivity towards Streptomycin and Tetracycline.

Keywords: Hospital indoor air, staphylococcal count, methicillin, c.f.u.

# **1.INTRODUCTION**

Indoor air of hospital is considered as a reservoir of the airborne microorganisms which contributes the air pollution caused by the airborne entities making major threat to the health and well being of the people. This also contributes in increasing the population of the microorganisms having multiple drug resistance patterns in them which is major increasing threat in front of the researchers and the community.

Airborne transmission is known to be route of infection for disease from the patients to the other patients. (C.B.Beggs, 2003). Airborne Nosocomial infection is a serious and wide spread problem with an estimated 1 in 10 patients acquiring of these infections are associated with person to person contact. There is increasing evidence that some infections are transmitted by the airborne route. It has been calculated that the airborne route of transmission may account for as much as 10-20% of all endemic Nosocomial infections. (L.A.Fletcher*et al*).

Large quantities of infectious airborne particles are expelled during many routine patient bodily functions such as sneezing, coughing, bowel evacuation, vomiting andtalking.Endemic to healthcare facilities, bacteria which can spread via airborne or droplet means are diverse (Aaron Fernstrom& Michael Goldblatt, 2012).The health and wellbeing of the public are affected by the physical, chemical and biological properties of hospital indoor environment (Ekhaise Fred O. &Ogbonghodo Blessing I., 2010).

In recent years many studies were done to isolate and check susceptibility of airborne micro organisms for various antibiotics. The increasing problem of multiple drug resistance patterns in airborne micro organisms is the new threat in front of community which is now reached at higher level.

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# **Objectives of Study**

- 1. The evaluation of types of micro organisms to give the index for the cleanliness of the environment as well as a profile reveling human health and nosocomial infections.
- 2. To measure the degree of bacterial contamination of indoor air and susceptibility pattern of the isolates to commonly used antibiotics.

# Materials:

The media plates of Mannitol Salt Agar and Nutrient Agar procured from Hi-Media Laboratories Pvt.Ltd. Mumbai were used for the collection of hospital air microflora.Following antibiotics discs were procured from Hi-Media Laboratories Pvt. Ltd., Mumbai.Penicillin (10mcg), Tetracycline (30mcg), Ciprofloxacin (05mcg), Methicillin (10mcg), Streptomycin (10mcg), Erythromycin (15mcg).

# **Study Area:**

The study was aimed at investigating the concentrations of airborne microorganisms in the selected five units of the Government District Hospital Parbhani.Parbhani lies at 18.45 & 20.10N latitude and 76.13 & 77.39E longitude.In order to detect airborne micro-flora, different wards of Government Hospital were selected for study was as follows:

- 1. Ward -1 General Ward
- 2. Ward-2 Children Ward
- 3. Ward-3 Maternity Ward
- 4. Ward-4 Burning Ward
- 5. Ward-5 Pathology Lab

# **Experimental:**

Sterile media plates (Mannitol salt Agar and Nutrient Agar) were exposed to hospital indoor environment for 10 minutes. Plateswere incubated at 37°c for 24 hours.

# **Direct Plate Count:**

Number of colonies present on media plates was counted. The number of colonies expressed as c,f.u./m3 was estimated using Koch sedimentation method according to Polish Standard PN89/Z-04008/08[30] sited in(Int. J. Environ. (2): 69-77) according to which,

CFU/m3 = a.10000/p.t.0.2 a-the number of colonies on Petri plate p-the surface of Petri plate t-time of Petri plate exposure

# **Antibiotic Susceptibility Test:**

Active culture of bacterial isolates was maintained of Nutrient agar slants. Disc diffusion testing was performed by Kirby-Bauer method as described in the guidelines of National committee for clinical laboratory standards (NCCLS, 2000,2002) using discs of antibiotics (Hi-Media).

Sr.No.	Ward	Name of Media	Total Colony Count	No. of Colonies (c.f.u./m³)	
	Conoral Word	Nutrient Agar	129	$3.28 \times 10^2$	
1	General Waru	Mannitol Salt Agar	45	$1.14 \times 10^2$	
2	Children Ward	Nutrient Agar	141	$3.59 \times 10^2$	

# Table 01. Bioburdon of Bacterial Isolates in different wards of Govt. Hospital, Parbhani

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		Mannitol Salt Agar	34	0.86 x 10 <sup>2</sup>
3	Maternity Ward	Nutrient Agar 236		$6.01 \times 10^2$
		Mannitol Salt Agar	56	$1.42 \times 10^2$
4	Burning Ward	Nutrient Agar	118	$3.0 \times 10^2$
		Mannitol Salt Agar	98	$2.49 \times 10^2$
5	Pathology Lab	Nutrient Agar	146	$3.71 \times 10^2$
		Mannitol Salt Agar	38	$0.96 \times 10^2$

# Graph:01Occurrence Frequency of Bacterial Isolates in different wards of Hospital



# Graph No. 02: Frequency of occurrence of Staphylococcal and Micrococcal sp. on Mannitol Salt Agar



# Table 02. Antibiotic Susceptibility testing of Bacterial Isolates

Sr.No.	Isolate No.	Zone of Inhibition (in cm.)					
		P 10	S 10	CIP 05	M 10	E 15	TE 30
1	NA-1	2.7	2.6	3.1	-VE	1.4	2.1
2	NA-2	2.8	2.9	2.5	3.2	3	2.6
3	NA-3	2.9	2.9	3.6	3	2.7	3.2
4	NA-4	2	2.3	2.6	2.7	2.5	2.2
5	NA-5	1.8	2.3	2.3	2.4	2.1	2.5
6	NA-6	-VE	1.9	2.4	1.4	1.8	2
7	MSA-1	-VE	2.1	2.3	2.5	1.4	2.6
8	MSA-2	1.6	2.5	2.3	-VE	-VE	2.5
9	MSA-3	2.6	2.6	2.5	3.2	2	2.7



#### **Result and Discussion:**

In this study the highest bacterial load was found in Maternity ward i.e.  $6.01 \times 10^2$  c.f.u./m<sup>3</sup>, followed by Pathology lab  $3.71 \times 10^2$  c.f.u./m<sup>3</sup>, Children ward  $3.59 \times 10^2$  c.f.u./m<sup>3</sup>, General ward  $3.28 \times 10^2$  c.f.u./m<sup>3</sup> and recorded lowest in Burning ward i.e.  $3 \times 10^2$  c.f.u./m<sup>3</sup>(Table no. 2)

A similar study was done by Ekhaise F. Osaro *et al.*, (2008) in Benin City, Nigeria.In this study they found somewhat different number of bacterial load which may be due to higher sanitary conditions maintained there.

In all the areas *Staphylococcus aureus, Staphylococcus epidermidis* and *Micrococcus luteus* are dominant organisms. 35% of the total isolates of *S.aureus* were found to be resistant to Methicillin and Erythromycin. *S.aureus* is most especially Methicillin resistant strain (MRSA) is a problem in hospitals worldwide. Though its infection is mostly associated with contact route, the airborne route is thought to play an important role in intensive care and burn unit.

# **Conclusion:**

The consequence of indoor air environment problem indicates that much is to be done in identifying and managing indoor air deficiencies. Indoor air monitoring focused on the presence of bacteria is important procedure and such procedure should be routine in hospitals.

Multidisciplinary approach is required to handle the complexity of bio-aerosols. Efforts are needed to improve hospital hygienic environment and it is recommended to raise the awareness and educational status of medical workers to reduce hazards of air borne transmission potentially pathogenic micro organisms.

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