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Short Communication

Study of Aerial Microbial flora of different Departments of a Tertiary care Hospital in Eastern India

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Abstract

Microbial bacterial and fungal flora can be a source of numerous allergic and infective illnesses like skin infections, respiratory tract infection and others. Patients attending Outpatient department as well as other specialties are hence at risk of acquiring these infections, and it is important to measure and monitor the microbial bio-load of ambient air of these places. We here present our observation regarding this, from our tertiary care hospital.

Keywords: Bacterial flora, chocolate agar, CLED, settle plate method.

Introduction

Microorganisms present in the indoor air can often build up in the form of aerosols and expose the patient to different airborne diseases¹. Moisture induced damage to a building or room and consequent growth of a number of virulent microorganisms in the indoor air are associated with numerous adverse health effects among its occupants². Actually, when a given building or its surface material becomes wet due to accumulated moisture, it is only a matter of time before microbes will start to grow profusely there². Indoor air comprises a complicated admixture of different microorganisms, fragments of microorganism, and their byproducts such as endotoxins, mycotoxins, and a plethora of volatile microbial organic compounds³. Elevated numbers of bacteria in the ambient and circulating air are associated with an increasing prevalence of different airborne diseases and even food pollution, and may be responsible for causing many respiratory and skin infections as well⁴. Keeping these things in mind, our study was planned to assess the bacterial and fungal load of ambient air of OPD, non-clinical departmental laboratories and General wards of our institute.

Material and Methods

The study, a part of a short-term project programme, was carried out in the Department of Microbiology from Middle of June 2015 to End of August 2015.

Settle plate method using chocolate agar (Nutrient agar 90 ml + Sheep blood 10 ml) and CLED agar was employed for studying the microbiota of air.

The places from where air sample was studied were: OPD (Out Patient Department) Microbiology Lab, Departmental Lab of Microbiology, Undergraduate Lab of Biochemistry Department, Physiology lab, OPD of Pulmonary Medicine Department, Lab of Department of Forensic medicine and Toxicology, General Medicine OPD, Pathlogy Departmental Lab, Anatomy Departmental Lab and General ward. From each place air sample was collected on two occasions, with a gap of 20 days in between, to check for reproducibility of study.

In the settle plate (sedimentation) method, both the plates were kept open in the respective labs or rooms, 1 metre away from wall, 1 meter above floor, for 30 minutes. Thereafter the plates were closed and incubated overnight at 37 deg. C. After that colonies were observed, and identified using Gram staining, catalase, coagulase and other standard biochemical reactions as applicable. If *Staphylococcus aureus* was isolated, it was checked for Methicillii resistanced by Disk diffusion methodd as per CLSI protocol using Oxacillin (5 mcg.) disk (Himedia labs, India)⁵.

If Gram positive bacilli with spores were found, they were identified using inoculation in blood agar, mannitol fermentation and lecithinase activity on egg yolk agar.

Results and Discussion

Gram positive aerobic sporulatig bacilli were found in all the places studied (100%). The other most commonly isolated bacteria were coagulase negative *Staphylococcus* spp. (3 out of 11 place, or 27.3% rooms or labs), *Staphylococcus aureus* (7 out of 11 sources, or 63.6%).

Acinetobacter spp. was isolated from the air of Biochemistry lab, general ward and Medicine OPD.

Interestingly, MRSA was found in only pulmonary medicine OPD air among all clinical Departments and in 3 non-clinical Departments, i.e. Pathology Lab., Biochemistry Lab and Anatomy department.

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General colony counts were found to be lowest in air from Anatomy department.

Bacillus anthracis or *Bacillus cereus* was not found in air from any source.

It was found that the mean number of colonies found from ward or OPD air (200 CFU/plate) was significantly more on manual counting than Non-Clinical Departmental labs (25 CFU/plate). (p<0.05 using Z-test of significance).

Discussion: The Settle Plate Method is a good, old qualitative assessor of microbial load of air⁶. It is a type of passive monitoring of air quality, and in this "settle plates" are used, which are, in fact, Petri dishes containing various enriched and other culture media, which are then exposed to the surrounding air for a given time. So as to collect suspended aerosols or biological particles which "sediment" out on the media and are then incubated and subsequently identified⁷. Studies have proposed that sedimentation plates are actually. An easier method of air sampling than other methods, and when properly used, is a very true indicator of bacterial contamination of air, especially near the operating table in Operation theatres as active air sampling captures small particles that might be removed by ventilation whereas sedimentation plates represent larger particles which resist removal and may pose a risk of post operative surgical site infections⁸. Biocontamination of circulating air and related adverse health effects are an emerging public health problem, and airborne microbes such as bacteria, viruses and fungi can cause infection in various living or working environments⁹. Industrial issues also occasionally arise from the presence of bacteria and fungi in air, like deterioration of art and paper objects¹⁰. Our study is the first, at least from this area, which highlights the importance of routine air sampling by simple and reproducible methods for all departments and specialities, and which also will be important in the context of hospital infection control. We have also shown here that virulent bacteria like MRSA strains can circulate and dissseminate in air of both clinical and non-clinical specialties. It was also found that the microbial bio-load remained the same on both occasions from a particular area, and can often be relatively constant. This method can also provide data necessitating routine fogging of rooms in all departments.

Conclusion

Settle plate method using Enriched media is a good, simple, cheap, qualitiative and also semi-quantitative method for microbial sampling of air, and is quite reliable and reproducible. It can also be routinely used for monitoring air quality of air of Operation theatre as well as ambient air of wards, outpatient Departments and other places. This method should be used more and more in routine practice.

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