



## IMPACT OF AIRBORNE MICROBES ON EXPIRATORY RATE OF CROWDED LIVING INDIVIDUALS

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### ABSTRACT

The present study examined the impact of airborne microbes on expiratory flow rate of individuals living in crowd area of Keelavasal Market, Thanjavure. There are four bacterial isolates in which two were Gram-positive bacteria namely *Staphylococcus sp.* and *Bacillus sp.* and another two were gram-negative bacteria were identified as *E. coli*, *Klebsiella sp.* In addition to this, there are two fungi namely *Aspergillus flavus* and *Microsporium sp.* were also isolated from the present investigation. From the peak expiratory flow rate study, maximum people were found normal while existence of few severe and very severe cases were also identified. Thus, the present study reports the possible reasons for these causes due to airborne microbial populations.

**Key words:** Peak expiratory flow rate, airborne microbes, *Aspergillus flavus*, *Klebsiella sp.*, *Bacillus sp.*

### INTRODUCTION

Respiratory tract infections are the most common cause of death in the world. Chronic lower respiratory disease is the fourth leading cause for death in the United States. Microorganisms primarily cause disease by a limited number of pathogenic mechanisms since there mechanisms relate to respiratory tract infections, for any organism to cause disease it must first be able to gain a foothold with the respiratory tract in order to grow to sufficient number to produce symptoms therefore most etiological agents of respiratory tract disease must first adhere to the mucosa of the respiratory tract. Bacteria have passes specific adherence factors. Aspiration of minor amounts of oropharyngeal material, as occurs of ten during sleep, plays an important role in the pathogenesis of many types of pneumonia.

Almost all forms of bronchitis's are associated with bacterial infections. A wide variety of infectious agents can initiate brachiates, including adenovirus, influenza virus, *S. aureus*, *klebsella sp.*, and anaerobes, infections cause the bronchial walls to weaken, and pockets of infection begin to form. When the walls of the

bronchial system are injured the mucociliary mechanisms is damaged. Allowing bacteria and mucus to accumulate within the pockets. The infection becomes worse and results in bronchiectasis.

The number of bacteria in air at any time is dependent on a variety of factors. The most important is the number of people present. There body moments and the amount of disturbances in their clothing [1]. Respiratory tract connects the interior of the body and the outside environment [2] all most all forms of Bronchiectasis associated with bacterial infections [3]. Bacterial respiratory infections often play a major role in exacerbations of asthma. Bacteria cause acute Bronchitis and are common both in smothers and non-smokers [4]. *Streptococcus pyre* genes [5] is a bacterium that possesses specific adherence factors. Air pollutants consist of bacteria that induce bronchial inflammation similar to that induced by figure he smoking [6].

Clinical signs of fungal airway disease are most common in housed horses and more particularly those that have an immunocompromising disease [7], or other

underlying primary lung pathology (including viral or bacterial infections) [8]. A few cases may develop following prolonged antibiotic treatments where it is presumed that the symbiotic and commensal bacteria are destroyed leaving "an open field" for the fungal proliferation. Focal fungal infections can develop in areas of damaged tissue and especially necrotic tissue and so pulmonary abscesses can be the primary source. The pathogenesis of nasal cavity, paranasal sinus and guttural pouch mycoses is very uncertain. The distribution of the lesions within the nasal cavities suggests that the lesions develop spontaneously - there is no defined locus that is more often affected than others.

The same cannot be said for the guttural pouch in which the lesions occur more commonly over the dorsal region of the exposed section of the internal carotid artery. Another locus is the maxillary artery on the lateral wall. In some cases however the entire upper portion of the pouch can be severely affected. The lesions in the guttural pouch are usually destructive and so arterial perforations can occur. This is usually catastrophic unless the early hemorrhages can be detected and the condition treated surgically. Lesions that develop on the mucosa of the upper hemisphere of the guttural pouch can also cause destruction or damage of the nerves. Nevertheless, healthy horses may succumb to the infections given a suitable challenge. For the most part, fungal infections are therefore best regarded as opportunistic and these are usually *Aspergillus*, *Candida* and *Mucor* sp.

Although a large number of factors are capable of prevalent respiratory tract infections, microorganisms produce significant effect [9] the most common organisms causing Acute Bronchitis are *klebsiella* sp, pneumonia sp and *Escherichia coli* are frequent causes of infection [10]. In the present study an attempt has been made to identify the microorganisms and measure the peak expiratory flow rate (PEFR) of subjects who are luring in lightly crowded areas.

## MATERIALS AND METHODS

### Sample collection

This study site of the present investigation is keelavasal market, Thanjavur. The samples were collected by using using open Petri plates containing different media. This media were exposed at air for 1-2 h and then closed immediately.. The plates were distributed in many places of the market at different distance from the area.

Immediately after collection of samples, the Petri plates were taken to the laboratory.

### Isolation and Identification of Microorganisms

The pathogenic microorganisms were isolated from the various places by using open plate methods. In this method we used three different media such as Nutrient Agar, Macon key Agar and PDA medium. All the plates were incubated at 37°C for 24 hrs. Isolated colonies were subjected to confirm by conventional biochemical tests. All the tests were compared with determinatives of Bacteriology [11]. The number of microorganisms deposited onto the agar surface of the plate over the period of exposure was determined by incubation of the agar plates at 25°C for 5- 7 days and counting colonies that develop. The results can be expressed as number of colony forming units (CFUs) per unit time. The counted colonies can then be further characterized to genera or species. A clean class slide was taken and a tuft of fungus was placed on the slide. A drop of lactophenol cotton blue was added on the surface of fungus. The clean cover slip was placed on the slide without air bubbles. The slide was placed on under the microscopy (45X) [12].

### Measurement of the Peak Expiratory Flow Rate (PEFR)

Peak expiratory flow Rate (PEFR) PEFR was measured using a Wright Peak Flow Meter at the peak time of crowded area (Keelavasal – Market), Thanjavur. Totally 140 subjects were observed. The best of three readings was recorded. The predicted PEF values have been introduced by Quanjer and co-workers. The subject's were recorded and observed values were compared with the predicted values.

## RESULTS

The isolates were identified according to morphological appearance, cultural characteristic and biochemical reactions as Gram-positive bacteria which further identified as *Staphylococcus* sp, and *Bacillus* sp. The Gram-negative bacteria were identified as *E. coli*, *Klebsiella* sp. As shown in (table 1).The fungal colonies were observed and identified using standard method. In this study we identified fungal colonies such as *Aspergillus* sp and microsperum as shown in the Table 2.The maximum air flow rate during forced expiration and monitoring of bronchial constriction of 140 subjects was studied by PEFM and compared with the predicted values as shown in the Table 3.

**Table 1. Biochemical characterization of isolated bacterial species.**

| Genes                    | Ind | Mal | Ure | Cit | Lac | Gas | Ure | Vp | H2s | Lys |
|--------------------------|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|
| <i>Escherichia coli</i>  | +   | +   | -   | -   | +   | +   | -   | -  | +   | +   |
| <i>Klebsiella</i> sp     | +   | +   | +   | +   | +   | +   | +   | +  | +   | +   |
| <i>Staphylococcus</i> sp | +   | +   | -   | +   |     |     |     |    | -   |     |

**Table 2. Characterization of fungi isolated from different regions of Thanjavur.**

| Species                   | Colony morphology        | Microscopy                                  |
|---------------------------|--------------------------|---|
| <i>Aspergillus flavus</i> | A deep blue green colony | Visible as small faint filamentous colonies |
| <i>Microsporium</i> sp    | White becoming tan       | Spindle shaped normally pressed             |

**Table 3. Peak expiratory flow rate of people of Keelavasal – Market area Thanjavur.**

| S.No | No of subjects         | Peak expiratory flow rate |
|------|------------------------|---------------------------|
| 1    | Normal (>80%) – 59     | MD 97± 9.724              |
| 2    | Mild (=70%) – 30       | MD 73 ± 2.47 SD 2.47      |
| 3    | Moderate (50-69%) – 35 | MD 58 ± 5.43 SD = 5.43    |
| 4    | Sever (35-49%) 9       |                           |
| 5    | Very sever (<35%) 7    |                           |

## DISCUSSION

Any micro organisms to cause disease must first be able to gain a foothold within the respiratory trues in order to grow in sufficient numbers to produce symptoms and based on this study, the presence of airway bacteria, is one of the factor for acute disease (COPD) in highly crowded places. Aspiration of micro amounts of nasopharyngeal material as occurs during sleep plays an important role in the pathogenesis of many types of pneumonia factors like the presence of microorganisms that impair the normal function of the removal of particulate matter may result in acute infection. Allergic respiratory disease such as Bronchial Asthma has become more common worldwide in the recent years [13]. Gring adequate concussing regarding the management of environmental exposures to people who live in crowded places may decrease the above discussed infections. The findings of this study suggest that changes in airway

bacterial load, the nature of the individual infective pathogens, and interactions between multiple pathogens and the airway modulate exacerbation severity. Further studies are required to improve understanding of the pathogen/host interactions at exacerbation and indeed also in the stable state. Manipulation of this complex relationship with appropriate anti-infective and anti-inflammatory therapies may benefit bronchial patients by reducing both exacerbation severity and slowing progression of this highly prevalent disease.

## CONCLUSION

The present study reports the possible susceptible persons and prevalence of airborne microbial infections in crowd living peoples in Keelavasal Market, Thanjavure. It would be further elevated to study the possible mechanism or factor or behavioral responsible for severity in this area.

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