Research Paper
*Impact Factor - **2.262***
Peer Reviewed Journal

IJMDRR
E- ISSN –2395-1885
ISSN -2395-1877

DIVERSITY OF AEROMYCOFLORA IN HOSPITAL ENVIRONMENT OF ADOOR PATHANAMTHITTA DISTRICT, KERALA, INDIA.

Swapna.S* Dr.Neeta N.Nair Lini K Mathew***
**PG & Research Dept of Botany, Marthoma College Thiruvalla, Kerala.*
***Research Supervisor, PG & Research Dept of Botany, Marthoma College Thiruvalla, Kerala.*

Abstract
Aerobiology is defined as a discipline of investigation of aerial transport of biological materials. Pollen grains and fungal spores and some bacteria are among the most abundant airborne bioparticles.This study was conducted to isolate and identify the predominant air borne fungi from indoor hospital environment of Adoor,Pathanamthitta district.The present aeromycological investigation was carried out by using gravity petriplate method. Investigation period for this study from July 2013-October 2013. Total 136 fungal colonies belonging to 15 fungal genera were recorded during the study period. Aspergillus niger was the most prevalent fungal genera followed by Penicillium chrysogenum, Aspergillus fumigates,Trichoderma viride,Fusarium oxysporum ,Curvularia lunata, Alternaria alternate, Rhizopus stolonifer,Phoma glomerata,Syncephalastrum racemosum,Rhizopus nigiricans, Aspergillus flavus, Curvularia fallax, Acremonium chrysogenum and Aspergillus oryzae. Meterological parameters were also recorded during the study period.Isolated cultures were deposited at National Centre of Fungal Taxonomy,New Delhi.

Key words: Aeomycoflora, Hospital, Aerospora, Ascomycotina, Zygomycotina.

Introduction

Fungi comprises a diverse group of organisms.Among all organisms fungi are second largest group in the world after insects Fungal spores are an important component of the bioaerosol. There are about 80,000 species,most of which are cosmopolitan in origin. Air contain large number of different types of fungal spores,they are called aeromycoflora. Fungi are often well adapted to airborne dispersal of the air, their spores having either tall conidiophore that penetrate into or through the Laminar boundary layer or specialized liberation mechanism that forcibly eject spores through this layer. The fungal spores and hyphal fragments are commonly recorded in the air and are important for the survival and subsequent continuation of generations. Many of fungal spores are endowed with unique structure and capacity to survive under unfavorable environmental conditions and this probably accounts for their predominance in the air (Tilak, 2010). Aerospora constitutes fungal spores, pollen, bacteria, hyphal fragments, insect's scales, etc. Airborne fungi are considered to act as indicator of the level of atmospheric bio-pollution. The presence of fungal propagules, volatiles and mycotoxins in the air can cause a health hazard in all segments of the population. Airborne fungal spores are ubiquitous in nature. The variation in aeromycoflora can be attributed to number of factors like, the rapid changing environmental conditions, increasing population, sanitary conditions, local vegetation, industrialization and pollution(Agarwal,1987;Edmonds *et al*.,1973;Lacey,1990;Harris and Birch,1988), weather and seasonal fluctuation, condition of the surrounding areas, climatic conditions and with the presence of a local source of spores. The examination of common aeromycoflora distribution in a particular region can be helpful in: identifying association between fungal sensitization and clinical diagnosis; and clinical prevention of the seasonal allergic diseases. The aim of this study was to determine the fungal flora, their identification, concentration and diversity in the Thaluk hospital. The environment may possess both beneficial and harmful fungal flora. In the case of beneficial fungi, they could be cultured in laboratories and could be used for producing valuable substances. On the other hand, in the case of harmful fungi, their effects could be studied more critically. Thus, precautions could be taken, their bio- control may be done and ultimately there will be more awareness of these particular contaminants.

Materials and Methods

In the present investigation fungal spores were isolated by using the gravity petridish method (Kaur,Behera and Mukerji,1989).Ten sterilized petriplates containing PDA medium were exposed for 10 minutes at different places at one meter height above the ground level. The exposed plates incubated at 28 ± 1^0 C in culture room for seven days. Fungal colonies developed in the Potato Dextrose agar plates were sub cultured in the potato dextrose agar slant on which they were maintained for longer duration without any contamination or deterioration of vigour.

Ecological Studies

For ecological studies, at the end of the incubation period, percentage frequency and percentage contribution of fungal flora is calculated (Sharma 2001) with the help of the following formula:

$$\text{Percentage frequency} = \frac{\text{Number of observation in which a species appeared}}{\text{Total no. of observation}} \times 100$$

$$\text{Percentage Contribution} = \frac{\text{Total no. of colonies of a species in all observations taken together}}{\text{Total no. of colonies}} \times 100$$

Meteorological datas were also recorded during the study				period from Meteorological Centre,	
Thiruvananthapuram.					
	Temperature	Humidity		wind speed	
	25° C	84%		81 km/hr	

Results and Discussion

During the present investigation 136 fungal colonies of 15 isolates were obtained. Fungal isolates (Table-1) recorded were representatives of the two major groups i.e. Zygomycotina and Ascomycotina. Fungal isolates were *Rhizopus nigiricans, Rhizopus stolonifer, Syncephalastrum racemosum, Acremonium chrysogenum, Alternaria alternata, Aspergillus flavus, Aspergillus fumigates, Aspergillus niger, Aspergillus oryzae, Curvularia fallax, Curvularia lunata, Fusarium oxysporum, Penicillium chrysogenum, Phoma glomerata* and *Trichoderma viride.*

Aspergillus niger showed maximum percentage contribution (19.117%) followed by *Penicillium chrysogenum (16.176 %), Aspergillus fumigates(8.088 %), Trichoderma viride(8.088 %), Fusarium oxysporum(6.617%), Curvularia lunata(5.882%), Alternaria alternate(5.882%), Rhizopus stolonifer(5.147%),Phoma glomerata(4.411%), Syncephalastrum racemosum(4.411%), Rhizopus nigiricans(3.676%), Aspergillus flavus(3.676%), Curvularia fallax(3.676%), Acremonium chrysogenum(2.941%)* and *Aspergillus oryzae(2.205%)* in (Fig-1). Out of 136 isolates, 18 isolates belongs to Zygomycetes and 118 isolates belongs to Ascomycetes

Study of indoor environment of the hospital wards has brought out valuable information on the different fungal forms. Species of Aspergillus and Penicillium are the dominant fungal forms indoor environment of Thaluk Hospital Adoor. Verma and Chile(1992) reported Aspergillus as a most dominant type isolated from the air of medical college hospital ,Jabalpur.Verma and Soni (1997) reported Aspergillus as a most dominant type from Victoria Hospital and allergy clinic Jabalpur.Kulshrestha and Chauhan (2001) reported Aspergillus as the major component of the medical college District hospital and GG Nursing Home in Agra city (UP)

Accession nos of isolated cultures at National Centre of Fungal Taxonomy,New Delhi.

Sl no	**Accession Number**	**Fungal isolates**
1	5832.13	*Rhizopus nigiricans*
2	6065.12	*Rhizopus stolonifer,*
3	6039.12	*Syncephalastrum racemosum,*
4	6050.12	*Acremonium chrysogenum*
5	6070.12	*Alternaria alternata*
6	6061.12	*Aspergillus flavus,*
7	6058.12	*Aspergillus fumigatus,*
8	6062.12	*Aspergillus niger*
9	6067.12	*,Aspergillus oryzae,*
10	6077.14	*Curvularia fallax,*
11	6041.12	*Curvularia lunata,*
12	5828.13	*Fusarium oxysporum*
13	5826.13	*Penicillium chrysogenum*
14	6095.14	*Phoma glomerata*
15	6037.12	*Trichoderma viride*

Conclusion

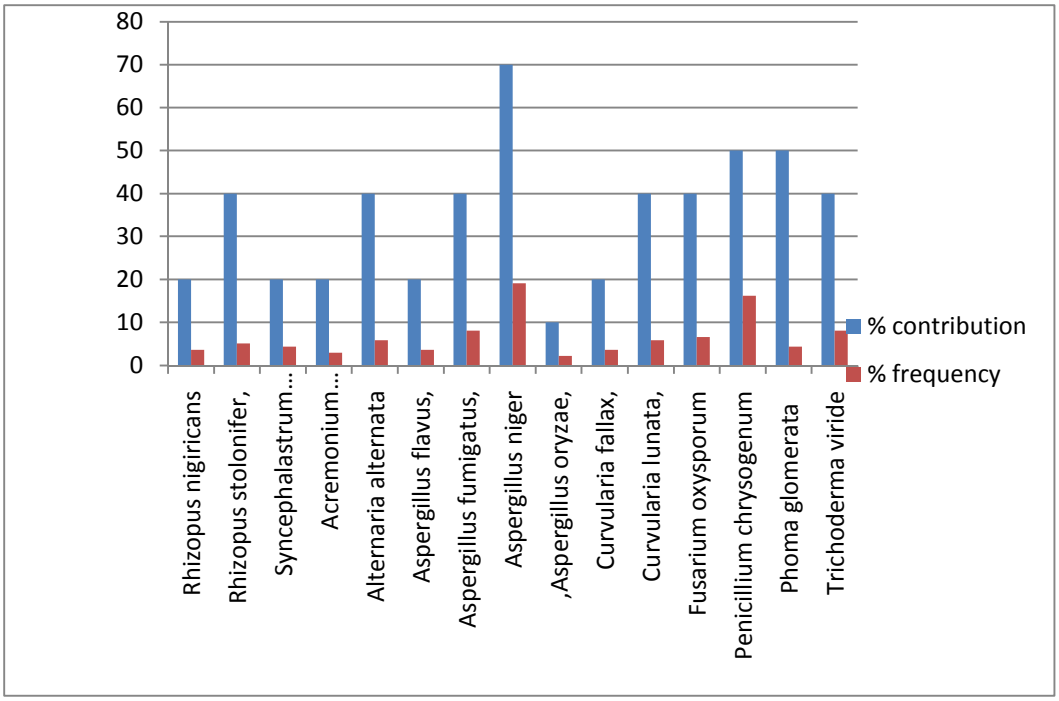
On the basis of this study the following conclusions were made.

1. The environment of Thaluk hospital was rich in fungal spores.
2. The morphological characters of predominant fungal spores have been studied and incorporated.
3. Among fungal spores the group Ascomycotina formed a dominant part of the air. The dominant airborne fungal spore types were *Aspergillus niger.*

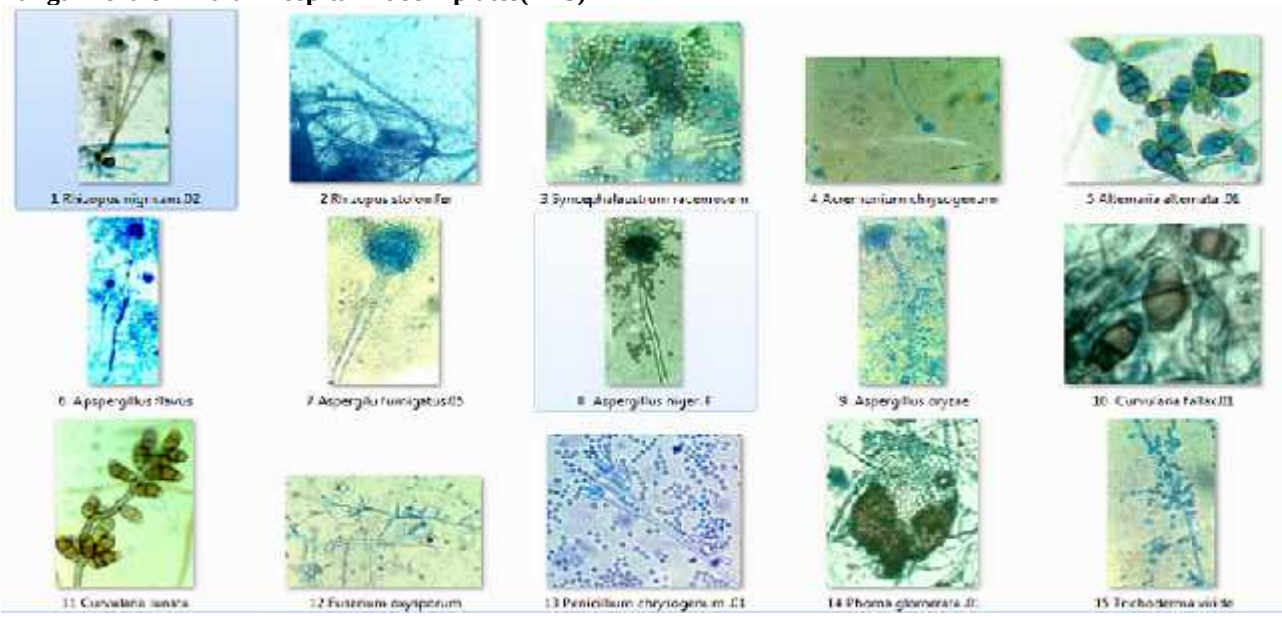
Table 1 - Isolated fungal flora of Thaluk Hospital Adoor, Pathanamthitta, Kerala, India

Sl.. no	Fungal isolates	Total no of colonies	Percentage Contribution	Percentage Frequency
Zygomycotina				
1	*Rhizopus nigiricans*	5	3.676 %	20%
2	*Rhizopus stolonifer*	7	5.147 %	40%
3	*Syncephalastrum racemosum*	6	4.411 %	20%
Ascomycotina				
1	*Acremonium chrysogenum*	4	2.941%	20%
2	*Alternaria alternata*	8	5.882%	40%
3	*Aspergillus flavus*	5	3.676%	20%
4	*Aspergillus fumigatus*	11	8.088 %	40 %
5	*Aspergillus niger*	26	19.117 %	70 %
6	*Aspergillus oryzae*	3	2.205 %	10 %
7	*Curvularia fallax*	5	3.676 %	20 %
8	*Curvularia lunata*	8	5.882 %	40 %
9	*Fusarium oxysporum*	9	6.617 %	40 %
10	*Penicillium chrysogenum*	22	16.176 %	50 %
11	*Phoma glomerata*	6	4.411 %	50 %
12	*Trichoderma viride*	11	8.088 %	40 %

Fig-1- % Contribution and % frequency of fungal isolates



Fungal flora of Thaluk hospital Adoor -plates(1-15)



Acknowledgement

We are thankful to Dr. Alex Mathew, Principal, Dr.Elizabeth.T.Mangatt, HOD Botany,Marthoma College,Thiruvalla for providing the facilities in research work and District Medical Officer Pathanamthitta, Health Department ,Kerala provided permission of collecting samples in hospital. Authors wishes to express their sincere thanks to Dr. P.N. Chowdhry, Principal Mycologist, National Centre of Fungal Taxonomy, Inderpuri, New Delhi for confirming the fungal identifications, their constant encouragement and valuable help during this course of investigation

References

1. Agarwal,G.P.M.(1987).In Atmospheric bio pollution(Ed.N.Chandra).*Environment Pub.Karad*,75-82.
2. Edmonds,R.L. and Bnninghoot,W.S.(1973).Aerobiology and its modern application.Report No.31.B.P.Aerobiology programme, p.17.
3. Harris,J.A.,and Birch,P.(1980).The effect of zeolite on the toxicity of lead to fungi.*Environmental pollution*,49:235-241.
4. Kaur,T.,Behera,N. and Mukerji,K.G.(1989).Aeromycoflora of Berhampur University Campus , Orissa.J.of *Indian Botanical Society*, 69,417-420.
5. Kulsrestha,A. and Chauhan,S.V.S (2001). Aeromycoflora of some hospitals of Agra, Indian journal of eaerobiology, Vol. 14 No. 1 and 2, pp 33-35.
6. Lacey,M.E.(1990).Aerobiology and Health;*The role of air borne fungal spore inrespiratorydisease*.Infrontiersin mycology,honorary and general lectures from fourth international mycological Congress, Regensburg, 1990. Ed. by. D.L.Hawks WorthC.A.B..International,1991.8;157-185.
7. Sharma, K. (2009). Incidence of fungal allergens in the air at Raipur.Lab to land. 1: 98-101.
8. Tilak ,T.S (2010).Aerobiology to Astrobiology.3:53-54.
9. Verma K.S. and Chile S. (1997) Allergenicity of airborne fungal spores at Jabalpur with reference to selected fungi in etiology of respiratory allergy. Res.J.Indian Bit.Soc.231-232.
10. Verma and Soni (1997).Allergenicity of some airborne fungal spore Int.Biol.Vasundhara 2:13-16.