# Aeromycological Study of an Urban area in Hyderabad City, Telangana State

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***Abstract*** **- Present investigation focuses on aeromycological survey, conducted from January to December 2014 at Gowliguda, an urban area of Hyderabad city of Telangana State, India. Out of various aerosporal components recorded in the study area, fungal spores constituted about 24.57% of total aerospora. A total of 15 fungal spore types, were encountered, among which Alternaria sp.( (18.2%) found to be predominant, followed by *Curvularia* sp. (10.6%).Other significant spore types include, *Drechslera sp* .,*Cercospora* sp. and Bispora sp. etc. Peak representation of fungal spores in the air was found in the months of September, November and December. Some of the important fungal spores that cause allergy, include, Alternaria sp., *Curvularia* sp., *Drechslera* sp.,Cladosporium sp. and *Epicoccum* sp were found in the. atmosphere of study area.**

***Index Terms*** **- Gowliguda, Hyderabad city, Fungal spores, Allergy.**

## INTRODUCTION

Airborne fungal spores which cause allergenic diseases such as, rhinitis and severe asthma, are one of the most important agents that trigger Type I and Type II allergic reactions. Although the exact incidence of fungal respiratory allergies is unknown, it is estimated to be 20%-30% among atopic subjects (Horner W E ,*et al*.,1995).Aerobiological and clinical investigations are in progress throughout the world, to find out prevalence and intensity of various airborne allergenic fungal spores (Shivpuri and Singh,1966). The role of fungi in triggering respiratory tract diseases have become more prominent, due to the crucial need of humans to air (Ghiasian S A ,*et al*.,2016). Present investigation focuses on survey of aeromycoflora in the atmosphere of Gowliguda area of Hyderabad, which is an active urban area with floating population .Being one of the most crowded area, it is a vulnerable place for allergenic diseases. The present paper provides the data of fungal spore types, including allergenic ones encountered from the residential localities of study area.

## MATERIALS AND METHODS

Daily monitoring of atmosphere of Gowliguda area was done for a period of one year from January 2014 to December 2014,using Lakhanpal and Nair's model of Gravimetric Aeroscope (Nair *et al.*,1986).*The* aeroscope was installed on the open terrace of the third floor of a residential house in the study area , at about 30ft from ground level. The daily census of airborne fungal spores was carried out by exposing the slides smeared with saffranine stained glycerine jelly to the atmosphere for 24 hours. Later slides were mounted with rectangular coverslip and critically scanned for air born fungal spores under Olympus Trinocular Microscope. The spore types were identified on the basis of published literature (Ellis.M.B.1971&1976).

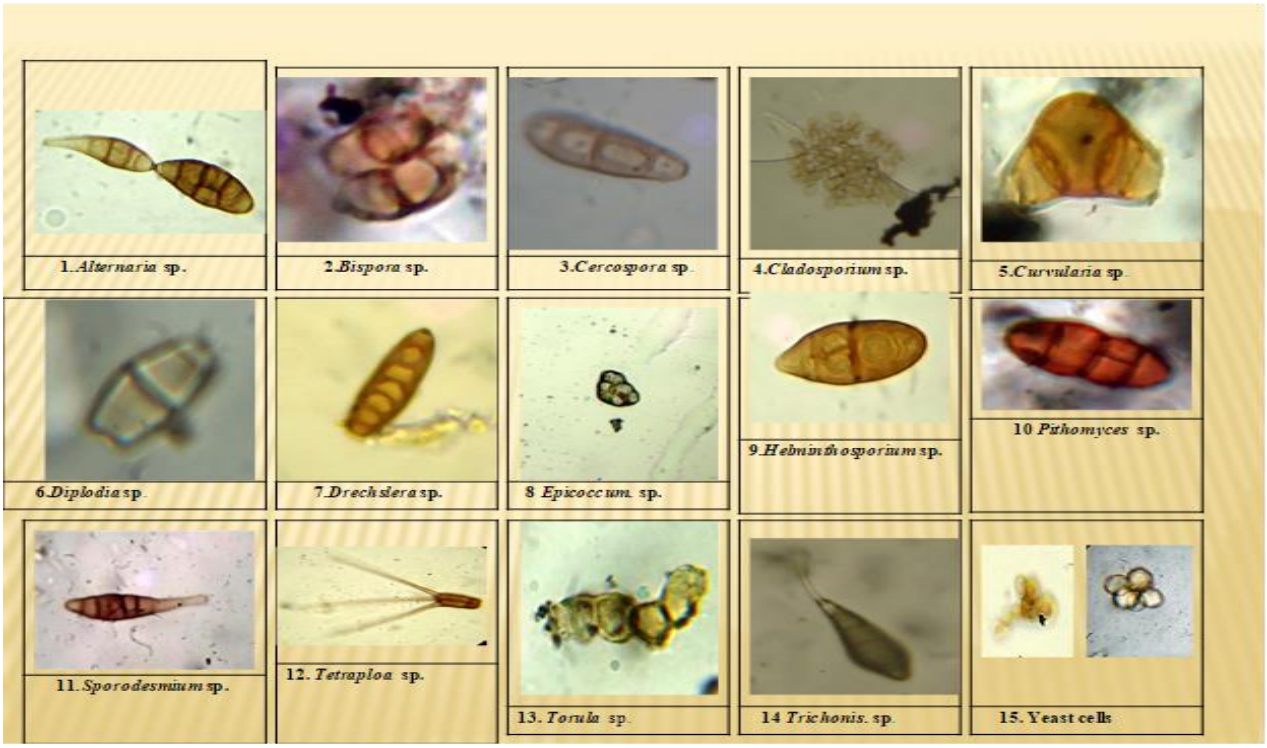
## OBSERVATIONS

The fungal spores accounted for 24.57% of total aerospal elements encountered in the study period. They were second predominant aerosporal components, next to pollen grains, recorded in the study area. Out of total 15 fungal spore types identified, *Alternaria* sp.(18.24%) found to be most predominant type, followed by *Curvularia* sp. (10.56%) and *Drechslera* sp.(9.40%). The predominance of spore type *Alternaria* sp.was also reported at Rajasthan(Singh & Maninder Grewal,1989)and Secunderabad(Jyothi Nayar 1992) . But sterile hyphae, Aspergillus sp. and Pencillium sp were in abundance at Kolkatta (Debasmita Ghosh etal.,2021).Other spore types like *Cercospora* sp.(8.91%), *Bispora* sp.(7.78%), *Pithomyces*

sp(6.65%),*Cladosporium* sp.(6.55%), *Epicoccum* sp.(4.93%), *Diplodia* sp.(4.88%), Yeast cells.(4.81%)and *Helminthosporium* sp(4.71%) were fairly well represented. *Trichonis* sp.(4.05%), *Sporodesmium* sp.( 3.51%), *Tetraploa* sp.(2.66%) and *Torula* sp(2.36%) were moderately encountered (Table 1). Recently, aeromycological survey at Ratnagiri dist. Maharashtra also reported incidence of fungal spore types like *Alternaria* sp., *Cladosporium* sp., *Cercospora* sp. and *Helminthosporium* sp etc., (Mahadeo and Kalpit 2017)

Table 1- Monthly incidence of various airborne fungal spores at Gowliguda 2014.

| S. No | Fungal spore types | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct | Nov | Dec | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | *Alternaria sp.* | 60 | 80 | 94 | 92 | 97 | 55 | 30 | 25 | 55 | 38 | 76 | 72 | 774 | 18.24 |
| 2 | *Bispora sp.* | 16 | 22 | 16 | 14 | 12 | 28 | 24 | 32 | 43 | 42 | 40 | 41 | 330 | 7.78 |
| 3 | *Cercospora sp.* | 28 | 36 | 47 | 55 | 48 | 12 | 6 | 12 | 36 | 24 | 28 | 46 | 378 | 8.91 |
| 4 | *Cladosporium sp.* | 26 | 28 | 6 | 0 | 0 | 14 | 18 | 14 | 36 | 32 | 48 | 56 | 278 | 6.55 |
| 5 | *Curvularia sp.* | 28 | 40 | 56 | 54 | 58 | 21 | 16 | 15 | 52 | 32 | 32 | 44 | 448 | 10.56 |
| 6 | *Diplodia sp.* | 12 | 22 | 9 | 0 | 0 | 8 | 12 | 13 | 33 | 14 | 48 | 36 | 207 | 4.88 |
| 7 | *Drechslera sp.* | 22 | 32 | 36 | 47 | 42 | 24 | 18 | 12 | 36 | 24 | 62 | 44 | 399 | 9.40 |
| 8 | *Epicoccum sp.* | 20 | 18 | 16 | 12 | 10 | 4 | 7 | 11 | 29 | 20 | 32 | 30 | 209 | 4.93 |
| 9 | *Helminthosporium sp.* | 12 | 18 | 12 | 0 | 0 | 8 | 10 | 16 | 38 | 32 | 28 | 26 | 200 | 4.71 |
| 10 | *Pithomyces sp.* | 18 | 30 | 26 | 0 | 0 | 20 | 18 | 30 | 42 | 40 | 30 | 28 | 282 | 6.65 |
| 11 | *Sporodesmium sp.* | 10 | 15 | 20 | 4 | 5 | 4 | 6 | 10 | 18 | 14 | 12 | 31 | 149 | 3.51 |
| 12 | *Tetraploa sp.* | 12 | 15 | 8 | 4 | 0 | 0 | 3 | 8 | 10 | 11 | 14 | 28 | 113 | 2.66 |
| 13 | *Torula sp.* | 6 | 12 | 10 | 12 | 0 | 0 | 6 | 10 | 14 | 12 | 10 | 8 | 100 | 2.36 |
| 14 | *Trichonis sp.* | 12 | 14 | 12 | 8 | 4 | 12 | 10 | 14 | 18 | 20 | 16 | 32 | 172 | 4.05 |
| 15 | *Yeast cells* | 16 | 12 | 10 | 0 | 0 | 8 | 8 | 12 | 26 | 34 | 36 | 42 | 204 | 4.81 |
| | Total | 298 | 394 | 378 | 302 | 276 | 218 | 192 | 234 | 486 | 389 | 512 | 564 | 4243 | 100 |



The incidence of most of the fungal spore types like, *Alternaria* sp., *Curvularia* sp., *Drechslera* sp., *Cercospora* sp., *Bispora* sp., *Epicoccum* sp., *Diplodia* sp., *Trichonis* sp. and *Sporodesmium* sp. was observed throughout the year, whereas others like Yeast cells, *Cladosporium* sp.,*Helminthosporium* sp.,*Torula* sp., *Tetraploa* sp. and *Pithomyces* sp. were encountered only during winter and rainy seasons. Overall winter season witnessed maximum catch(Fig 1). Similar variations were noticed at Secunderabad (Jyothi Nayar 1993),Vikarabad.

(Reddy and Reddy 1996) and North coastal AndhraPradesh(P. Vijayalaksmi et al.,2020).

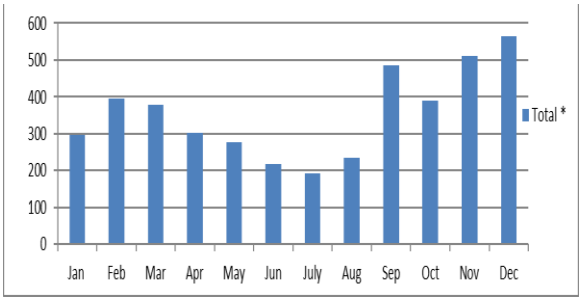



Fig 1- Graph showing monthly incidence of fungal spores in aerospora of Gowliguda area 2014.

## DISCUSSION

Airmonitoring throughout the year revealed that there was no month during the entire period of study, when the atmosphere of study area was totally free from fungal spores .Both qualitatively and quantitatively, high incidence of fungal spores was observed in the months of September ,November and December. The month of July witnessed lowest incidence. Almost similar findings were reported from Safilguda by Jyothi Nayar (1993) and Vikarabad by Reddy and Reddy(1996).

The variations in the incidence of spores may be attributed to meteorological factors such as, relative humidity, temperature, rainfall, and wind velocity. Gradual increase in the incidence of spores recorded, is seen from the month January to March, is due to gradual increase in the mean temperature( from 22.5oC to 28.1oC).But in the month of May, little decrease in the concentration of spores has seen, may be due to very high temperature (33.90C). Low incidence of fungal spores in the months of June, July and August was noticed because most of the airborne spores get washed down by heavy rains. But soon after the heavy rains, on the days with bright sunlight and high wind velocities, the incidence of spores was significantly increased. This is in conformity with the results obtained by Agarwal et al.,(1969)

The aerospora data recorded from spider webs collected from same study area i.e, Gowliguda ,revealed not only the presence of many allergenic pollen and spores, but also dominance of fungal spores over the pollen grains in the air(Narmada et al.,2016). This high prevalence of allergenic airborne fungi both qualitatively and quantitatively in the atmosphere of study area may be correlated to allergenic disorders prevailing in the locality. The data revealed from present study may be helpful in effective and proper diagnosis and therapeutic management of diseases caused by allergenic airborne fungal spores.

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## REFERENCES

[1] Agarwal .M.K., Shivpuri D.N., and Mukerji K.G, 1969.Studies on the allergenic fungal spores of the Delhi, India, metropolitan area. The Journal of Allergy.44(4);193-203.

[2] Debasmita Ghosh Dhar, P.Dhar, A.Das and N.Uddin., 2021,Assesment of Airborne Fungi Childrens Hospital located at Kolkata India. Journal of Environmental Science.

[3] Ellis.M.B 1971.Dermatious Hyphomycetes. Commonwealth Mycological Institute, Kew Surrey, England.

[4] Ellis.M.B.1976. More Dermatious Hyphomycetes, Commonwealth Mycological Institute, Kew, Surrey, England. Ghiasian SA, Maghsood A H and Aghamirian M R.,2016,Aeromycological analysis of allergenic airborne fungi in Qazvin, Iran. Curr Med Mycol.2(3):5-9.

[5] Horner WE, Helbling A, Salvaggio JE, Lehrer SB. Fungal allergens. Clin Microbiol Rev. 1995;8(2):161–179.

[6] Jyothi Nayar.1993.Aeromycological Survey of a semi urban area in Secunderabad., Ind .J. Aerobiol., 6:33-35.
[7] Mahadeo Badge and Kalpit Mhatre. 2017.Aeromycological studies over some paddy fields in the Ratnagiri district of Maharashtra state,Int.J.Curr Research.9(6):52441-52444.
[8] Nair,P.K.K., Joshi, A.P. and Gangal,S.V.1986.Airborne pollen, spores and other plant materials of India-A survey., CSIR Centre for Biochemicals and NBRI, Lucknow.
[9] Narmada,D., Ramakrishna,H., Seetharam, D.S. and Prabhaker, R.,2016.Allergenic pollen in the spider webs of Gowliguda locality in Hyderabad city of Telangana state. Adv in Plant Sciences 29(II):225-230.
[10] Reddy, R.R. and Reddy, P.R.1996. Aeromycological Survey at Vikarabad.Ind. J.Aerobiol.9 (1and2):9-13
[11] Shivpuri, D. N., and Singh, K.1966 : Studies in local allergens in 324 patients with bronchial asthma and rhinitis in New Delhi/Delhi-India, in. Proc. Twenty-first Tuberculosis and Chest Disease Workers' Conference., Calcutta, Feb.,1966, p. 189.
[12] Singh,B.P and Maninder Grewal.1989:Survey of Aeromycoflora at Sriganganagar City(Rajasthan). Journ. Palynol.25:25-43.
[13] Vijayalakshmi.P, Usha rani.V and Kiranmai Reddy.M 2020.Studies on Aeromycoflora in North Coastal Andhra Pradesh, India. Annals of Biology36(3):382-388.