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ASSESSMENT OF OCCUPATIONAL HEALTH HAZARDS OF FUNGAL SPORES IN DIFFERENT INDUSTRIAL AREA OF DAVANGERE DISTRICT, KARNATAKA

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ABSTRACT:

The Present investigation report shows that airborne particles have the arbitrator for the growth of fungi and proliferation the level of fungal deliberation in the

atmospheric environment, its depends upon the emission of bio-aerosol. The poor house-keeping in industrial environment is making an unhygienic situation and may cause fungal growth. The industrial workers inhaled air borne fungal spore leads to symptoms as a human health hazards. The present investigation the air borne fungal symptoms were recorded during the year 2017-18 from occupants and residents in the study area by using questionnaire method. This study mainly focused on the percentage of fungal spore inhalation and related symptoms. A total of 120 members were responded regarding airborne symptoms in eight sampling stations of Davanagere district. The Present research shows that the industrial sector of Davanagere district were responsible for the growth of airborne fungi and its adverse health impact to industrial workers and surrounded residents of Davanagere district, Karnataka.

KEYWORDS: Airborne fungi, fungal hazards, occupational health, Davanagere district.

INTRODUCTION:

Superior air quality is essential for the health of people and the environment. Although significant improvements have been made in many countries over the last 2 to 3 decades, air quality particularly in urban areas, remain a priority issue on most national environmental agendas (Mitchell *et al.*, 2000). Particulate and gaseous emission of pollutants

from industries and auto-exhausts area unit accountable for rising discomfort, increasing airway diseases, decreasing productivity and deterioration of inventive and cultural patrimony in urban centers (Puliafitoet *al.*, 2003). The presence of air pollutants over the prescribed limit within the lower atmosphere isn't solely injurious to humans, however conjointly to animals, foliage, fruits, vegetables and microbic life and should even injury property (Pandey, 2001). mobile fungi area unit

unremarkably gift in part a ir thus, the air we have a tendency to breathe contains spores of the many totally different fungi and it ends up in health hazards to several industrial occupants.

According to WHO (1990) guidelines for assessment of hazardous airborne fungi norms are summarized in Table 1. Horner (1995) pointed out that more than 80 genera

of fungi have been associated with symptoms of respiratory tract allergies. The *Aspergillus*, *Alternaria*, *Cladosporium* and *Fusarium* fungal species are amongst the most common allergenic fungi and metabolites of fungi also lead to irritate the respiratory system. In addition, aerosol particles may also be the carriers of fungal allergens into the lung. Hence, the allergenic molecules could conceivably be carried into the lung at a greater depth than a fungal spore would be expected to penetrate (Lippman *et al.*, 2003). Airborne fungi can be the cause of a variety of infectious diseases as well as allergic symptoms and toxic effects. The Particles smaller than 5 μm , the so called respirable fraction, which is able to penetrate into the alveoli and can lead to allergic alveolitis and other serious illnesses Burge, 1990; Owen *et al.*, 1992; Seltzer, 1995). Inhalation of fungal spores and hyphal fragments commonly leads to allergy, especially to asthma (Gravesen, 1979; Braback and Kalvesten, 1991; Ninan and Russel, 1992). Nasal congestion or runny nose, shortness of breath and wheezing are the respiratory symptoms reported by many researchers (Goldfarb, 1968; Platt *et al.*, 1989; Strachan and Sanders, 1989).

Inhalations of fungal spores cause allergic responses and infectious diseases, it depends on viability the infectivity of the inhaled fungi and their landing site. Fungal spores are capable of causing diseases in man and animals by direct infection (the living tissues invaded by microbes), by toxicoses (ingestion of toxic metabolites of microbes), or by allergy (sensitivity to microbial proteins and polysaccharides). Respiratory allergy in man may develop immediately as asthma, or it can be delayed as farmer's lung. Potential sources of hazardous airborne spore are many stored products, including rice dust, hay, straw, grain, woodchips, vegetable waste, solid waste, poultry waste, sugarcane dust and agricultural waste (Maureen Lacey and Jonathan West, 2006).

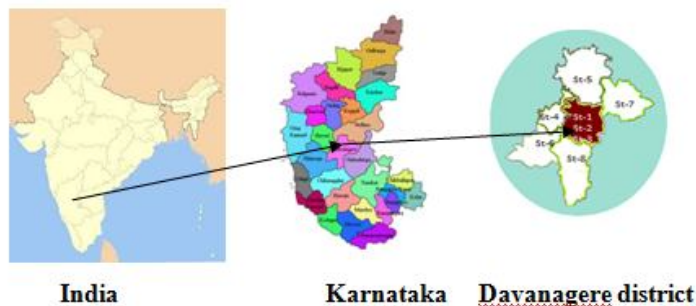
The increasing incidence of fungal hazard in the population at large has involved spore data being included in publications emanating from respiratory diseases, community health and medical practices (Amanto, 1991; Spiewak, 1995; Emberlin, 1997; Newton *et al.*, 2000; Millington, 2001; Corden, 2003). Spore has been associated with the prevalence of allergic rhino conjunctives, asthma and atopic eczema among children (Burr *et al.*, 2002; Mackay *et al.*, 1992).

MATERIALS AND METHODS

The geographical location of Davangere district lies in the center of Karnataka state with latitudes of 13°5' and 14°50' N and longitudes of 75°30' 30" E. The district consists of total 5,926 km (2,288 sq meters) of geographical area. The district has consisted various industrial units. The District has a number of groundnut oil factories, rice mills and rice puff industries, as well as poultry farms, sugar industry and distillery units. In addition to that number of small scale industry provides the highest employment in the district therefore; Davanagere is a major industrial Centre in the State.

The occupational health hazards carried out in 8 sampling station the occupational health hazards of air borne fungi were identified in the study area by questionnaire method (Jadhav and Tiwari, 2011; Sharma, 2011). The survey carried out during the one year from 2017-2018 by randomly eight locations is selected in each taluk of the district. The questionnaire method is conducted to the industrial occupants and public people those who resided around the industrial environment of Davanagere district.

Map showing the study area



Station-I: Azad Nagar

Station-II: Poultry farm in Davanagere city

Station-III: Market area

Station-IV: Harihara Poly fibre industries

Station-V: Dugavathi Sugar Industries

Station-VI: Honalli city

Station-VII: Jagalur city

Station-VIII: Chanagiri city

RESULTS AND DISCUSSION

Air borne fungal symptoms were recorded from occupants and residents in the study area by Questionnaire method. This study mainly focused on percentage of fungal spore inhalation and related symptoms. A total of 120 members were responded regarding airborne symptoms in 8 sampling stations of Davanagere district.

The presence of rice mill dust in station-I show 13.3% skin allergy symptoms, 6.6% of eye irritation symptom, 26.6% of sneezing and 20% respiratory problems. The station also shows 13.3% of Asthma related symptom and 20.0% of cough related symptoms (Table 2).

Station-II showing fungal growth due to presence of bio-aerosol from poultry dust. These station shows 28.5% of sneezing and 14.2% cough related symptoms. The 28.5% of peoples are suffering from respiratory symptoms and 14.2% of people are having skin and eye irritation symptoms (Table 2).

In station-III, 22.2% of each member is suffered from eye irritation and respiratory disorder. While, 11.1% of each member is suffering from asthma, 33.3% of sneezing and 11.1% of cough related symptoms (Table 2).

In station-IV respiratory symptom of 23.0% and cough related problems in 15.3% each in total members were recorded. The 15.3% of each respondent shows eye irritation, asthma and cough related symptoms and 7.6% showing sneezing problem (Table 2).

In station-V, 14.2% of each member having asthma and sneezing symptoms, 14.2% of the respondents shows eye irritation and 28.5% of the members are respiratory disorder were recorded (Table 2).

At station-VI, 16.6% having coughed related disorder and 50% having respiratory symptoms. 16.6% are having sneezing problems (Table 2).

In station-VII, 20% are respiratory illness and 40% are sneezing problems and 40% of each member having cough related symptoms (Table 2).

The minimum air borne symptoms were recorded in station-VIII. Present study shows 50% of sneezing disorder and 50% of cough related symptoms (Table 2).

The questionnaire survey shows that the industrial sector was responsible for the growth of airborne fungi and its adverse health impact to industrial workers and surrounded residents of Davanagere district, Karnataka.

Table 1. Acceptable level of assessing airborne fungi (WHO, 1990)

	Result of air sampling	Acceptable level
A	Confirmed pathogens (e.g. <i>Aspergillusfumigatus</i>) or toxigenic fungi (e.g. <i>Strachybotrysatra</i>) and toxigenic (<i>Penicillium</i> and <i>Fusarium</i> species)	Not acceptable
B	Only one species other than <i>Cladosporium</i> or <i>Alternaria</i>	< 50 CFU/m ³
C	A mixture of species reflective of outdoor flora	< 150 CFU/m ³
D	Primarily <i>Cladosporium</i> or other common phylloplane fungi	< 500 CFU/m ³

Note: CFU/m³ = Colony-forming units per cubic meter of air

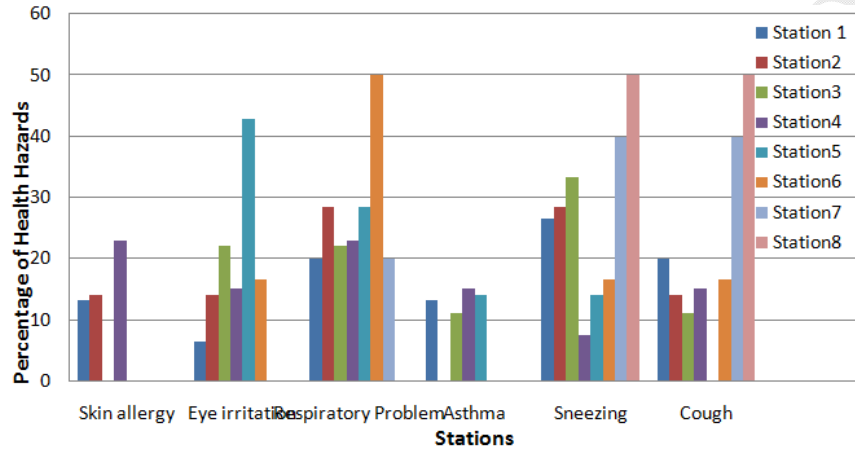


Figure 1: Showing total Percentage of Health Hazards in All Selected stations

Table 2: Percentage of occupational health hazards identified in stations

Station Health problem	Skin allergy	Eye irritation	Respiratory Problem	Asthma	Sneezing	Cough
Station I	2 13.33%	1 6.67%	3 20.00%	2 13.33%	4 26.66%	3 20.00%
Station II	1 14.20%	1 14.20%	2 28.50%	0 0%	2 28.50%	1 14.20%
Station III	0 0%	2 22.20%	2 22.20%	1 11.10%	3 33.30%	1 11.10%
Station IV	3 23.00%	2 15.30%	3 23.00%	2 15.30%	1 7.60%	2 15.30%
Station V	0 0%	3 42.80%	2 28.50%	1 14.20%	1 14.20%	0 0%
Station VI	0 0%	1 16.60%	3 50%	0 0%	1 16.60%	1 16.60%
Station VII	0 0%	0 0%	1 20%	0 0%	2 40%	2 40%
Station VIII	0 0%	0 0%	0 0%	0 0%	1 50%	1 50%

CONCLUSION

Potential health effects of fungal exposures are diverse including infectious diseases, acute toxic effects, and allergies. Methods to assess fungal exposures are available; however, selection of the most appropriate methods is highly dependent on the specific goals of the study.

The present investigations show that airborne fungal particles have the mediator for the growth of fungi and increase the level of fungal concentration in the atmosphere depends upon the emission of bioaerosol. The poor house-keeping in industrial environment is making an unhygienic situation and may cause fungal growth. The industrial workers inhaled air borne fungal spore leads to symptoms as a human health hazard.

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