Indoor Air Pollution – A Cause of Concern

Rambal Kavita

Department of Botany, Maharishi Dayanand College of Arts, Science & Commerce. Parel, Mumbai – 400012.
Email id : kavita.rambal@gmail.com

ABSTRACT

Indoor air pollution which is of chemical and biological origin is a cause for worry. Various studies related to indoor air pollution have revealed that it can cause many complications like irritation in the eyes and throat, dizziness, fatigue, allergy, rhinitis, and other respiratory problems besides sick building syndrome and poor visibility. Indoor air pollution affects all especially children and immunocompromised people or people suffering from other ailments. Studies have revealed that the outdoor environment also affects it. Especially fungal spores or mould spores which are normally present in the outdoor air intrude into the indoor environment. In the present paper a review of literature related to indoor air fungi as pollutant has been undertaken and to find ways to improve the indoor air quality.

Keywords: Pollution, Indoor, Outdoor, Particulate matter, Agricultural wastes, Indoor plants.

INTRODUCTION

Outdoor air pollution has been a cause of worry from a lot of time and lot of studies pertaining to it have been carried out. It being one of the reasons for indoor air pollution has become a cause of concern, as people spend more time indoors as compared to outdoors. It is a burning problem, for instance Delhi the air pollution level has crossed the permissible levels and is causing havoc. It has become a health hazard. One can imagine what must be the levels indoors. Pollution be it outdoors or indoors has chemical and biological components. Increasingly attention is being paid to microbial components present in the indoor air, as exposure to microbial components especially fungi. Fungi are ubiquitous and can grow on almost all natural and synthetic materials and can cause a spectrum of diseases. In the present study an attempt has been made to find possible ways to overcome this problem.
Indoor Air Pollution

Indoor air pollution like outdoor pollution is of chemical and biological origin. The main source of indoor air pollution is outdoor pollution and it becomes more harmful as it gets concentrated indoors. Since people spend more time indoors, it directly affects the health and wellbeing of individuals. Indoor air pollution refers to physical, chemical, and biological characteristics of air in the indoor environment or in other words it refers to chemical, biological, and physical contamination of indoor air. Both outdoor and indoor sources determine the constituents of indoor air. Since people spend 80 – 95% of their time indoors the indoor air quality directly affects their health and wellbeing (Dacarro, et al., 2003).


Indoor air mould fungi and their metabolites are gaining importance as they contribute to a spectrum of clinical diseases and sick building syndrome, (Bhuvaneshwari, 2005), WHO, 1990. These also release chemicals which include allergens, glucans, Mycotoxins, Trichothecenes and microbial volatile compounds (MVOC’S) which can cause many diseases like toxin induced inflammation, allergy, or infection. These fungi are also responsible for musty odour. (Curtis, et al., 2004, Gordon, et al., 1993, Yoshida et al., 1989).

Allergenic nature of hyphal fragments and spores of Rhizopus, Alternaria, Aspergillus and Curvularia etc have been proved by clinical investigations, WHO 1990, 2009, Yoshida and Araki, 1989. Studies carried out in India, indicate the following allergenic spore types and hyphal fragments of following fungi Rhizopus, Chaetomium, Basidiospores, Alternaria, Aspergillus, Penicillium, Cladosporium, Curvularia. (Singh 2005, Tobin, et al., 1987).

Presence of fungi is associated with presence of moisture and humidity. Paper and glue used in indoor surfaces have been reported as good growth substrates for most of the fungi besides, fiber glass insulation, ceiling & tiles etc. The fungi frequently isolated include Aspergillus, Cladosporium and Penicillium species (Yazicioglu, et al., 2004). Fungi even colonize inorganic materials as these absorb dust and moisture serve as good substrates. Painted surfaces and acrylic painted surfaces have been reported to be colonized by fungi like Alternaria, Cladosporium and Aspergillus (Shirakawa, et al., 2011), even air filters and ventilation ducts have also been reported to be colonised by fungi (Noris, et al., 2011).

Fungi indoors have been associated with allergy, Neuro psychiatric problems and immune diseases. Volatile fungal metabolites released by fungi have been reported to cause respiratory irritation and allergy. Volatile organic compounds, released have been associated with headache, nasal irritation, dizziness, fatigue, and nausea. (Weinhold, 2007, Burton, et al., 2008).

There are many factors responsible for the growth and colonization of fungi indoors which include moisture, humidity, organic matter (dust and dirt), etc. poor ventilation and leaking air conditioners and coolers are the cause for their colonisation.

Ways to improve the indoor air quality

From the literature available and studies so far carried out the measures include.

Primarily, the indoor Environment should completely be moisture free and humidity needs to be controlled by using dehumidifiers. Indoor area be it building, rooms, hall etc should be cleaned daily and crawl
spaces should be cleaned regularly. No dust dirt should be allowed to settle on the shelves and other spaces. Leaking pipes and coolers should be fixed. Proper ventilation needs to be carried out. Ventilation with proper management of humidity and temperature needs to be taken care of. It should be distributed effectively throughout spaces and stagnant air zones need to be avoided (WHO 1990). Besides all these control measures indoor plants need to be planted. NASA has even suggested some indoor plants like Dracaena, Spathiphyllum, Chrysanthenium, Anthurium, Pothos etc. These plants have been found to purify the air and keep the indoors safe in a natural way. Volatile phytochemicals released by leaves of these plants have been reported to play an important role in controlling airborne microbes and mould spores. (Kobayashi, et al., 2007). Installation of artificial air filters should be avoided under all circumstances, as air outside cannot be filtered. Burning and non-administered decomposition of agricultural wastes in the open should be avoided as it indirectly adds to the indoor air pollution.

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