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Assessment of Airborne Fungi (Molds) in School Environment in Udgir Town, Maharashtra

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Abstract:
The school/classroom environment potentially plays an important role in mold exposure, since students spends a large portion of their day in school environment. We measured the concentrations of airborne molds during two seasons of five secondary schools in Udgir in Maharashtra state.
The indoor and outdoor samples were studied therefore, the results of indoor and outdoor air samples were analyzed. Fungal spores were detected in all samples.

There were 78 classroom air samples were collected from five schools in Udgir town of district Latur, Maharashtra (January 2019 to December 2019). In this study, the most prevalent spore types detected in both the indoor and outdoor air samples were generally from the *Penicillium/Aspergillus* group, ascospores, basidiospores, and *Cladosporium* species. These findings are qualitatively similar to those observed in other geographical locations confirming the ubiquitous nature of these fungi.

Keywords: Fungi, indoor air quality, molds, school building, allergy.

Introduction:

Air is the most important content in the environment. Different type of microbiological factor is present in the environment. Air is mainly the dispersal medium for microorganisms. Air contamination caused by fungi is considered because of their dangerous influence on human health.To foster the development of this interdisciplinary subject International association for Aerobiology was founded in 1974. Theterm aerobiology was first coined by the American plant pathologist "Fred cambell meier" in 1930. So the term aerobiology came in use since1930 to denote the airborne fungal spores, pollen grains and other airborne microorganisms. The term airspora is suggested by (Gregory 1952).

The high prevalence of allergies in developing and developed countries contributes to the increased public concern about indoor air quality. This has resulted in an increase in demand for environmental assessments, which at the present time are mainly focused on assessment of school buildings for evidence of indoor fungal growth (mold). Rigorous prospective studies linking exposure to mold in school environments and subsequent human disease need to be done.

Mold spores are ubiquitous in the indoor and outdoor environment. They play a pivotal role in nature through the recycling of organic matter into useful nutrients. Mold spores are also responsible for a number of health related diseases as they can be allergens, irritants, infectious agents, or produce toxins. Several studies have suggested that mold sensitization is associated with asthma development and asthma morbidity. Additionally, a smaller literature links exposure to elevated mold pathogens such as mycotoxins or microbial volatile organic compounds (MVOC) to wheezing, development of asthma and increased asthma morbidity in non-sensitized children with asthma.

The school/classroom environment potentially plays an important role in mold exposure, since students spends a large portion of their day in school environment. We measured the concentrations of airborne molds during two seasons of five secondary schools in Udgir in Maharashtra state. The objective of this study was to evaluate the diversity, concentrations and presence of molds in these schools environment; to describe the differences between schools and classrooms; and to judge seasonal trends and predictors of total mold levels.

Materials and Methods

Air Sampling :

Airborne mold spores were collected in each classroom using exposed PDA petridish in classroom PDA Plates were exposed on the floor, in the periphery of the room and away from entryways or operable windows. Slides were microscopically analyzed at 1000X magnification. A segment of the slide representing the school day (8:00 am until 4:00 pm) was marked, a portion of which was scanned, and all mold spores encountered were identified and counted. Two consecutive half hour collection per day were averaged for each classroom.

One indoor and outdoor samples were studied therefore, the results of indoor and outdoor air samples were analyzed. Fungal spores were detected in all samples. A large diversity of spore types with a broad dispersion of values was found in all samples.

Result and Discussion:

There were 78 classroom air samples collected from 05 schools in Udgir town of district Latur, Maharashtra (January 2019 to December 2019). In this study, the most prevalent spore types detected in both the indoor and outdoor air samples were generally from the Penicillium*/Aspergillus* group, ascospores, basidiospores, and *Cladosporium* species. These findings are qualitatively similar to those observed in other geographical locations confirming the ubiquitous nature of these fungi.

This study also indicates a similarity of fungal types and concentrations within portions of buildings, as well as a similar diversity of fungal types indoors versus those detected outdoors, supporting general interpretative guidelines. However, spores classified in the group of *Penicillium/Aspergillus* species, which were the most prominent spore types in the indoor air samples, generally exceeded the relative percentage of these spore types detected outdoors.

Large airborne fungal spore concentrations were recorded in association with musty odour, water intrusion, high indoor humidity, and limited ventilation through open windows, few extractor fans and failure to remove indoor mold growth. Visible mold growth or condensation evidence was associated with large concentrations of *Cladosporium* spores, but not with large total spore concentrations. *Penicillium* exposure was a risk factor for asthma, while *Aspergillus* exposure was a risk factor for atopy. Fungal allergies were more common among children exposed to *Cladosporium* or *Penicillium* in winter or to musty odour. Respiratory symptoms were marginally more common with exposure to *Cladosporium* or total spores in winter.

Seasonal variation

Mold concentrations varied by season. Total mold and the most predominant molds were significantly higher in the Monsoon and winter season

Table 1: Most prevalent genera

Sr.No	Common indoor fungal sps.	Common outdoor fungal sps.
1	*Cladosporium*	*Aspergillus*
2	*Penicillium*	*Penicillium*
3	*Aspergillus*	*Alternaria*
4	*Alternaria*	*Chaetomium*
5	*Aureobasidium*	

Conclusion

This study demonstrates that the school/classroom environment can be a source of mold exposure both in quantity of spores and variety of mold types. In particular, we found that the classroom microenvironment varies among classrooms within the same school and that a classroom specific mold sampling may provide the most accurate exposure data. Our study also verified an intuitive belief that the presence of visible mold may be a predictor for high mold spore counts. Further studies are needed to determine the clinical significance of mold exposure relative to asthma morbidity in sensitized and non-sensitized asthmatic children.

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