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Letter to the Editor

Investigation of Bioaerosols in Laboratories of Islamic Azad University, Tehran, Iran

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Dear Editor-in-Chief

Laboratories work as centers of research and education in scientific centers, especially universities. Monitoring the indoor air quality in school laboratories is very important in recent years. Exposure to airborne fungi can lead to allergies and asthma. The purpose of this study was to determine the type and number of biological aerosols in indoor and outdoor air laboratories of Islamic Azad University, Tehran Medical Sciences Branch, Tehran, Iran to determine the effect of physical variables, the location of laboratories on the number of biological aerosols.

This research was descriptive-analytic and was done in 2014. Air sampling was performed to assess the number of aerosols in outdoor and indoor by direct microbial sampling of Quick Take-30 with air flow rate (28.3 L/min). All results were compared with the EU GMP standard and the pollution level of each station was determined. The average number of airborne bacteria and mushrooms in the school lab is more than open air. The most common fungal and bacterial species of the school's lab were *Aspergillus flavus* and gram-positive bacteria, respectively. The average number of bacterial genera in indoor air is higher in bacteriological laboratories. The average number of fungal genera in the internal air of the mycology lab is higher ($P<0.061$). The prevalence of aspergillosis in students is proportional to the average number of airborne spores.

Analyzing the Results

According to the results of the SBS form, the average duration of attendance in the laboratory was less than that of the class. The type of student activity in the laboratory is one of the effective factors in increasing the number of bioaerosols in the indoor air laboratory compared to the class. The prevalence of SBS syndrome in the studied students, the greater number of bioaerosols, especially fungi, in the indoor air of laboratory were among the factors contributing to the increase in the prevalence of SBS syndrome in comparison with the class. This finding is consistent with other research (1). Mildew and moisture can have a health effect on schoolchildren's SBS syndrome (2).

The minimum optimum temperature for growing fungi inside the building was 20 °C. This finding is consistent with other research (3). The temperature and relative humidity range of indoor air were 23.7-34.7 °C and 32.9-35.4%, respectively. Fluctuations in temperature and relative humidity

in autumn led to an increase in the number and diversity of bioaerosols. Therefore, relative humidity and temperature affects the number and type of microbes in the classroom's indoor airflow. The use of equipment and detergents for laboratory washing leads to an increase in the growth and sustainability of organisms due to increased relative humidity of indoor air. The poor flow of air inside the laboratory leads to suction and entry of airborne pathogenic agents from outside to the inside due to absence of positive pressure. The fall of temperature in the autumn will lead to an increase in the number of bio-aerosols in the open air due to reduced sunlight exposure to ultraviolet radiation.

There was a significant difference between the number of bioaerosols in the air and moisture and temperature variables ($P<0.001$). There was a statistically significant difference between the population density of bacteria and the relative humidity of air inside the hospitals. Four bacterial species and four genera of fungi were identified from the air sampled to determine the number of bioaerosols. The average number of fungal species of *Aspergillus fumigatus* and penicillium identified in the first-floor class indoor air in autumn was 428 and 323 in CFU/m^3, respectively. The number and variety of the genus of fungi can be attributed to variables such as season, classroom situation, occupation and occupation operations. The highest number of bio-aerosols was found in the first-class airspace in the fall season when the class was full. It is possible to attribute a large number of bioaerosols to more relative humidity, activity, cadre operations, and student density. Therefore, the air inside the class is an open-air function. The activity of the students leads to suspension of spores in the air when the laboratory and the class are filled.

The number of gram-negative bacterial colonies in the sampling stations is in the medium level of IMA standard (51-75 colonies). The number of gram-positive bacteria colonies at the sampling stations is at the very weak IMA standard level (75 ≤).

Conflict of interests

The authors declare that there is no conflict of interest.

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