

Remediation effect of indoor airborne fungi by operating the ionizing air cleaner in the university office.

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ABSTRACT

Our study from February to March, 2003, were done in university office A and B, located in Seoul. This study was carried out to investigate the reduction of the airborne fungi before and after we activate the air cleaner which using ionization. And the method of assessment was done by the CAMNEA method.

The result was as follows.

1. In the research office A, the concentration of the airborne fungi was $18(\pm 11.3)$ CFU/m³ before the ionizing air cleaner system was turned on; whereas three days after this result the concentration decreased to less than 1 CFU/m³.
2. In the laboratory office B, the concentration was $210.6(\pm 5.3)$ CFU/m³ before using the air cleaner and was decreased to $32.2(\pm 10.3)$ CFU/m³ after using the air cleaner. The remediation rate in the experiment was 85 percentile.

I. Introduction

People spend more than 90% of their lives inside constructed environments. Over time, the construction of buildings has increasingly focused on energy efficiency and comfort. So, the home and office construction has moved toward minimizing heat or cool air loss by making buildings more airtight. Therefore, bioaerosol concentrations in office environments and their roles in causing building-related symptoms have drawn much attention in recent years.

Bioaerosols include bacteria, fungi, protozoa and their fragments, toxins, and particulate waste products from all varieties of living things. They will vary in size from a fraction of a micron to around 100 microns.

People have continuously come in contact with airborne fungi through inhalation generally with no particular health effects. However, certain fungi and their metabolic products are well-known agents attributable to many human diseases.

The aim of this study, therefore, was to show the remediation effect of the indoor airborne fungi populations by operating the ionizing air cleaner. Also, the objective was to offer a primary data source in developing countermeasures for remediation of airborne microbial population.

II. Materials and Methods

On February and March , 2003, this study was performed within the university research offices. We observed the variations on airborne fungi concentration before and after the ionizing air cleaner system(Ionair Type 7-D-1/a, made in Switzerland) was turned on.

The sample of airborne fungi was collected on Nuclepore filters with a pore size of 0.4 μm and a diameter of 37 mm, the samples were placed on cellulose support pads and sealed in pre-sterilized plastic filter cassettes. The collected microorganisms were extracted from the exposed filters by the sterile peptone water and was injected into the sampler. One over ten ml of extraction fluids was inoculated on the fungal medium. This fungal medium contained Malt Extract Agar and 30 mg/ ℓ chloramphenicol which were to restrict bacterial growth. The number of fungi colony on the MEA medium surface was counted.

III. Results and Discussion

The airborne mold levels were significantly reduced when sampling was performed with the air cleaner in the research office A(≤ 1 CFU/ m^3) and B(32.2 ± 10.3 CFU/ m^3) than when the air cleaner was without in the office A(18 ± 11.3 CFU/ m^3) and B(210.6 ± 5.3 CFU/ m^3). The counts in the office A was similar to that obtained in clean room. In comparison, poor quality in office B had higher fungal counts. The result when air cleaner was used indicated that little remediation (85 %) occurred in the dirty office B and the greater remediation (≥ 99 %) was noted in the clean research office A.

There are no numerical government standards that can be used to determine what level of concentration of mold spores in the air are safe or harmful. The current best-practices method for interpreting air samples for mold is to compare indoor with outdoor air. The recommended levels from the guidelines of the World Health Organization and the American Conference of Governmental Industrial Hygienists are 150 CFU/ m^3 and 100 CFU/ m^3 each, as an indoor bioaerosol threshold level. In our study, office B had higher concentration than what is recommended from the guidelines I mentioned above.

IV. Conclusions

So far, we examined the indoor airborne fungi remediation rates by operating the ionizing air cleaner system. The result showed that the significant reductions in the number of fungi colonies were observed when the air cleaner was operated. Also, depending on the degree of hygiene of the office building it seems possible to maximize the effect. Therefore, the usage of the air cleaner system for our indoor environment is an applicable method for improving the quality of the air in which we spend most of our time.