Inhalable Exposure Levels of Airborne Mold spores in Rural Georgia Homes

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BACKGROUND

Exposure to mold is known to cause allergic symptoms. Most molds produce highly allergenic proteins or glycoproteins that can cause hypersensitivity diseases in susceptible hosts. Between 10% and 60% of genetically susceptible persons develop immediate hypersensitivity to mold. The Institute of Medicine report on "Damp Indoor Spaces and Health" states that there is sufficient evidence to conclude that a causal relationship exists between the presence of mold and upper respiratory tract symptoms, cough, hypersensitivity pneumonitis in susceptible persons, wheeze, and asthma symptoms in sensitized asthmatic persons. To our knowledge, no research has been conducted in rural Georgia to examine the air quality indoors, particularly with respect to mold. According to the 2013 Census, Statesboro Georgia has a population of 29,937 persons. Statesboro is located within the Rural area of southeast region of Georgia. It is comprised of the home of Georgia Southern University and agricultural areas.

INTRODUCTION

- The purpose of this study was to determine exposures to allergens, microbial contaminants, and other air pollutants that may not be healthy and may develop breathing problems among adults and children.
- Another purpose was to provide test results, data interpretations, and some suggestions for improving participant's indoor air quality and suggestions on remediation options.
- In a total of 20 homes, an air sampling pump was used to collected mold spores. In addition, at each study site, the temperature, moisture and humidity levels were measured.
- Collected samples were analyzed in the laboratory for mold spores and other air pollutants.
- Each participant was asked to complete a questionnaire form that will ask about their breathing problems, allergies, asthma, and other general questions on their home characteristics (visible water damage, visible molds, musty odor, pets, old furniture and books, and other pollution sources associated to your work).

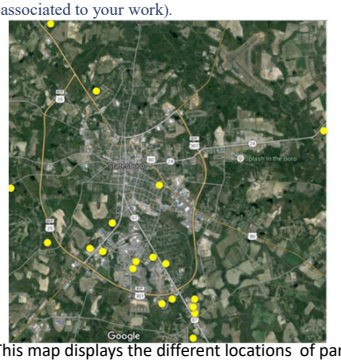

Figure 1. This map displays the different locations of participation.

MATERIALS + METHODS

Temperature, Humidity & Moisture:

Temperature and humidity were measured with a Fisher Scientific Memory Humidity/ Temperature pen. This pen measured the temperature in Celsius or Fahrenheit and the humidity in a percentage. An Aquant Moisture Meter measures the moisture from a 0-999 scale. Moisture was measured on the carpet, hardwood, grass and concrete.

Traceable Temperature & Humidity Pen

Aquant Moisture Meter

Filter Paper Samples in Air Pumps:

Primary Standard Calibrator, Defender 510 Model, was used to calibrate the Omni 400 air pumps to be used to pump air through button samplers. Each sampler contained either a Polycarbonate or Mixed cellulose ester (MCE) membrane filter paper. Mixed Cellulose filter was used for mold spore analysis. Two pumps were placed in each house study within a high traffic room. An air sampling pump was set for a 48 hour time period and indoor air samples were collected using an inhalable aerosol sampler which can effectively collect mold spores of up to 100 µm aerodynamic diameter.

Button Samplers

Air Pump Sampler

Preparation + Observation of Slides:

After the studies were conducted, the filters were then taken back to the lab and placed on to slides. The MCE filters were used for collecting spores in the inhalable aerosol sampler. The filters were cleared with acetone vapor, stained by Lactophenol and cotton blue, and the slides were than sealed. They were examined under a high-resolution light microscope at 400X-1000X magnification. Mold spores were identified and spore counts were converted to airborne inhalable spore concentrations.

Mold Spore Slides

Acetone Vaporizer

RESULTS

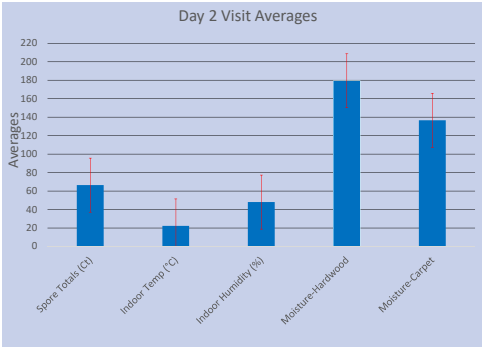

Figure 1. Displays the averages of Spore Totals, Indoor Temperature, Humidity and Moisture with their standard deviations on the Day 2 visit.

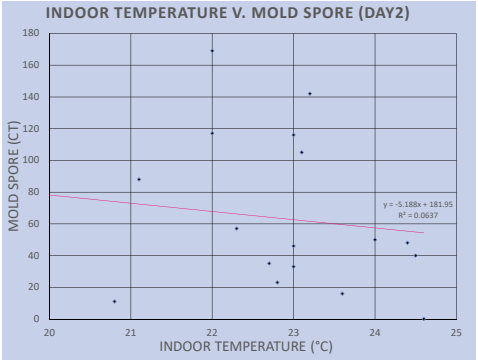

Figure 2. Displays the correlation between Mold Spore Counts and Indoor Temperature on the Day 2 visit.

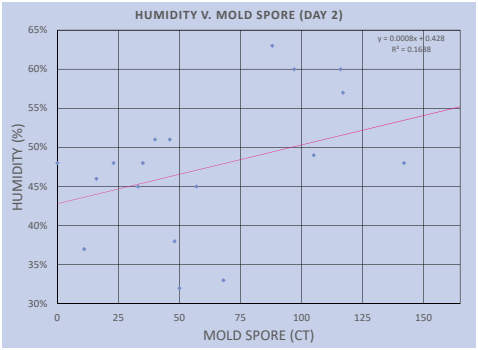

Figure 3. Displays the correlation between Mold Spore Counts and Indoor Humidity on the Day 2 visit.

CONCLUSION

The data showed that total spore concentration ranged from 122 to 1,994 spores/m^3 and most common spore types were *Aspergillus/Penicillium, Ascospores, Cladosporium, Curvularia, Periconia, Smuts/Myxomycete,* and unknown species. Several species of *Aspergillus, Penicillium, Cladosporium*, and *Curvularia* were previously reported to be allergic for humans sensitive to mold allergens.

The tables and graphs showed a correlation between _____.

All test results, data interpretations, and some suggestions for improving participant's indoor air quality and suggestions on remediation options were provided to each participant.

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