

Determinants of susceptibility to nasal effects of exposures to dust spiked with glucan or aldehydes

Jakob H Bønløkke^{1,*}, Lars Mølhave¹, Søren Kjærgaard¹, Torben Sigsgaard¹, Kjell Andersson², Göran Stridh², Lennart Bodin² and Jan-Erik Juto³

¹Institute of Public Health, Dept. of Environmental and Occupational Medicine, University of Aarhus, Denmark

²Dept. of Occupational and Environmental Medicine, Örebro University Hospital, Sweden

³Department of Otorhinolaryngology, Karolinska University Hospital, Huddinge, Stockholm, Sweden

*Corresponding email: jb@mil.au.dk

Keywords: Atopy, Nasal Histamine Hyperresponsiveness, Office dust, Beta-glucan, Aldehydes

Introduction

Atopy is considered an important determinant of susceptibility to the effects of airway irritants. Nasal histamine hyperresponsiveness has been proposed as another such determinant of susceptibility. We wanted to investigate if the nasal reactions observed during an exposure study with dust, beta-glucan, and aldehydes were dependent on atopy and/or nasal histamine hyperresponsiveness.

Methods

We exposed 36 volunteers in a double blind setting for 4 hours to clean air, office dust, dust+glucan, and dust+aldehydes. All dust exposures were approximately 350 µg particles/m³. Spiking was done with beta-glucan 0.01 g/g dust or aldehydes 0.1 µL/g dust. Twelve persons were atopic, 13 were nonatopic, and 11 were nonatopic with nasal histamine hyperresponsiveness. Nasal swelling was assessed with acoustic rhinometry before, during, and after the exposures. The 4 exposures and 3 times at which outcomes were measured were entered as within subjects factors in a repeated measurements general linear model.

Results

No differences between the 3 subject groups in the effects of the 4 exposures on nasal volume appeared – see Figure 1. The fit of the model was optimized by replacing subject groups with the continuous variables nasal histamine responsiveness, gender, age, and the covariates wheal size of the positive skin prick test (SPT) and number of positive SPT reagents. Nasal

volume decreased during and after all the exposures ($p = 0.018$). Exposure, time, and gender appeared to interact ($p = 0.052$). Among females, the greatest decline appeared during exposure to dust+glucan followed by an increase after the exposure. Among males, the greatest decline appeared during exposure to aldehydes, followed by an increase. The nasal volume continued to decrease after the glucan exposure.

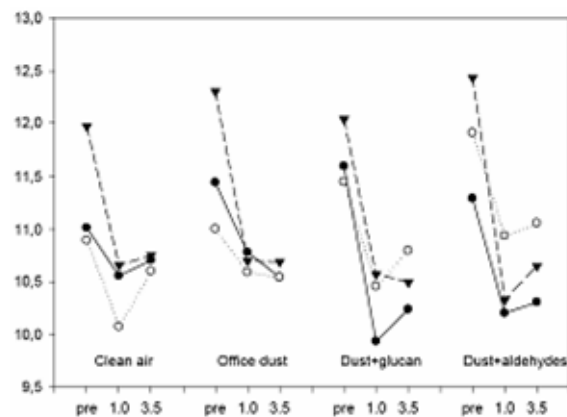


Figure 1. Nasal volumes changes during exposures among atopics (triangles), hyperresponders (closed circles) and normal persons (open circles).

Discussion and Conclusion

Neither atopy nor histamine hyperresponsiveness were important determinants of susceptibility to the organic dust exposures in this study. Differences in nasal reactions between genders and depending on the type of organic component were observed. A higher no. of subjects would be needed to study determinants of susceptibility in detail.