

**Sick building syndrome (SBS) among office workers in a Malaysian university -  
Associations with atopy, fractional exhaled nitric oxide (FeNO) and the office  
environment**

**ABSTRACT**

There are few studies on sick building syndrome (SBS) including clinical measurements for atopy and fractional exhaled nitric oxide (FeNO). Our aim was to study associations between SBS symptoms, selected personal factors, office characteristics and indoor office exposures among office workers from a university in Malaysia. Health data were collected by a questionnaire (n=695), skin prick test (SPT) (n=463) and FeNO test (n=460). Office settled dust was vacuumed and analyzed for endotoxin, (1,3)- $\beta$ -glucan and house dust mites (HDM) allergens group 1 namely *Dermatophagoides pteronyssinus* (Der p 1) and *Dermatophagoides farinae* (Der f 1). Office indoor temperature, relative air humidity (RH), carbon monoxide (CO) and carbon dioxide (CO<sub>2</sub>) were measured by a direct reading instrument. Associations were studied by two-levels multiple logistic regression with mutual adjustment and stratified analysis. The prevalence of weekly dermal, mucosal and general symptoms was 11.9%, 16.0% and 23.0% respectively. A combination of SPT positivity (allergy to HDM or cat) and high FeNO level ( $\geq 25$  ppb) was associated with dermal (p=0.002), mucosal (p<0.001) and general symptoms (p=0.05). Der f1 level in dust was associated with dermal (p<0.001), mucosal (p<0.001) and general (p=0.02) symptoms. Among those with allergy to *D. farinae*, associations were found between Der f 1 levels in dust and dermal (p=0.003), mucosal (p=0.001) and general symptoms (p=0.007). Office-related symptoms were associated with Der f 1 levels in dust (p=0.02), low relative air humidity (p=0.04) and high office temperature (p=0.05). In conclusion, a combination of allergy to cat or HDM and high FeNO is a risk factor for SBS symptoms. Der f 1 allergen in dust can be a risk factor for SBS in the office environment, particularly among those sensitized to Der f 1 allergen.

**Keyword:** Sick building syndrome; Allergy; House dust mites; Fractional exhaled nitric oxide; Office environment; Malaysia