

## SUMMARY

*A cross-sectional study was performed on the relationships between hygienic measurements and nasal investigations in 234 personnel in 12 primary schools in mid-Sweden. Hygienic data included building characteristics, measurements of indoor air pollutants, air change rate, temperature and humidity. Clinical examinations included symptom reports, acoustic rhinometry and nasal lavage, with the determination of biomarker levels for eosinophil cationic protein (ECP), lysozyme, myeloperoxidase (MPO) and albumin. Subjective nasal obstruction was increased in schools with mechanical ventilation (adjusted prevalence OR=2.0; 95 CI 1.1-3.7) and subjects reporting nasal obstruction had higher levels of dust in the classroom, compared to those not reporting this symptom ( $p=0.008$  by Mann-Whitney U-test). Congruently, a decreased nasal patency measured by acoustic rhinometric minimum cross-sectional areas (MCA1 and MCA2) was related to the use of mechanical ventilation ( $p=0.008$  and  $p=0.02$  respectively, by Mann-Whitney U-test), dust levels ( $p=0.03$  and  $p<0.001$  respectively, by Kendall's tau correlation analysis), a lower cleaning frequency of desks ( $p<0.001$  and  $p=0.02$  respectively, by Kendall's tau correlation analysis), the use of wet mopping ( $p<0.001$  and  $p=0.04$  respectively, by Mann-Whitney U-test) and PVC floor material ( $p<0.001$  and  $p=0.034$  respectively, by Mann-Whitney U-test). The cleaning frequency of floors was positively correlated with MCA1 ( $p=0.049$  by Kendall's tau correlation analysis). In buildings with signs of water damage, flat roof or a concrete slab fundament the personnel had increased ECP, lysozyme or albumin levels in nasal lavage. A reduced nasal patency and an increased inflammatory biomarker response were seen for higher levels of formaldehyde (MCA1, MCA2, VOL1, VOL2, ECP and lysozyme) and nitrogen dioxide (MCA1, VOL2, ECP and lysozyme) in the classrooms. In conclusion, the results indicate that acoustic rhinometry in combination with the determination of nasal lavage biomarkers can be used to study effects on the upper airways of the indoor environment. Actual exposures to indoor air pollutants in Swedish schools can affect the occurrence of subjective nasal obstruction and give clinical signs of reduced nasal patency together with an inflammatory biomarker response in the nasal mucosa.*

*Key words: acoustic rhinometry, environmental illness, indoor air pollution, nasal lavage, nasal obstruction*