Exposure to polycyclic aromatic hydrocarbons, hair nicotine, normalized vegetation index and lung function in a cohort of outpatient children with asthma

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Background

Exposure to secondhand smoke and polycyclic aromatic hydrocarbons (PAHs) have been implicated as risk factors for asthma [1-2]. Some cross-sectional studies have shown an association between lung function and PAH [3-4]. Other studies have reported positive effects of green exposure on respiratory function [5]. No study has evaluated the effect of combined exposure to multiple factors on the performance of respiratory function in pediatric patients with persistent asthma.

Aim

To evaluate in a cohort of children with mild/moderate persistent asthma:
• the distribution of PAH, hair nicotine and NDVI by level of asthma control
• the effect of PAH, hair nicotine and NDVI on spirometric parameters

Methods

50 male and female asthmatic children, 6-11 years old, were followed for 3 months at mean time intervals of one month. The metabolites of PAHs (1-Hydroxynaphthalene, 2-Hydroxynaphthalene, 2-Hydroxyfluorene, 1,9-Hydroxyphenanthrene, 2-Hydroxyphenanthrene, 3-Hydroxyphenanthrene, 4-Hydroxyphenanthrene, 1-Hydroxypyrene) were monthly measured according to guidelines [6]. The level of control (C: controlled, NC: not controlled / partially controlled) was assigned in accordance with the GINA guidelines (http://ginasthma.org). The normalized vegetation index (NDVI) was calculated by satellite acquisition on a 100m buffer for each dwelling. The effects of the considered environmental factors on the longitudinal trend of the spirometric parameters were estimated through a mixed-effect regression model. The model was adjusted for gender, age, height and level of control. Statistical analyses were carried out with the statistical software R (3.5.2); a p-value <0.05 was considered statistically significant.

Results

Table 1 PAH, hair Nicotine, NDVI e spirometric parameters in C vs NC

Table 2 Generalized mixed models on spirometric parameters

Conclusions

The results of the study showed that exposure to smoke and PAHs can determine harmful effects on the values of respiratory function parameters.