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Title: Carboxyhemoglobin as a marker for chronic carbon monoxide exposure in school-age children with persistent asthma

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Body: Introduction: When inhaled, carbon monoxide (CO) reacts very rapidly with hemoglobin in the blood and forms carboxyhemoglobin (COHb), decreasing the oxygen delivery to vital organs, leading to free-radical production and cytokines releasing. Aims: To investigate the adverse effects of CO on the respiratory system using COHb as a marker for chronic CO exposure and forced expiratory volume in one second (FEV1) as a marker for the lung airflow obstruction. Methods: We examined blood COHb concentrations in school-age children who suffer from moderate and easy form of asthma (n=52), ages 8-16 years, living in urban and suburban areas. COHb was measured in patient's blood immediately after obtaining by spectrophotometric method and expressed as a percentage of blood hemoglobin. FEV1 parameter was measured using Schiller-spirovit SP-1 spirometer. Results: Our study show that school-age children, with moderate and easy form of persistent asthma have statistically significant elevation of COHb concentration (3.53% ±0.97) in relation to control group (2.03% ± 0.28, $p<0.001$) and decrease of FEV1 parameter compared to control group, ($p< 0.001$). We also studied the influence of environmental factors: air pollution, secondhand smoking, wood-heating, heavy traffic, aspect of living in urban and rural areas. There are positive associations between air pollution concentrations and asthma aggravation in children. Conclusions: Our results sugests that blood COHb concentration above safe level of 2.5% can be involved in pathogenesis of many respiratory diseases, especially asthma and trigger asthma attacks and allergies. The most important factor in prevention is reducing of air pollution.