

The influence of traffic-related air pollution TRAP in primary schools and residential proximity to traffic sources on histone H3 level in selected Malaysian children

ABSTRACT

This study aimed to investigate the association between traffic-related air pollution (TRAP) exposure and histone H3 modification among school children in high-traffic (HT) and low-traffic (LT) areas in Malaysia. Respondents' background information and personal exposure to traffic sources were obtained from questionnaires distributed to randomly selected school children. Real-time monitoring instruments were used for 6-h measurements of PM₁₀, PM_{2.5}, PM₁, NO₂, SO₂, O₃, CO, and total volatile organic compounds (TVOC). Meanwhile, 24-h measurements of PM_{2.5}-bound black carbon (BC) were performed using air sampling pumps. The salivary histone H3 level was captured using an enzyme-linked immunosorbent assay (ELISA). HT schools had significantly higher PM₁₀, PM_{2.5}, PM₁, BC, NO₂, SO₂, O₃, CO, and TVOC than LT schools, all at $p < 0.001$. Children in the HT area was more likely to get higher histone H3 levels ($z = -5.13$). There were positive weak correlations between histone H3 level and concentrations of NO₂ ($r = 0.37$), CO ($r = 0.36$), PM₁ ($r = 0.35$), PM_{2.5} ($r = 0.34$), SO₂ ($r = 0.34$), PM₁₀ ($r = 0.33$), O₃ ($r = 0.33$), TVOC ($r = 0.25$), and BC ($r = 0.19$). Overall, this study proposes the possible role of histone H3 modification in interpreting the effects of TRAP exposure via non-genotoxic mechanisms.

Keyword: Traffic-related air pollution; Primary schools; Vulnerable population; Indoor air quality; Histone H3