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Deposition of Size Segregated Particulate Matter in Human Respiratory Tract and Their Health Effects in Glass City Residents

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Abstract : Particulates are ubiquitous in the air environment and cause serious threats to human beings, such as lung cancer, COPD, and Asthma. Particulates mainly arise from industrial effluent, vehicular emission, and other anthropogenic activities. In the glass industrial city Firozabad, real-time monitoring of size segregated Particulate Matter (PM) and black carbon was done by Aerosol Black Carbon Detector (ABCD) and GRIMM portable aerosol Spectrometer at two different sites in which one site is urban and another is rural. The average mass concentration of size segregated PM during the study period (March & April 2022) was recorded as PM10 (223.73 □g/m⁻³), PM5.0 (44.955 □g/m⁻³), PM2.5 (59.275 □g/m⁻³), PM1.0 (33.02 □g/m⁻³), PM0.5 (2.05 □g/m⁻³), and PM0.25 (2.99 □g/m⁻³). The highest concentration of BC was found in Urban due to the emissions from diesel engines and wood burning, while NO2 was highest at the rural sites. The average concentrations of PM10 (6.08 and 2.73 times) PM2.5 exceeded the NAAQS and WHO guidelines. Particulate Matter deposition and health risk assessment was done by MPPD and USEPA model to know about the particulate matter toxicity in industrial residents. Health risk assessment results showed that Children are most likely to be affected by exposure of PM10 and PM2.5 and may have various non-carcinogenic and carcinogenic diseases. Deposition results inferred that the sensitive exposed population, especially 9 years old children, have high PM deposition as well as visualization and may be at risk of developing health-related problems from exposure to size-segregated PM. They will be discussed during presentation.

Keywords : particulate matter, black carbon, NO2, deposition of PM, health risk
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