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Characterization of ultrafine particles in an air conditioned building located in tropical climate

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Exposure to ultrafine particles (UFPs) is harmful as they can penetrate deeper into the pulmonary region of the lungs. However there is limited information regarding the UFPs in environmental and health sciences. In the present study, characteristics of UFPs in an air conditioned computer laboratory located in an academic campus in Chennai, India was investigated. Indoor UFPs measurement was conducted during the period of 9 days (02^{nd} to 10^{th} August, 2017) using TSI Nanoscan SMPS 3910 (TSI Inc., USA). The Pearson correlation analysis was performed to determine the association between UFPs concentration with temperature, relative humidity, air velocity as well as fine and coarse particulate matter (PM) concentrations. A student's t-test was applied to compare the mean values of day and night UFPs concentration. The results indicated that the median UFPs concentration during day was higher than that at night (UFP_{day}=2135.41 particles/cm^3 and UFP_{night}=1448.92 particles/cm^3 respectively). The UFPs concentration showed a weak negative correlation with temperature (r=-0.256), and relative humidity (r=-0.127) and a weak positive correlation (r=0.116) with air velocity and nearly no correlation with PM_1 (r=0.081), $PM_{2.5}$(r=0.071) and PM_{10} (r=0.068) all at a significance level of $p<0.01$. The student's t-test showed that there is a statistically significant (t=4.29, $p< 0.01$) difference in mean UFPs concentration during day and night indicating different source contributions. Therefore, the use of computers and printers may be responsible for higher UFPs concentration during the day. Further, by controlling indoor environmental parameters like temperature, humidity and air velocity we can minimize indoor UFPs concentration to some extent.