Abstract

Efficacy of the ramathibodi nasal filter in a simulated human airway evaluated by a laser diode portable dust monitor under low laser smoke particle concentration

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The Ramathibodi nasal filter attached to a simulated human airway was proposed to filter laser smoke particles. The simulated human airway composed of nasal and pharyngeal model, airway passage and lung model machine which mimicked the human respiratory system. The laser smoke particles represented a suspended particulate matter in a highly air-pollutted area such as at a main roadside in Bangkok. The experiment was done in the Department of Otolaryngology, Ramathibodi Hospital, from January to March 2000. The simulated human airway got an equal amount of laser smoke particles in a sealed plastic box for 1 min. The residual amount of laser smoke particles in a closed system of the simulated human airway was measured by a laser diode portable dust monitor for 1 min in each cycle and calculated as a mean and standard deviation. Without the Ramathibodi nasal filter of 39 sample pairs, the amounts of PM15, PM10 and PM2.5 were 52.3 +/- 6.8, 43.0 +/- 4.9 and 37.0 +/- 3.5 mcg/m3 respectively. With the Ramathibodi nasal filter of 39 pairs sample, the amounts of PM15, PM10 and PM2.5 were 48.1 +/- 9.9, 39.1 +/- 9.1 and 33.2 +/- 7.2 mcg/m3 respectively. Ramathibodi nasal filter efficacy for all laser smoke particle sizes evaluated statistically using t-test showed significant differences from those without the filter. Filtration efficacy should be tested further in higher concentrations of laser smoke particles and applied in human nasal vestibules under a critical air-polluted condition.