

1C2) Indoor PM_{2.5} Levels in Public Places

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1. Introduction

Indoor air contaminants are generated by various sources. Secondhand smoke(SHS) is a major source of indoor air pollution. SHS is the third leading preventable cause of mortality and morbidity in the USA(Glantz & Parmley, 1991). However, there have been few studies of impact of SHS in South Korea. In this study, impact of SHS on indoor air pollution was investigated in public places in Seoul, Korea.

2. Method

Particulate matter with 2.5 μ m aerodynamic diameter or smaller(PM_{2.5}) was used as an indicator of SHS concentration. PM_{2.5} levels in 38 public places were measured using Sidepak aerosol monitor (TSI, Model AM510). The 38 places included 6 restaurants, 9pub/bars, 9 cafés, 8 PC rooms and 6 billiard halls and each place visited for at least 40 minutes. When inside the place, a central location was chosen and the direct puffs of smokers were avoided. Outdoor levels were measured as control.

3. Results and discussion

The mean of fine particle concentrations in the 38 places was 168 μ g/m³, which was more than 4 times higher than the US National Ambient Air Quality Standard(NAAQS) for 24 hours(35 μ g/m³). Indoor PM_{2.5} concentration in 35 places with smoking was 181 μ g/m³. When there was no smoking in 3 places, indoor PM_{2.5} concentrations were 24 μ g/m³, below the NAAQS.

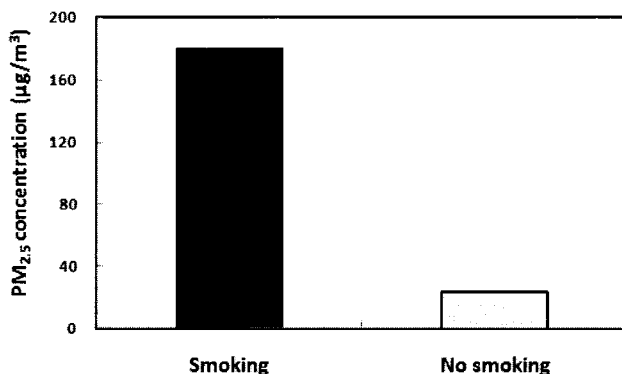


Fig. 1. Comparison of PM_{2.5} concentrations at public spaces with and without smoking.

Among the 35 smoking places, indoor PM_{2.5} concentrations was 79 μ g/m³ in restaurants, 149 μ g/m³ in pub/bars, 140 μ g/m³ in cafés, 168 μ g/m³ in billiard halls and 317 μ g/m³ in PC rooms.

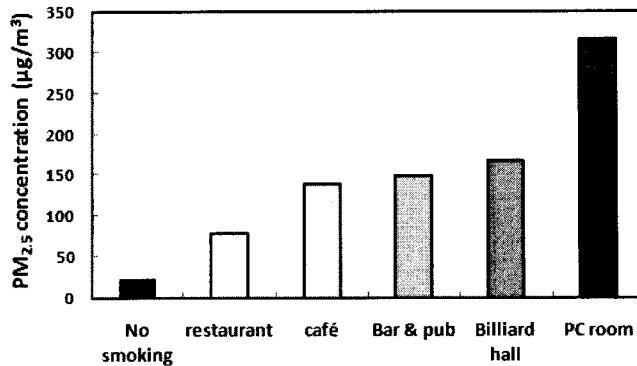


Fig. 2. Comparison of PM_{2.5} concentrations in each public place.

Indoor PM_{2.5} levels were significantly associated with smoking density. One burning cigarette may be enough to increase the indoor air pollution significantly.

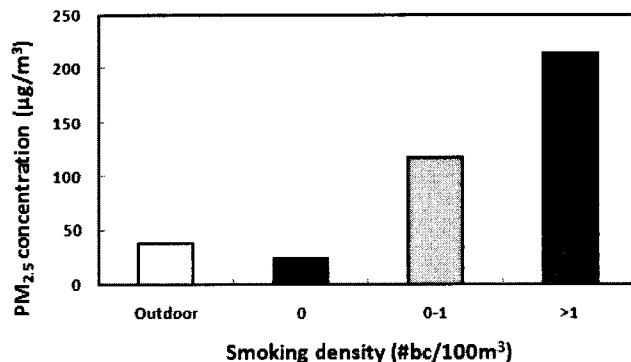


Fig. 3. Comparison of PM_{2.5} concentrations by smoking density.

Indoor air pollution in Seoul public places may be high enough to cause health effects due to secondhand smoke. The findings support the need of smoke-free law in Korea to improve indoor air quality in public places.

References

- Glantz, S.A. and W.W. Parmley (1991) Passive smoking and heart disease: Epidemiology, physiology, and biochemistry, *Circulation*, 83, 1-12.
- Lee, K. et al. (2008) Different Impact of Smoke-free Laws on Indoor Air Quality, *Journal of Environmental Health*, In press.
- Lee, K. et al. (2007) Immediate Impact of Smoke-free Law on Indoor Air Pollution, *Southern Medical Journal*, 100(9), 885-889.
- Repace, J. (2004) Respirable particles and carcinogens in the air of Delaware hospitality venues before and after a smoking ban, *Journal of occupational and environmental medicine*, 46(9), 887-905.