



Association of Particulate Matter With ENT Diseases

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Air pollution especially particulate matter is a really huge problem in East Asian countries including Korea these days. Different from sand dust (yellow dust) which is prevalent in spring season, particulate matter concentration has increased irrespective of season, and checking particulate matter concentration becomes a daily routine like checking weather forecast.

Particulate matter is a kind of air pollutant and is almost invisible fine particles that causes a lot of harmful damages to our body including respiratory system. Particulate matter is classified into PM10 (less than 10 μm), and PM2.5 (less than 2.5 μm) according to its diameter. The smaller PM2.5 can be reached into the lower airway and can cause damages into lower respiratory illness. Recently it is well known that particulate matter is absorbed in blood stream and causes many health-related problems systemically. World Health Organization published an air quality guideline for Europe in 1987 and defined particulate matter as a carcinogen on its own.

Particulate matter usually enters into our body through nasal airway. Nose is the most important passage of the air and plays an important role of air filtration and humidification. Particles more than 10 μm can be filtered by the filtration capability of the nose. Nasal mucosa is covered with the sticky mucous blanket and cilia, and they cooperate with each other to filter inhaled particles. However, smaller particles less than 2.5 μm cannot be filtered and go down to the lower airway.

Persistent exposure of the particulate matter can irritate the mucosa and result in initiation and/or aggravation of the inflammation. Exposure of the particulate matter on nasal airway can result in disruption of epithelial barrier function, inflammation and swelling of the nasal cavity, causing initiation and/or aggravation of the disease such as allergic rhinitis and rhinosinusitis.

Recent study revealed association of PM10 with allergic rhinitis, especially pollen allergic rhinitis [1]. Another cohort study showed that pediatric allergic rhinitis was associated with PM2.5 [2]. In case of chronic rhinosinusitis (CRS), some studies claimed association of particulate matter with CRS. One study showed

that PM2.5 was significantly associated with undergoing functional endoscopic sinus surgery [3]. For each unit increase in PM2.5, there was a 1.89-fold increased risk in the proportion of chronic rhinosinusitis with nasal polyp patients who required further surgery. The effects of chronic airborne exposure of particulate matter on mice have been reported. When mice were exposed to chronic PM2.5 exposure, airway epithelial cells were disrupted with inflammatory cells infiltration and inflammatory cytokine increase [4]. Several other studies have shown that PM2.5 exposure can disrupt epithelial barrier function *in vitro* [5,6].

In this issue of *Clinical and Experimental Otorhinolaryngology*, Park et al. [7] studied the association of air pollutant with ENT diseases and revealed that PM10 particles were associated with increased the risk of CRS and septal deviation using Korea National Health and Nutrition Examination Survey data. An increase in the PM10 level by 1 $\mu\text{g}/\text{m}^3$ was associated with a 1.22% and a 1.43% increased risk of CRS and septal deviation, respectively. This is an interesting epidemiologic study data that can explain the relationship of air pollutants with important rhinologic diseases such as CRS and septal deviation. It is reasonable to think that PM10 can aggravate the inflammation the sinonasal cavity by disrupting epithelial integrity in case of CRS; however, more explanation and studies are needed to think of PM10 as a contributing factor of septal deviation although there was statistically significant association in this study. Several new evidences have been published to prove the harmful effects of particulate matter on upper airway diseases and more attentions need to be paid on particulate matter issues.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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