

Abstract

Exposure of Outdoor Workers to Particulate Matter and its Management Guide

Objectives

This study was conducted to evaluate the PM exposure levels and contribution ratio between construction activities and atmosphere source in construction sites.

Methods

Literature review on field measurements and governmental systems related to PM exposure in occupational settings was conducted. In our own field evaluation, 5 construction sites and 1 golf course were selected. For each site, personal samples from outdoor construction workers and area samples from the outdoor of construction site office were collected by their construction work types and their concentrations were compared to those from nearby National Ambient Air Monitoring Station. Respirable dust concentrations, respirable silica concentrations, and several metal concentrations including Cd, Cr, Pb, As were monitored over 4 months. At the end we suggested how to manage particulate matter exposure in construction sites.

Results

Few studies on the exposure levels of construction workers to PM were found. Respirable dust concentrations measured in Gyeonggi Province were higher than those measured in North Gyeongsang Province. The geometric means of respirable dust concentrations of personal samples and area samples were 37.89 $\mu\text{g}/\text{m}^3$ and 92.86 $\mu\text{g}/\text{m}^3$, respectively. The respirable dust concentrations were higher than the PM concentrations reported from nearby National Ambient Air Monitoring Station. The geometric means of respirable silica concentrations of personal samples and area samples were 1.3 $\mu\text{g}/\text{m}^3$ and 1.1 $\mu\text{g}/\text{m}^3$, respectively. All metal concentrations were lower than 10% of corresponding Korean occupational exposure limits.

Conclusions

Assuming that personal samples consisted of ambient PM and dust originated from work activities and that area samples only collected ambient PM, we concluded that dust exposure of outdoor construction workers originated 40.8% from atmosphere and 59.2% from construction activities. PM exposure in construction site should be controlled by employers as the case of outdoor heat stress.

Key words : particulate matter(PM), outdoor construction worker, PM from construction activities, ambient PM, respirable dust, respirable silica