

## **Metal dust exposure and lung function deterioration among steel workers: an exposure-response relationship**

### **ABSTRACT**

Background: Metallic dust is a heterogeneous substance with respiratory sensitizing properties. Its long term exposure adversely affected lung function, thus may cause acute or chronic respiratory diseases. Methods: A cross-sectional study was conducted in a steel factory in Terengganu, Malaysia to assess the metal dust exposure and its relationship to lung function values among 184 workers. Metal dust concentrations values (Co, Cr, and Ni) for each worker were collected using air personal sampling. Lung function values (FEV<sub>1</sub>, FVC, and %FEV<sub>1</sub>/FVC) were determined using spirometer. Results: Exposure to cobalt and chromium were 1–3 times higher than permissible exposure limit (PEL) while nickel was not exceeding the PEL. Cumulative of chromium was the predictor to all lung function values (FEV<sub>1</sub>, FVC, and %FEV<sub>1</sub>/FVC). Frequency of using mask was positively associated with FVC (*Adj b* = 0.263, *P* = 0.011) while past respiratory illnesses were negatively associated with %FEV<sub>1</sub>/FVC (*Adj b* = -1.452, *P* = 0.026). Only few workers (36.4%) were found to wear their masks all times during the working hours. Conclusions: There was an exposure-response relationship of cumulative metal dust exposure with the deterioration of lung function values. Improvement of control measures as well as proper and efficient use or personal protection equipment while at work could help to protect the respiratory health of workers.

**Keyword:** Metal dust; Lung function; Exposure-response relationship; Cumulative metal dust; Respiratory protection devices