

## ABSTRACT

Title: A Study on the Exposure and Health Risk: Suspended Asbestos during Maintenance of Vehicles and Heavy Machinery

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### Abstract:

Asbestos-containing products are still used in developing countries. Malaysia has partially banned the use of asbestos (crocidolite) but not the chrysotile. Exposure to chrysotile during brake maintenance can result in a range of diseases including asbestosis, lung cancer and mesothelioma. Thus, this study aims to assess the workers' exposure to asbestos and its association with the asbestos-related diseases. The study was conducted in three workshops such as light vehicle, heavy vehicle and aircraft. Presence of the asbestos was detected using Polarised Light Microscopy via bulk sampling. Area and personal airborne sampling were also measured using Phase Contrast Microscopy. The recruited workers were interviewed on occupational history and respiratory symptoms using structure and validated questionnaires. Lifetime of asbestos exposure among these workers was estimated based on the reconstruction of past inhalation exposure modelling. Lung cancer and mesothelioma mortality rate were also predicted using the US EPA model. In-depth interviews were also conducted among subject matter experts (SMEs) on the current guideline of asbestos prevention program. Asbestos fibre was detected in almost all samples collected. A total 112 workers were approached in this study (Total response rate = 74.6%). Almost all of the workers were male and relatively young (mean age = 30 years old (SD) = 7). The estimated lifetime asbestos inhalation exposure ranged from 1.1 to 1176.5 fibre.Years/ml (median of 73.3 fibre.Years/ml (IQR = 210.6). Only cough symptoms showed a significantly higher prevalence (11.4%) result compared to non-exposed workers (1.3%) ( $p=0.032$ ). The relative risk of lung cancer was 1.51, whereas the excessive risk for mesothelioma was  $1 \times 10^{-6}$ . The SME synthesis data showed that almost all experts agreed to establish a new guideline for asbestos-related work (vehicle brake maintenance) jurisdiction as a whole (ranged 95 to 98%). Our finding concluded that all of the friction material sampled in our study did contain chrysotile. Even though the measured asbestos concentration level was below the Permissible Exposure Limit, the estimated lifetime asbestos among these workers were high. They could be at excessive risk of developing asbestos-related diseases such as asbestosis, lung cancer and mesothelioma. This study recommends the new guideline for asbestos-related work (vehicle brake maintenance) to be established in Malaysia.

**Keyword:** asbestos, asbestos-related work, vehicle brake maintenance, mechanics, risk management