

Mortality Experience of Register II Silicotic Patients in Hong Kong - An Extended Follow-Up (1981-2006)

BY

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December 2008

The work described in this report was substantially supported by a grant from Pneumoconiosis Compensation Fund Board of the Hong Kong Special Administrative Region, China.

Executive Summary

Objectives:

The primary objective of the study was to elucidate whether excess lung cancer mortality or esophageal cancer mortality was associated with silicosis based on the cohort of silicotic patients in Hong Kong, after controlling for the confounding effects of cigarette smoking and/or concomitant exposures to other established carcinogens. The second objective was to examine the exposure-response relationship that might exist between various indices of silica dust exposures and the mortality of lung cancer and esophageal cancer among silicotic patients.

Methods:

All workers with silicosis in Hong Kong diagnosed during the period 1981-2005 were followed up till the end of 2006 to ascertain their vital status and causes of death. Standardized mortality ratios (SMR) for cancers of the lungs and esophagus, as well as other major causes of death, were calculated. Axelson's indirect method was used to adjust the effect of smoking for both lung cancer and esophageal cancer, while alcohol drinking was further adjusted for esophageal cancer. Multiple Cox's regression models were performed to examine the exposure-response relationship between various indices of silica dust exposure and lung cancer after controlling for age at diagnosis, cigarette smoking, and other important confounding factors. Cox' regression analysis with esophageal cancer was hampered by too few cases of esophageal cancer in the cohort.

Results:

The 3202 eligible male silicotic workers contributed a total of 36890.10 person-years of observation during the study period 1981-2006. The vital status of 97.53% of the subjects was confirmed by the study end date. During the study period of 1981-2006, 1562 deaths occurred, giving a SMR of all causes of 2.33 (95%CI: 2.22-2.45). There was a small increase in the risk of death from all cancers, with a SMR of 1.31 (95%CI: 1.17-1.46), and the increased risk of all cancer mortality was mainly a result of the significant excess risk from cancer of the lungs (1.86, 95%CI: 1.59-2.17, 157 deaths) and esophagus (1.77, 95%CI: 1.18 - 2.66, 23 deaths). There was a substantial increase in the risk of death from non-malignant respiratory diseases with a SMR of 6.61 (95%CI: 6.17-7.07).

The SMRs of lung cancer (3.02, 95%CI: 2.31- 3.94, 54 deaths) and esophageal cancer (3.22, 95%CI: 1.75- 5.92, 10 deaths) were higher in the subgroup that had worked in underground caissons than those in surface construction workers (1.63, 95%CI of 1.32- 2.00 with 88 deaths and 1.37, 95%CI: 0.76- 2.45 with 11 deaths respectively). After the indirect adjustment of smoking effect using the most conservative RR of lung cancer for Chinese male population (RR=6.42), SMR for underground caisson workers and surface construction workers became 1.96 (95%CI: 1.50-2.56) and 1.06 (95%CI: 0.86-1.30) respectively for lung cancer and 2.04 (95%CI: 1.11-3.75) and 0.87 (95%CI: 0.48-1.55) respectively for esophageal cancer. The SMR of esophageal cancer among underground caisson workers further decreased to 1.40 (95%CI: 0.76-4.05) after the effect of alcohol drinking was adjusted.

Indices of silica dust exposures used in this cohort to explore the exposure-response relationship with the risk of lung cancer mortality included cumulative dust exposure (CDE), mean dust concentration (MDC), years of silica dust exposure, and radiological severity

(small and large opacities and their sub-categories). No consistent exposure-response relationships were detected between these indices of silica dust exposure and the risk of lung cancer death.

Conclusion:

Results from this updated historical cohort study (1981-2006) did not offer positive support to a link between silica dust or silicosis and lung cancer after taking into consideration the confounding effects of cigarette smoking and concomitant occupational exposures to other lung carcinogens. The lack of exposure-response relationship with the various exposure indices and the radiological severity also did not offer support for a causal link. On the other hand, this updated cohort study revealed that there was a weak association between the risk of esophageal cancer mortality among silicotics who had worked in underground caissons in Hong Kong after adjusting for cigarette smoking and alcohol drinking, but the possibility of chance could not be ruled out.