

A Study on Asbestos Exposure, Health Effects and Causes of Deaths among Construction Workers

Eiji Shibata¹, Hitoshi Kubota², Jian Sun⁴, Kiyoshi Sakai³, Naomi Hisanaga²,
Ippei Mouri², Fumio Kobayashi¹

¹National Institute of Industrial Health, Japan, ²Aichi Medical University, Japan, ³Nagoya City Public Health Research Institute, Japan, ⁴Institute of Health Economics, Canada

Abstract

Focusing on the members of the Construction Workers' Health Insurance Society, we have conducted various research projects on asbestos exposure in the construction industry. In the present report, we briefly outline our activities and research findings obtained so far.

We investigated the handling of asbestos-containing building materials and found that a worker would possibly be exposed to an asbestos concentration of 100 fibers/cm³ or more in her/his breathing area when cutting an asbestos-containing material with a radial arm saw.

We conducted a questionnaire survey among members of the All Kyoto Construction Workers Union, which revealed that those who had inhaled asbestos dust very often and sometimes accounted for 13.7% and 26.4%, respectively. The trade most frequently exposed to such situations was that of carpenter. The material most frequently used was asbestos slate.

Since 1988, we have interviewed members who showed asbestos-related symptoms on their chest X-rays, taken in regular checkups, and have advised them to have full examinations and medical treatment or have given them health guidance.

Using the data on 17,667 deaths of members who were in the Society for 1 year or longer between 1973 and 1993, we investigated the characteristics of the causes of their death in comparison with the general population of prefectures they resided in. Tracheal/ bronchial/lung cancer, accidents and harmful effects showed high overall standardized mortality ratios.

Introduction

In Japan, 6.18 million workers were engaged in the construction sector in 2002. Japan has imported large amounts of asbestos for several decades and most of it has been consumed in the construction sector. However, most of the workers are working for small-scale enterprises or are self-employed. Moreover, workers from a variety of trades enter a construction site one after another and the site is changing continuously. These features of the construction sector make it difficult to have an overview of occupational health in the construction industry in Japan. In the present study, we

aimed to demonstrate exposure to asbestos and health effects of that exposure among construction workers in Japan.

Subjects and methods

The Construction Workers' Health Insurance Society in Mie prefecture, Japan was the subject of the present study. The society was founded in 1970. In 2001, the society is made up of owners of small-scale construction companies, workers in those companies and self-employed workers, totalling 17,236 members.

Questionnaire survey

Self-complete questionnaires were distributed to the members of the All Kyoto Construction Workers Union in Kyoto Prefecture. The questionnaires included a question about the use of construction materials containing asbestos.

Asbestos exposure measurement during cutting of construction materials

We measured ambient asbestos concentrations around the workers during tasks using construction materials.

Findings of chest radiograph

Annual health checks on the members of the Society have been conducted since 1985. During the period of 1988-95, chest X-rays of 6,864 workers were taken. We observed the prevalence of pleural thickening among the job titles.

Mortality study

The Mie Construction Workers' Health Insurance Society has stored documents on causes of death of members who died during their membership since 1973. We analyzed the documents for the period 1973-1993.

Results

Questionnaire survey

The survey yielded 7,411 responses (response ratio: 79.3%). According to the answers to the question about the frequency of handling asbestos-containing materials by workers, 13.4 % of the workers frequently, and 26.4 % sometimes handled such materials. Among carpenters, 22.3 % frequently, and 37.3 % sometimes handled them. In construction sites, frequently used asbestos products were asbestos slates (50.3 %), calcium silicate board (35.0 %), asbestos roof materials (24.2 %), sprayed asbestos (13.4 %). The distribution of the start of asbestos use in the worksite was: earlier than 1960s (5.9 %), 1960s (18.9 %), 1970s (44.5 %), later than 1970s (30.7 %).

Asbestos exposure during cutting of construction materials

During cutting of the materials with an electric saw, the concentration was more than 100 fibers/cm³. During fixing the materials with nails, screws or drilling the materials, the concentration was 0.3-14.1 fibers/cm³.

Findings of chest radiographs

Thermal insulators by far the most frequently showed pleural thickening (25.0 %), and iron workers (9.3 %), tilers (5.9 %), water-worker (5.6 %), cabinet makers (2.9 %), carpenters (2.5 %) followed.

Mortality study

We found the standardised mortality ratios (SMRs) of all malignant neoplasms (0.98, 95 % confidence interval (CI): 0.90-1.07) and cancer of trachea, bronchus and lung (1.08, 95 % CI: 0.88-1.30). Then, we calculated the SMRs of cancer of trachea, bronchus and lung among carpenters, plasterers and iron workers and found a significantly high SMR in iron workers (2.88, 95 % CI: 1.44-5.15), whereas the SMRs in carpenters (1.02, 95 % CI: 0.77-1.33) and plasterers (1.61, 95 % CI: 0.86-2.75) were not significant.

Discussion

The measurement of ambient asbestos concentrations demonstrates that construction workers are exposed to large amounts of asbestos during some tasks in construction sites. Sawing of construction materials causes extremely high concentrations of asbestos. This suggests that all the workers in construction sites are exposed to substantial amounts of asbestos.

Chest X-rays and epidemiological studies showed health effects caused by exposure to asbestos among construction workers. It seems that the significantly high mortality of “cancer of trachea, bronchus and lung” in iron workers is associated with tasks almost specific to them such as asbestos spraying, demolition of buildings with metal structures.

Conclusion

Because of the heavy exposure to asbestos, construction workers are facing the threat of health problems such as lung cancer and other asbestos-related diseases. We should continue to observe the health status of construction workers in Japan.

References

- Hisanaga N, Hosokawa M, Sakai K, Shibata E, Huang J, Takeuchi Y, Ono Y. Asbestos exposure among construction workers. Proceedings of 8th International Pneumoconioses Conference. 1988, Pittsburgh, USA.
- Sun J, Shibata E, Hisanaga N, Kamijima M, Ichihara G, Huang J, Toida M, Takeuchi Y. A cohort mortality study of construction workers. *Am J Ind Med* 1997;32:35-41.
- Sun J, Kubota H, Hisanaga N, Kamijima M, Nakamura K. Mortality among Japanese construction workers in Mie Prefecture. *Occup Environ Med* 2002;59:512-516.