

CAUSE SPECIFIC MORTALITY IN AN ITALIAN POOL OF ASBESTOS WORKERS COHORTS

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Introduction

Asbestos is a known human carcinogen. At a global scale, the highest level of asbestos consumption occurred in 1977, when approximately 4.7 million tons were reached. Then, asbestos health risks triggered country-wide bans and stringent regulations, which resulted in a worldwide asbestos consumption decline until the late 1990s, when it leveled at two million tons, a consumption level that has been maintained since then with some minor fluctuations. [1]

In 2006, the World Health Organization [2] called for the elimination of asbestos-related diseases taking the position that the most efficient way to eliminate them is to cease using all types of asbestos. The 2014 update of this statement, which was attached to the WHO document "Chrysotile Asbestos" published in response to the continuing widespread production and use of chrysotile, emphasized that all forms of asbestos, including chrysotile, are causally associated with an increased risk of cancer of the lung, larynx and ovary, mesothelioma and asbestosis. [3]

Objectives

Italy was one of the great producer and user of asbestos and is among the countries mostly affected by asbestos-related diseases. The analysis of mortality of pleural and peritoneal neoplasms, as well as of lung cancer and other asbestos-related diseases by time-dependent variables was one of the major purposes that led to the construction of the Italian pooled cohort study of asbestos workers. [4-5]

Methods

The study included a pool of 52 Italian asbestos cohorts (asbestos cement, rolling stock, shipyards, glassworks, insulation, ship furniture, harbors, asphalt rolls production, industrial ovens construction, miners, rock salt workers) with an observation period longer than 40 years. Workers in the cohort contributed until their most recent date of observation. Duration of exposure was computed by summing up the duration of all employment periods in the cohort. Latency (TSFE) was computed from the date of first employment.

The vital status was assessed by the Registrar's Offices of the town of residence and the causes of death for decedents were provided by the Local Health Authorities. The cause of death was coded according to the International Classification of Disease, 8th, 9th, and 10th Revisions, according to the date of death.

Statistical analyses were based on the person-years and standardised mortality ratios (SMRs) method. [6] Reference rates were age-, period-, sex-, region- and cause-specific.

The set of rates was prepared by the National Institute of Health, using mortality and population figures provided by the Italian National Institute of Statistics - ISTAT (Rome, Italy) and available from 1970. Correspondingly, analyses were restricted to person-years and events occurring after January 1st 1970.

Analyses were carried out using OCMAP plus and SAS 9.4.

Results

The study included 63,502 subjects (57,156 men and 6,346 women): 40% alive, 58% died and 2% lost to follow-up. The main industrial activities were asbestos-cement (14,818 workers), rolling stock (carriages and engines) construction and maintenance (20,927) and shipyards (14,550).

Mortality was significantly increased for all deaths (SMR: men: 1.04, 95% CI 1.03 to 1.05; women: 1.15, 95% CI 1.11 to 1.18), all malignancies (SMR: men: 1.21, 95% CI 1.18 to 1.23; women: 1.29, 95% CI 1.21 to 1.37), pleural and peritoneal malignancies (SMR: men: 10.46 and 4.29, 95% CI 9.86 to 11.09 and 3.66 to 5.00; women: 27.13 and 7.51, 95% CI 23.29 to 31.42 and 5.52 to 9.98), lung cancer (SMR: men: 1.28, 95% CI 1.24 to 1.32; women: 1.26, 95% CI 1.02 to 1.53), ovarian cancer (SMR=1.42, 95% CI 1.08 to 1.84) and asbestosis (SMR: men: 143.04, 95% CI 131.21 to 155.66; women: 374.81, 95% CI 291.06 to 475.16).

In men an increase of mortality by latency for pleural malignancies was observed: SMRs increased from 3.95 for TSFE <20 years to 12.58 for TSFE 40-49 and did not further increase at longer TSFE periods. Peritoneal neoplasms showed a statistically significant increase in SMRs starting from 20-29 years of TSFE, with an increasing trend over the entire follow-up period. Deaths from asbestosis showed an increasing trend until 40 years of TSFE. In women pleural and peritoneal neoplasms exhibited a trend with TSFE similar to men.

In men SMRs for pleural and peritoneal malignancies and for asbestosis increased with duration of occupation, while a less evident trend was observed for lung cancer. Among women an increasing trend was observed for deaths from malignant neoplasms, pleural and peritoneal malignancies and asbestosis.

Conclusion

Our study is a pooled analysis of a large multicentre cohort of workers exposed to asbestos in different industries in Italy.

The obtained results clearly showed that pleural neoplasms risk increases with time since first exposure, for both men and women: after longer latency, SMR no longer increases. These findings confirm the previous

observation suggesting that the risk for pleural cancer does not increase indefinitely but it reaches a plateau when a sufficiently long time has elapsed since the start of exposure and that this may be related to the clearance of asbestos from the start of exposure, according to Berry's hypothesis. [7-8]

Contrary to pleural neoplasms, the risk for peritoneal neoplasms increased all over the observation time in men and women.

SMRs increased with duration of exposure for asbestosis, pleural and peritoneal neoplasms in men and women.

Further analyses from this pooled cohort are warranted and will include analyses by industrial activity.

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