

Are the Asbestos Substitutes Hazardous as well?

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Abstract

Introduction

Due to the proven pathogenicity of asbestos, suitable alternatives to asbestos have been sought with like chemical properties but no, or lower, pathogenicity. Synthetic vitreous fibers are an important substitute for asbestos in a variety of products where thermal and acoustical is required. Due to numerous uses, it is important to monitor the exposure rate of workers and others who deal directly with production and handling of asbestos. Man-made fibers, like asbestos, may also cause health effects due to morphological fiber, microscopic appearance, application and large uses in industry. The aim of this study was determine occupational exposure to Rockwool fibers and survey respiratory symptoms such as cough, breathlessness, phlegm and wheezing, as well as respiratory capacity.

Material and Methods

The standard method for the determination of airborne fibrous particles in the workplace is NIOSH Method 7400 by Phase Contrast Microscopy. According to this method, samples are collected on 25-mm cellulose ester filters. The filter is treated to make it transparent and then is analyzed by microscopy at 400-450x magnification, with phase-contrast illumination, using a Walton-Beckett graticule. Using counting rules B, only fibers $<3 \mu\text{m}$ in diameter and $>5 \mu\text{m}$ in length with aspect ratios of 5:1 are counted. Pulmonary function tests were carried out by P.F.T spirometer to obtain VC and FVC values. Questionnaires on respiratory health were completed for case - control groups; administrative staff and production workers were selected as case and control groups respectively. The respiratory questionnaire was filled out by members of both groups.

Results and Discussion

Sampling results showed different levels of exposure to fibre in the rock wool factory. The mean exposure, TWA 8 hours, and actual exposure were 0.51 and 0.7 fiber/cc, respectively. Occupational exposure did not exceed TLV-TWA (ACGIH); however due to overtime, occupational exposure was high and the T-Test revealed significantly different OEL ($p = 0.001$). While other tests showed some health effects of rock wool exposure, lung capacity and volume were not affected. The correlation test revealed that there is a significant correlation between smoking and respiratory signs such as phlegm ($r = 0.29$, $P = 0.006$), cough ($r = 0.25$, $P = 0.02$).