

SHORT REPORT

Respiratory health among quartz-exposed slate workers—a problem even today

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Background	Quartz and dust are known to cause respiratory problems. Slate workers in Alta, Norway are exposed to these compounds even today, and the need for improvement of their work environment was evaluated.
Methods	Respiratory health was examined using chest X-ray, lung function tests and a self-administered questionnaire in a cross-sectional study.
Results	The prevalence of silicosis among the slate workers varied between 1.9 and 6.5%. The slate workers had significantly more respiratory symptoms than the controls when adjusted for smoking. Peak expiratory flow was significantly lower among slate workers than among controls.
Conclusion	The work environment of the slate workers may cause adverse effects in their airways. Improvements to their work environment are indicated.
Key words	Quartz; silicosis; slate worker.
Received	19 June 2002
Revised	19 March 2003
Accepted	22 April 2003

Introduction

Alta has the largest deposits of slate rock in Norway, with opencast slate quarries and a factory. The slate products from Alta contain up to 83% quartz after processing. It has been known for years that inhalation of free crystalline quartz can cause silicosis [1].

The aim of the study was to compare the occurrence of silicosis, chronic obstructive pulmonary disease (COPD) and lung function, and the prevalence of respiratory symptoms among slate workers and a control group, to evaluate the need for improving the work environment.

Material and methods

In a cross-sectional study, a group of slate workers in Alta

who had been exposed to quartz dust for at least 1 year were included. The control group consisted of workers with no present or previous dust exposure. Exposure levels to quartz and dust are presented in a separate publication [2].

A modified version of a British Medical Research Council questionnaire [3] concerning respiratory symptoms was used. Lung function tests were performed with a Jaeger Flow Screen spirometer, using the American Thoracic Society criteria [4].

A small-scale chest X-ray was performed. Those with suspected silicosis were referred for a full-scale chest X-ray, judged blindly by two independent radiologists. An International Standard Classification was used [5]. Silicosis was defined as grade 1/1 or more.

COPD was defined as the presence of coughing for >3 months during a year, phlegm when coughing, breathlessness walking uphill or wheezing, and FEV₁ < 70% of FVC.

Results

One hundred and eight slate workers (78%) and 127 controls (78%) completed the questionnaire. The slate

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Table 1. Differences (%) in respiratory symptoms: slate workers and controls

	Slate (<i>n</i> = 108)	Control (<i>n</i> = 127)	Odds ratio (95% confidence interval) adjusted for smoking
Cough with phlegm	38.0	17.5	2.69 (1.44–5.04)
Cold with cough or phlegm for >3 weeks	31.1	18.4	1.97 (1.05–3.71)
Breathless walking uphill	28.2	11.5	2.74 (1.34–5.63)
Breathless climbing two stairs	21.3	7.1	3.14 (1.38–7.11)
Breathless walking on level ground	7.6	2.4	3.11 (0.76–12.72)
Respiratory symptoms at work	30.8	11.9	3.08 (1.54–6.17)

workers had worked with slate stone for an average of 15 years. No difference was found between the groups regarding age or occurrence of atopic diseases. There were significantly more smokers among slate workers than among controls (χ^2 , $P = 0.04$). The slate workers had a higher occurrence of respiratory symptoms than controls (Table 1). Peak expiratory flow was significantly lower among slate workers than controls (Student's *t*-test, $P < 0.01$). The spirometric results did not show any other differences between the groups.

The prevalence of silicosis among slate workers in this material was between 1.9 and 6.5%, depending on the interpretations from the two radiologists. In total, seven workers were diagnosed, giving a prevalence of 6.5. However, the radiologists agreed upon the diagnosis for two workers only, giving a prevalence of 1.9. Silicosis was not found among controls.

No significant difference could be found among the groups regarding the occurrence of COPD.

Discussion

The prevalence of silicosis varies in different studies. In a study of Spanish slate workers, De Quiros *et al.* [6] obtained similar findings to our study. Studies from other types of mines [7] with exposure to silica have shown a higher prevalence of silicosis, probably due to a different type of exposure in these mines and examination of a larger population.

Slate workers have a higher prevalence of several respiratory symptoms than do controls. These results are consistent with several studies [8,9]. The increased prevalence of symptoms might indicate the occurrence of an early state of obstructive and/or restrictive respiratory disorders among the slate workers.

Both previous and present exposure to dust and quartz exposure may have caused the findings in our present study. Improvements in the work environment ought to be performed.

Acknowledgements

This investigation was supported by grants from Medical Research in Finnmark, Alta Slate Quarries and the Research Fund of the University Hospital of Tromsø. We are grateful to the workers and managers at the slate factory Stensliperiet, the workers in the slate quarries, managers in the slate workers' cooperative society and the workers participating in the control group. We also want to thank Hasse Melbye, Gudmund Dyvik, Ulf Aasebø, Arne Borgersen, Jan Erikson, Jon Terje Wahl, Arne Nakken, Ernst Omenaas, the Community Health Service in Alta and Alta Felles Bedriftshelsetjeneste.

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