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Respiratory morbidity among miners in Rajasthan state
– Report of a pilot study

Introduction

The present health survey was conducted among miners working in different mines of Rajasthan state in western India. Rajasthan is geographically the largest state, and has the second highest amounts of mineral deposits in India. Three-fifths of the 342,239 square kilometres of land in this state is desert (1).

The number of mines in the organized sector and reporting to the Indian Bureau of Mines was 425 mines in 2003–4. The commercial value of minerals produced from these mines in 2003–4 was Rs 27,596,556/- (2). According to the report of the Mine Labour Protection Campaign, there are 1,324 leases for the mining of major minerals, 10,851 leases for the mining of minor minerals and 19,251 licensed quarries in Rajasthan (1).

The population of this state is 49.7 million, out of which 2.5 million people are mine workers engaged in 64 kinds of metallic and non-metallic mineral extraction activities (1). 97% of mining activities take place outside the organized sector. 37% of miners are women and 15% are children (1). Only 0.8% of the mine workers are literate, and their working hours average 8 to 10 hrs per day (1). In 2004 Rajnarayan R. Tiwari et al. stated that subjects who were exposed to dust in quartz crushing units for two or more years have low peak expiratory flow (PEF) rates compared with those of workers who were exposed for less than two years' duration

(3). The low PEF value is due to irritation of the upper respiratory tract mucosa among the exposed workers (3).

The objective of this study was to estimate the percentage of the mine worker population employed in the organized sector of Rajasthan who suffer from pulmonary impairment.

How the study was carried out?

The present study was undertaken by making a preliminary survey of various mines located in different regions of Rajasthan. The miners who participated in this health survey were working in limestone, lignite, gypsum and fluorite mines. Out of the subject group of 800 miners, 260 (32.5%) were working in limestone mines, 265 (33.1%) in lignite mines, 248 (31%) in gypsum mines and the remaining 27 (3.4%) were working in fluorite mines.

For this study, a pulmonary function test was carried out for the 800 miners working in the above mines of Rajasthan. The pulmonary function test was done by using a Cosmed Pony Graphic 4.0 Spirometer. The parameters measured by the Spirometer were the forced vital capacity (FVC), the forced expiratory volume in 1 second (FEV_1), the FEV_1/FVC %, the peak expiratory flow (PEF) rate, the forced expiratory flow between 200 and 1200 ml (FEF 200–1200), and the FEF 25–75%.

The parameters studied for this

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survey were the FVC, the FEV_1, and the FEV_1/FVC %. The subjects were told to take a deep forceful inspiration followed by a deep forceful expiration through the mouthpiece of the spirometer. Three readings were obtained for each miner, and the best reading was taken for reporting and analysis of data.

All pulmonary function test data were expressed as body temperature and pressure saturated (BTPS). On the basis of a subject's performance in the pulmonary function test, the results were interpreted as normal spirometry, obstructive impairment, restrictive impairment and combined impairment, i.e. both restrictive and obstructive impairment.

As normal pulmonary function test values change in relation to a subject's age, sex, body height and race, the predictive FVC and FEV_1 were calculated by using the predictive equation of Kamat et al. (4). To determine obstructive impairment, the predictive FEV_1/FVC % was calculated for each subject. If the predicted FEV_1/FVC % value was <75%, the subject was considered to have obstructive impairment. For restrictive impairment, predictive FVC