DECEASES BY RESPIRATORY CANCER AMONG URANIUM MINERS

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ABSTRACT

The deceases by respiratory cancer(bronchopulmonary and laryngeal) arised among miners from two uranium mines for the period 1960-1993 were studied.The control groups were formed by the male population deceased by the same cause in the native localities of the miners.

It resulted an enhanced occurrence risk of lung cancer among miners in comparison to the unexpected controls.

INTRODUCTION

Bronchopulmonary cancer is a specific occupational desease for uranium miners,the cause being the protracted exposure to high levels of alpha active radon daughters; depending on the magnitude of the pulmonary doses the desease occuring after 10-15-20 years from the beginning of exposure.(1-3)

For the knowledge of sicken risk by cancer of respiratory tract(bronchopulmonary and laryngeal) among uranium miners it was conducted an epidemiological study for two uranium mines from Romania for a 34 years period(1960-1993).

METHODOLOGY

The studied period(1960-1993) was established on the basis that a longer study period offers a higher certainty to find respiratory cancer among uranium miners.Were chosen out the localities that have provided the working force for the two mines,after that,from official records, were extracted the deaths by respiratory cancer among the adult male population.

Then fallowed the identification of retired miners from personnel records.So,it could be established the occupational route, the level of cumulative exposure to radon(WLM) and the smoking habit for each miner deceased due to respiratory cancer.

The controls were made up by unexposed adult male population from the native localities of the miners.

The statistical computations had in view the incidence of deaths/10.000 person-year, the expectancy, the observed/expected cases ratio and the relative risk coefficient.

The interpretation of data was made depending on age, years of underground service, cumulative exposure to radon and smoking habit for the miners, but on age for controls.

RESULTS AND DISCUSSION

The study group for Mine I was of 28,796 persons from 22 localities and for Mine II was of 8,164 persons from 2 localities.

In the period 1960-1993, in the areas of Mine I and Mine II were observed 103 deaths by respiratory cancer among miners and 480 among controls, respectively 34 among miners and 130 among controls.

As regarding the anatomical position in the respiratory tract, as for miner as for controls, obviously prevailed the bronchopulmonary cancer (over 80%).

The incidence of deaths by respiratory cancer is significantly increased among miners in comparison to controls ($p<0,001$) : almost 6 times higher for Mine I and almost 3 time higher for Mine II (Figure 1)

Incidence/10,000 person-year

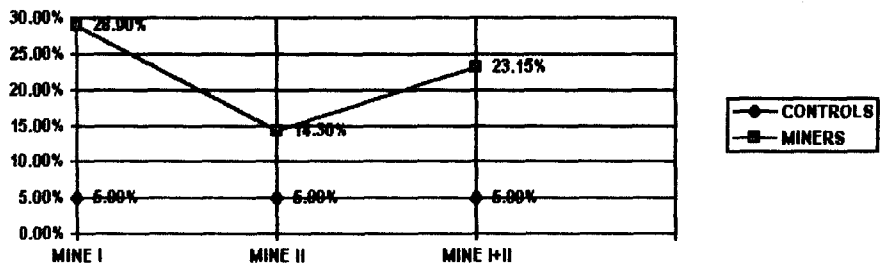

Figure 1. The incidence of deaths by respiratory cancer for the miners from Mine I and Mine II in comparison to the controls(1960-1993)

The risk of being taking ill by respiratory cancer, as expressed by the observed/expected cases ratio, as well as by the relative risk coefficient, it is significantly higher for miners in comparison to controls (Mine I:5,78>1.00 and Mine II : 2.80>1.00).

The average age at death for the miners from Mine I and Mine II(57.5 and 53.8years,respectively) is significantly lower($p<0,001$) in comparison to the controls(61.7 years and 61.3 years,respectively).(Figure 2)

Figure 2. Mean age at the date of death by respiratory cancer for the miners from Mine I and Mine II in comparison to controls(1960-1993)

The average years of underground service for the deceased miners from the two mines are 15 years for Mine I and 12 years for Mine II, predominanting the service in uranium mines: 11.3 years for Mine I and 11.1 for mine II.

As for the cumulative exposure to radon, deceases by respiratory cancer show enhanced ratios among miners having a cumulative exposure over 120WLM(Figure 3).The average exposure of the 103 deceased miners form Mine I was 401.1WLM and that for the 34 deceased miners from Mine II was 119WLM.

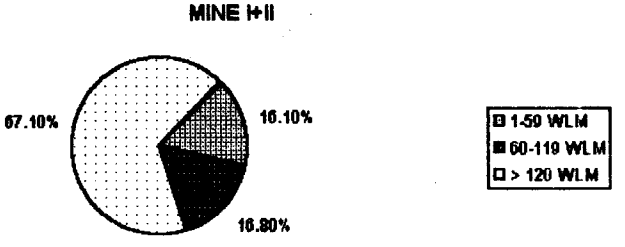

Figure 3.Distribution of deaths for the miners from Mine I and II versus cumulated exposure to radon(1960-1993)

The information regarding smoking habits of Mine I miners allowed to correlate the frequency of deaths and smoking habits, being proved the sinergetic effect of exposure to radon and smoking. The risk coefficient due to smoking is more obvious if the deaths are discussed in comparison to the smoking index(4)(no. of daily smoked cigarettes multiplied by no. of years of smoking):the proportion of respiratory cancer cases is 62.4% for smokers, with an index higher than 500, in comparison to only 4.3% for those having an index under 150.

The latency period calculated for miners deceased by respiratory cancer averaged to 26.7 and 21.0 years for Mine I and Mine II, respectively. The significantly increased incidence of deaths among miners, the obsviously lower age at death in comparison to controls, taking into account, also, the level of occupational exposure prove the occupationl character of respiratory cancer among uranium miners.

CONCLUSIONS

The epidemiological study of deaths by respiratory cancer among uranium miners proved that the increased incidence of deaths, much higher in comparison to controls(5.7 times for Mine I and 2.8 times for Mine II), is due to cumulative exposure to radon and its daughters, and it confirmed the occupational

character of deceases. Also, it can not be neglected the sinergetic effect of smoking, over 90% from the deceased miners being smokers.

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