

Occupational exposures PM and radiation in an artisanal coal mine in central Myanmar

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Background:Coal is a fossil fuel used in the production of electricity all around the world. In Myanmar, this is the primary source of fuel. Despite being a great source of energy, coal can harm both miners and the environment.**Objective:**This study's objective was to investigate the occupational exposure of miners to radioactivity and air particles in central Myanmar mines. **Methods:**Coal samples collected from the mine were analyzed for ionizing radiation using a sodium iodide detector. PM levels on the ground and inside the shaft were measured using handheld PM counters. **Results:**Levels of PM_{2.5} and PM₁₀ on the ground were 0.4 µg/m³ and PM₁₀ = 9 µg/m³, respectively. The average PM levels inside the shaft without a mechanical fresh air supply (PM_{2.5} = 90±70 µg/m³ and PM₁₀ = 3,116±2,726 µg/m³) were much higher than the shaft with the fresh air supply (PM_{2.5} = 2±1 µg/m³ and PM₁₀ = 8±2 µg/m³).The ionizing radiation dose based on coal samples was 3.6 µSv/hour. **Conclusion:**Miners reported that they typically spent 12 hours a day inside the cave without wearing masks. If fresh air was not properly supplied to the cave, miners could have been exposed to PM approximately five and 31 times higher than the World Health Organization guideline for PM_{2.5} of 25 µg/m³ and PM₁₀ of 50 µg/m³ on 24-hour means, respectively. The estimated radiation dose, assuming constant exposure to radiation is 32 mSv/year. This is higher than the maximal annual occupational dose limit of 20 mSv recommended by the International Commission on Radiological Protection. This study highlights the need to further understand safety practices and effects of exposure on miners working in central Myanmar.

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