EXPOSURE TO PARTICULATE MATTER AND AIR QUALITY: CYTOGENOTOXIC RISKS IN SANDSTONE MINING

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ABSTRACT

INTRODUCTION: Mining contributes to the socioeconomic development of many municipalities but has also raised concerns about the health of miners exposed to particulate matter (PM). This exposure can cause cytotoxic and genotoxic damage, increasing the risk of disease.
OBJECTIVES: This study aimed to assess air quality and its potential cytogenotoxic effects on workers involved in sandstone mining.
MATERIAL AND METHODS: The research was conducted in a mining region in the rural area of Taquara/RS. Particulate matter sampling (PM2.5 µm and PM10 µm) was carried out monthly from July 2022 to May 2023, using the AFG (Fine and Coarse Sampler) over a 24-hour period. Meteorological data were provided by the meteorological station (INMET). The study consisted of a group of 21 miners exposed to PM from sandstone extraction and a control group of 21 unexposed individuals with no ties to mining activities. Cytogenotoxic effects were assessed through the analysis of nuclear alterations in samples of oral mucosa cells from both groups.
RESULTS: The average particulate matter concentrations during the study period were within the limits set by the WHO. However, values exceeding these limits were observed for PM2.5 samples in July and August 2022 and January 2023, and for PM2.5-10 in February and April 2023. Regarding cytogenotoxic effects, miners exhibited significantly higher values than the control group for nuclear buds, micronuclei, and pyknosis frequencies.
CONCLUSION: The results indicate a possible association between air quality and cytogenotoxic damage in sandstone miners, highlighting the need for strategies aimed at minimizing the impact on human health and the environment in extractive industries.

Keywords
Air pollution; Genotoxic damage; Mineral extraction.

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