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Verification of radon, radium, polonium concentrations and lung cancer rates in blood of female hookah smokers

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Abstract

Hookah smoking has become very popular in Iraq among women and men. Hookah tobacco contains natural radioactive elements, such as radon, radium, and uranium, as well as toxic elements, such as polonium, which are released during the combustion of tobacco and are inhaled by smoking. Most reviews focus on hookah tobacco, and only a few have investigated the blood of hookah smokers. In this study, a CR-39 detector was used to measure radon, radium, and polonium concentrations and conduct risk assessments in female hookah smokers of different ages. The results show that the concentrations of radon-222, polonium-218, and polonium-214 varied between 61.62 and 384.80, 5.45–33.64 on the wall of the can, and 2.43–15.00 Bq/m^3 on the surface of the detector, respectively. The effective radium-226 concentration varied between 4.52 and 56.31 Bq/kg. The absorbed effective dose varied between 1.55 and 9.71 mSv/y, which is within the recommended limit (3–10 mSv/y) by International Commission on Radiological Protection (ICRP). The average case of lung cancer 107.91 cppp, which exceeds the European Union (EU) limit (96.9–104.8 cppp). The rates of radon activity and radon exhalation from the intake of a natural radionuclide due to hookah smoking in a female's blood were calculated and discussed. This study aimed to establish preliminary results on the risks of radioactivity concentrations and assess the dose in the blood of women who smoke hookah and assess the possibility of developing cancer.

Keywords: absorbed dose; CR-39 detector; hookah; lung cancer; polonium; radon

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Corrigendum

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