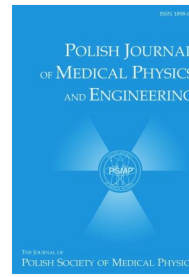


## Radiological and health hazards resulting from radioactivity and elemental composition of some soil samples

Abdu Hamoud Al-Khawlany, A. R. Khan and J. M. Pathan | Jun 25, 2020

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#### Abstract

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Inspection of the radioactivity level in the soil is very important for human health and environmental protection. This study aims at evaluating the radiological hazards and pollution risks related to natural radionuclides and elements in the selected soil samples. Ten samples of soil were collected from different sites of Aurangabad-India and the level of radioactivity was measured using gamma-ray spectrometry with NaI (TI) detector. Furthermore, the Physico-chemical properties such as pH, organic matter, electrical conductivity, moisture, soil texture, etc., and elemental composition of soils have been decided on using various standard techniques. The mean concentrations of  $^{226}\text{Ra}$ ,  $^{232}\text{Th}$ , and  $^{40}\text{K}$  were 8.178, 17.408, and 96.496 Bq/kg, respectively, which are lower than the global average values of 35, 30, and 400 Bq/kg, respectively (UNSCEAR, 2000). The radiological hazard indices such as radium equivalent, absorbed dose, annual effective dose, internal index, external index, gamma index, excess lifetime cancer risk, etc., were calculated to assess the radiation hazards and compared with internationally recommended values which found to be lower than the permissibility limits.

The Pearson correlation was applied to determine the existing relationship between radionuclides and radiological health hazard parameters, as well as with the physicochemical properties of the soil samples. The major and trace elements presented in soils were measured and their mean concentration was ranked in the formed order (Mg>Na>Ca>K>N>Mn>Fe>P>Zn>Cu). The pollution risk parameters (Geo-accumulation index, contamination factor, degree of contamination, pollution load index, and potential ecological risk index) related to the elements in the samples were assessed and results shown that the soils under study are unpolluted with the measured elements. Generally, the radioactivity levels and pollution risks indices in the soils of the study area are within the permissible safety limits and do not cause any significant health threat to humans. Thus, the presented data provide a general background of the detectable radionuclides for the study area and can be helpful in the future as a reference for more extensive studies in the same field.

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Keywords

[health hazards](#), [radionuclides](#), [gamma spectrometry](#), [physico-chemical properties](#), [absorbed dose](#)

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