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The Effect of Natural Radioactive Elements in the Soil and Ground Water toward Human Beings

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Abstract: The review of the current work were to assess the consequence of natural radioactive elements in soil and water sample. Most of the word wide was that covers emitting radiation elements. The primary source of the radioactive isotopes is deposits that can be enriched in 238 U and its daughter isotopes. Water is one of the most vital natural resources. About 70% of the Earth's surface is enclosed with water, which is estimated at a volume of around 1.4 billion km3. Gamma-ray Spectrometry was applied using high-purity germanium (HPGe) gamma-ray detector of soil and water sample. Natural radioactivity and radiation in soils have gained substantial research attention because humans are exposed to natural radioactivity at different levels depending on natural radioactive minerals were presented throughout in world wide.

Keywords: Radiation, radioactivity, environments, effect and exposure.

1 Introduction

Natural radiation is a normal part of the environment that originates from two main sources (Thomas M. etal, 2019). Radioactive materials found in nature are often referred to as Naturally Occurring Radioactive Materials (Ali A., etal, 2017). NORMs are categorized in three groups of radionuclides, namely primordial or terrestrial, Cosmo genic and anthropogenic nature which are everywhere in the environment (Ahmad N., 2015). Natural radioactivity and the associated external exposure due to gamma radiation depend primarily on the environmental and topographical conditions, and appear at different levels in soils in the world (Ouko S., 2015). The levels of radioactivity can be used to assess public dose rates and radioactive pollution and predict changes in natural radioactivity caused by nuclear accidents, manufacturing activities, and other human activities (Ghazwa A. etal, 2016). The increasing demand of radioactivity and its applications has brought about the need for an assessment of human exposure to radiation (L. I. Nwankwo, 2013).

In spite of the worldwide attention in the amount of natural background radiation and the extent of nuclear investigation and applications being carried out the level of natural radioactivity for most of its environments have not been established (Abubakar D., 2016). Most of previously studies on environmental radioactivity the essence on the measurement of natural radionuclides in soil and water trials for specific locations and reported comparatively higher radioactivity levels (ABBA, 2018).

The aimed of this review is to assess the baseline data on natural radiation and radioactivity levels in soil and water in environment. The assessment of this work also used form a scientific baseline data on the levels of natural radioactivity in the area for monitoring and evaluation for any future radiation contaminations in the environment due to local accidental releases or those of universal scale. Such data can also be used to assess the radiological health effects of natural radiation in the environment and can be used to approve, and to plan decisions about possible radiation linked health problems in the area (ABBA.H, 2018). Also it evaluates the contribution of the natural radioactivity and radiation risks received by the populations living in the area (Dr. S.Y. Loemba M. etal, 2018). To distinguish the levels of usual radioactivity in some soils and possible impact on groundwater radioactivity (Dalal Matar A., 2014).

At select sites soil was scooped while rock pieces were chipped from out crops and transferred to the laboratory (D. Otwoma etal, 2012). Radioactive particles enter the environment from different sources and the behavior (Salbu B.et al., 1998). The

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consequence of these particles in the environment is linked to their physicochemical forms and weathering effects (Mustafa S., 2010).

1.1 Radiation in the Environment

Human exposure to radiation is an unavoidable part of life. Everybody is exposed to ionizing radiation in their daily life other than medical treatment. The majority of our daily exposure comes from primordial sources of radiation from radionuclides that remain from the creation of all matter billions of years ago (Innocent Y., 2017). The methods produce radioactive elements, which was widely dispersed into the environment. This has left a inheritance of polluted water supplies, improvised agricultural land and soil containing abnormally high levels of naturally occurring radioactive elements with interactions of ionizing radiation in the environment. This leads to various biological effects that may later show up as a medical symptom. The nature and harshness of the symptoms depends on the absorbed dose as well as the rate of many sickness and diseases which have been effectively managed if information about the radiation level of an environment is available. Only radioactive elements with half-lives comparable with the age of the earth or their corresponding decay products existing in terrestrial material such as ^{232}Th, ^{238}U, and ^{40}K, are of great interest in this study. Since this radioactive elements are not evenly distributed in soils and water, hence its play an important role in radiation protection and measurement (D.I. Jwanbot, 2013).

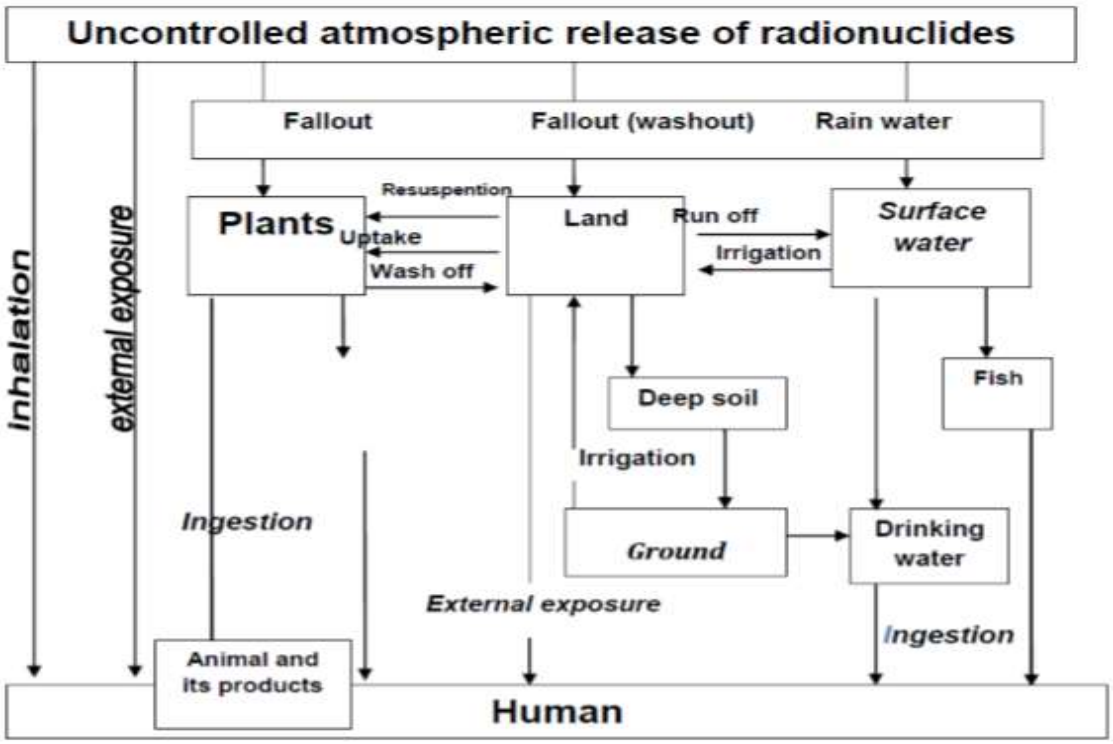

Fig. 2.1: Radionuclides exposure to human being (Innocent Y., 2017).

Soil is an important resource to human. It can be used for food production and building shelter. The chemical, mineral and biological components of soil can be inhaled, ingested or absorbed through the skin, hence can be harmful to human health, for example cancers due to inhalation of radon gas from the decay of uranium in soil minerals, radiation sickness and sterility (KIPLANGAT E., 2016).

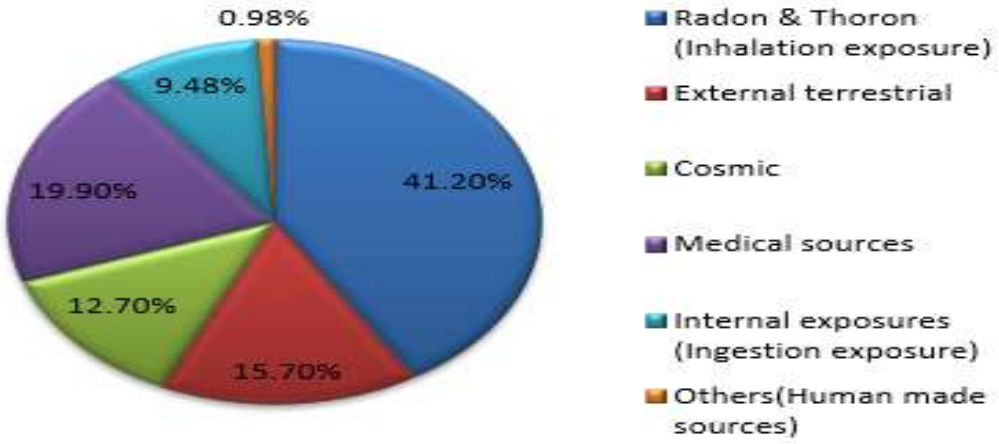

Fig. 2:2 A chart on human exposure to sources of radiation (KIPLANGAT E., 2016).

1.2 Biological Effects of Ionizing Radiation

Radioactive materials and ionizing radiations are existed naturally in our environment. The radiation exposure hazard cannot be removed entirely but can only be restricted. The two categories of detrimental health effects that can be caused by exposure to radiation are deterministic and stochastic.

1.2.1 Deterministic Effects

These are effects that can occur once a threshold level of exposure has been exceeded. The threshold can be small and may vary from one person to another. However, on exceeding the threshold, the severity of an effect increases with increase in dose. Deterministic effects include skin erythema, sterility, hair loss, cataracts and fetal abnormality. Deterministic effect results from delayed cell division or cell death, due to exposure to very high radiation levels. These effects can weaken the function of the exposed tissues if they are extensive enough (Venkata R. Y., 2013).

1.2.2 Stochastic Effects

Mostly these are delayed effects induced due to exposure to radiation. This induction takes place without a threshold level but overall range of doses. Stochastic effects may occur on modification of an irradiated cell. The modified cells may develop into a cancer after a prolonged delay. This may not occur at small doses due to the body's repair mechanisms; nonetheless, there is no threshold dose below which cancer cannot result. For higher doses, the possibility of occurrence of cancer is high, but the severity of any cancer that may result from irradiation does not depend on the dose. The likelihood of stochastic effects is proportional to the dose received (MUSAMALI E.W., 2016).

2 Conclusion

The present work in this review were the assess the effect of radioactive elements on human being causing by soil and water pollution. The effect of ionizing radiation stochastic effects and determinant effect on the gene of human cell. Most of naturally radioactive element occurred in soil, and water surface. The main source of radiation was natural and manmade source. Gamma spectrometry was used to measure the radioactivity concentration of soil samples collected from worldwide. Exposure to external gamma radiation, radioactivity in soil and ingestion of under groundwater were assessed the level of risks of peoples.

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