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VIRTUAL EVENT

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Investigation of radioactivity level and evaluation of total effective dose at SPA facilities in Turkey

Mineral and thermal waters may contain natural radioactivity. In some cases, these waters can lead to radiation-protection problems for both workers and consumers of spa facilities. In Turkey, as in many other countries, the consumption of drinking mineral water is increase and the practice of short stays in balneological facility is also popular. In these facilities, protection of consumers and workers against natural radioactivity is not adjusted and exposure from thermal waters is not treated in detail, in most of the countries and Turkey. For this reason, a technical cooperation project (TUR/9/018) was conducted to provide a report containing radioactivity measurement results, dosimetric calculations and assessment of radiation protection regulations to be applied in spas between 2012 and 2014. This study could carried out in 70 SPA centers which constitute 47% of balneological facilities in Turkey. The active and passive measurement techniques were applied to determine radon concentration of air in SPA facilities. Soil and water samples were collected and analyzed. A questionnaire was conducted at each spa facilities to determine consumption amount of mineral water, duration of stay in spas and age group of spas customers. Dose calculations were made by considering two different scenarios for those workers and consumers. A moderate scenario was determined and used for dose calculations. It was assumed that spa personnel work in the indoor swimming pool section of spa facilities for 1 hour and in corridors and towel-dressing rooms sections of spa facilities for 4 hours. It was also assumed that they consume an average of 1 liter of drinking mineral water per day and do not apply mud curing at the facilities where mud curing is applied. It is accepted that the people who benefit from the spa facilities twice a year for 15 days and the accommodation period calculated as 30 days a year. Consumers stay at the indoor pool of spa facilities is determined as 1 hour per day. The duration of consumers to be in the indoor places is accepted as 4 hours. The average amount of drinking mineral water consumed daily by customers who stay in the spa facilities is accepted as 1 L.

The obtained results show that ^{222}Rn activity concentrations in indoor swimming pools vary between 13 Bq/m³ and 10 kBq/m³. The measured gross alpha and beta concentrations in thermal waters range from 0.018 Bq/L to 54.2 Bq/L and 0.024 Bq/L - 37.7 Bq/L, respectively. Concentrations of ^{238}U , ^{234}U , ^{226}Ra were measured in 29 mineral waters and ^{228}Ra was measured in 7 mineral waters for the estimation of annual committed effective dose to the adults. The average activity concentration values of ^{238}U , ^{234}U , ^{226}Ra and ^{228}Ra were measured as 18.8 mBq.L⁻¹, 23.8 mBq.L⁻¹, 1027.2 mBq.L⁻¹ and 12.6 Bq.L⁻¹ respectively. The total effective doses delivered to the personnel during work and the consumers during treatment were in the range of 0.06 mSv to 39.3 mSv and 0.08 mSv to 17.1 mSv per year respectively.

Reference

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