

A Study of The Factors Predicting Radiation Exposure to Contacts of Saudi Patients Treated With Low-Dose Radioactive Iodine (I-131)

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Abstract : Aim: To measure exposure levels to family members and caregivers of Saudi patients treated with low dose I131 therapy, and household radiation exposure rate to predict different factors that can affect radiation exposure. Patients and methods: All adult self dependent patients with hyperthyroidism or cancer thyroid referred for low dose radioactive I131 therapy on outpatient basis are included. Radiation protection procedures are given to the participant and family members in details. TLD's were dispensed to each participant in sufficient quantity for his/her family members living in the household. TLD's are collected at fifth days post-dispense from patients who agreed to have a home visit during which the household is inspected and level of radiation contamination of surfaces was measured. Results: Thirty-two patients were enrolled in the current study, with a mean age of 43.1 ± 17.1 years Out of them 25 patients (78%) are females. I131 therapy was given in twenty patients (63%) for cancer thyroid of and for toxic goiter in the remaining twelve patients (37%), with an overall mean I131 dose of 24.1 ± 7.5 mCi that is relatively higher in the former. The overall number of household family members and helpers of patients are 139, out of them 77 are females (55.4%) & 62 are males (44.6%) with a mean age of 29.8 ± 17.6 . The mean period of contact with the patient is 7.6 ± 5.6 hours. The cumulative radiation exposure shows that radiation exposure to all family members is below the exposure constraint (1mSv), with a range of 109 to 503uSv, and a mean value of 220.9 ± 91 uSv. Numerical data shows a little higher exposure rate for family members of those who receive higher dose of I131 (patients with thyroid cancer) and household members who spent longer time with the patient, yet, the difference is statistically insignificant ($P > 0.05$). Besides, no significant correlation was found between the degree of cumulative exposure of the family members to their gender, age, socioeconomic standard, educational level and residential factors. In the 21 home visits all data from bedrooms, reception areas and kitchens are below hazardous limits (0.5uSv/h) apart from bathrooms that give a slightly higher reading of 0.57 ± 0.39 uSv/h in those with cancer thyroid who receive a higher radiation dose. A statistically significant difference was found between radiation exposure rate in bathrooms used by the patient versus those used by family members only, with a mean value of exposure rate of 0.701 ± 0.21 uSv/h and 0.17 ± 0.82 uSv/h respectively, with a p-value of 0.018 (< 0.05). Conclusion: Family members of patients treated with low dose I131 on outpatient basis have a good compliance to radiation protection instruction if given properly with a cumulative radiation exposure rate evidently beyond the radiation exposure constraints of 1 mSv. Given I131 dose, hours spent with the patient, age, gender, socioeconomic standard, educational level and residential factors have no significant correlation with the cumulative radiation exposure. The patient bathroom exhibits more radiation exposure rate, needing more strict instructions for patient bathroom use and health hygiene.

Keywords : family members, radiation exposure, radioactive iodine therapy, radiation safety

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