
IMPACT OF RADIOACTIVE IODINE THERAPY I-131 ON PATIENT HEALTH QUALITY

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Abstract The main indications for therapeutic use of I-131 are treatment of hyperthyroidism, radioactive removal of residual thyroid tissue in malignant thyroid cancers that accumulate iodine, and possible adjuvant therapy of extensive malignancies that accumulate iodine. Treatment with radioactive iodine is used for diffuse hyperthyroidism when medications are not effective for a period or when medications fail to control elevated hormone levels in the blood, as well as for drug-related side effects. I-131 therapy is increasingly replacing surgical treatment because it is simple, economical, practical, and usually has no complications. The aim of this study is to investigate the quality of health of the target group before and after thyroid therapy with radioactive iodine. The study is a prospective study that is conducted from November 2019 to November 2020 in the Clinic for Nuclear Medicine and Endocrinology of the Clinical Center of the of Sarajevo (KCUS) from November 2019 to November 2020. The study including 30 patients who have been injected with I-131 for the treatment of thyroid disease and undergo regular check-ups and examinations at the Nuclear Medicine and Endocrinology Clinic of KCUS. The results show that patients felt better after treatment with radioactive iodine, which is confirmed by the Wilcoxon test for paired samples ($p = 0.001$). In both time periods, the most frequent rating is 3. However, the mean rating of general health before therapy is 2.6 and after therapy is 3.2. Since improvement in health and quality of life was observed in almost all treatment groups, this indicates that radioactive iodine therapy is suitable for all age groups. The quality of health of the target group of subjects before and after thyroid therapy with radioactive iodine I-131 increased significantly after therapy.

Keywords: Iodine-131; Iodine Radioisotopes; Thyroid Neoplasms; Hyperthyroidism; Hormones; Quality of Life

1. INTRODUCTION

In a broader sense, health is understood as the state or quality of the human body expressed in the adequate functioning of the organism under the given genetic conditions and the conditions of the external environment

(Naess S., 1999). At the individual level, health potential means good nutritional status, immune resistance to infectious agents, physical fitness, emotional stability, adequate knowledge and access to health, and successful coping with psychosocial stresses. At the community level, important elements of health potential include appropriate health policies, well-organized social protection, employment, adequate living and working conditions, access to health, education, and other public services, etc. (Knack JM, et al., 2007). The impairment of health and the course of the disease itself may lead to slight or dramatic changes in some or all quality-of-life and health factors, with complex interactions between disease and treatment and individual patient responses to the social environment (Deniz M., 2006).

Radioactive iodine (I-131) treatment has been used in medicine since the 1950s. Given that only the thyroid gland specifically accumulates iodine in its cells to produce thyroid hormones: T4 (with 4 iodine atoms) and T3 (with three iodine atoms). This fact has been exploited for the very specific use of iodine isotopes for diagnostic and therapeutic purposes. I-131 is used for diagnostic and therapeutic purposes, but its role in the treatment of thyroid diseases is much more pronounced (Dodig D, Kusić Z., 2012). Indeed, I-131 very readily treats increased thyroid function (hyperthyroidism) in diffuse disease, when the entire thyroid gland is affected by the disease (Mb Graves, Mb Basedow), and in situations where one nodule (toxic adenoma) or multiple nodules (multinodular toxic current) are enhanced. Treatment with radioactive iodine, but at much higher doses, is used in closed hospitals for patients with thyroid cancer (cancer) as well as local distant metastases from differentiated thyroid cancers (Salter M., 2007; Bogićević M, Ilić S., 2007).

The main indications for therapeutic use of I-131 are treatment of hyperthyroidism, radioactive removal of residual thyroid tissue in malignant thyroid cancers that accumulate iodine, and possible adjuvant therapy of extensive malignancies that accumulate iodine. Treatment with radioactive iodine is used for diffuse hyperthyroidism when medications are not effective for a period of time or when medications fail to control elevated hormone levels in the blood, as well as for drug-related side effects. I-131 therapy is increasingly replacing surgical treatment because it is simple, economical, practical, and usually has no complications (Bogićević M, Ilić S., 2007).

The aim of this study is to investigate the quality of health of the target group before and after thyroid therapy with radioactive iodine.

2. SUBJECTS AND RESEARCH METHODS

The study is a prospective study that is conducted from November 2019 to November 2020 in the Clinic for Nuclear Medicine and Endocrinology of the Clinical Center of the of Sarajevo (KCUS) from November 2019 to November 2020. The study including 30 patients who have been injected with I-131 for the treatment of thyroid disease and undergo regular check-ups and examinations at the Nuclear Medicine and Endocrinology Clinic of KCUS. Approval from the KCUS Science and Education Discipline (No.:10-01-48919 dated 09/30/2019) was obtained to conduct the research.

Criterion for inclusion in the study: patients who have been administered I-131 for the treatment of thyroid disease and have regular follow-up visits to the KCUS Department of Nuclear Medicine and Endocrinology.

Criterion for exclusion from the study: patients who have been treated for thyroid swelling at the KCUS Nuclear Medicine and Endocrinology Clinic and who have not been administered i-131 for this purpose.

The European Survey Questionnaire SF -36 for self-assessment of the health status of a patient with various chronic diseases, served as a research instrument for longitudinal research (Ware IS, Sherbourne CD., 1992). In addition to the SF -36 questionnaire, a questionnaire on sociodemographic data of the subjects was also conducted

The SPSS for Windows software package (version 19.0, SPSS Inc, Chicago, Illinois, USA) and Microsoft Excel (version 11) were used for statistical analysis of the data obtained. Microsoft Corporation, Redmond, WA, USA).

3. RESULTS

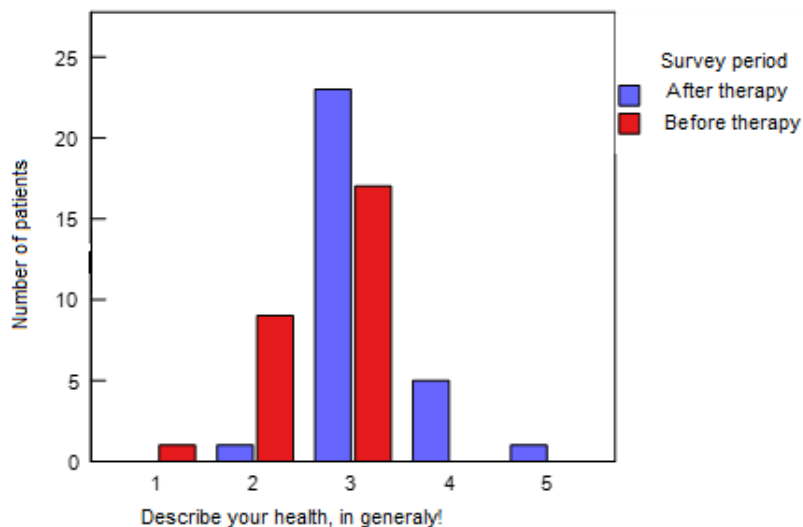
The total number of subjects involved in the study was 30, of which 25 (83.3%) were female and 5 were male (16.7%). There were significantly more females in the study group (binary test, $p = 0.001$). The mean age of the subjects was 50 years ($\sigma = 12$). The age distribution monitored the normal distribution (Kolmogorov-Smirnov test, $p > 0.2$). For the purpose of better statistical analysis, the age variable was dichotomized, i.e. divided into two groups of subjects - those under 55 years of age (middle-aged and younger subjects) and those aged 55 years and older (older-aged subjects). The group of those under 55 years of age consists of 19 patients, while the remaining subjects, 11, are 55 years of age or older. There is no significant difference in patient frequency in these two groups (binary test, $p = 0.201$).

Table 1 Marital status, number of years of education, and occupation of individuals participating in the study, grouped by age.

		Age					
		<55		≥55		Total	
		N	%	n	%	n	%
Marital status	icy(s)	1	5,3%	0	0,0%	1	3,3%
	married/married	16	84,2%	9	81,8%	25	83,3%
	widower	1	5,3%	2	18,2%	3	10,0%
	divorced	1	5,3%	0	0,0%	1	3,3%
	Total	19	100,0%	11	100,0%	30	100,0%
Number of years education	8	2	10,5%	3	27,3%	5	16,7%
	9–12	10	52,6%	5	45,5%	15	50,0%
	>12	7	36,8%	3	27,3%	10	33,3%
	Total	19	100,0%	11	100,0%	30	100,0%
Occupation	unemployed	3	15,8%	2	18,2%	5	16,7%
	housewife	3	15,8%	1	9,1%	4	13,3%
	farmer(s)	1	5,3%	0	0,0%	1	3,3%
	industrial worker(s)	1	5,3%	0	0,0%	1	3,3%
	officer(s)	11	57,9%	3	27,3%	14	46,7%
	pensioner(s)	0	0,0%	5	45,5%	5	16,7%
	Total	19	100,0%	11	100,0%	30	100,0%

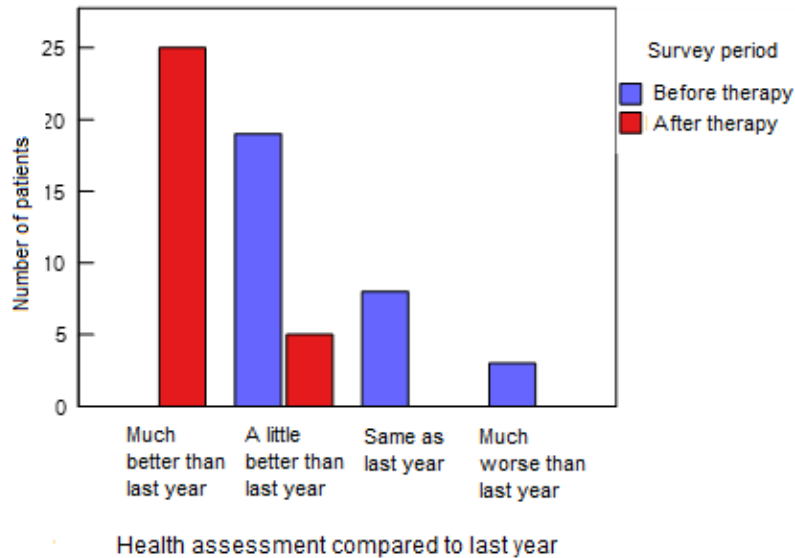
The marital status, education, and occupation of the subjects involved in the study, grouped by age, are shown in Table 1. The marital status of most subjects is married (83.3%). There are no significant differences between the two age groups (Pearson's χ^2 test, $p = 0.508$). There are also no significant differences found in the number of years of education (Pearson's χ^2 test, $p = 0.488$). Most subjects have an education of 9-12 years (50.0%). On the other hand, most subjects of younger age are employed, most often as civil servants or employees (57.9%), while older patients are most often retired (45.5%). The difference between the two groups is considerable (Pearson's Some of the subjects involved in the study had to use their vacation during treatment, had to undergo specialist examinations and were exposed to costs during these examinations. They also felt complications and side effects of the treatment. The results show that patients felt better after treatment with radioactive iodine, which is confirmed by the Wilcoxon test for paired samples ($p = 0.001$). In both time periods, the most frequent rating is 3 (Graph 1). However, the mean rating of general health before therapy is 2.6 and after therapy is 3.2.

Graph 1. Assessment of the general health of subjects before and after radioactive iodine therapy. The general health condition was assessed by patients better after therapy (Wilcoxon paired sample test, $p = 0.001$).



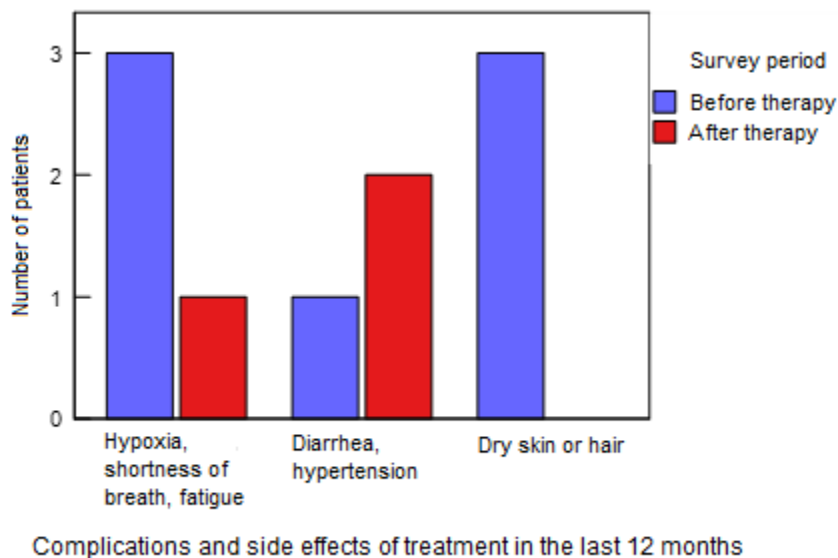
The second question was related to an assessment of health status compared with the previous year. Patients were examined before and after therapy. There is a significant difference in the answers (Wilcoxon test for paired samples, $p < 0.001$). The answers "much better than last year" are most frequent among patients after therapy. In contrast, the answers "just like last year" and "much worse than last year" are only found in the surveys before radioactive iodine therapy (graph 2)

Graph 2. Health assessment compared to the situation last year before and after the survey. The health condition is worse compared to the previous year after radioactive iodine therapy (Wilcoxon paired sample test, $p = 0.001$).



Before treatment with radioactive iodine therapy, a number of patients annexed had health problems. The most common were a feeling of lack of oxygen, a feeling of suffocation, and fatigue, then diarrhea and high blood pressure. Subjects also reported dry hair and skin. Health problems were more frequent before treatment with radioactive iodine (Graph 3).

Graph 3. Complications and side effects of treatment in the last 12 months, before and after radioactive iodine therapy



4. DISCUSSION

The results showed that patients felt significantly better after treatment with radioactive iodine. Our results are consistent with those of the 2020 study. From Australia (Rowe C et al., 2020). C. Rowe also compared the difference in quality of life: before and after RAI therapy in hyperthyroid patients and concluded that the quality of health improves and that a better understanding of patients' experiences after therapy is necessary to continue treatment and manage patients appropriately. Also, in one paper (Mirzaeva U, Gulyam's K., 2018), significant improvement in the quality of life of women with Graves' disease was noted after radioactive iodine therapy, and patients' overall physical performance increased.

When health status was assessed in this study, a significant difference in responses was noted. The most frequent responses were "much better than last year" given by patients who received radioactive iodine therapy, but there were also a significant number of responses "as good as last year" and "much worse than last year" in patients before radioactive iodine therapy, but these responses were given only in the surveys that referred to the period before therapeutic treatment. Therefore, we can conclude that even after the health assessment, the effect of the therapy exists. There is a difference in health assessment after therapy. Author Okosieme (Okosieme O, Taylor P, Dayan C., 2020) states that thyrostatic agents are still appropriate for the treatment of patients with milder disease and with contraindications to radioiodine, but that early treatment with radioactive iodine may reduce mortality and improve other parameters of life, and that I-131 therapy is recommended for patients with severe thyroid disease

In his research, Yang and Sar. state that the effect of radioactive iodine therapy after total thyroidectomy is excellent and can significantly improve the efficacy of clinical treatment and the patient's postoperative quality of life, which is worth clinical administration (Yang Y, Jiao Y, Yu J, Wang C., 2019).

The aim of Yin and Sar.'s research was to observe and analyze the clinical effect of total thyroidectomy combined with radioactive iodine in the treatment of thyroid cancer. 120 thyroid cancer patients who were hospitalized were enrolled as subjects and divided into the study group (treated with total thyroidectomy and radioactive iodine) and the reference group (treated with conventional total thyroidectomy). Overall treatment efficacy was compared between the two groups. Comparison of overall treatment efficacy between the two groups showed that the study group had better results compared with the reference group ($P < 0.05$). In the assessment of quality of life, the study group was significantly superior to the reference group in terms of physiological function, psychological function, social function, and overall assessment of quality of life, $P < 0.05$. Total thyroidectomy combined with radioactive iodine may significantly improve the overall efficacy of treatment while providing patients with a higher quality of life, which correlates with the results of our study (Yin X et al., 2018).

5. CONCLUSION

Since improvement in health and quality of life was observed in almost all treatment groups, this indicates that radioactive iodine therapy is suitable for all age groups. The quality of health of the target group of subjects before and after thyroid therapy with radioactive iodine I-131 increased significantly after therapy.

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