

**ORIGINAL RESEARCH****Study of symptoms of anxiety and depression and quality of life before and after radioactive iodine intake in patients with thyroid cancer**Shahab Banihashem<sup>1</sup>, Mehdi Arabzadeh<sup>2\*</sup>, Mohsen Ghotbi<sup>3</sup>

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**Abstract**

**Introduction:** Thyroid cancer can affect the quality of life of patients and no validated study has been conducted to evaluate the quality of life in patients with thyroid cancer in Iran. The purpose of this study was to evaluate the changes of quality of life in patients with thyroid cancer treated with radioactive iodine.

**Materials and Methods:** According to a prospective longitudinal study, quality of life and mood in these patients were studied by two questionnaires: Short Form Health Survey (SF36) and Hospital Anxiety and Depression Scale (HADS) provided to the patients by the researcher. The questionnaires were completed one month before iodine injection, on the day of injection, at the end of the second week, and sixth month after radioactive iodine injection. The patients were treated in two groups of 100 and 150  $\mu$  Curie. After completing the questionnaires, the resulting scores at four different time points were evaluated and compared.

**Results:** The mean SF36 scores were lower than one month before iodine intake and after 6 months, the mean scores were lower than one month before iodine intake. The mean HADS scores one month after iodine intake were not significantly different from the time of iodine intake, but after two weeks, anxiety and depression were reduced, and the result continued till the sixth months. No difference was found in the levels of anxiety and depression between the doses of 100 and 150  $\mu$  Curie.

**Conclusion:** The highest level of anxiety and depression and quality of life during the first two weeks of iodine intake reduced with time and iodine intake dose did not affect it.

**Keywords:** Thyroid cancer, Radioactive iodine, Quality of life

## Introduction

The prevalence of thyroid cancer around the world is increasing (1) while mortality rate has been reduced and survival has been increased (2,3). The treatment and follow-up of patients with thyroid cancer has become a major challenge in the world. It can affect their quality of life significantly, and evaluating the quality of life in these patients can help improve post-treatment care (4,5). To date, few studies have been conducted on the effect of radiation therapy on the quality of life of these patients (6,7). Most studies have used general questionnaires to evaluate quality of life in patients with thyroid cancer who cannot evaluate the specific conditions of these patients and so far no acceptable tool has been available to measure quality of life in patients with thyroid cancer (8). Therefore, further studies are needed to investigate the effects of this disease and this treatment on one's quality of life. The harmful effects of thyroid cancer in addition to physical effects can affect the quality of life and mood of patients, which may be due both to the disease itself, the side effects and duration of treatment (9). So, it is important to know the changes in mood and function of patients and in their quality of life after radioactive iodine treatment (10) to improve the quality of life of patients with appropriate psychiatric measures.

## Materials and Methods

This is a longitudinal prospective study. 150 patients with Papillary and Follicular thyroid cancer entered the study referring to Endocrinology Clinic of Ayatollah Taleghani Hospital, Tehran, Iran, between 2017 and 2018, who had 18 to 70 years of age, willing to participate and be treated with radioactive iodine at Nuclear Medicine Center of the same hospital. Serum TSH test was performed on patients before iodine intake, and one and six months after iodine intake. Patients completed SF36 and HADS questionnaires on four occasions: before iodine intake, at the time of intake, two weeks and six months thereafter.

The checklist also included questions about variables (type, stage and size of thyroid tumor, pre-admission levothyroxine use, radioactive iodine dose, and etc.) and comorbidities and non-thyroid diseases.

## Analysis

The method of repeated-measures analysis of variance was used to analyze the data, which is in fact a generalization of the paired t-test method (11). For the variable SF, 3 repeats were recorded that based on the analysis of variance Table, the test statistic value F is equal to 76.7 with a probability value of p-value <0.001, so we conclude that a significant difference is found between the 3 repeats. Considering this significant difference, we identified significant differences between the measured times using Bonferroni post hoc test (13,14).

## Results

The present study was performed on 150 patients with thyroid cancer. The patients completed the two questionnaires SF36 and HADS at different stages.

The results of this study are as follows.

First, the mean SF scores were measured at 3 time points.

In order to determine whether these differences are significant, using Bonferroni method, the results of pairwise comparisons at 3 times are obtained as following:

Comparing Times	Mean Difference (I-J)	Std. Error	Sig.	Pairwise Comparisons 95% Confidence Interval for Difference	
				Lower Bound	Upper Bound
-1 vs 0	-64.100	41.491	.373	-164.563	36.363
-1 vs 6	591.867	69.323	.000	424.015	759.719
0 vs 6	655.967	60.873	.000	508.574	803.359

These pairwise comparisons show that no significant difference is found between SF scores one month before iodine injection and at the time of iodine injection, but SF score six months after iodine injection was significantly lower than the time of iodine injection. Also, SF score six months after iodine injection was significantly lower than one month before iodine injection. The significant values corresponding to P-values less than 0.05 are shown in bold.

For the variable HADS, 4 repeats have been recorded. According to the analysis of variance Table, F test statistic value is equal to 80.6 with a probability value <0.001, so we conclude that a significant difference is found between the 4 repeats. Considering this significant difference, we identified significant differences between the measured times using Bonferroni post hoc test. First, the mean HADS scores at the four measurement times are as following:

These values indicate that the mean HADS scores one month before iodine intake are approximately equal to the time of iodine intake, but two weeks after injection, the mean scores reduced, and after six months, this reduction is even greater.

In order to determine whether these differences are significant, using Bonferroni method, the results of pairwise comparisons at 4 times are obtained as follows:

Comparing Times	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
				Lower Bound	Upper Bound
				-1 vs 0	-.517
-1 vs 0.5	2.175	.373	.000	1.176	3.174
-1 vs 6	5.035	.506	.000	3.680	6.390
0 vs 0.5	2.692	.342	.000	1.776	3.608
0 vs 6	5.552	.475	.000	4.281	6.824
0.5 vs 6	2.860	.365	.000	1.882	3.838

Study of these pairwise comparisons' values indicated that no significant difference is found between HADS scores one month before iodine injection and at the time of iodine injection, but HADS score one month before iodine injection was significantly greater than two weeks after iodine injection, and HADS score one month before iodine injection is significantly higher than six months after iodine injection. In addition, HADS score at iodine injection was significantly higher than two weeks after iodine injection, and HADS score at iodine injection time was significantly higher than six months after iodine injection. Finally, HADS score two weeks after iodine injection was significantly higher than six months after iodine injection. The significant values corresponding to p-values less than 0.05 are indicated in bold.

Given that only 3 cases of follicular cancer have been reported, it is in fact impossible to compare SF and HADS scores between the two types of cancer and no statistically significant difference was found.

Independent t-test was used to compare two doses of the medicine according to their difference in HADS score two weeks and six months after iodine injection and the results were as following:

Dose	Obs	Mean	Std. Err.	[95% Conf. Interval]	
100	64	10.59375	.7222783	9.150392	12.03711
150	84	10.36905	.7651285	8.847238	11.89086

P-value for the two values' comparison is 0.836, which means that the mean HADS score of the two doses of 100 and 150 did not differ significantly two weeks after injection.

The mean HADS scores six months after injection

Dose	Obs	Mean	Std. Err.	[95% Conf. Interval]	
100	62	7.596774	.6642888	6.268447	8.925102
150	82	8.085366	.6164954	6.858733	9.311998

P-value for these two values' comparison is 0.594, which means that the mean HADS score of the two doses of 100 and 150 six months after injection is not significantly different.

Independent t-test was used to compare two doses of the medicine according to their difference in SF score at the time of injection and six months after iodine injection and the results were as follows:

The mean SF scores at the time of injection

Dose	Obs	Mean	Std. Err.	[95% Conf. Interval]	
100	65	2137.231	84.03482	1969.352	2305.11
150	85	2255	76.48483	2102.902	2407.098

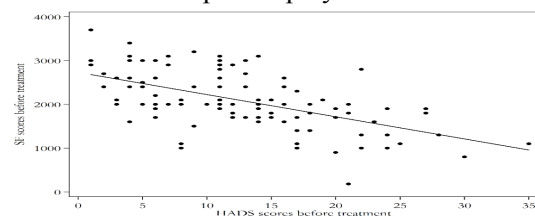
The p-value for the two values' comparison is 0.304, which means that the mean SF scores of the two doses of 100 and 150 are not significantly different at the time of injection.

The mean SF scores six months after injection

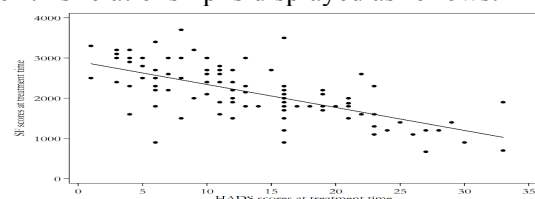
Dose	Obs	Mean	Std. Err.	[95% Conf. Interval]	
100	65	1430.769	65.88609	1299.147	1562.392
150	85	1637.647	86.44839	1465.735	1809.559

P-value for the two values' comparison is 0.073, which means that the mean SF score of the two doses six months after injection is not significantly different. However, given p-value obtained between 0.05 and 0.1, this conclusion requires caution.

At the time of injection, between HADS and SF scores, Pearson correlation coefficient was -0.57 (p-value <0.001), which means that an inverse and relatively strong and significant relationship is found. The corresponding graph of this relationship is displayed as follows:



At the time of injection, Pearson's correlation coefficient was -0.66 between HADS and SF scores (p-value <0.001), which means that an inverse and relatively strong and significant relationship is found. The corresponding graph of this relationship is displayed as follows:



Six months after injection, Pearson correlation coefficient was equal to 0.20 between HADS and SF scores ( $p$ -value = 0.018), which means that a direct and significant relationship is found.

### Discussion

The present study was conducted to compare the symptoms of anxiety and depression and quality of life of patients with thyroid cancer who were treated with radioactive iodine at different times before, during and after radiation therapy in two doses of 100 and 150  $\mu$  Curie. The present study was performed on 150 patients, 3 of whom had follicular cancer and 147 had papillary cancer. Among them, 28 patients were male (18.6%) and 122 patients were female (81.4%). The mean age was 43.2 years.

The results of our study showed that no significant difference was found between the mean and standard deviation of SF36 scores one month before iodine injection and at the time of iodine injection (2139.8 vs. 2203.9), but SF score six months after iodine injection was significantly lower than the time of iodine injection (1548 vs. 2203/9). Also, SF score six months after iodine injection was significantly lower than one month before iodine injection (1548 vs. 2139.8).

The mean HADS scores one month before iodine intake were approximately equal to the time of iodine intake (12.9 vs. 13.4) but two weeks after injections, the mean scores reduced (10.7). After six months, the reduction was even greater (7.9).

Study of these pairwise comparisons, values indicates that no significant difference is found between HADS scores one month before iodine injection and at the time iodine injection (12.9 vs. 13.4), but HADS scores one month before iodine injection was significantly greater than two weeks after iodine injection (12.9 vs. 10.7), and HADS score one month before iodine injection was significantly higher than six months after iodine injection (12.9 vs. 7.9). In addition, HADS score at iodine injection time was significantly higher than two weeks after iodine injection (13.4 vs. 10.7) and HADS score at iodine injection time was significantly

higher than six months after iodine injection. (13.4 vs. 7.9). Finally, HADS score two weeks after iodine injection was significantly higher than six months after iodine injection (10.7 vs. 7.9).

Given that only 3 follicular cancer types were observed, it was virtually impossible to compare SF and HADS scores between the two types of cancer and no statistically significant difference was found.

The mean HADS score of the two doses of 100 and 150 two weeks after injection was not significantly different (10.5 vs. 10.3).  $P$ -value for the two values was 0.836.

The mean HADS score of the two doses six months after injection was not significantly different (7.5 vs. 8).  $P$ -value for the two values was 0.594.

The mean SF36 score of these two doses was not significantly different two weeks after injection (2137 vs. 2255).  $P$ -value for the two values was 0.304.

The mean SF36 score of the two doses six months after injection was not significantly different (1430 vs. 1637).  $P$ -value for the two values was 0.073.

### Conclusion:

The results of our study showed that mean SF36 scores one month before iodine intake were lower than the time of iodine intake, but after six months, the mean scores were lower than one month before iodine intake, indicating improved quality of life of patients 6 months after iodine intake and mean HADS scores one month after iodine intake did not differ significantly from the time of iodine intake, but over time after two weeks anxiety and depression reduced significantly, which continued after six months, and patients' anxiety and depression symptoms were less than before. At doses of 100 and 150  $\mu$  Curie, no difference was found in anxiety and depression in two weeks and six months after iodine intake.

### Conflict of interest

Authors declare no conflict of interest.

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