

Original Article

Negative correlation between psychological distress and quality of life in papillary thyroid carcinoma (PTC) patients treated with radioactive iodine

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Abstract: Objective: To investigate the association between psychological distress and quality of life in patients with papillary thyroid cancer (PTC) receiving radioactive iodine after surgery. Methods: This cross-sectional study included 87 PTC patients who received Radioactive iodine (RAI) following thyroidectomy between February and August 2022. Psychological distress was measured with the Distress Thermometer (DT) and quality of life with the Functional Assessment of Cancer Therapy-General (FACT-G). Patients were divided into high-distress (DT $\geq$ 4) and low-distress (DT<4) groups. Quality of life was compared between the two groups, and the correlation between psychological distress and quality of life was analyzed. Results: The mean quality of life score was significantly higher in the low-distress group than in the high-distress group (76.31 $\pm$ 10.42 vs. 63.06 $\pm$ 9.99; $t=5.92$, $P<0.05$). Eighty-seven patients showed a significant negative correlation between DT and FACT-G scores ($r=-0.712$, $P<0.05$). The most frequently reported distress-related problems were surgical scar concerns (59.8%), fatigue (57.5%), sleep disturbances (52.9%). Conclusion: Patients treated with radioactive iodine after PTC surgery experience varying levels of psychological distress, which are strongly associated with quality of life. Routine psychological distress screening may help identify patients at a risk for poor quality of life.

Keywords: Papillary thyroid cancer, psychological distress, quality of life, radioactive iodine, DT, FACT-G

Introduction

Over the past two decades, the incidence of thyroid cancer has increased faster than that of most other malignancies; it is more common in women, with an average annual increase of approximately 6.2%, and the age of onset tends to be younger, with approximately 190,000 new cases reported annually in China [1, 2]. Clinically, papillary thyroid carcinoma (PTC) is the most common type of thyroid cancer, and accounts for more than 90% of new thyroid cancer cases each year in China [3]. Papillary thyroid cancer has an excellent prognosis, with a 5-year survival rate of approximately 90% [4]. Currently, papillary thyroid cancer is commonly

managed using a multimodal approach comprising surgery, radioactive iodine therapy, and thyroid hormone suppression therapy. Among these therapies, radioactive iodine can significantly reduce the tumor recurrence rate and improve the prognosis of patients [5]. However, patients' lack of understanding of radioactive iodine treatment and their fear of complications from radioactive iodine treatment make this treatment option less ideal. In particular, because of the radiotoxicity of β and γ rays emitted during radioactive iodine treatment, patients become temporary sources of radiation after administration, necessitating isolation and radiation safety precautions; this treatment approach can cause anxiety, fear, de-

pression and other negative emotions. In clinical practice, many patients who have undergone an operation to remove PTC suffer from varying degrees of psychological distress when receiving radioiodine therapy, which leads to poor compliance with radioiodine therapy and affects clinical outcomes. The invasive nature of thyroid cancer surgery can cause certain physiological trauma and additional risks to the body, such as affecting the patient's appearance, normal pronunciation, and endocrine status. Long-term postoperative use of oral thyroxine also results in poor psychological and behavioral outcomes. Few studies have examined psychological outcomes in patients receiving radioactive iodine after PTC surgery. Previous studies have shown that mood disorders such as anxiety and depression often occur after PTC surgery and are closely related to quality of life among these patients [6]. However, comprehensive evidence on the evaluation of psychological distress and quality of life in patients who have been treated with radioactive iodine after PTC surgery is scarce.

It is unclear whether there is a correlation between psychological distress and quality of life in Chinese patients treated with radioactive iodine after surgery to remove PTC. Therefore, this study was conducted to explore the relationship between psychological distress and quality of life in patients treated with radioactive iodine after surgery to treat papillary thyroid carcinoma.

Materials and methods

General information

This was a cross-sectional study conducted at the Department of Nuclear Medicine, the First Affiliated Hospital of the University of Science and Technology of China. A total of 87 patients who received RAI therapy after thyroidectomy for PTC between February 2022 and August 2022 were enrolled. This study was approved by the Ethics Committee of the First Affiliated Hospital of the University of Science and Technology of China (approval no. 2022-RE-14), and all participants provided written informed consent. The inclusion criteria were as follows: 1. PTC confirmed by a pathological examination after total or subtotal surgical resection; 2. Patients with indications for radioactive iodine therapy after surgical treatment; 3. Those who were cognisant and could cooperate with the

treatment and questionnaires independently; 4. Patients who provided informed consent and voluntarily joined the study; 5. There were no serious cardiovascular, cerebrovascular diseases or liver and kidney function diseases; and 6. Patients with thyroid cancer who completed surgery. The exclusion criteria were as follows: 1. Female patients who want to have children soon; 2. Those with extremely rapid disease progression or distant metastases to an important organ; 3. Those who were unable to communicate normally or understand the content of the DM scale; 4. Patients who withdrew from the study on their own for other reasons; and 5. Those who did not complete the assessment scale during the experiment.

Study methods

1. Basic patient information, including sex, age, marital status, occupation, education level, tumour stage, and risk level classification, was collected. 2. The DT scale was administered at the end of the radioactive iodine treatment. 3. Patients with DT scores ≥ 4 were assigned to the high group, and those with DT scores < 4 were assigned to the low group. 4. The FACT-G survey was also administered, and the overall score was calculated. For patients with low literacy, trained research doctors administered the questionnaires using a standardized interview format, reading questions verbatim and recording the patients' direct responses to ensure accuracy. The study workflow is presented in **Figure 1**.

Evaluation of psychological distress

The Distress Thermometer (DT) scale was used to evaluate psychological distress among cancer patients. This tool is recommended by the National Comprehensive Cancer Network (NCCN) and is used in two parts. The first part is a psychological pain thermometer, with 0-10 points showing the degree of psychological pain, 0 points indicating no psychological pain, and 10 points indicating extreme psychological pain. Degree of psychological pain according to scores: 1 to 3 was mild pain, 4 to 6 was moderate pain, 7 to 9 was severe pain, and 10 was extreme pain. Part 2: The list of psychological pain problems includes a series of problems that patients encounter when they fall ill. The list of questions contains five subcategories: physical problems, practical problems, emotional problems, communication problems, and

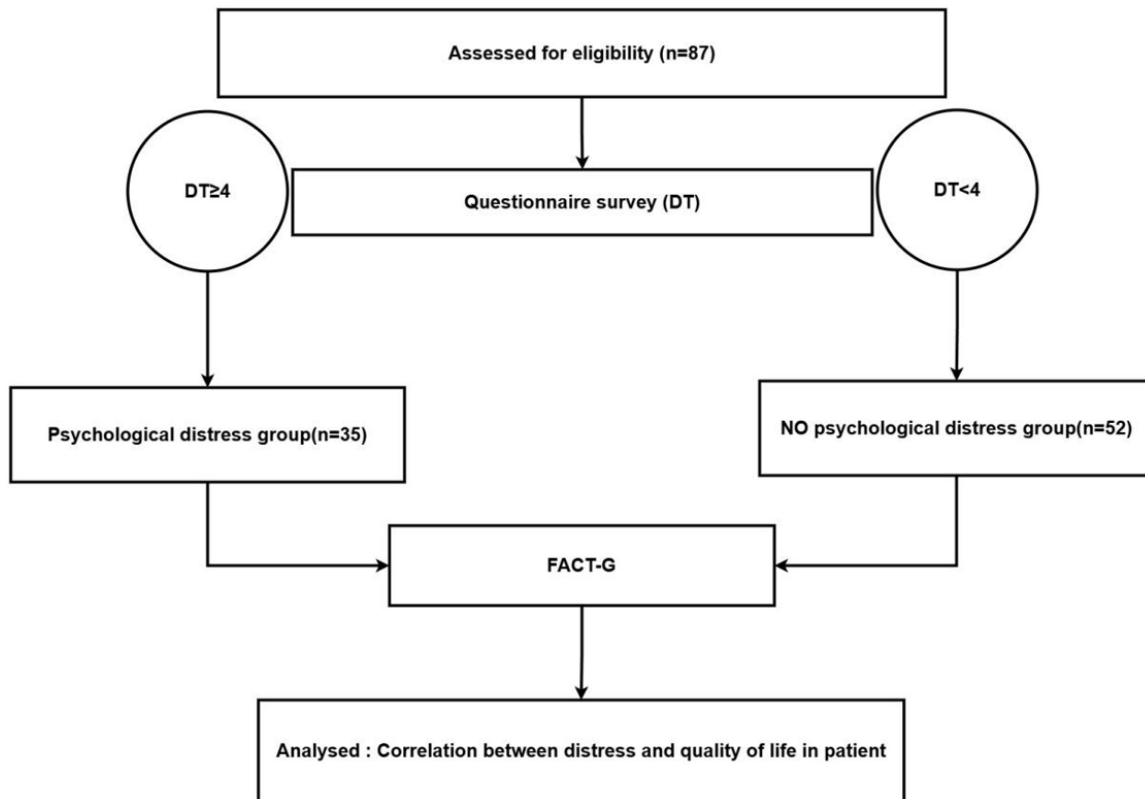


Figure 1. Technical roadmap. DT, Distress Thermometer; FACT-G, Functional Assessment of Cancer Therapy-Genera.

faith/religious problems. The National Comprehensive Cancer Network (NCCN) states that tumours with DT scores ≥ 4 are clinically significant and require active intervention [7]. Part 2: The accompanying Problem List (Chinese version, 40 items) was used to provide a descriptive report of sources of distress across five subcategories: physical, practical, emotional, communication, and faith/religious problems. This version, translated by Lili Tang et al., was expanded to 40 items to better suit psychological distress screening in Chinese oncology patients, and its validity has been confirmed in a meta-analysis.

Evaluation of quality of life

Quality of life was evaluated using the Functional Assessment of Cancer Therapy-General (FACT-G), a widely used instrument for assessing health-related quality of life in cancer patients [8, 9]. The total score ranges from 0 to 108, with higher scores indicating a better quality of life. In this present study, the Chinese version of the FACT-G has demonstrated good reliability, with a Cronbach's α of 0.883 for

the total scale (physical well-being: $\alpha=0.827$; social/family well-being: $\alpha=0.900$; functional well-being: $\alpha=0.909$; and emotional well-being: $\alpha=0.923$).

Statistical analysis

Statistical analyses were performed using SPSS version 31.0 (IBM Corp, Armonk, NY, USA). Continuous variables are expressed as the mean $\pm$ standard deviation (SD), and categorical variables are expressed as frequencies and percentages. Differences between groups were compared using independent samples t tests for continuous variables and Fisher's exact test or chi-square test for categorical variables. Patients were divided into two groups based on DT scores: the low-distress group (DT<4) and the high-distress group (DT $\geq$ 4). Multiple linear regression (enter method) was used to identify factors associated with psychological distress, with the DT score as the dependent variable. Variables with $P<0.05$ in univariate analysis (age, tumor stage, recurrence risk, surgical protocol, lymph node metastasis, and number of RAI treatments) and total FACT-G

Table 1. Baseline information

Project	Patients	DT score <4	DT score ≥4	χ^2	P
Age				19.22	<0.001
≥55	14	1	13		
<55	73	51	22		
Sex				1.507	0.2196
Male	33	17	16		
Female	54	35	19		
Marital status				0.371	0.543
Unmarried and divorce	11	8	3		
Married	76	44	32		
Education level				0.261	0.610
Junior high school and below	55	34	21		
High school and above	32	18	14		
Tumor stage				*	<0.001
Stage I	71	51	20		
Stage II	8	1	7		
Stage III	6	0	6		
Stage IV	2	0	2		
recurrence risk				*	<0.001
Low risk	2	0	2		
Medium risk	46	36	10		
High risk	39	16	23		
Surgical protocol				8.370	0.004
Full cut	36	15	21		
Subtotal resection	51	37	14		
lymph node metastasis				5.186	<0.05
Yes	63	33	30		
No	24	19	5		
number of RAI treatments				11.571	<0.001
=1	58	42	16		
>1	29	10	19		

Note: *For Fisher's exact test; DT, Distress thermometer; RAI, Radioactive Iodine.

score were entered as candidates. The correlation between DT scores and FACT-G scores was examined using partial correlation analysis. To assess the robustness of the partial correlation results against outliers, we performed bootstrap resampling (1,000 iterations) to compute bias-corrected and accelerated (BCa) 95% confidence intervals for the partial correlation coefficients. A two-tailed *P* value <0.05 was considered statistically significant.

Results

Basic information of the participants

The mean age of the enrolled patients was 42.06±11.95 years. The patients' marital sta-

tuses were as follows: 10 unmarried, 76 married and 1 divorced. The patients' education levels were as follows: 55 completed junior high/middle school, and 32 completed senior high school or above. The patients' tumour stages were as follows: 71 patients in stage I, 8 patients in stage II, 6 patients in stage III, 1 patient in stage IV B and 1 patient in stage IV C. The patients' risks of recurrence were as follows: 2 patients were at low risk, 46 patients were at medium risk, and 39 patients were at high risk. The patients' surgical protocol were as follows: 36 patients had a full cut, 51 patients had Subtotal resection. The patients' lymphatic metastasis were as follows: 63 patients were yes, 24 patients were no. The

Table 2. Multiple linear regression analysis (enter method) with DT score as the dependent variable

Variable	B	SE	β	t	p	95% CI
Constant	8.813	1.724	-	5.112	<0.001	5.382-12.244
Age	0.013	0.012	0.079	1.101	0.274	-0.011-0.038
Tumor stage	0.558	0.225	0.192	2.478	0.015	0.110-1.007
Recurrence risk	-0.070	0.292	-0.019	-0.242	0.810	-0.651-0.510
FACT-G score	-0.109	0.013	-0.646	-8.100	<0.001	-0.135-0.082
Surgical protocol	0.386	0.244	0.094	1.582	0.118	-0.100-0.872
Lymph node metastasis	0.640	0.299	0.141	2.139	0.035	0.045-1.236
Number of RAI treatments	0.286	0.261	0.067	1.096	0.276	-0.234-0.806

Note: All VIFs <2, no multicollinearity issue. Adjusted $R^2=0.718$, the model explains 71.8% of the variance in DT scores. Overall model F-test: $F(7, 79)=32.343$, $P<0.001$. FACT-G, Functional Assessment of Cancer Therapy-General; RAI, Radioactive Iodine.

Table 3. Frequency of distress-related problems (N=87)

Problem	n	%
Surgical scars	52	59.8
Fatigue	50	57.5
Sleep disorder	46	52.9
Anxiety	45	51.7
Tension	42	48.3
Depression	32	36.8
No energy to care for children/family	30	34.5
Work and school concerns	29	33.3
Getting along with a partner	29	33.3
Memory loss/inattentiveness	25	28.7

number of treatments equal to 1 patient number was 58, more than 1 time was 29.

In univariate analysis, age, tumor stage, recurrence risk, surgical protocol, lymph node metastasis, and number of RAI treatments were significantly associated with psychological distress (all $P<0.05$; **Table 1**).

Multivariate analysis of factors associated with psychological distress

Multiple linear regression analysis using the Enter method was performed to identify independent factors associated with psychological distress. Variables with $P<0.05$ in univariate analysis (age, tumor stage, recurrence risk, surgical protocol, lymph node metastasis, and number of RAI treatments) and FACT-G total scores were entered as candidates. The final model revealed that tumor stage, lymph node metastasis, and the FACTG score were independent risk factors for psychological distress (all $P<0.05$; **Table 2**).

Table 4. Quality of life scores for low DT versus high DT

FACT-G	Low DT	High DT	t	p
PWB	21.06 $\pm$ 2.78	19.49 $\pm$ 2.51	2.69	<0.05
SWB	22.38 $\pm$ 2.67	19.06 $\pm$ 3.40	5.10	<0.05
EWB	13.25 $\pm$ 3.72	9.80 $\pm$ 2.51	4.79	<0.05
FWB	19.62 $\pm$ 3.21	14.71 $\pm$ 3.48	6.76	<0.05
Total	76.31 $\pm$ 10.42	63.06 $\pm$ 9.99	5.92	<0.05

Note: All t tests were performed with equal variances assumed (Levene's test $P>0.05$ for all). FACT-G, Functional Assessment of Cancer Therapy-General; PWB, physical well-being; SWB, social/family well-being; EWB, emotional well-being; FWB, functional well-being.

Psychological distress and problems

The overall psychological distress score of 87 patients was 3.61 ± 2.02 ; 35 patients were in the high DT group, accounting for 40.2% of the total participants, and the remainder of patients were in the low DT group. The most frequent problems among patients were surgical scars (59.8%), fatigue (57.5%), sleep problems (52.9%), anxiety (51.7%), and tension (48.3%). Among female participants ($n=54$), 41 (75.9%) expressed concerns about surgical scars, whereas 11 of 33 male participants (33.3%) reported such concerns. Only the most frequently reported problems ($\geq 25\%$ of patients) are presented in **Table 3**.

Comparison of QOL between the low-DT group and the high-DT group

Patients in the lowdistress group ($DT<4$) had significantly higher overall quality of life scores than those in the highdistress group (76.31 ± 10.42 vs. 63.06 ± 9.99 ; $t=5.92$; $P<0.05$). Although no established MCID for the FACTG

Table 5. Partial correlation analysis between psychological distress and quality of life

FACT-G	DT	
	r	P
PWB	-0.494	<0.05
SWB	-0.656	<0.05
EWB	-0.387	<0.05
FWB	-0.786	<0.05
Total	-0.712	<0.05

Note: Because the total FACTG score aggregates multiple dimensions, its partial correlation coefficient may be lower than that of certain subscales (FWB) that are particularly strongly associated with DT. This reflects a dilution effect of the aggregated information rather than a contradiction in the results. FACT-G, Functional Assessment of Cancer Therapy-Genera; PWB, physical well-being; SWB, social/family well-being; EWB, emotional well-being; FWB, functional well-being.

scale exists specifically for patients with thyroid cancer, the observed difference of 13.25 points far exceeds the classic minimal clinically important difference (MCID) of 4 points proposed by Cella et al. [10], indicating clear clinical significance. Significant differences were also found in all four domains: physical, social/family, emotional, and functional wellbeing (all $P < 0.05$) (Table 4).

Partial correlation analysis between psychological distress and quality of life

Partial correlation analysis was performed to examine the relationship between psychological distress (DT) and quality of life (FACTG) after adjusting for clinical stage and lymph node metastasis, which were identified as independent factors associated with DT. As shown in Table 5, the DT score was significantly and negatively correlated with all FACTG domains and the total score, with partial correlation coefficients ranging from -0.387 to -0.786 (all $P < 0.05$). The strongest correlation was observed for the functional wellbeing subscale ($r = -0.786$). The partial correlation between total FACTG and DT was $r = -0.712$ ($df = 83$, $P < 0.05$), indicating that the inverse association between psychological distress and quality of life persists even after accounting for disease severity (Table 5; Figure 2).

Discussion

Psychological distress is a multifactorial emotional state influenced by psychological and

social factors, among which oncology patients primarily experience negative emotions such as fatigue, anxiety and depression [11]. Psychological distress negatively affects patients' quality of life to some extent [12-14]. The result of the present study confirms that the quality of life of patients treated with radioactive iodine after PTC surgery is affected by psychological distress and that the greater the degree of psychological distress, the worse their quality of life.

The incidence of thyroid cancer has increased steadily in recent years, with a trend toward younger age at onset, and it is relatively common among women under 30 years of age [15]. Due to fear of recurrence or disease progression, patients with PTC are prone to postoperative depression, anxiety and other negative emotions. Although the prognosis of PTC is generally very good (5-year survival approximately 90%), quality of life does not necessarily improve, and psychological distress remains a common problem [16, 17]. Many postoperative factors including surgical symptoms, RAI-related radiation symptoms and isolation, uncertainty about disease progression, and lifelong levothyroxine use significantly reduce quality of life. Young patients, who were generally healthy before diagnosis, are highly susceptible to psychological distress due to the sudden change in health status, postoperative fear, and concerns about recurrence and future work life. Patients requiring RAI after surgery often have limited knowledge of the treatment and worry about its complications, which heightens anxiety [18-21]. The need for closed in-hospital management and home isolation after receiving radioactive iodine further aggravates patients' anxiety, fear and depression. In this study, 40.2% of patients met the threshold for clinically significant psychological distress ($DT \geq 4$), which is consistent with the findings of previous reports in similar populations. The most frequently reported concern was surgical scars (59.8%), particularly among female patients (75.9%). These findings suggest that surgeons should consider cosmetic outcomes when selecting surgical approaches for thyroid cancer, especially for young female patients. Sleep disturbances were reported by 52.9% of patients, highlighting the need to address sleep quality as a potential target for distress reduction. Future longitudinal studies are required to elucidate this pathway. Patients who undergo thyroid cancer surgery have varying degrees of

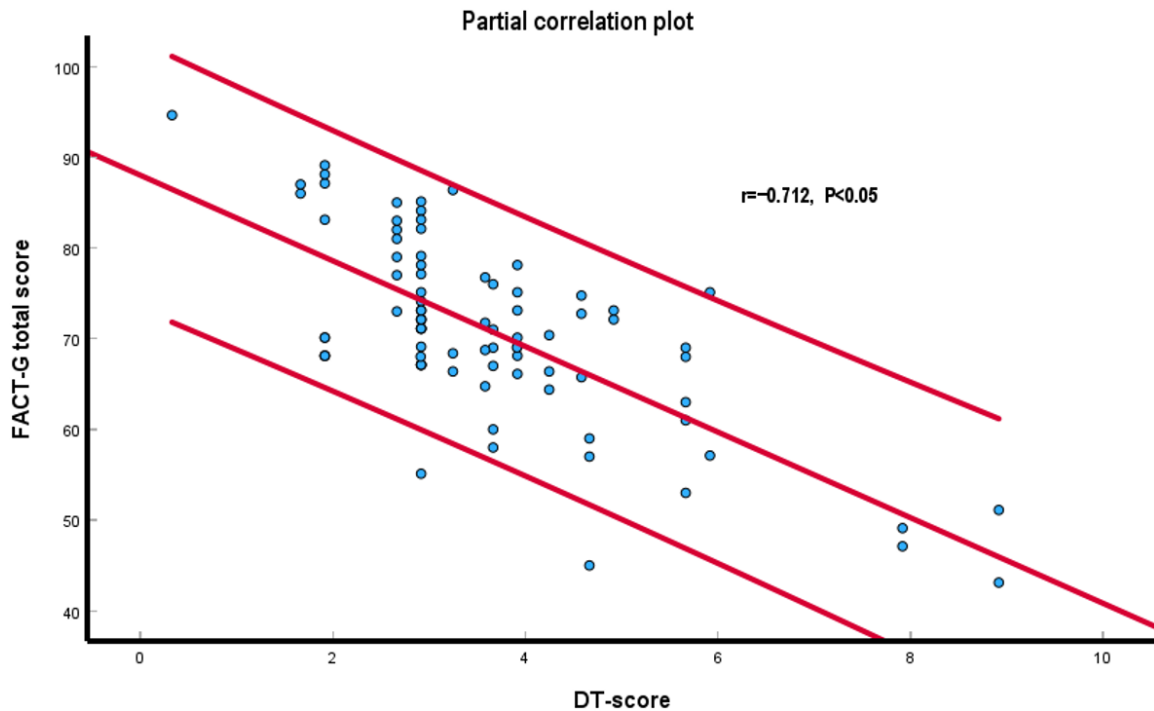


Figure 2. Partial correlation between the DT score and FACT-G total score, adjusted for tumor stage and lymph node metastasis ($r=-0.712$, $P<0.05$). The BCa 95% confidence interval based on 1,000 bootstrap resamples was $[-0.814, -0.557]$. DT, Distress Thermometer; FACT-G, Functional Assessment of Cancer Therapy-Genera.

preoperative psychological distress. Close attention should be devoted to patients who are young, female and introverted. Additionally, targeted intervention should be conducted so that the patients can positively and effectively cope with the operation and recover quickly.

Postoperatively, PTC patients are now mostly treated with radioactive iodine, a treatment option that has led to a significant improvement in survival rates and significantly longer survival periods; thus, the quality of life of patients has become increasingly important. The quality of life of patients treated with radioactive iodine after PTC surgery is affected by several factors, such as the therapy itself, exogenous thyroid hormone therapy, and psychological distress. Among them, psychological distress is an important influencing factor and can have an effect even several years after treatment. Using the DT and FACTG, we confirmed a negative association between psychological distress and quality of life in patients who received radioactive iodine after PTC surgery. These findings have several clinical implications. First, routine screening for psychological distress using the DT may help identify patients at risk for poor quality of life, enabling timely psycho-

social support. Second, patients with advanced tumor stage, lymph node metastasis, and those requiring multiple RAI sessions may benefit from targeted psychological interventions. Third, attention to cosmetic outcomes and sleep quality may be modifiable factors that help mitigate distress in this population. This study has some shortcomings, including its single-center design, the relatively small number of patients with advanced tumor stage (Stage III/IV), and the absence of a control group (e.g., PTC patients treated with surgery alone), which limits the generalizability of the findings and the ability to isolate the specific effects of RAI isolation on psychological distress. Future multicenter, prospective studies are warranted to evaluate whether routine distress screening coupled with targeted psychological interventions can improve quality of life outcomes in this population.

Conclusions

This study demonstrates that the quality of life of patients treated with radioactive iodine after PTC surgery is significantly associated with psychological distress. Routine screening for psychological distress may help identify patients

at risk for poor quality of life and facilitate timely intervention.

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Disclosure of conflict of interest

None.

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References

- [1] Liang B, Zhou J, Wang S, Xu H, Li K, Liang H, Sun Z, Liu Y, Wang Y, Zhang J, Qin P and Hu X. Spatial and temporal distribution and evolutionary trend of thyroid cancer incidence in Guangzhou, 2010-2020. *Endocrine* 2025; 89: 484-496.
- [2] Fu M, Peng Z and Wu M. Thyroid cancer in Asia: incidence, mortality in 2022, and future projections to 2050. *Eur J Cancer Prev* 2026; 35: 126-140.
- [3] Zhu P, Zhang Q, Wu Q, Shi G, Wang W, Xu H, Zhang L, Qian M and Hegarty J. Barriers and facilitators to the choice of active surveillance for low-risk papillary thyroid cancer in China: a qualitative study examining patient perspectives. *Thyroid* 2023; 33: 826-834.
- [4] Matsuyama H, Sugitani I, Fujimoto Y and Kawabata K. Indications for thyroid cancer surgery in elderly patients. *Surg Today* 2009; 39: 652-657.
- [5] Volpe F, Nappi C, Zampella E, Di Donna E, Maurea S, Cuocolo A and Klain M. Current advances in radioactive iodine-refractory differentiated thyroid cancer. *Curr Oncol* 2024; 31: 3870-3884.
- [6] Chen W, Li J, Peng S, Hong S, Xu H, Lin B, Liang X, Liu Y, Liang J, Zhang Z, Ye Y, Liu F, Lin C, Xiao H and Lv W. Association of total thyroidectomy or thyroid lobectomy with the quality of life in patients with differentiated thyroid cancer with low to intermediate risk of recurrence. *JAMA Surg* 2022; 157: 200-209.
- [7] Riba MB, Donovan KA, Ahmed K, Andersen B, Braun I, Breitbart WS, Brewer BW, Corbett C, Fann J, Fleishman S, Garcia S, Greenberg DB, Handzo GF, Hoofring LH, Huang CH, Hutchinson S, Johns S, Keller J, Kumar P, Lahijani S, Martin S, Niazi SK, Pailier M, Parnes F, Rao V, Salman J, Scher E, Schuster J, Teply M, Usher A, Valentine AD, Vanderlan J, Lyons MS, McMillian NR and Darlow SD. NCCN Guidelines(R) insights: distress management, version 2.2023. *J Natl Compr Canc Netw* 2023; 21: 450-457.
- [8] Luckett T, King MT, Butow PN, Oguchi M, Rankin N, Price MA, Hackl NA and Heading G. Choosing between the EORTC QLQ-C30 and FACT-G for measuring health-related quality of life in cancer clinical research: issues, evidence and recommendations. *Ann Oncol* 2011; 22: 2179-2190.
- [9] Song L, Tan X, Bredle J, Bennett AV and Northouse L. Psychometric properties of the FACT-G quality of life scale for family caregivers of cancer patients. *Qual Life Res* 2020; 29: 2241-2252.
- [10] Cella D, Eton DT, Lai JS, Peterman AH and Merkel DE. Combining anchor and distribution-based methods to derive minimal clinically important differences on the Functional Assessment of Cancer Therapy (FACT) anemia and fatigue scales. *J Pain Symptom Manage* 2002; 24: 547-561.
- [11] Morrison EJ, Novotny PJ, Sloan JA, Yang P, Patten CA, Ruddy KJ and Clark MM. Emotional problems, quality of life, and symptom burden in patients with lung cancer. *Clin Lung Cancer* 2017; 18: 497-503.
- [12] Llamas-Ramos I, Alvarado-Omenat JJ, Rodrigo-Reguilón M and Llamas-Ramos R. Quality of life and side effects management in cancer treatment-a cross sectional study. *Int J Environ Res Public Health* 2023; 20: 1708.
- [13] Karveli S, Galanis P, Mitropoulou EM, Karademias E and Markopoulos C. The role of attachment styles on quality of life and distress among early-stage female breast cancer patients: a systematic review. *J Clin Psychol Med Settings* 2023; 30: 724-739.
- [14] Papadopoulou A, Govina O, Tsatsou I, Mantzourou M, Mantoudi A, Tsiou C and Adamakidou T. Quality of life, distress, anxiety and depression of ambulatory cancer patients receiving chemotherapy. *Med Pharm Rep* 2022; 95: 418-429.
- [15] Mousavi SE, Abiri Jahromi N, Motlagh Asghari K and Nejadghaderi SA. Epidemiology of thyroid cancer in Asia in 2020 and its projection to 2040. *BMC Public Health* 2025; 25: 3201.

- [16] Pham MC, Nguyen T and Nguyen HP. Surgical complications in papillary thyroid cancer patients with cervical lymph node metastases. *Clin Med Insights Oncol* 2024; 18: 11795549241233692.
- [17] Dora JM and Scheffel RS. Cervical lymph node metastases in patients with differentiated thyroid cancer: a new (and more relevant) indication of active surveillance? *Arch Endocrinol Metab* 2024; 68: e230436.
- [18] Changchien TC, Yen YC and Lu YC. Mental health and quality of life of patients with differentiated thyroid cancer pre and post radioactive iodine treatment: a prospective study. *J Clin Med* 2024; 13: 5472.
- [19] Shin JH and Lee SY. Experiences of Korean patients with thyroid cancer receiving radioactive iodine therapy after total thyroidectomy. *Asia Pac J Oncol Nurs* 2022; 9: 161-166.
- [20] Banihashem S, Arabzadeh M, Jafarian Bahri RS and Qutbi M. Psychological status and quality of life associated with radioactive iodine treatment of patients with differentiated thyroid cancer: results of hospital anxiety and depression scale and short-form (36) health survey. *Indian J Nucl Med* 2020; 35: 216-221.
- [21] Hamurcu HD, Kokurcan A, Uçmak G and Çayköylü A. Anxiety, depression, and quality of life among survivors of differentiated thyroid cancer in türkiye. *Int J Psychiatry Med* 2025; [Epub ahead of print].