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ORIGINAL ARTICLE

Prevalence and predictors of psychological distress among patients with thyroid cancer during transitional period in China: a cross-sectional study

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Abstract

Objective This study aimed to explore the psychological distress and its predictors among Chinese patients with thyroid cancer during their transitional period from hospital to home.

Methods A cross-sectional study was conducted in a cancer hospital in Tianjin, China. A total of three hundred patients with thyroid cancer completed the Chinese version of the National Comprehensive Cancer Network Distress Thermometer (DT), Cancer Fatigue Scale, and the Brief Illness Perception Questionnaire. Logistic regression was used to obtain the model of predictors of psychological distress among patients with thyroid cancer during the transitional period.

Results The DT score of 300 patients with thyroid cancer ranged from 0 to 10, and the median DT score was 2 [1–4]. The prevalence of clinically relevant psychological distress (DT score ≥ 4) in Chinese patients with thyroid cancer during their transitional period was 29.33% (88/300). The results of logistic regression analysis showed that gender (OR = 2.505, $P = 0.036$), fatigue (OR = 1.086, $P = 0.005$), and illness perception (OR = 1.137, $P < 0.001$) were significantly related to psychological distress in patients with thyroid cancer.

Conclusions The psychological distress of patients with thyroid cancer during the transitional period is medium level. Patients with thyroid cancer who are female, easily fatigued, and have worse illness perceptions are more likely to experience psychological distress. Therefore, clinical attention should be paid to female patients and potential interventions aimed at improving fatigue and illness perception. It may reduce the prevalence of psychological distress during the transitional period.

Keywords Distress · Fatigue · Illness perception · Thyroid cancer · Transitional period

Introduction

At present, the incidence of thyroid cancer is increasing rapidly [1]. According to the Global Cancer Statistics 2020 report, the global crude incidence rate of thyroid cancer was reported to be 7.5 per 100,000, ranking ninth in the global cancer incidence spectrum, and 15.3 per 100,000, ranking seventh in China [2]. Thyroid cancer is usually treated with a thyroidectomy, followed by lifelong thyrotropin (TSH) suppression and radioactive iodine ablation when appropriate. Hematoma, hypoparathyroidism, recurrent laryngeal nerve injury, and wound infection are the most common complications of thyroidectomy [3]. Patients frequently suffer from great emotional problems, which not only causes a decrease in quality of life but also impedes their treatment and recovery [4–6]. The National Comprehensive Cancer Network (NCCN) defines distress as a psychological, social, spiritual, and/or physical multifactorial unpleasant experience that may interfere with a patient's ability to effectively cope with cancer, its physical symptoms, and treatment [7]. Unfortunately, since thyroid cancer is usually labeled as a "good cancer" and is frequently regarded as "no big deal," the psychological distress experienced by patients is usually ignored

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[8, 9]. Studies in the USA and the Netherlands reported that approximately 40% of patients with thyroid cancer suffered from psychological distress [10, 11]. However, data for Chinese patients with thyroid cancer remain unclear. Only one cross-sectional study in China found that young, female, and introverted patients with thyroid cancer were more likely to experience psychological distress before surgery, with an incidence of 33.67% [12].

In terms of factors influencing the psychological distress of patients with thyroid cancer, the literature review revealed inconsistencies in general demographic and sociological variables, such as gender and employment status [11, 13, 14]. Besides demographic and sociological characteristics, evidence shows that fatigue is one of the most common symptoms that may persist after treatment [15] and may be related to psychological distress [16]. Patients with thyroid cancer need to take levothyroxine with TSH suppression treatment after discharge to reduce the risk of tumor progression or recurrence [17]. This condition may lead to thyroid dysfunction, which manifests as extreme fatigue and low energy [18]. Another influencing factor of psychological distress in other cancer patients is illness perception in which patients perceive and react to their illness [19]. One study showed that when patients encounter the disease, their beliefs and feelings about it influenced their strategies for dealing with it and their psychological status [20]. However, for thyroid cancer, the relationship between illness perception and psychological distress is still unclear. The only study from the Netherlands discovered that negative illness perceptions were related to psychological distress in adolescents, young adults, and older patients with thyroid cancer [21]. However, there is a scarcity of research on the illness perception and psychological distress of patients with thyroid cancer in China.

Additionally, throughout the disease trajectory of cancer patients, many transitional periods can lead to increased distress. If psychological distress and a transitional period occur together, it is likely to exacerbate the impairment of patients' quality of life [22]. The transition from hospital to home is defined as the period following discharge from a health facility to the home or community to continue rehabilitation, which is usually within 8 weeks after discharge [23, 24]. It is critical to the patient's recovery because the smooth transition can assist patients in adjusting to their new status as survivors and improving their quality of life. However, the health status of many patients frequently changes during this period, along with the risk of clinical deterioration [25, 26]. Patients with thyroid cancer will face many new challenges during the transitional period, such as dealing with postoperative complications, daily use of thyroxine replacement medication, unstable thyroid hormone levels, the worry about recurrence, feelings of isolation, and lack of understanding. All of these may have worse impacts on their psychological status [27]. Moreover, several studies have shown that the majority of patients with thyroid cancer have unmet psychological needs after discharge [28, 29].

Consequently, this study aimed to investigate the prevalence of psychological distress among patients with thyroid cancer during the transitional period in China and explore the factors associated with psychological distress. Furthermore, it can provide a reference for developing targeted interventions to reduce the occurrence of psychological distress in this population.

Methods

This study was a cross-sectional study and approved by the Ethics Committee of Tianjin Medical University Cancer Institute and Hospital (approval number: bc2020194).

Participants and settings

From January to June 2021, we used the convenience sampling method to enroll samples at the thyroid cancer outpatient clinic of the Tianjin Medical University Cancer Institute and Hospital, China. This study followed the principles of the Declaration of Helsinki. All eligible participants in this study were invited to participate during the first scheduled follow-up visit after discharge, and written informed consent was acquired. Inclusion criteria were as follows: (i) pathologically confirmed as thyroid cancer, (ii) aged 18 years or older, (iii) received thyroidectomy for the first time, (iv) in the transitional period, and (v) voluntarily participated in this study. Exclusion criteria were as follows: (i) mental disorders; (ii) combined cardiac, cerebral, pulmonary, hepatic, renal insufficiency, and other serious diseases; (iii) prior diagnosis of anemia, anxiety, or depression; and (iv) combined malignant tumors of other systems.

Instruments

Based on the published literature, potential variables that may have an impact on psychological distress were identified. Sociodemographic variables included age, gender, marriage, education level, employment, monthly household income per capita, medical insurance, religion, and comorbidities. Disease variables included tumor type, tumor, node, metastasis (TNM) stage, surgical treatment, complications of the surgery, and thyroid function test.

Distress Thermometer

The distress thermometer (DT) was recommended by the National Comprehensive Cancer Network as a rapid screening tool for the level of psychological distress in cancer

patients [7]. It is a self-assessment tool of a single item ranging from 0 to 10 to assess the patient's extent of psychological distress throughout the previous week. A score of 0 indicates no distress, 1 to 3 indicates mild distress, 4 to 6 indicates moderate distress, 7 to 9 indicates severe distress, and 10 indicates extreme distress. The DT score of ≥ 4 indicates clinically relevant psychological distress, while the score below 4 is considered normal mood swings and does not require specific intervention. The sensitivity and specificity values of the Chinese version of the DT in cancer patients were 0.80 and 0.70 respectively when the cut-off score was 4 [30].

Cancer Fatigue Scale

The Chinese version of the Cancer Fatigue Scale (CFS) is used to investigate the fatigue symptoms of cancer patients, which includes three subscales: physical, affective, and cognitive subscales, with a total of 15 items. Each item is scored on a 5-point Likert scale ranging from 0 (not at all) to 4 (very much), for a total score ranging from 0 to 60. The higher the overall score, the greater the severity of the fatigue. The internal consistency reliability of the three subscales and the whole scale, as measured by Cronbach's alpha, was 0.63–0.86, indicating good reliability and validity [31].

The Brief Illness Perception Questionnaire

The Brief Illness Perception Questionnaire (B-IPQ) in Chinese is used to measure cognitive and emotional perceptions as well as illness comprehension. The scale consists of nine items. Except for item 9 (the open question), which asks patients to list the three most important factors they believe have caused their illness, all items have 11 levels ranging from 0 to 10, with 0 and 10 representing no and significant impact, respectively, for a summary score of 0–80. Higher summary scores indicate overall worse illness perceptions. The Cronbach's alpha was 0.77 for the Chinese version of the scale, and half reliability was 0.81 [32].

Data collection

The members of our research team were trained to complete this study. Participants who agreed to participate in this study were given access to an electronic version of the questionnaire through the internet. The researcher explained to the participants the purpose, methodology, and significance of the study. We asked all participants to complete their questionnaires by themselves based on their true situation except those participants with visual impairment or reading difficulties, whose demographic questionnaires, DT, CFS, and B-IPQ were completed by the trained researcher through interviews. The disease-related information was obtained from the inpatient medical records. The thyroid function result (TSH) was obtained at the first month of follow-up visit after discharge and recorded on the spot by the researcher.

Statistical analysis

IBM SPSS version 23.0 software was used to analyze the data. Categorical variables such as sociodemographic and clinical variables were expressed as frequency and percentage. Numerical variables with the normal distribution such as fatigue and illness perception scores were expressed as the mean and standard deviations. DT scores were described using the median and interquartile ranges since the Kolmogorov–Smirnov test indicated a skew distribution. The Pearson's chi-square test was used to compare the variability of the DT scores between the two different groups of categorical variables. Thereafter, the independent *t*-test was used to compare the continuous variable. A forward stepwise binary logistic regression analysis was conducted to explore the influence of general information, fatigue, and illness perception on psychological distress ($\alpha_{in} = 0.05$, $\alpha_{out} = 0.10$). The difference was judged statistically significant at $P < 0.05$. GraphPad Prism version 8.0 software was used to generate the figures.

Results

Description of the participants

Of the patients with thyroid cancer, 344 were eligible for this research, 35 patients declined to participate in this study, with an 89.8% response rate. Due to missing data of nine cases, 300 patients were finally recruited in this study. Of the participants, the median age was 38.5 years old (range: 18–72). The percentage with age ranges 18–39, 40–54, and over 55 years old were 53.00%, 35.33%, and 11.67%, respectively. A total of 221 (73.67%) were female, 239 (79.67%) were married, 163 (54.33%) had a college degree and above, 200 (66.67%) were employed, and 201 (67.00%) had medical insurance. The minority were accompanied by other diseases such as hypertension, heart disease, and diabetes (15.67%). Almost all participants had papillary carcinoma (99.67%), and the majority underwent hemithyroidectomy (74.00%), 96.33% of participants were at TNM stage I, and 54.33% had complications of surgery (choking on water/hoarse voice/numbness in hands and feet). Table 1 shows the sociodemographic and clinical characteristics in detail.

Table 1 Comparison of baseline information related to patients with thyroid cancer with different psychological distress conditions ($n=300$)

Characteristics	*N*	DT < 4 ($n=212$)	DT ≥ 4 ($n=88$)	t/X^2	*P*-value
Age (yrs.), *n* (%)					
18 ~ 39	159 (53.00)	118 (39.33)	41 (13.67)	2.135	0.344
40 ~ 54	106 (35.33)	70 (23.33)	36 (12.00)		
≥ 55	35 (11.67)	24 (8.00)	11 (3.67)		
Gender, *n* (%)					
Male	79 (26.33)	66 (22.00)	13 (4.33)	8.579	0.003
Female	221 (73.67)	146 (48.67)	75 (25.00)		
Marriage, *n* (%)					
Married	239 (79.67)	166 (55.33)	73 (24.33)	0.831	0.362
Unmarried/divorced/widowed	61 (20.33)	46 (15.33)	15 (5.00)		
Education level, *n* (%)					
High school diploma and below	137 (45.67)	88 (29.33)	49 (16.33)	5.034	0.025
College degree and above	163 (54.33)	124 (41.33)	39 (13.00)		
Employment, *n* (%)					
Employed	200 (66.67)	143 (47.67)	57 (19.00)	1.416	0.493
Retired	30 (10.00)	23 (7.67)	7 (2.33)		
Not employed	70 (23.33)	46 (15.33)	24 (8.00)		
Monthly household income per capita (RMB), *n* (%)					
< 3000	63 (21.00)	34 (11.33)	29 (9.67)	11.4	0.003
3000 ~ 5000	117 (39.00)	85 (28.33)	32 (10.67)		
> 5000	120 (40.00)	93 (31.00)	27 (9.00)		
Medical insurance, *n* (%)					
No	99 (33.00)	69 (23.00)	30 (10.00)	0.067	0.796
Yes	201 (67.00)	143 (47.67)	58 (19.33)		
Religion, *n* (%)					
No	288 (96.00)	203 (67.67)	85 (28.33)	0.000	0.990
Yes (Buddhism/Taoism/Islam/ Catholicism/Christianity)	12 (4.00)	9 (3.00)	3 (1.00)		
Tumor type, *n* (%)					
Papillary	299 (99.67)	211 (70.33)	88 (29.33)	0.000	1.000
Follicular	1 (0.33)	1 (0.33)	0 (0)		
TNM stage, *n* (%)					
I	289 (96.33)	204 (68.00)	85 (28.33)	0.000	1.000
II	11 (3.67)	8 (2.67)	3 (1.00)		
Surgical treatment, *n* (%)					
Hemithyroidectomy	222 (74.00)	158 (52.67)	64 (21.33)	6.048	0.049
Total thyroidectomy	48 (16.00)	38 (12.67)	10 (3.33)		
Lymph node dissection	30 (10.00)	16 (5.33)	14 (4.67)		
Comorbidities, *n* (%)					
Yes	47 (15.67)	30 (10.00)	17 (5.67)	1.257	0.262
No	253 (84.33)	182 (60.67)	71 (23.67)		
Complications of surgery, *n* (%)					
Yes (choking on water/hoarse voice/numbness in hands and feet)	163 (54.33)	106 (35.33)	57 (19.00)	5.470	0.019
No	137 (45.67)	106 (35.33)	31 (10.33)		
TSH level (mIU/L), *n* (%)					
≤ 0.5	165 (55.00)	116 (38.67)	49 (16.33)	1.093	0.779
> 0.5 to ≤ 1	44 (14.67)	32 (10.67)	12 (4.00)		
> 1 to ≤ 2	34 (11.33)	26 (8.67)	8 (2.67)		
> 2	57 (19.00)	38 (12.67)	19 (6.33)		
Fatigue score, mean (SD)	300	24.14 (5.26)	28.08 (6.27)	5.581	< 0.001

Table 1 (continued)

Characteristics	*N*	DT < 4 (*n* = 212)	DT ≥ 4 (*n* = 88)	t/X^2	*P*-value
Illness perception score, mean (SD)	300	27.15 (10.93)	40.64 (8.31)	11.620	< 0.001

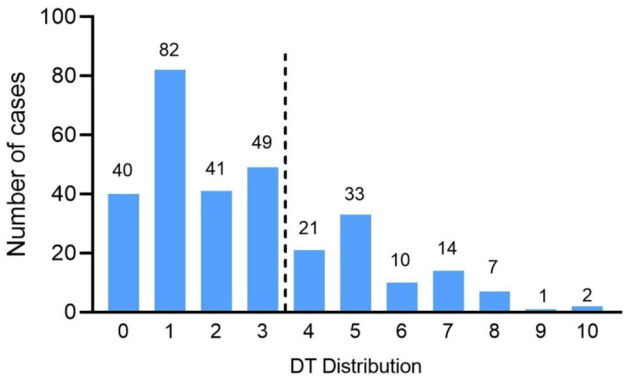

Fig. 1 The distribution of DT scores of patients with thyroid cancer

Psychological distress of patients with thyroid cancer during the transitional period

The DT scores of 300 patients with thyroid cancer ranged from 0 to 10. With a skew distribution, the median DT score was 2 [1–4]. There were 88 patients with clinically relevant psychological distress (DT score ≥ 4) among the 300 patients with thyroid cancer, and the prevalence of psychological distress in this cohort was 29.33%. Among 88 patients, we observed that 72%, 25%, and 2.3% experienced moderate, severe, and extreme distress, respectively. Figure 1 shows the distribution of the DT scores across patients with thyroid cancer in our research.

Univariate analysis of predictors associated with psychological distress among patients with thyroid cancer during the transitional period

Patients in these two groups differed significantly in terms of gender ($X^2 = 8.579$, $P = 0.003$), education level ($X^2 = 5.034$, $P = 0.025$), monthly household income per capita ($X^2 = 11.4$, $P = 0.003$), surgical treatment ($X^2 = 6.048$, $P = 0.049$), complications of surgery ($X^2 = 5.470$, $P = 0.019$), scores of fatigue ($t = -5.581$, $P < 0.001$), and scores of illness perception ($t = -11.620$, $P < 0.001$). There were no significant differences between the two groups for age, marriage, employment, medical insurance, religion, tumor type, TNM stage, accompanied by other diseases, and TSH level ($P > 0.05$).

The binary logistic regression model of psychological distress of patients with thyroid cancer during the transitional period

The Hosmer–Lemeshow test was used to assess the model's fitness, with $X^2 = 10.102$ and $P = 0.258$, indicating that the model fitted well and held together. The prediction accuracy of the model was 79.3%. The findings of the binary logistic regression model revealed that three factors (gender, fatigue, and illness perception) may be predictors for psychological distress in patients with thyroid cancer during the transitional period. The results indicated that female patients with thyroid cancer increased the risk by 2.505 (*OR* 2.505, 95%*CI* 1.061–5.913, $P = 0.036$) compared to male patients with thyroid cancer. Higher scores of fatigue (*OR* 1.086, 95%*CI* 1.025–1.150, $P = 0.005$) and illness perception (*OR* 1.137, 95%*CI* 1.095–1.180, $P < 0.001$) and a higher prevalence of psychological distress were observed among patients with thyroid cancer (Table 2). Different odds ratios for three predictors of psychological distress in patients with thyroid cancer are illustrated in Fig. 2.

Discussion

The findings in this study indicated that the psychological distress of Chinese patients with thyroid cancer during the transitional period was medium level. The prevalence of psychological distress in this study was higher than that in a large Chinese cross-sectional survey of general cancer patients (incidence 20%, 90/450) [33]. Previous research found that patients with thyroid cancer perceived their disease to be severe, regardless of its severity [34]. Surprisingly, Chan et al. discovered that lifelong TSH suppression therapy and regular serum TSH testing, which appeared to be simple and easy to monitor, could cause anxiety in patients with thyroid cancer [35]. However, the prevalence of psychological distress in this study was lower than the results of the study on patients with thyroid cancer from the USA (incidence 43.3%, 51/118) [10]. This may be because of different cultural backgrounds. The Chinese are easily sensitive or resistant to the term "psychological distress" and some patients may choose a low score or even a zero score to hide their true feelings [36], which may lead to a low detection rate. Also, because their study included patients with a history of psychopathy or who were taking antidepressants, their prevalence was higher than that of this study.

Table 2 The binary logistic regression analysis of factors influencing psychological distress in patients with thyroid cancer during the transitional period

Variables	*β*	*SE*	Wald	*OR*	95%*CI*	*P*-value
Gender	0.918	0.438	4.392	2.505	1.061–5.913	0.036
Education level	−0.346	0.366	0.894	0.708	0.346–1.449	0.344
Monthly household income per capita						
< 3000	-	-	0.737	1	-	0.692
3000 ~ 5000	−0.370	0.449	0.676	0.691	0.286–1.667	0.411
> 5000	−0.358	0.486	0.541	0.699	0.270–1.814	0.462
Surgical treatment						
Hemithyroidectomy	-	-	4.865	1	-	0.088
Total thyroidectomy	−0.676	0.472	2.051	0.509	0.202–1.283	0.152
Lymph node dissection	0.700	0.505	1.923	2.014	0.749–5.416	0.166
Complications of surgery	0.362	0.336	1.165	1.437	0.744–2.773	0.280
Fatigue score	0.082	0.029	7.876	1.086	1.025–1.150	0.005
Illness perception score	0.128	0.019	44.738	1.137	1.095–1.180	< 0.001
Constant	−7.883	1.182	44.461	< 0.001		< 0.001

SE standard error, *CI* confidence interval

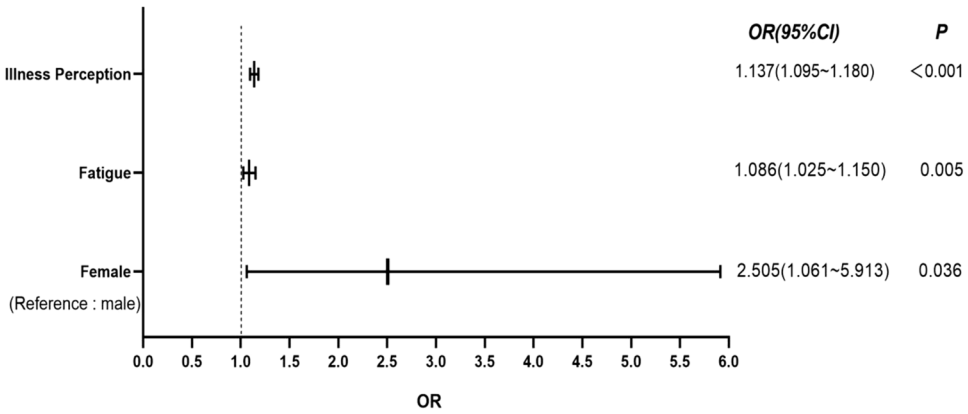

Fig. 2 Different odds ratios for three predictors of psychological distress in patients with thyroid cancer

Inconsistent with previous studies [11, 13], our study revealed that psychological distress in Chinese patients with thyroid cancer was associated with gender during the transitional period. Female patients with thyroid cancer were more likely to be psychologically distressed. Kuswanto et al. found that female patients had higher levels of depression, since female patients were more concerned with emotions and motherhood, whereas male patients were only concerned with physical symptoms. Mothers diagnosed with cancer may find it hard to cope with their families' needs and their own, increasing the challenge to perform the duties of motherhood [37]. Invasive surgical treatments and subsequent postoperative complications usually result in female patients being unable to fulfill their role as mothers as they have done before diagnosis, which can lead to feelings of loss of control and guilt [38]. Furthermore, other studies have discovered significant infertility-related psychological distress in young female patients with thyroid cancer [39, 40]. Female patients were more concerned about fertility and the health of their future children than men [41, 42]. This may be because women have the primary role in the family and are under more pressure to have children, and thus have more concerns about fertility. In our study, there were 221 female patients with thyroid cancer, of whom 112 (50.68%) were young female patients aged 18 to 39 years. In women of childbearing age, thyroid cancer is the second most common endocrine condition [39] and most likely to affect young women in their 20 s and 40 s [43]. Fertility, reproductive safety, and disease recurrence have all become serious issues for female patients of childbearing age with thyroid cancer as tumor onset has gotten younger and fertility policy has been adjusted in China [40]. Therefore, the psychological state of female patients with thyroid cancer should be monitored during the transitional period. Importantly, young women should pay attention to their infertility-related psychological distress and provide knowledge and access to counseling.

Our findings revealed that the higher fatigue scores indicated more severe psychological distress in Chinese patients with thyroid cancer during the transitional period.

Consistent with the findings of Husson et al., psychological distress was associated with fatigue in patients with thyroid cancer [16]. Fatigue is a common source of distress for thyroid cancer patients after treatment [15, 35], where the reported incidence ranges between 28 and 51% [11, 15, 18]. Surgical trauma, hypocalcemia after thyroidectomy, and thyroid hormone suppression therapy were all linked to fatigue in patients with thyroid cancer, manifesting as weakness, inability to perform daily activities, or decreased interest that was not relieved by rest and had a serious psychological impact on the patients [18]. Husson et al. found that the levels of fatigue in thyroid cancer survivors were not lower than survivors of other kinds of cancer such as endometrial cancer, colorectal cancer, and lymphoma [44]. Fatigue symptoms in cancer patients may contribute to their subsequent mood problems [45]. Cancer patients reduce their daily activities to conserve energy, which may result in a decrease in positive reinforcement for their participation in social activities, contributing significantly to depression [46]. Weaver et al. found that patients in pediatric oncology who experienced fatigue were 11.37 times more likely to suffer from moderate distress than those who did not, and were 2.99 times more likely to suffer from high distress as the severity of fatigue increased [47]. Before thyroidectomy, patients should be thoroughly informed about the increased fatigue and reduced energy that are common after thyroid cancer treatment. Furthermore, during the follow-up phase, nurses should ask whether these symptoms are present and give guidance on how to deal with it.

According to regression analysis, illness perceptions were associated with psychological distress in Chinese patients with thyroid cancer during the transitional period. Consistent with previous studies, the stronger the patient's worse illness perceptions, the more severe their psychological distress [19, 48]. Worse illness perceptions include viewpoints that cancer may cause severe symptoms, long illness duration, poor manageability, high disease worry, and emotional impact [19]. When a patient's worse illness perception is too strong, it can affect disease adjustment, treatment status, and quality of life, resulting in a severe level of psychological distress [49]. Husson et al. discovered that maladaptive cancer-related perceptions were more likely to contribute to anxiety and depression in thyroid cancer patients aged 18–39 years and 65–84 years [21]. Gibbons et al. discovered that patients with breast cancer who had low confidence in the effectiveness of treatment and negative illness consequences could experience an increase in cancer-specific distress [50]. This result is consistent with findings in other cancer groups, including esophageal [51] and colorectal [52] cancers. According to a study conducted in the USA, more information support can help patients with thyroid cancer gain a better understanding of their illness and thus reduce distress [29]. Therefore, the illness perception status of patients with thyroid cancer during the transitional period should be considered, and information support interventions are suggested to assist in the reduction of psychological distress.

Implications for practice

The psychological status of patients with thyroid cancer is not promising during the transition period, especially for female patients. During their routine follow-up visit, patients should be screened for psychological conditions using quick and effective screening tools such as the DT. Attention should also be paid to their symptoms of fatigue and illness perceptions. However, there is a lack of research on effective interventions in China. Future studies could explore how to improve fatigue symptoms of patients with thyroid cancer during short-term or long-term survival and target the patient's level and characteristics of illness perception at various disease stages. This not only helps reduce the incidence of psychological distress in patients with thyroid cancer but also contributes to an improvement in quality of life.

Limitations

There are mainly two limitations. First, because this study was a cross-sectional study, it lacked dynamic observation of psychological distress among patients with thyroid cancer. Second, according to the disease characteristics of thyroid cancer, papillary thyroid carcinoma is the most common pathological type, while follicular and medullary thyroid carcinoma accounts for approximately 10% and 5% of thyroid malignancies, respectively. Therefore, it is difficult to enroll patients with other types of thyroid cancer, such as follicular thyroid cancer, for our clinical work. In this study, we had only one patient with follicular thyroid carcinoma. Qualitative studies may be considered in the future to explore the psychological distress of patients with other types of thyroid cancer.

Conclusions

This study provides new insight into the psychological distress of patients with thyroid cancer in China during the transitional period. Thus, psychological distress should not be ignored. Predictors associated with psychological distress in Chinese patients with thyroid cancer included being female, high fatigue symptoms, and worse illness perception. Future studies aimed at improving fatigue and modulating illness perception may be beneficial in reducing the incidence of psychological distress.

Author contribution All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Jie Gao, Li Zhang, and Juan Li. Figures were designed by Xuan Qin. The first draft of the manuscript was written by Jie Gao, the manuscript was revised by Lan Wang and Jing Zhao, and all authors discussed the results and commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Data availability The data that support the findings of this study are available at https://www.wjx.cn/newwjx/manage/myquestionnaires.aspx. All patient information and other relevant clinical data can be searched through HIS system of Tianjin Medical University Cancer Institute and Hospital.

Code availability Not applicable.

Declarations

Ethics approval This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Tianjin Medical University Cancer Institute and Hospital (date: December 03, 2020/approval number: bc2020194).

Consent to participate Informed consent was obtained from all participants in the study.

Consent for publication Not applicable.

Competing interests The authors declare no competing interests.

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