



Psychological health status among thyroid cancer patients during the COVID-19 epidemic in China

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Abstract

Objectives To investigate the psychological health status and explore the impact of different factors among thyroid cancer patients during the peak period of the COVID-19 epidemic in China.

Methods With thyroid cancer patients who had attended Peking Union Medical College Hospital included, we collected their demographic and clinical characteristics, COVID-19-related factors, and outcomes of 4 psychological scales (Insomnia Severity Index [ISI], Generalized Anxiety Disorder Questionnaire [GAD-7], Patient Health Questionnaire [PHQ-9], and Impact of Events Scale-Revised [IES-R]) through an online questionnaire and used multiple linear regression to find independent risk factors for each psychological symptom.

Results A total of 219 patients were included. Insomnia, anxiety, depression, and clinically relevant post-traumatic stress symptoms (PTSS) were reported by 69 (31.5%), 87 (39.7%), 74 (33.8%), and 44 (20.1%) patients, respectively. Based on multiple linear regression, being single/divorced/widowed, having a lower level of education, receiving resources of science lectures during the epidemic, and experiencing disruption of routine treatment or follow-up were associated with poorer psychological health among patients with thyroid cancer.

Conclusions High rates of psychological symptoms and potential risk factors were found in thyroid cancer patients during the peak period of COVID-19 in China. Based on these findings, the psychological status of these patients should be a focus, and the psychological support systems need to be strengthened for the prevention of psychological crises during the epidemic.

Keywords Mental health · Thyroid cancer · Thyroid surgery · COVID-19

Introduction

Since the identification of COVID-19 in Wuhan, Hubei Province, in December 2019, COVID-19 has rapidly become a large-scale outbreak across China and around the world [1]. In late January 2020, the Chinese government declared that Wuhan would be placed under lockdown measures, and people in other provinces outside of Hubei were also asked to wear masks and minimize face-to-face interaction. At the same time, with the explosive growth of the number

of diagnosed COVID-19 cases, the levels of stress, anxiety, and depression increased significantly in the normal Chinese population [2, 3]. As a more vulnerable group due to their tumor burden and poorer general condition [4], cancer patients face a higher risk of COVID-19 infection and psychological problems than the general population [5–9].

During the COVID-19 pandemic, the psychological health status of patients with a variety of cancer types, such as breast, colorectal, and lymphoma, has been studied [10–12]. As a relatively mild type of cancer, thyroid cancer usually has a good prognosis. However, previous psychosocial studies have shown that patients with thyroid cancer have substantial unmet psychosocial support needs [13–15]. In a large-scale cross-sectional assessment among thyroid cancer survivors, thyroid cancer diagnosis was found to result in a decreased quality of life [16], and Buchmann et al. also reported that the diagnosis of thyroid cancer itself would carry a psychological impact on patient's distress¹⁴. Patients with thyroid cancer have been reported to have a

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similar or greater psychological burden than patients with other types of cancer [14, 17]. Studies have shown that thyroid cancer was a common diagnosis among patients admitted to the hospital during the COVID-19 outbreak [4, 14, 18], while the number of fine-needle aspiration (FNA) and radioactive iodine treatments greatly reduced [19, 20] and the diagnosis and treatment of patients were severely affected. Since the outbreak of COVID-19, there have been several studies of psychological health status in the general population [3, 21], as well as in specific populations such as medical students, health care workers, and cancer patients [22–27], while no studies have been conducted specifically on the psychological status of patients with thyroid cancer during the COVID-19 period, which deserves attention.

Given this knowledge gap, our study aims to describe the psychological health status of patients with thyroid cancer during the peak period of COVID-19 in China, to explore the impact of different factors on psychological health, and to emphasize the significance of early detection and intervention.

Materials and methods

Participants

This is a cross-sectional study. Approval was obtained from the Institutional Ethics Committee of Peking Union Medical College Hospital. An online anonymous questionnaire was administered to outpatients who were diagnosed with differentiated thyroid cancer via postoperative pathology reports at Peking Union Medical College Hospital. Patients who had a history of psychological disorders, either self-reported or confirmed through their medical records, or who could not guarantee the authenticity of the information they provided were excluded. Data between 2020.02.04 and 2020.02.18 were collected, which corresponds to the period with the most rapid spread of the epidemic in China according to epidemiological data³.

Demographic and clinical characteristics

Participants' sex, age, employment status, marital status, education, annual family income, complications, and history of psychological disorder were collected. They were also asked to answer questions about whether they understood their condition and how they considered the severity of their condition. Clinical characteristics such as time since surgery, type of surgery, lymph node metastasis, postoperative thyroid hormone, or radioactive iodine therapy were obtained from the hospital's medical record system.

COVID-19-related factors

Participants were asked about their location during the COVID-19 epidemic and whether they and their family members were infected or close to infected people. Information on if and how their usual treatment and follow-up were disrupted by the outbreak was also obtained. Since the COVID-19 epidemic was still rapidly progressing and we could not predict if and how it would affect patients' routine treatment, we did not focus on patients' response to the interruption in this study.

In addition, participants were asked if they had received resources such as science lectures about COVID-19 through the internet or remote consultations since the outbreak.

Psychological status outcomes

Psychological status during the past 2 weeks, i.e., between 2020.02.04 and 2020.02.18, was assessed by the following 4 scales.

Symptoms of insomnia were assessed by the Insomnia Severity Index (ISI). The ISI is one of the most widely used insomnia assessment scales in clinical practice and consists of 7 questions, each of which is scored on a 5-point scale from 0 to 4 with a total score of 28 [28].

Symptoms of anxiety were assessed by the use of the Generalized Anxiety Disorder Questionnaire (GAD-7), a 7-item, 4-point scale from 0 to 3 with a total score of 21. It is one of the most concise and clinically proven ways to assess symptoms of generalized anxiety disorder [29].

For the measurement of depression, the Patient Health Questionnaire (PHQ-9) was administered to all patients, which is a simple, validated 9-item, 4-point scale from 0 to 3 with a total score of 27, with good reliability and validity to assist in the diagnosis of depression and the assessment of symptom severity [30].

For the assessment of patients' symptoms of PTSS, we used the Impact of Events Scale-Revised (IES-R). It is a self-assessment scale commonly used in international research on PTSS, which is composed of 22 questions, each of which is scored on a 5-point scale from 0 to 4 with a total score of 88 [31]. Since there needed to be a subject to be a traumatic event on the IES-R scale, patients were told to consider the COVID-19 epidemic and subsequent restrictive measures as a traumatic event in response to the IES-R. Examples of items were as follows: "I avoided letting myself get upset when I thought about it (COVID-19) or was reminded of it," "I felt as if it (COVID-19) hadn't happened or wasn't real," and "I had dreams about it (COVID-19)," and the symptoms were identified as COVID-19-related PTSS.

The total scores of these scales were interpreted as follows: ISI, normal (0–7), subthreshold (8–14), moderate (15–21), and severe (22–28) insomnia; GAD-7, normal (0–4), mild (5–9), moderate (10–14), and severe (15–21) anxiety; PHQ-9, normal (0–4), mild (5–9), moderate (10–14), and severe (15–27) depression; and IES-R, normal (0–23), mild (24–32), moderate (33–36), and severe (37–88) PTSS.

In the present study, the cutoff scores for detecting symptoms of insomnia, anxiety, depression, and PTSS were 8, 5, 5, and 24, respectively [12, 32]. Participants who had scores greater than the cutoff threshold were characterized as having symptoms of insomnia, anxiety, depression, and PTSS.

In our sample, Cronbach's alpha coefficients for the four psychological scales were 0.941 (insomnia), 0.941 (anxiety), 0.937 (depression), and 0.959 (PTSS), suggesting good internal consistency.

Statistical analysis

All statistical analyses were carried out using SPSS version 26.0. $P \leq 0.05$ was considered statistically significant, and all tests were 2-tailed. An independent sample *t*-test was performed to analyze the relationship between each independent variable and each psychological symptom. Factors with univariate $P \leq 0.05$ were included in the multivariable linear regression analysis, which was used to explore potential factors influencing psychological status for patients with thyroid cancer. VIF < 10 was considered to indicate no collinearity of the associated factors.

Results

Demographic and clinical characteristics of participants

After excluding 2 patients for whom the validity of the information could not be guaranteed and 5 patients with a history of self-reported psychiatric disorders, a total of 219 patients who completed the questionnaire were included in the study. The majority of the patients were female (76.7%), older than 40 years old (53.4%), employed (72.6%), and married (84.9%) and had obtained a college degree or higher (78.5%), an annual family income of more than RMB 60,000 (70.8%), and no comorbidities such as hypertension, diabetes, or obesity (77.2%). All patients were from cities outside of Wuhan and had no history of exposure to Wuhan or infected persons during the peak of the epidemic.

In terms of clinical presentation, 162 of the 219 patients (74.0%) had undergone thyroid surgery by total thyroidectomy. Most patients had been operated on within the past year (68.5%) and were not found to have lymph node

metastases (58.4%), and most had undergone postoperative thyroid hormone replacement therapy (64.4%), while most had not accepted radioactive iodine therapy (75.8%). The vast majority of patients reported a complete/basic understanding of their condition (94.1%), and most patients perceived their condition as not too severe/not severe/not clear (58.4%).

Regarding factors related to COVID-19, 125 patients (57.1%) reported that their follow-up or treatment was affected during the epidemic. A total of 160 patients (73.1%) had obtained resources such as science lectures about COVID-19 through the internet, and 96 patients (43.8%) had received remote consultations since the outbreak.

The patients' demographic and clinical characteristics, along with COVID-19-related factors, are presented in Table 1.

Psychological health outcomes

According to the questionnaire results, the median ISI scale score of the 219 patients was 4 (0–24, IQR 0–9), the median GAD-7 scale score was 3 (0–21, IQR 0–7), the median PHQ-9 scale score was 2 (0–27, IQR 0–7), and the median IES-R scale score was 10 (0–70, IQR 2–22) (Table 2). The number of patients with symptoms of insomnia, anxiety, depression, and PTSS was 69 (31.5%), 87 (39.7%), 74 (33.8%), and 44 (20.1%), respectively.

The independent sample *t*-test showed that among patients with thyroid cancer, lower education level ($p = 0.010$), lower annual family income ($p = 0.019$), and inadequate understanding of the condition ($p = 0.020$) were associated with higher ISI scores. Being single/divorced/widowed ($p = 0.037$), lower education level ($p = 0.032$), and usual follow-up and treatment being disrupted ($p = 0.026$) were associated with higher GAD scores. Inadequate understanding of the condition ($p = 0.005$) was associated with higher PHQ scores. Being single/divorced/widowed ($p = 0.033$), having a lower education level ($P = 0.008$), having a lower annual family income ($p = 0.047$), and receiving resources of science lectures through the internet ($p = 0.003$) were associated with higher IES-R scores (Table 3).

Significant independent variables from the independent sample *t*-test were included in the multivariable linear regression analysis, and among patients with thyroid cancer, being single/divorced/widowed was still an independent factor associated with anxiety ($P = 0.035$), depression ($p = 0.034$), and PTSS ($p = 0.022$). Inadequate understanding of the condition was found to be an independent factor positively related to depression ($p = 0.008$), and receiving resources such as science lectures during the epidemic remained an independent factor of PTSS ($p = 0.003$) (Fig. 1).

Table 1 Patients' demographic and clinical characteristics

Variables	N (%)
Sex	
Male	51 (23.3)
Female	168 (76.7)
Age	
≤ 40	102 (46.6)
> 40	117 (53.4)
Employment status	
Employed	159 (72.6)
Not working	60 (27.4)
Marital status	
Married	184 (84.9)
Single/divorced/widowed	33 (15.1)
Education level	
High school or below	47 (21.5)
Bachelor's degree or higher	172 (78.5)
Annual family income (RMB)*	
≤ 60,000	64 (29.2)
> 60,000	155 (70.8)
Comorbidity	
No	169 (77.2)
Yes	50 (22.8)
Time since surgery	
≤ 1 year	150 (68.5)
> 1 year	69 (31.5)
Type of surgery	
Total thyroidectomy	162 (74.0)
Lobectomy	57 (26.0)
Lymph node metastasis	
Yes	91 (41.6)
No	128 (58.4)
Postoperative thyroid hormone therapy	
Yes	141 (64.4)
No	78 (35.6)
Postoperative radioactive iodine therapy	
Yes	53 (24.2)
No	166 (75.8)
Usual follow-up and treatment disrupted	
Yes	94 (42.9)
No	125 (57.1)
Understand their condition	
Complete understanding/basic understanding	206 (94.1)
Partial understanding/basically not understanding	13 (5.9)
Self-identification of the severity	
Very serious/somewhat serious	91 (41.6)
Not too serious/not serious/unclear	128 (58.4)
Resources of science lectures	
Yes	160 (73.1)
No	59 (26.9)
Remote consultations	
Yes	96 (43.8)

Table 1 (continued)

Variables	N (%)
No	123 (56.2)

* 1 RMB is equivalent to 0.16 USD

Table 2 Level of insomnia, anxiety, depression, and PTSS

	ISI	GAD-7	PHQ-9	IESR
Mean	5.13	4.11	3.94	13.62
SD	5.47	4.20	4.98	13.18
Min	0	0	0	0
Max	24	21	27	70
Median	3	3	2	11
IQR	0–9	1–7	0–7	2–22

Discussion

The present study investigated the psychological status among 219 patients with thyroid cancer during the peak period of the COVID-19 epidemic, when newly diagnosed cases of COVID-19 infection increased most rapidly in China, and used common psychological symptoms such as insomnia, anxiety, depression, and post-traumatic stress symptoms as observations and 4 well-established professional psychological scales as instruments. Overall, 31.5% had symptoms of insomnia, 39.7% had symptoms of anxiety, 33.8% had symptoms of depression, and 20.1% had symptoms of PTSS. We also explored the influence of demographic and clinical characteristics on psychological health status, and being single/divorced/widowed, having a low education level, low annual family income, or inadequate understanding of one's condition, receiving resources of science lectures during the epidemic, and experiencing disruption of routine treatment or follow-up were potential factors associated with poorer psychological health.

Results of the present study showed a considerable proportion of patients who had symptoms of insomnia, anxiety, depression, and PTSS. As stated in the introduction, since the outbreak of COVID-19, there have been several publications reporting elevated levels of psychological burden among various populations [3, 21–27]. A nationwide, large-sample survey conducted by Shi et al. reported that the prevalence of insomnia, anxiety, and depression among the general population in China during the COVID-19 outbreak was 29.2%, 31.6%, and 27.9%, respectively [32]. Our study showed higher rates of these psychological symptoms, which indicates that patients with thyroid cancer may be more vulnerable to psychological symptoms

Table 3 The associations between psychological health outcomes and variables

Variables	ISI	GAD	PHQ	IESR
Sex				
Male	5.45 (5.92)	3.65 (3.46)	3.69 (4.55)	11.80 (12.44)
Female	5.03 (5.34)	4.26 (4.40)	4.02 (5.11)	14.17 (13.38)
Age				
≤40	4.64 (5.44)	3.74 (4.05)	4.20 (5.08)	12.10 (12.00)
>40	5.56 (5.48)	4.44 (4.31)	3.72 (4.90)	14.95 (14.05)
Employment status				
Employed	4.72 (5.36)	3.84 (3.74)	3.73 (4.66)	12.88 (12.48)
Not working	6.20 (5.63)	4.85 (5.19)	4.50 (5.75)	15.58 (14.08)
Marital status				
Married	4.88 (5.35)	3.87 (3.96)*	3.60 (4.62)	12.82 (13.10)*
Single/divorced/widowed	6.55 (5.97)	5.52 (5.19)*	5.85 (6.42)	18.12 (12.89)*
Education level				
High school or below	6.94 (5.16)**	5.47 (4.99)*	4.81 (5.07)	18.11 (14.36)**
Bachelor's degree or higher	4.63 (5.46)**	3.74 (3.89)*	3.70 (4.94)	12.40 (12.60)**
Annual family income (RMB)				
≤60,000	6.47 (5.97)*	4.98 (5.27)	5.06 (6.28)	16.38 (15.00)*
>60,000	4.57 (5.16)*	3.75 (3.62)	3.48 (4.27)	12.48 (12.22)*
Comorbidity				
No	5.12 (5.42)	4.25 (4.42)	3.89 (5.10)	13.04 (13.08)
Yes	5.14 (5.69)	3.66 (3.33)	4.10 (4.58)	15.58 (13.47)
Time since surgery				
≤1 year	5.08 (5.73)	4.19 (4.33)	4.03 (5.17)	13.76 (13.31)
>1 year	5.23 (4.88)	3.94 (3.90)	3.75 (4.56)	13.32 (12.98)
Type of surgery				
Total thyroidectomy	5.12 (5.42)	3.99 (4.10)	3.71 (4.80)	13.67 (12.88)
Lobectomy	5.14 (5.65)	4.47 (4.47)	4.60 (5.45)	13.47 (14.12)
Lymph node metastasis				
Yes	5.23 (5.80)	4.21 (4.63)	3.93 (5.41)	14.53 (14.58)
No	5.05 (5.24)	4.05 (3.88)	3.95 (4.67)	12.98 (12.10)
Postoperative thyroid hormone therapy				
Yes	4.99 (5.28)	3.87 (3.66)	3.77 (4.37)	13.32 (12.53)
No	5.37 (5.81)	4.56 (5.02)	4.24 (5.94)	14.17 (14.34)
Postoperative radioactive iodine therapy				
Yes	5.40 (5.68)	4.64 (5.16)	4.28 (5.76)	15.64 (14.68)
No	5.04 (5.41)	3.95 (3.84)	3.83 (4.72)	12.98 (12.64)
Usual follow-up and treatment disrupted				
Yes	5.80 (5.91)	4.84 (4.34)*	4.18 (4.80)	15.54 (13.97)
No	4.62 (5.07)	3.57 (4.01)*	3.76 (5.12)	12.18 (12.41)
Understand their condition				
Complete understanding/basic understanding	4.91 (5.31)*	4.01 (4.19)	3.70 (4.81)**	13.23 (12.91)
Partial understanding/basically not understanding	8.54 (6.91)*	5.69 (4.15)	7.69 (6.20)**	19.85 (16.18)
Self-identification of the severity				
Very serious/somewhat serious	5.40 (5.60)	4.38 (4.60)	4.14 (5.43)	13.91 (13.52)
Not too serious/not serious/unclear	4.94 (5.39)	3.92 (3.90)	3.80 (4.65)	13.41 (12.98)
Resources of science lectures				
Yes	5.20 (5.42)	4.36 (4.21)	3.84 (4.80)	15.20 (13.50)**
No	4.93 (5.61)	3.44 (4.12)	4.20 (5.48)	9.34 (11.30)**
Remote consultations				
Yes	4.96 (5.20)	4.31 (3.87)	4.04 (4.64)	14.05 (11.96)
No	5.26 (5.69)	3.96 (4.44)	3.86 (5.25)	13.28 (14.10)

The bold entries indicate variables with p value less than 0.05

* $p < 0.05$

** $p < 0.01$

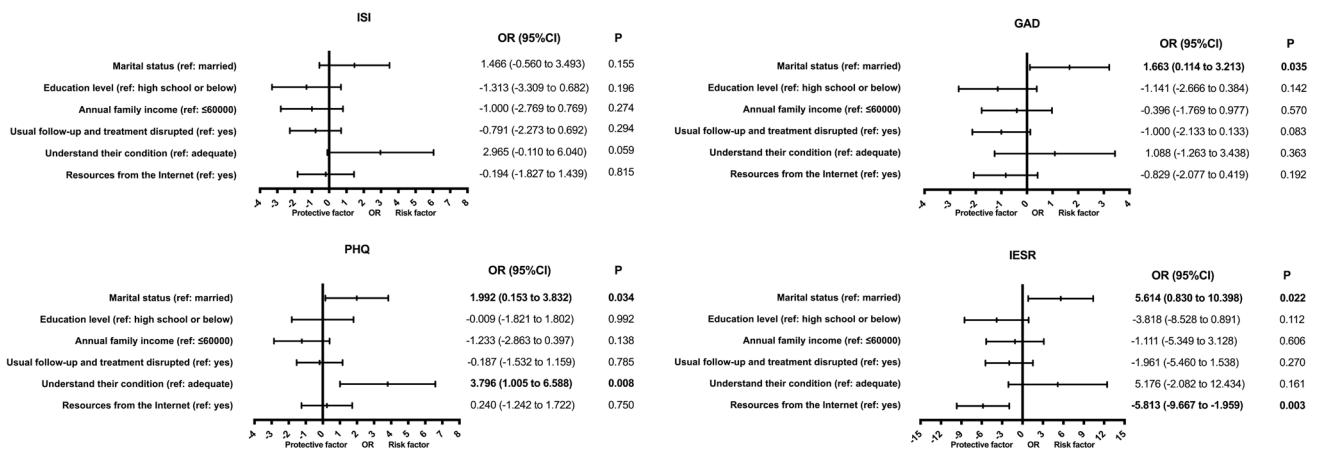


Fig. 1 Multivariable linear regression analysis of factors affecting the psychological status

during the epidemic. Data from a survey with 6213 cancer patients revealed that during the COVID-19 crisis, cancer patients tended to develop higher levels of psychological health symptoms such as anxiety, depression, and PTSD than either the general Chinese populations or the levels found in previous studies of Chinese cancer patients [33]. For patients with thyroid cancer, there were no studies relevant to psychological health during the COVID-19 epidemic, and a few pre-COVID-19 publications have suggested that anxiety and distress are common in thyroid cancer survivors [14–16]. Findings of our study indicated that COVID-19 is related to a higher psychological burden.

Multifactorial analysis revealed that inadequate understanding of the condition was an independent factor related to depression, which is consistent with previous findings that thyroid cancer patients received the least amount of information support about the cancer [34]. In contrast, another survey among Chinese medical students during COVID-19 demonstrated that medical students had fewer psychological problems even when compared to the normal population with more tools to learn about the disease and a more comprehensive understanding of it [26]. This may be a possible explanation of the psychological symptoms among thyroid cancer patients, as a lack of knowledge about the disease increases the fear of progression and recurrence [35]. However, contrary to expectations, patients' inadequate understanding of their condition was not significantly related to anxiety. This inconsistency may be explained by the fact that insufficient knowledge of the disease and lack of awareness of the trends in the COVID-19 epidemic kept these patients from considering the potential impact of the COVID-19 epidemic on their disease but rather manifested more as depression due to fear of recurrence of the disease.

We found that being single/divorced/widowed was an independent factor of depression and PTSS in addition to

insomnia, which has not been reported in previous studies. During the COVID-19 period, the population experienced social isolation, and thus, married people may receive more companionship and emotional support from their mates, which corresponds to a better psychological health status. Marital status has been shown to be associated with higher HRQoL scores in a previous study [36], since being married also means living with someone to some extent, which is an effective protective factor against anxiety under social isolation [26]. Receiving resources of science lectures about COVID-19 from the internet during an epidemic is an independent factor of PTSS, consistent with previous findings that when social media is overloaded with information, people are inundated with a wide variety of news about the epidemic, both true and false, which exacerbates anxiety and fear and increases the risk of posttraumatic stress disorder (PTSD) symptoms [33, 37]. Therefore, to improve the psychological status of thyroid cancer patients during COVID-19, more information support and emotional support should be provided, and in terms of information support, a threshold should be set to filter inaccurate news and provide the public with real and powerful information about COVID-19.

Previous studies have shown that the diagnosis and treatment of thyroid cancer can lead to decreased quality of life and that being female, younger age at diagnosis, and lower education are highly predictive of health-related quality of life (HRQoL) decline [16], and thyroid hormone replacement therapy is associated with lower HRQoL scores in patients with differentiated thyroid cancer (DTC) [38]. It has also been reported that unilateral lobectomy has less impact on HRQoL, including anxiety, depression, and mood problems, than total thyroidectomy in patients with DTC because unilateral lobectomy of smaller nodules is usually associated with fewer side effects [21]. This study included surgery-related independent variables,

including time since surgery, type of surgery, presence of lymph node metastases, and postoperative therapy, but after analysis, they all proved not to be independent influences of psychological status, which is interesting and unanticipated. It is difficult to explain this result, but it might be related to the specific time setting, where feelings of anxiety and depression encompassed a variety of populations during the rapid progression of the COVID-19 epidemic, making variables such as type of surgery, lymph node metastasis status, and type of postoperative treatment, which would have an impact on psychological status in normal times, less influential. At the same time, however, disruption of routine treatment or follow-up was associated with higher levels of anxiety, which indicates that it was not their surgical history and treatment that was relevant to the psychological status of patients with thyroid cancer during the COVID-19 epidemic but rather whether their routine follow-up or treatment was affected by isolation. Therefore, to avoid psychological problems and to ensure the normal functioning of the treatment order as much as possible, patients who cannot go to the hospital for follow-up and treatment can be treated online. The Department of Nuclear Medicine of Peking Union Medical College Hospital, together with the Chinese Society of Nuclear Medicine (CSNM), made adjustments to radioactive iodine treatment for thyroid cancer during COVID-19, including hospital-based prevention and control measures, as well as online medical consultations [20].

Based on the analysis of the results of the four psychological health indicators, we found that a high proportion of thyroid cancer patients had psychological symptoms during the peak period of COVID-19 epidemic when the curve of diagnosed infection was at its steepest zone. We found independent factors relevant to insomnia, anxiety, depression, and PTSS, so patients at higher risk for psychological problems could be identified earlier and more accurately in the future. Screening for psychological health status and identifying thyroid cancer patients with higher levels of psychological health problems is necessary for the prevention and control of the COVID-19 outbreak. Patient education about their diseases needs to be strengthened, and media information also needs to be filtered for true and accurate news. In addition to public health interventions already in place [39], psychological interventions should also be included in the response to the epidemic. There is a need to provide psychological counseling services to support normal people and patients cope with stress and anxiety. Since most participants of our study were from areas near Beijing, far from Wuhan, the epicenter of COVID-19, compared to the Wuhan population, the non-Wuhan population in our study represents a more general population, which is more useful

for drawing generalizable conclusions and for specifying subsequent patient management plans.

There are several limitations to this study that should be mentioned. First, the cross-sectional design meant that we were unable to determine causality between the independent and dependent variables, and thus, a longitudinal cohort study may be needed to further investigate psychological health issues in patients with thyroid cancer. Second, there was a lack of specific comparative data to draw direct conclusions. Additionally, the methodology of soliciting questionnaire responses online excluded patients who did not participate in social media. In addition, since this was a single-institution study and most patients have a higher education level and higher annual family income, a larger sample size may be needed to improve representativeness and to generalize to other populations. Finally, psychological symptoms were assessed through self-report questionnaires. We recommend clinical interviews performed by psychiatrists to evaluate the impact of other psychological and personality aspects on psychological symptoms in future studies.

Nevertheless, to our knowledge, this study is the first to describe the psychological status and explore the influence of different factors on the occurrence of psychological health problems in patients with thyroid cancer during COVID-19, filling a knowledge gap in this area and providing reliable recommendations to meet the psychological needs of patients and maintain their mental health.

Author contribution Conceptualization: Xiequn Xu; methodology: Xiequn Xu, Shijie Yang; formal analysis and investigation: Shijie Yang, Jinhui Wang; writing—original draft preparation: Shijie Yang, Xiequn Xu; writing—review and editing: Xiequn Xu.

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Data availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval The study was approved by the Ethics Committee of Peking Union Medical College Hospital (JS-2555).

Consent to participate All individual participants consented to participate in the study.

Consent for publication All individual participants consented to having their data published.

Conflict of interest The authors declare no competing interests.

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