ABSTRACT

Purpose: The primary objective of the present study was to investigate the course of anxiety and depression in thyroidectomy. The second objective was to investigate the association between somatic symptoms and psychological symptoms, and the final objective was to identify the sociodemographic, clinical, and psychosocial factors that affect psychiatric morbidity.

Methods: This prospective study, 101 patients who were admitted to the Endocrine Surgery Clinic of the Department of General Surgery, Istanbul Faculty of Medicine, University of Istanbul, Istanbul, Turkey were included in the study. Data were collected before surgery, and in the early, and late periods after surgery. Data were collected using a semi-structured interview form, a visual analogue scale, and the Hospital Anxiety and Depression Scale.

Results: The average scores of anxiety and depression before surgery were statistically significantly higher compared with the early and late periods after surgery (P<0.001). Psychological morbidity was identified about 10% of patients before surgery and remained after thyroidectomy. A poor positive correlation founded between somatic symptoms and psychological condition in period surgery (P<0.05). Various sociodemographic features and psychosocial parameters affected anxiety and depression level (P<0.05).

Conclusion: Anxiety and depression level in thyroid diseases decreased after thyroidectomy. These patients may express psychologic distress through somatic symptoms. Screening of psychological morbidity is suggested in patients planned thyroid surgery, especially in women, low-educated, inadequate social support, attributed to psychological causes.

Keywords: Thyroidectomy; Anxiety; Depression; Social support; Disease attributes

INTRODUCTION

Thyroid abnormalities are endocrine disorders that affect a considerable portion of the population and thyroid pathology is reported to be common in Turkey (1). Normal thyroid state is important to maintain proper function of the brain (2). An association between thyroid dysfunction and neuropsychologic and psychiatric disturbances or symptoms has been documented in the literature (3,4). Thyroid diseases may require medical treatment,
surgery or radioiodine; the exact knowledge of the impact of each treatment modality on psychologic status is essential. Despite opposing views, it is reported that medical treatment of thyroid dysfunction decreases psychiatric symptoms in general (5).

Surgery is frequently used in the treatment of thyroid pathologies. Surgery is a major trauma. Many studies in various surgical settings reported that the frequency of preoperative anxiety was significantly high (6,7). Associations between level of preoperative anxiety and postoperative mood and pain have been consistently reported in those patient groups (8). But, depression has not been studied sufficiently in surgical patients. In recent years, researchers investigated the risk of depression along with anxiety in patients undergoing surgical interventions and found that it was an important problem (9,10). Ghoneim and O’Hara (11) reported in detail that depression increased the rate of postoperative infections by suppressing the immune system, healing was delayed after surgery, and it was also associated with lower life quality and increased postoperative mortality. The researchers only found a small number of recent studies where the psychological effects of thyroid surgery were evaluated (12-14). The study of Miccoli et al. (12) which investigated the effect of thyroidectomy on psychiatric symptoms and life quality, was considered as the first prospective study in the literature. There is deficient a prospective study about the psychological effects of thyroid surgery and there is not in Turkey.

The physical and psychological preparation of patients for surgical treatment is the responsibility of health professionals (15). The clinical experience of the researchers revealed that thyroidectomy caused significant distress and the accompanying symptoms were shortness of breath, despair, sore throat, and numbness in the neck. There is a need for understanding the psychological conditions and somatic symptoms of patients. Therefore, the primarily objective of the present study was to investigate the course of psychological distress including anxiety and depression in patients affected by thyroid disease with a surgical indication before and after thyroidectomy. The second objective was to investigate the association between somatic symptoms and psychological symptoms, and the final objective was to identify the sociodemographic (age, gender, marital status, etc.), clinical (medical diagnosis, disease duration, biopsy result, etc.), and psychosocial factors (social support, etc.) that affect anxiety and depression levels.

**MATERIALS AND METHODS**

1. **Sample**

One hundred twelve patients who were admitted to the Endocrine Surgery Clinic of the Department of General Surgery, Istanbul Faculty of Medicine, University of Istanbul, with thyroid pathology between May 1st 2012, and September 30th 2014, were included in the study. Total thyroidectomy was planned, and all patients were literate and willing to participate in the study. Adult patients who were diagnosed as having mental retardation, psychotic or organic mental disorder, and those who had undergone previous thyroid surgery were excluded. The study was completed with 101 patients because 10 patients were excluded owing to lack of follow-up and 1 patient discontinued through personal choice. There was a previously published study (16) at the same patient population. In this report, causal attributions, social support and psychological morbidity of adult patients were studied as an expansion of previous study.
Data were collected before surgery ($T_0$), and in the early (within the first month) ($T_1$) and late (between 4-6 months) ($T_2$) periods after surgery. All patients who were euthyroid either under medical treatment or with untreated and patients undergoing preoperative preparation for anesthesia were included in the study. Follow-up data were collected after surgery before the start of levothyroxine treatment, when the patients were hypothyroid in the first month of surgery and at late period when the patients were euthyroid with the levothyroxine treatment at the 4–6 months of surgery. Data were collected using a semi-structured interview form, a visual analogue scale (VAS), and the Hospital Anxiety and Depression Scale (HADS). Approval for this study was obtained from the ethical and research committee of the Istanbul University, Istanbul Faculty of Medicine. Informed consent was obtained from all individual participants included in the study.

2. Data sources

Semi-structured interview form
The form included sociodemographic features (age, sex, marital status, family members in the house, living environment, and employment status), clinical, and psychosocial data. The clinical data consisted of medical diagnosis, disease duration, and biopsy result. Psychosocial data were obtained according to their own perception and notification of patients. The questions “How much do you know about your disease?” and “How would you describe the support of your family and friends?” were evaluated through responses “adequate-inadequate. The questions “Do you use active smoke?”, “Do you drink alcohol?”, “Have you experienced any psychiatric disorder?”, “Have you ever received psychiatric treatment?”, “Do you need any professional psychological support in this period?” were evaluated through “yes-no” answers. By asking the question, “What is your belief about the cause of your disease?” the causative attributions were classified as psychological (sadness, distress, negative thinking, and personality), risk factors (genetic, unhealthy life behaviors, and iodine deficiency), immune system, and accidents/fate.

The assessment of somatic symptoms
The somatic symptoms (weakness, shortness of breath, hoarseness, dysphagia, tachycardia, fatigue, sore throat, and insomnia) of patients before surgery, and in the early and late periods after surgery were evaluated using a 100-mm VAS. The patients were instructed to indicate the degree of somatic symptoms on the scale; 100 mm corresponded to maximum pain and zero meant the absence of somatic symptoms (17).

The HADS
HADS was specifically developed by Zigmond and Snaith (18) for use in physically ill patients. It is a 14-item questionnaire designed as a brief screening instrument for anxiety and depression. The items are answered on a 4-point Likert scale (range, 0–3). The anxiety and depression subscales each comprise seven items, which are summed to give subscale scores ranging from 0 to 21. Good reliability has been reported for each HADS subscale. Cronbach’s α coefficients for HADS subscales are 0.84 for anxiety and 0.78 for depression. The Turkish version of HADS was validated by Aydemir et al. (19) in 1997, with a Cronbach’s α value of 0.88. The cut-off point for anxiety subscale was 10/11 and the cut-off point for the depression subscale was 7/8. HADS is one of the best instruments to monitor anxiety and depression in patients who have thyroid dysfunction and undergo surgical procedures (4,15).
3. Data analysis
Statistical analysis of the data was performed using SPSS version 21.0 (SPSS Inc., Chicago, IL, USA). Numeric and percentage distribution of the data was studied. The change in anxiety and depression levels before surgery and in the early and late period after surgery was evaluated using the Friedman test. The Wilcoxon test was then used to specify the exact time period of the symptoms. Student’s t-test and 1-way analysis of variance test were used to identify factors that affected anxiety and depression levels. The association between anxiety and depression and degree of somatic symptoms was tested using Spearman’s correlation analysis. The outcomes were evaluated in 95% reliability, and the significance degree was accepted as P<0.05.

RESULTS
The average age was 45.23±12.74 years (range, 20–78 years), and the median age was 44 years. Most patients (75%) were women, and 62.4% were primary school graduates, 72.3% were married, and 71.3% lived with their spouse and children in Istanbul (67.3%).

Benign disease was diagnosed in 70.2% of the patients, and 29.8% had thyroid cancer. The average duration of illness was 43.20±64.47 months (range, 1–96 months). All patients underwent bilateral total thyroidectomy. The post-operative histopathologic findings revealed that 57.4% of the samples were malignant and 42.6% were benign. All patients were euthyroid before surgery, hypothyroid in the early postsurgical period, and euthyroid in the late period.

Most patients (79.2%) declared that they had no history of psychiatric disorders and 6.9% had received psychiatric treatment at least once throughout their lives. A total of 24.8% of patients were active smokers and 2% were active drinkers. Some 52.5% of patients reported that they had inadequate information about their disease, and 59.4% had inadequate support systems. Regarding disease causes, 56.4% of the patients attributed the development of disease to psychological problems, 26.6% to risk factors, 6% to the immune system, and 11% to accidents and fate. The need for professional psychological support to cope with the disease was detected as 14.9%.

The prevalence of anxiety in time periods T₀, T₁, and T₂, which were 22.8%, 7.9%, and 5.9%, respectively. The prevalence of depression for T₀, T₁, and T₂ were 31.7%, 16.8%, and 13.9%, respectively. In addition, psychological morbidity (the anxiety and/or depression risk) continuity of each patient before and after total thyroidectomy was analyzed. The findings revealed that 55.4% of patients had no psychological morbidity before surgery and the psychological well-being was maintained after surgery. Some 26.7% had psychological distress before surgery but it has been eliminated after surgery; 8% had no psychologic distress prior to surgery but were distressed after surgery; 9.9% of patients were psychological morbidity before surgery and remained after thyroidectomy. The average scores of anxiety and depression before surgery were statistically significantly higher compared with the early and late periods after surgery (P<0.001, Table 1).

A poor positive correlation was detected between the symptoms of tachycardia, insomnia, and sore throat and anxiety; and shortness of breath and depression before surgery. A poor positive correlation was detected between all somatic symptoms and psychological condition in the early period after surgery. A poor positive correlation was detected between the
symptoms of weakness, insomnia, tachycardia, and anxiety level; and tachycardia, weakness, fatigue, insomnia, and depression in the late period after surgery (Table 2).

The level of depression was high in primary school graduates and anxiety levels were high in women in the preoperative period (P=0.04). There was no statistical difference in anxiety and depression levels associated with clinical data such as medical diagnosis, biopsy result, and duration of disease. Anxiety and depression levels were high in patients who had psychiatric history and had inadequate information about the disease, but there was no statistical difference. Anxiety (P≤0.001) and depression (P=0.01) levels were high in patients who attributed the emergence of disease to psychological causes. Anxiety (P=0.002) and depression (P≤0.001) levels were high among patients with inadequate social support (Table 3).

<table>
<thead>
<tr>
<th>Psychological morbidity</th>
<th>Anxiety</th>
<th>Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before surgery (T₀)</td>
<td>7.56±4.23 (1–18)</td>
<td>5.89±4.07 (0–17)</td>
</tr>
<tr>
<td>Early period after surgery (T₁)</td>
<td>5.46±3.84 (0–19)</td>
<td>3.79±3.69 (0–17)</td>
</tr>
<tr>
<td>Late Period After Surgery (T₂)</td>
<td>5.09±3.14 (0–15)</td>
<td>3.18±3.20 (0–13)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Significance</th>
<th>T₀–T₁</th>
<th>T₀–T₂</th>
</tr>
</thead>
</table>

Data shown are mean±standard deviation (minimum–maximum).

Table 2. The association of somatic symptoms, anxiety, and depression levels in thyroid surgery

<table>
<thead>
<tr>
<th>Somatic symptoms</th>
<th>Anxiety Before surgery (T₀)</th>
<th>Depression Before surgery (T₀)</th>
<th>Anxiety Early period after surgery (T₁)</th>
<th>Depression Early period after surgery (T₁)</th>
<th>Anxiety Late period after surgery (T₂)</th>
<th>Depression Late period after surgery (T₂)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weakness</td>
<td>0.125; 0.212 (0.167; 0.095)</td>
<td>0.352; &lt;0.001 (0.335; 0.001)</td>
<td>0.457; &lt;0.001 (0.392; &lt;0.001)</td>
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<tr>
<td>Shortness of breath</td>
<td>0.175; 0.079 (0.288; 0.003)</td>
<td>0.308; 0.002 (0.361; &lt;0.001)</td>
<td>0.214; 0.03 (0.270; 0.006)</td>
<td></td>
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<tr>
<td>Hoarseness</td>
<td>0.202; 0.14 (0.86; 0.31)</td>
<td>0.254; 0.01 (0.300; 0.002)</td>
<td>0.368; &lt;0.001 (0.301; &lt;0.001)</td>
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<tr>
<td>Dysphagia</td>
<td>0.170; 0.09 (0.142; 0.155)</td>
<td>0.393; &lt;0.001 (0.418; &lt;0.001)</td>
<td>0.035; 0.731 (0.292; 0.003)</td>
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<tr>
<td>Tachycardia</td>
<td>0.405; &lt;0.001 (0.250; 0.1)</td>
<td>0.391; &lt;0.001 (0.418; &lt;0.001)</td>
<td>0.323; &lt;0.001 (0.413; 0.001)</td>
<td></td>
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<tr>
<td>Fatigue</td>
<td>0.209; 0.02 (0.238; 0.01)</td>
<td>0.346; &lt;0.001 (0.403; &lt;0.001)</td>
<td>0.291; 0.003 (0.398; 0.001)</td>
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<tr>
<td>Sore throat</td>
<td>0.348; &lt;0.001 (0.188; 0.060)</td>
<td>0.342; &lt;0.001 (0.338; &lt;0.001)</td>
<td>0.246; 0.01 (0.197; 0.04)</td>
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<tr>
<td>Insomnia</td>
<td>0.390; 0.01 (0.100; 0.318)</td>
<td>0.429; &lt;0.001 (0.358; &lt;0.001)</td>
<td>0.371; &lt;0.001 (0.339; &lt;0.001)</td>
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</tbody>
</table>

Data shown are correlation (r); P values.

Table 3. Factors affecting anxiety and depression levels

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>No. (%)</th>
<th>T₀ anxiety</th>
<th>t or F</th>
<th>P</th>
<th>T₀ depression</th>
<th>t or F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
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<tr>
<td>Female</td>
<td>75 (74.3)</td>
<td>8.07±3.92</td>
<td>2.057</td>
<td>0.102</td>
<td>5.87±4.17</td>
<td>0.372</td>
<td>0.199</td>
</tr>
<tr>
<td>Male</td>
<td>26 (25.7)</td>
<td>6.12±4.81</td>
<td>0.04</td>
<td>0.919</td>
<td>5.96±3.38</td>
<td>0.38</td>
<td>0.63</td>
</tr>
<tr>
<td>Education</td>
<td></td>
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<tr>
<td>Primary school</td>
<td>63 (62.4)</td>
<td>5.89±3.66</td>
<td>1.933</td>
<td>3.296</td>
<td>4.46±3.93</td>
<td>0.42</td>
<td>0.33</td>
</tr>
<tr>
<td>High school</td>
<td>18 (17.8)</td>
<td>3.89±3.61</td>
<td>0.150</td>
<td>0.04</td>
<td>2.11±2.74</td>
<td>0.74</td>
<td>0.27</td>
</tr>
<tr>
<td>University and over</td>
<td>20 (19.8)</td>
<td>5.50±4.35</td>
<td>3.20±3.17</td>
<td>0.04</td>
<td></td>
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<tr>
<td>Causes attributions</td>
<td></td>
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<tr>
<td>Psychologic factors</td>
<td>57 (56.4)</td>
<td>8.72±4.24</td>
<td>3.775</td>
<td>2.631</td>
<td>6.70±3.42</td>
<td>2.34</td>
<td>0.12</td>
</tr>
<tr>
<td>Other factors</td>
<td>44 (43.6)</td>
<td>5.71±3.02</td>
<td>&lt;0.001</td>
<td>0.01</td>
<td>4.55±4.53</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Social support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Adequate</td>
<td>60 (59.4)</td>
<td>9.56±4.61</td>
<td>3.243</td>
<td>3.726</td>
<td>8.00±4.25</td>
<td>0.39</td>
<td>0.13</td>
</tr>
<tr>
<td>Inadequate</td>
<td>41 (40.6)</td>
<td>6.48±3.86</td>
<td>0.002</td>
<td>0.001</td>
<td>4.70±3.62</td>
<td>0.01</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Data shown are mean±standard deviation not otherwise specified.
t = Student’s t-test; F = One-way analysis of variance test.
DISCUSSION

The association between mind and body is complex. There is an interaction between thyroid function, surgery, and psychosocial condition. In the present prospective study, we evaluated that anxiety and depression levels decreased after thyroidectomy. The psychological morbidity, which was identified in the preoperative period in about 10% of patients, remained in the postoperative period. It is striking to find that the rate of depression was higher than the anxiety rate. However, the type of thyroid diseases and characteristics (benign and malignant) would not affect anxiety and depression level, whereas various sociodemographic features and psychosocial parameters would affect these levels. Another important outcome was that somatic symptoms were in correlation with psychological conditions. The outcomes of the study are discussed in line with the objectives.

Psychiatric symptoms in thyroid diseases decreased after thyroidectomy. The prospective study of Eskander et al. (14) using HADS revealed that patients who were planned to undergo thyroid surgery had mild to moderate psychological morbidity and there was improvement after surgery. Miccoli et al. (12) detected a decrease in psychiatric symptoms after surgery and significant improvement in mental health. In another study, long-term (3.5 years) psychological stability was maintained after surgery (20). The outcomes of the present study are in correlation with previous studies in the literature.

Anxiety is a common emotional reaction against a surgical procedure. Anxiety may develop in any situation when life or integrity of a person is at risk and it is considered risky. Mild and moderate anxiety is normal but severe and panic levels of anxiety must be assessed and treated. Anxiety in surgical patients has been well studied. Preoperative anxiety has been reported to range from 11%–80% in adults (7,21). The studies reported from Turkey have shown that surgical patients have moderate to severe anxiety (6,10). The anxiety prevalence detected in the present study is compatible with the rates reported in the literature.

Depression and anxiety are the most common comorbidities (22). The prospective cohort study of Basak et al. (10) demonstrated that presence of anxiety may be a strong predictor for depression in general surgery inpatients. However, depression has not been fully investigated in patients undergoing surgery. The present study revealed that depression levels were higher than anxiety in the preoperative and postoperative period. Topitz et al. (23) reported that incidence of depression is high in general hospital, but it is not recognition by non-psychiatric treatment team. Unfortunately, psychological morbidity is frequently overlooked in everyday clinical work. It may be difficult to distinguish anxiety, depression, and somatic symptoms in patients with medical diseases. It is particularly common in eastern culture to express the psychologic distress with somatic symptoms (24). One study reported that somatization, depression, and anxiety symptoms were high in patients’ thyroidectomy compared with a non-thyroid surgery group (12). Our study also demonstrated that the somatic symptoms, particularly in the early period after surgery, were correlated with anxiety and depression.

Health care professionals must be able to predict patients with a potential risk for anxiety and depression. The assessment of patients in the preoperative period may help to identify patients at high risk of developing poor outcomes. In addition, prior knowledge of factors affecting anxiety/depression can be used to reduce psychological morbidity. In the present study, patients with low education were at risk of depression, but no risk of anxiety. This
association has been reported by some studies in surgical patients (7, 10, 14). However, other studies have shown a correlation between education and anxiety (6). In most studies, female sex has been shown to be related with higher levels of anxiety (6, 7, 9, 10), which is in line with the findings of the present study. Psychosocial stress, anxiety, depression, and somatic symptoms are more prevalent among women than men (22); however, the cause is not clear (25). It may be due to gender-based differences, biomedical (genetic, hormonal, anatomic, physiologic), epidemiologic (population-based risk factors), and psychosocial (personality, coping, symptom reporting) factors. Women are at high risk due to social determinants, and role differences (22). Matud (25) also reported that one of the contributing factors may be stress differences; women suffer more stress than men and their coping is more emotion-focused than that of men. In particular, women who are exposed to life events and have no social support are more vulnerable than men with no social support (22).

Social support is defined as instrumental, emotional, and informational help provided by reliable individuals such as partner, family, and friends in the social environment. The role of social support on physical and mental well-being is explained by 2 dominant models. First, the main effects model assumes that social support has a restorative role by satisfying social relation needs regardless of the current stress level. Second, the stress buffering model assumes that social support reduces the adverse effects of stressors. The processes or mechanisms are still not well understood. Nevertheless, the literature has revealed the importance of social support on health (26). Studies that investigated patients undergoing surgery reported that there was an association between social support and anxiety and depression (27). Family and friend support has vital importance in Turkey and has been reported as one of the factors that affect psychological morbidity in patients undergoing surgery (6). Our study also demonstrated that anxiety and depression levels were higher in patients with less social support than the patients with proper social support. Availability of social support of patients scheduled for thyroid surgery is also important to evaluate.

Beliefs and attitudes considerably influence patients’ responses to physical symptoms and illness. How people perceive and respond to their illness was explained by the Common Sense Model of Self-Regulation. The main components of the model are beliefs about the cause of a disease. The typical categories of causative attributions include psychologic, risk factors, immunity, accident, or fate (28). The study of Tiemensma et al. (29), in which illness attribution in endocrine diseases was first evaluated, revealed that patients believed that psychological attribution might have caused their Cushing’s syndrome. Studies of chronic diseases revealed that the people who attribute disease to distress and personal characteristics involving psychological problems had poor psychological well-being, and were related to increased anxiety and depression (30), which is in line with the findings of the present study. The outcomes indicate that questioning patients about the cause of their diseases, who are to undergo thyroid surgery, may help to detect patients with a psychopathology risk.

**CONCLUSION**

In conclusion, the outcomes of the present study demonstrated that thyroidectomy has a positive contribution to the psychological condition. However, the psychosocial well-being assessment of patients who undergo thyroid surgery, particularly low-educated, women,
inadequate social support and who attributed the emergence of disease to psychological
causes should not be dismissed. It is important to recognize both depressive symptoms and
anxiety symptoms in the patient assessment. It should be kept in mind that the patients may
express psychologic distress through somatic symptoms. Clinical guides also recommend
this to integrate psychosocial aspects with medical disease. Therefore, screening of
psychological distress is the first step in the preoperative period. There are various scales
such as HADS with sufficient psychometric properties to measure clinically significant
general psychological distress including depression and/or anxiety, which help in performing
psychosocial self-assessment of surgical patients.

REFERENCES

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