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Original Article

Investigating life quality and health-related mental status in patients with thyroid disorders

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ABSTRACT

Previous studies have investigated and demonstrated potential associations between thyroid disorders, common psychological problems (anxiety, stress, and depression), and HRQoL (health-related quality of life). The present study examines this relationship by using different and valid questionnaires; it investigates the adult population with hypothyroidism and both obvious and subclinical hyperthyroidism, compared to the group of healthy people. The participants in this cross-sectional research were randomly chosen from the clients of the endocrinology clinic. Based on the inclusion and non-inclusion criteria, 212 patients were studied and placed in three groups: underactive (obvious and subclinical hypothyroidism), overactive (overt thyroid and subclinical hyperactivity), and euthyroid. The mental status and health-related life quality of the participants were assessed by the 21-item scale of anxiety, depression, and stress (DASS-21) and version 2 of the short 12-point health test (SF-12v2). The obtained results show that people with thyroid disorders, including both underactive and overactive groups, have significantly higher levels of anxiety, stress, and depression symptoms ($P<0.05$) and lower HRQoL than their euthyroid counterparts. In addition, a more detailed analysis revealed that in participants with underactive and overactive thyroid, the psychological and physical domains of HRQoL were also seriously affected. This study showed that thyroid disorders could have a significant impact on the life quality of patients in different dimensions and lead to a decrease in mental health in an adult population.

Keywords: Quality of life, Mental status, Patients, Thyroid disorders.

Introduction

Thyroid gland disorders are one of the most common hormonal disorders in the world. The prevalence of 0.5-2% of hyperthyroidism impacts women ten times more than men [1-3]. Thyroid studies have shown a high rate of disorders in some populations [4-6]. In addition to physical complications, there is a potential link between thyroid disorders, mental status, and mental health factors [7-10]. In addition, it is thought that thyroid disorders are related to mood disorders [7].

Many physiological pathways affect a person's psychological state, which is often described as anxiety, depression, and stress. This situation can be different among societies and genders. The obtained evidence has shown the existence of many irreversible brain abnormalities because of thyroid hormone deficiency [11, 12]. Health-related life quality is a multidimensional and broad concept that evaluates a person's psychological, physical, and social health status [13-15].

Several evidences emphasize the relationship between health-related life quality and thyroid disorders [10, 16, 17]. Probably, the proper functioning of the thyroid plays a vital role in mental stability. On the other hand, thyroid disorders can hurt health-related quality of life from several aspects. Anxiety, depression, stress, and quality of life-related to health need to be examined according to the culture and context of societies.

This study aims to investigate the relationship between thyroid disorders with anxiety, depression, stress, and health-related life quality among a sample of euthyroid people and patients with hyperthyroidism and hypothyroidism. Considering the effect of various cultural, social, and economic factors on the mental state and quality of life in different populations, in this study, two 21-item index questionnaires for anxiety, depression, and stress

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(DASS-21) and health-related life quality have been used In addition, patients with obvious and subclinical hyperthyroidism have also been examined in a separate group.

Materials and Methods

The current research is a cross-sectional study. The data sources and search method of the studied population included those who referred to the clinics. Initially, 383 patients were selected. Four of them were excluded from the study due to their unwillingness to participate. Finally, 212 patients who met the exclusion and inclusion criteria were studied.

Patients were placed into three groups based on thyroid function: hypothyroid, overactive, and euthyroid. The underactive group contained people with overt and subclinical hypothyroidism. Overt hypothyroidism was the simultaneous occurrence of low FT4 levels and high TSH, while subclinical hypothyroidism was considered as normal FT4 levels and high TSH [18]. The hyperactive group contained people with overt and subclinical hyperthyroidism. Hyperthyroidism is evident in the simultaneous occurrence of high FT4 levels and low TSH. While subclinical hyperthyroidism is introduced as a normal level of FT4 and a low level of TSH [19].

The criteria for inclusion in the study included all patients of any gender who visited the related hormone clinic and had thyroid function tests done for them in the last ten days and had the results in hand. Test findings should include at least free thyroxine levels and thyroid-stimulating hormone. In addition, patients with early symptoms of obvious or subclinical thyroid disorders should not have been treated or received insufficient treatment at the research time. Euthyroid people should also not be under any treatment of thyroid-related. Exclusion criteria included any people with known psychological problems or those who were being treated for any psychological problems. Patients with background chronic medical conditions such as seizures, diabetes, chronic liver disease, chronic kidney disease, cancer, cardiovascular disease, autoimmune disorder, thalassemia, chronic lung disease, AIDS (acquired immunodeficiency syndrome), pregnant women, and People who recently had stressful experiences such as abortion, hospitalization, death of loved ones, and divorce in the last six months were excluded from participating in this research because these experiences could have significant effects on the mental state and health-related life quality.

Study tools include a demographic questionnaire written by the researcher, a 21-item index of anxiety, depression, and stress to assess mental status, and version 2 of the short 12-point health test (12v2-SF) to study health-related life quality. All participants were requested to complete the questionnaires. Participants filled out a demographic questionnaire that included gender, age, residence place, physical activity level, marital status, smoking status, and education level. In this study, the 21-item index of anxiety, depression, and stress (DASS-21) was used. This questionnaire examines how often the respondent has experienced anxiety, depression, and stress in the past week. This questionnaire has three sub-components, each of which has seven items. Higher scores indicate greater persistence of the mentioned mental state.

Among all the questionnaires that check the quality of life related to health, version 2 of the short 12-point health test has the highest reliability and validity in scoring. This scale assesses health-related life quality over the past four weeks. This questionnaire contains eight components of 12 items, including Mental Health (MH), Role Emotional (RE), Vitality (VT), Social Functioning (SF), Bodily Pain (BP), General Health (GH), Physical Function (PF), and Role Physical (RP). The first four components form the Physical Component Score (PCS) while the next four components constitute the Mental Component Score (MCS). Higher scores indicate better health status [20]. The software for qualitative measurement of health outcomes 2 can be used for this purpose [21].

Quantitative variables were reported by mean ± SD while qualitative variables were indicated by frequency (%). In addition, chi-square tests and one-way analysis of variance were utilized to compare qualitative and quantitative variables between groups, respectively. Covariance analysis was also used to compare SF-12v2 and DASS-21 scores in the study groups by adjusting the effect of confounding variables such as marital status, gender, age, physical activity, education level, and smoking of the participants. All analyses were done by SPSS23 software and the significance level of p-value was 0.05.

Results and Discussion

212 participants participated in the current study, including 172 (81.1%) women and 40 (18.9%) men. The participant's average age was 38.17. The studied groups contained the euthyroid (n = 73), high workgroup (n = 61), and low work group (n = 78). The demographic specifications of the participants of each group are provided in **Table 1**. None of the variables had a significant difference between the groups, except for the level of physical activity, which was significantly higher in the euthyroid group than the other two groups (p = 0.015) **(Table 1)**.

Table 1. Demographic specification of participants according to study groups.

Variable		Total	Hyperthyroidism	Hypothyroidism	Euthyroid	P-value
Gender	Male	13 (21.3%)	11 (14.1%)	40 (18.9%)	16 (21.9%)	
	Female	48 (78.7%)	67 (85.9%)	172 (81.1%)	57 (78.1%)	0.399
Age		38.17 ± 12.61	38.13 ± 12.73	39.33 ± 12.53	36.94 ± 12.67	0.513
Marital status	Single	20 (32.8%)	23 (29.5%)	57 (26.9%)	14 (12.2%)	

	Married	36 (59.0%)	53 (67.9%)	144 (67.9%)	55 (75.3%)	0.198
	Divorced/Widow	5 (2.8%)	2 (6.2%)	11 (5.2%)	4 (5.5%)	
Education	Illiterate/Elementary	14 (23.0%)	9 (11.5%)	43 (20.3%)	20 (27.4%)	0.112
	Diploma	22 (36.1%)	27 (34.6%)	68 (32.1%)	19 (26.0%)	
	Bachelor's/Master's and above	25 (41.0%)	42 (53.8%)	101 (47.6%)	34 (46.6%)	
Smoking	Yes	8 (13.1%)	4 (5.1%)	17 (8.0%)	5 (6.8%)	0.205
	No	53 (86.9%)	74 (94.9%)	195 (92.0%)	68 (93.2%)	
Physical activity	A lot	18 (29.5%)	38 (48.7%)	95 (44.8%)	39 (53.4%)	0.015
	Low	43 (70.5%)	40 (52.3%)	117 (55.2%)	34 (46.6%)	

The results of covariance analysis revealed that after adjusting the impact of confounding variables, the average score of the depression component in the underactive and overactive thyroid groups was higher than the euthyroid group, 4.45 and 3.89, respectively (p = 0.012 and p = 0.035 for underactive and overactive thyroid groups, respectively). On the other hand, for the anxiety component in the low-work and high-work groups, compared to the euthyroid group, the average scores were 3.73 and 4.43, respectively (p = 0.022 and p = 0.10 for underactive and overactive thyroid groups, respectively). It was also higher for stress, 5.52 and 5.08, respectively (p = 0.003 and p = 0.010 for underactive and overactive thyroid groups, respectively) **(Table 2)**.

Table 2. Comparison of scores of DASS21 components in study groups using covariance analysis approach.

Variable		β (95% CI)	P-value
Depression	Hypothyroidism compared to euthyroidism	4.45 (1.00, 7.90)	0.012
	Hyperthyroidism compared to euthyroidism	3.89 (0.27, 7.51)	0.035
Anxiety	Hypothyroidism compared to euthyroidism	3.73 (0.55, 6.91)	0.022
	Hyperthyroidism compared to euthyroidism	4.43 (1.07, 7.78)	0.010
Stress	Hypothyroidism compared to euthyroidism	5.52 (1.87, 9.17)	0.003
	Hyperthyroidism compared to euthyroidism	5.08 (8.93, 1.23)	0.010

According to the results of covariance analysis, **Table 3** shows that regarding the life quality related to health, the average score of RE, MH, and MCS components in the hypothyroid group was considerably lower than the euthyroid group (p = 0.013, p = 0.002, and p = 0.012 for RE, MH, and MCS, respectively). In the hyperthyroid group compared to the euthyroid group, the average score of the components of PF (p = 0.015), RP (p = 0.004), GH (p = 0.015), VT (p = 0.017), RE (p = 0.003), and MH (p = 0.049) were significantly lower. There was no considerable difference in BP (p = 0.994), MCS (p = 066), PCS (p = 0.086), and SF (p = 0.748) between these two groups **(Table 3)**.

Table 3. Comparison of scores of SF-12 V2 components in study groups using covariance analysis approach.

Variable		β (95% CI)	P-value
Physical Function (PF)	Hypothyroidism compared to euthyroidism	-8.25 (-19.67, 3.16)	0.191
	Hyperthyroidism compared to euthyroidism	-14.64 (-26.77, -2.51)	0.015
Role Physical (RP)	Hypothyroidism compared to euthyroidism	-9.56 (-19.60, 0.47)	0.064
	Hyperthyroidism compared to euthyroidism	-15.04 (-25.66, -4.41)	0.004
Bodily Pain (BP)	Hypothyroidism compared to euthyroidism	-2.43 (-12.42, 7.55)	0.810
	Hyperthyroidism compared to euthyroidism	-0.44 (-11.12, -10.23)	0.994
General Health (GH)	Hypothyroidism compared to euthyroidism	-6.88 (-16.36, 2.59)	0.188
	Hyperthyroidism compared to euthyroidism	-12.13 (-22.23, -2.02)	0.015
Physical Component Score (PCS)	Hypothyroidism compared to euthyroidism	-1.35 (-4.93, 2.23)	0.612
	Hyperthyroidism compared to euthyroidism	-3.39 (0.39, 7.18)	0.086
Vitality (VT)	Hypothyroidism compared to euthyroidism	-6.06 (-15.83, 3.69)	0.284
	Hyperthyroidism compared to euthyroidism	-12.27 (22.67, -1.88)	0.017
Social Functioning (SF)	Hypothyroidism compared to euthyroidism	-2.63 (-13.80, 8.53)	0.820
	Hyperthyroidism compared to euthyroidism	3.42 (-8.51, 15.35)	0.748
Role Emotional (RE)	Hypothyroidism compared to euthyroidism	-12.81 (-2.33, -23.29)	0.013
	Hyperthyroidism compared to euthyroidism	-16.22 (27.30, -5.13)	0.003
Mental Health (MH)	Hypothyroidism compared to euthyroidism	-12.76 (-21.19, -4.32)	0.002
	Hyperthyroidism compared to euthyroidism	-9.01 (-0.36, -17.98)	0.049

Mental Component Score (MCS)	Hypothyroidism compared to euthyroidism	-5.37 (-5.37, -1.04)	0.012
	Hyperthyroidism compared to euthyroidism	-4.34 (-8.91, 0.23)	0.066

Based on the obtained results and according to the questionnaire of DASS-21, anxiety symptoms, stress, and depression are seen more frequently in people with thyroid disorders than in the euthyroid group. According to the result of SF-12v2, patients with thyroid disorders have a lower level of health-related life quality than the euthyroid group. These problems are initially physically present in people with obvious and subclinical hyperactivity; while patients with obvious and subclinical hypoactivity are often psychologically affected.

Batla *et al*. [22] studied the prevalence of symptoms related to stress, depression, and anxiety in patients with hypothyroidism, and reported the significant prevalence of these psychological symptoms in these people. Another research by Rakhshan *et al*. [8] in Iran studied mental health in people with hypothyroidism and hypothyroidism and acknowledged that patients with hypothyroidism suffer from low mental health and this low mental health includes all components related to anxiety and depression. The results of these two research are consistent with the results of the current study regarding lower quality of life in people with hypothyroidism, especially the psychological components of life quality. However, this article also examines patients with hypothyroidism in the diagnostic stage and reaches similar results about them.

Taking into account the psychological state of hyperthyroidism, Bukvic *et al*. [23] have examined psychological and physical symptoms in people with Graves' disease and those with toxic nodular goiter, after and before surgical intervention. These researchers reported that most of the symptoms; including depression and anxiety with such an intervention have improved significantly. The effect of thyroid hormones on the normal activity of the brain has been proven. Differences in mental status symptoms can be related to thyroid disorders. The results of this research are consistent with the findings regarding the effects of hyperthyroidism on anxiety and depression. Bukvic *et al*. [23] study has shown the effect of surgical intervention on decreasing depression and anxiety in patients with hyperthyroidism; while in the current study, the prevalence of these symptoms in these patients has been examined. In addition, in the upcoming study, patients with subclinical hyperthyroidism have also been considered. In the study of Kalera *et al*. [24], a large number of stressful factors were reported in people with hypothyroidism. Stress is related to Hashimoto's thyroiditis as well as Graves' disease [25, 26]. A survey of patients with hypothyroidism in the early stages shows abnormal stress scores in the initial examination, which is in line with our findings [27].

Contrary to the results of this article, the findings of some studies indicate that thyroid disorders, especially subclinical disorders, do not affect people's quality of life. For example, a study by Feller *et al*. [10], which included 2192 patients and 21 randomized controlled trials, studied the impact of medical treatment on improving symptoms and life quality in people with subclinical hypothyroidism and found no significant impact in did not report improvement in symptoms or increased quality of life. This result is inconsistent with the results of this study about the impact of subclinical hypothyroidism on life quality. However, Feller *et al*. [10] studied the impact of an intervention on life quality, while the following article examines the difference in life quality between these people and euthyroid individuals. Also, people with overt and subclinical hypothyroidism have been examined together in one group, which can cause a bias possibility in the research. In addition, research by Han *et al*. [28] on Korean people showed that patients with overt hypothyroidism had better health-related life quality compared to euthyroid individuals. Although this result does not apply to those who have subclinical hypothyroidism and hyperthyroidism, these findings are not consistent with the findings of the current study. Hahn's study contained only 10 people with overt hypothyroidism, and the other 987 people were euthyroid. In addition, another reason could be the differences between the life quality assessment tools utilized in these two studies.

Conclusion

Based on the findings, it can be concluded that thyroid disorders, including obvious and subclinical hypothyroidism, can cause different mental states (stress, anxiety, and depression) and reduce health-related quality of life components. It is suggested that specialists check their mental health status and examine patients with thyroid disorders. In addition, it is suggested to conduct more research with a larger sample to analyze the subclinical and obvious nature of thyroid disorders.

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