

PREVALENCE OF ANXIETY AND DEPRESSION AMONG PATIENTS WITH THYROID DISORDER

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ABSTRACT Background: Thyroid dysfunctions have been recognized to cause significant manifestations in mental health. They may lead to disturbances in emotions and cognition. Both an increase and decrease in thyroid function can cause mood abnormalities. Symptoms of anxiety and depression are more common, as well as increased scores on depression and anxiety self-rating scales. Indian studies are scarcely exploring the association of anxiety and depression and its severity with hypo or hyperthyroid status of the patients. Hence this study was carried out to find the prevalence of anxiety and depression among patients with thyroid abnormalities and its association with hypo or hyperthyroid status. **Methods:** The present is a hospital-based cross-sectional study carried out in the Endocrinology outpatient unit of a tertiary care hospital in south India between March 2014 and March 2015. A total of 132 patients underwent endocrine and mental state evaluation using standard tools. **Results:** The mean (SD) age of the population was 40 (12) years, with the majority of the patients from the age group of 35-49 years (38%). There was a preponderance of females (60%). The overall prevalence was higher among the patients with thyroid disorders compared to the general population, with around half of the patients having at least one psychiatric illness. The most common illnesses were major depressive disorder/dysthymia and generalized anxiety disorder, present in 20% and 13% of the patients. The number of patients developing the major depressive disorder and generalized anxiety disorder was similar between hypothyroid and hyperthyroid category ($p>0.05$). Anti-TPO positivity did not have any statistically significant association with the presence of anxiety and depressive disorder. **Conclusion:** The overall prevalence was higher among the patients with thyroid disorders compared to the general population, with around half of the patients having at least one psychiatric illness. Hyper or hypo thyroid status does not change the prevalence of major depressive disorder and generalized anxiety disorder.

KEYWORDS Thyroid dysfunction, Mood abnormalities, Depression

Introduction

Thyroid dysfunctions have been recognized to cause significant manifestations in mental health. They may lead to disturbances in emotions and cognition. A valuable amount of data has revealed the connection between Hypothalamic-pituitary-thyroid (HPT) axis dysfunction, primary hypothyroidism and depres-

sion. Both an increase and decrease in thyroid function can cause mood abnormalities. Vice versa, depression can also go hand in hand with subtle thyroid dysfunctions [1]. In the adult age group, it can cause behavioural disturbances, depressive symptoms, anxiety, learning deficits, memory impairment, and problems in verbal fluency. These can be attributed to neurotransmission impairment in the brain related to learning and memory, such as the hippocampus. Thus, a decrease in CNS-TH levels can promote alteration in neurotransmission leading to mood disorders such as depression [2]. Symptoms of anxiety and depression are more common, as well as increased scores on depression and anxiety self-rating scales [3-5].

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Endocrine disorders are frequently associated with secondary psychiatric symptoms, such as depressed mood and disturbances in thought. Also, many people diagnosed with psychiatric disorders on evaluation have distinct endocrine dysfunction [6]. Over the years, research has documented alteration in HPT and Hypothalamic-Pituitary-Adrenal (HPA) axes in patients with bipolar disorder, especially depressive disorder, with evidence suggesting 50-70% of patients with depression have HPA axis hyperactivity [7]. Despite the reported high prevalence of psychiatric symptoms and disorders among people with hypo and hyperthyroidism, Indian studies are scarcely exploring this issue. A better understanding of this comorbidity could improve how these patients are assessed and supported. Hence, this study was planned to find the prevalence of anxiety and depression among patients with thyroid abnormalities.

Methods

The present is a hospital-based cross-sectional study carried out in the Endocrinology outpatient unit of a tertiary care hospital in south India between March 2014 and March 2015 after obtaining approval from the institute's ethics committee.

Participants

The study targeted people over 18 years of age with thyroid abnormality who attended the Endocrinology outpatient clinic of the Department of Medicine at Kannur Medical College and Hospital in south India. Written informed consent was obtained before the enrolment. Patients on treatment for thyroid dysfunction at the time of evaluation or with co-morbid medical disorders like stroke, ischemic heart disease, chronic obstructive pulmonary disease, renal failure and other endocrine disorders were excluded from the study.

Endocrine Evaluation

The patients who attended the endocrinology clinic were diagnosed with thyroid hormone abnormality and, based on their T4 and TSH values, classified into hyperthyroidism and hypothyroidism based on American Thyroid Association – 2013 guidelines and following assessment by the endocrinologist. Anti-thyroid peroxidase (anti-TPO) chemiluminescence immunoassay (CLIA) test kit was used to quantitatively determine the anti-TPO concentration in serum of subjects. Those with 40 IU/mL and above anti-TPO values were considered positive.

Mental State Evaluation

The psychiatric history was taken using a pretested semi-structured interview. The interviewer was blind to the participants' endocrinological diagnosis. These interviews were conducted using the mood and anxiety modules of the Mini-International Neuropsychiatric Interview (MINI) [8] and the diagnostic criteria for depression and anxiety of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition [9]. In addition, all participants were evaluated using Hamilton Depression Rating Scale (HAM-D) and Hamilton Anxiety Rating Scale (HAM-A) [10, 11].

Statistical Analysis

Data were keyed into Microsoft Excel 2016 and, after cleaning, exported to Statistical Package for the Social Science® (SPSS)

for Mac® version 25.0 software (SPSS Inc., IL, USA) for further analysis. Numbers and percentages were used to present categorical data. Mean (\pm standard deviation) was used for normally distributed continuous data. The χ^2 test of independence was used for qualitative variables. A probability level of $P < 0.05$ was taken as significant.

Results

A total of 132 patients were included in the analysis. The mean (SD) age of the population was 40 (12) years, with the majority (38%) of the patients from the age group of 35-49 years. In addition, there was a preponderance of females (60%). More than half of the samples (51.5%) fell into the upper-lower socioeconomic status. The majority (81%) of the patients were married. Around half of the patients (67) were hypothyroid, and the remaining half (65) were hyperthyroid. Around 60% of the hypothyroid and hyperthyroid patients were females. Age group distribution was similar in the hypothyroid and hyperthyroid categories. A total of 20 patients (15%) had anti-TPO positivity, which was significantly higher among the females ($n=16$, 80%, $p=0.046$).

The sample was screened for mental illness using the Modified Mini Screen, and 50.8% required further evaluation and assessment. These patients were assessed using MINI 5.0.0, which is a comprehensive questionnaire for the diagnosis of psychiatric illnesses based on the DSM IV. The overall prevalence was higher among the patients with thyroid disorders as compared to the general population, with around half of the patients having at least one psychiatric illness (Table 1). The most common illnesses were major depressive disorder/dysthymia and generalized anxiety disorder was present in 20% and 13% of the patients, respectively. Around 10% of the patients had mixed anxiety-depression illness. A total of 21 hypothyroid patients (32%) had major depressive disorder/dysthymia, while 17 patients (26%) had major depressive disorder/dysthymia in the hyperthyroid category, and this difference was not statistically significant ($p=0.51$). Similarly, the number of patients developing generalized anxiety disorder was similar between hypothyroid and hyperthyroid categories $n=14$ (21%) and $n=17$ (26%) respectively; $p=0.47$ (Table 2). The distribution of the patients based on the severity of depression using the HAM-D scale was similar between the hypothyroid and hyperthyroid categories ($p=0.25$). Similarly, the distribution of the patients based on the severity of anxiety using the HAM-A scale was similar between the hypothyroid and hyperthyroid categories ($p=0.30$). Anti-TPO antibody was positive in 20 patients (15%). Of the total samples which tested positive for AntiTPO, 80% were females, and 20% were males. A significant association was seen between sex and anti-TPO status ($p < 0.05$, $\chi^2 = 3.983$). There was no significant difference in the prevalence of major depressive disorder and generalized anxiety disorder based on the anti-TPO positivity (p -value 0.89 and 0.45, respectively).

Discussion

The current study assessed 132 patients of age 18 and above diagnosed with hypothyroidism and hyperthyroidism attending an Endocrinology Clinic at a tertiary referral centre. The mean (SD) age of the population was 40 (12) years, with the majority of the patients from the age group of 35-49 years (38%).

There was a preponderance of females (60%). This finding is in concordance with a previous study which showed a higher prevalence of thyroid disorder among females [12].

Table 1 Distribution of various psychiatric disorders in the sample population

Primary Psychiatric Diagnosis	Frequency	Percent
Major Depressive Disorder/Dysthymia	27	20.45
Generalised Anxiety Disorder	18	13.6
Mixed Anxiety – Depressive Disorder	13	9.8
Alcohol Dependence (Current/Lifetime)	3	2.27
Obsessive Compulsive Disorder	2	1.5
Panic Disorder	1	0.75
Adjustment Disorder	1	0.75
Specific Phobia	2	1.5
No illness	65	49.4
Total	132	100

Table 2 Prevalence of Depression and Anxiety in thyroid dysfunction

		Thyroid status		
		Hypothyroid	Hyperthyroid	
Major Depressive Disorder / Dysthymia/Mixed Anxiety depressive disorder	Depressive Disorder/ Dysthymia / Mixed	21 (31.3%)	17 (26.2%)	p = 0.510
	No depression	46 (68.7%)	48 (73.8%)	
Generalised Anxiety Disorder/ Mixed Anxiety Depressive Disorder	GAD/ Mixed	14 (20.9%)	17 (26.2%)	p = 0.476
	No GAD	53 (79.1%)	48 (73.8%)	

The Wickham survey's estimated prevalence of thyroid disorder was 27/1000 females and 1/1000 males. The current study shows an increased prevalence of anxiety and depression disorder and other psychiatric illness compared to the general population. This was like the previous report, which showed a high frequency of lifetime Depressive Disorder (OR = 6.6; 95% CI 1.2–25.7), Generalized Anxiety Disorders (OR = 4.9; 95% CI 1.5–25.4), Social Phobia (OR = 20; 95% CI 2.3–153.3) and Primary Sleep Disorders (OR = 20; 95% CI 2.3–153.3); and a tendency towards an increased frequency of panic disorder [13]. The current study found the prevalence of major depressive disorder/dysthymia and generalized anxiety disorder at 20% and 13%, respectively. A total of 21 hypothyroid patients (32%) had major depressive disorder/dysthymia, while 17 patients (26%) had major depressive disorder/dysthymia in the hyperthyroid category, and this difference was not statistically significant (p=0.51). Boswell et al. in 1997 reported a prevalence of depression of 50% in hypothyroidism and 28% in hyperthyroidism [14]. This study did not find a significant difference in the prevalence of major depressive disorder and generalized anxiety disorder between hypothyroid and hyperthyroid patients. Studies comparing the prevalence between hypothyroid and hyperthyroid patients are scarce. Most studies have reported the prevalence of anxiety and depression among hypothyroid and hyperthyroid patients separately. One study has reported around a 60% prevalence of some degree of depression based on HDRS (males – 56.63% and females – 64.29%) and a 63% prevalence of some degree of anxiety (males –56.66% and females – 65.72%) based on HAM-A among hypothyroid patients [15]. Similarly, another study reported a higher prevalence of psychiatric disorders among female hyperthyroid patients (60% versus 34.7%) [16]. In addition, there was a higher prevalence of major depressive disorder, suicidality, generalised anxiety disorder, panic attacks, and agoraphobia in that study. However, the current study fails to report any statistically significant association between the severity of depression and anxiety and hypothyroid or hyperthyroid status.

The current study also reports a significant association between anti-TPO positivity and the female sex ($p < 0.05$, $\chi^2 = 3.983$). In a study by Ghorraishian et al. on the Iranian population, 89.14% of the sample testing positive for Anti TPO were women [17]. Canaris et al. also reported that autoimmune thyroid diseases affect women 2 to 4 times more than men [18]. The current study evaluated 132 subjects with thyroid diseases, and the anti-TPO positivity did not have any statistically significant association with anxiety and depressive disorder. The severity of anxiety and depression assessed by HAM-A and HAM-D in the same sample also did not have any statistically significant association between anti-TPO status. This is in contrast with previous studies. Carta et al. indicated a significant association between Anti TPO positivity and a lifetime prevalence of anxiety disorders and mood disorders [13].

Similarly, anti-TPO antibody titer was significantly raised in endogenous depression in a study from Pakistan, which evaluated 60 subjects with endogenous depression [19]. This finding paves a pathway to explore other factors in thyroid dysfunction with implications for anxiety and depression disorder. In addition, other factors like antimicrosomal antibodies, transthyretin, a thyroid hormone transporter and their implications in the central nervous system must be elucidated to provide a concrete understanding of the thyroid gland's and supporting system's effects on mood and anxiety in individuals.

Study design, small sample size and non-inclusion of additional variables like sleep disturbances and cognitive deficits to determine the true association of thyroid disorders in psychiatric co-morbidities are a few limitations of the current study.

Conclusion

The overall prevalence was higher among the patients with thyroid disorders than the general population, with around half of the patients having at least one psychiatric illness. The number of patients developing major depressive disorder and generalized anxiety disorder was similar between the hypothyroid and hyperthyroid categories. Anti-TPO positivity did not have any

statistically significant association with the presence of anxiety and depressive disorder. A large longitudinal study might help estimate the exact prevalence of depression and anxiety disorder among patients with thyroid dysfunction and difference based on hypo or hyperthyroid status.

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Conflict of interest

There are no conflicts of interest to declare by any of the authors of this study.

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