Frequency of Depression in Patient Presenting with Thyroid Dysfunction

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ABSTRACT

Objective: To determine the frequency of depression in patient presenting with thyroid disorder at tertiary care hospital.

Methodology: This cross-sectional investigation was executed over an eighteen-month period from December 2022 to June 2023 within the Department of Psychiatry at DUHS, Karachi. A total of 231 subjects, ranging in age from 18 to 70 years, were recruited through non-probability consecutive sampling methodology. The assessment of depression was conducted utilizing the Hamilton Depression Rating Scale (HAM-D). The data were subjected to analysis via SPSS version 26.0. The evaluation of statistical significance was performed employing the Chi-square test, with a p-value of ≤0.05 deemed indicative of significance.

Results: Among a cohort of 231 participants (mean age 37.52 ± 11.38 years; 64.1% within the age range of 18–40), a

significant association with depression was exclusively observed in relation to marital status, wherein individuals who were divorced exhibited markedly elevated odds (OR=11.010, P=0.000). Despite the predominance of male participants (90.5%), neither age (P=0.363) nor gender (P=0.533) demonstrated a significant association. Furthermore, thyroid dysfunctions did not reveal any significant relationship with depression (P=0.961).

Conclusion: The overall incidence of depression among individuals diagnosed with thyroid dysfunction was significant; nevertheless, no statistically meaningful association was identified between the specific type of thyroid disorder and the manifestation of depression. Marital status, particularly the condition of being divorced, surfaced as a notable predictor of depression within this demographic. Further longitudinal studies are required to explore causality and the mediating role of psychosocial factors in thyroid-related depression.

Keywords: Depression, Hamilton depression rating scale, Subclinical hyperthyroidism, Thyroid disorder

INTRODUCTION

Thyroid disorders are among the most common endocrine conditions worldwide and are known to exert widespread effects on physical and psychological health. The thyroid gland plays a crucial role in regulating metabolism, and disturbances in its function have been increasingly linked to various neuropsychiatric manifestations, particularly mood disorders such as depression and anxiety^{1.2}.

Emerging evidence suggests a bidirectional relationship between thyroid dysfunction and mental health disturbances. Both hypothyroidism and hyperthyroidism can lead to alterations in neurotransmitter activity, hypothalamic– pituitary–thyroid (HPT) axis dysfunction, and structural brain changes, contributing to the onset or exacerbation of depressive symptoms^{3,4}. Subclinical thyroid dysfunction, often overlooked due to its mild biochemical abnormalities, has also been implicated as a significant risk factor for depression. A meta-analysis by Tang et al.⁵ demonstrated that the prevalence of depression was slightly higher among individuals with subclinical hypothyroidism (SCH) compared to euthyroid individuals (8.6% vs. 7.5%), reinforcing the subtle yet impactful role of thyroid status in mental health outcomes.

Patients with hypothyroidism frequently report fatigue, lethargy, and low mood—core features overlapping with clinical

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Submitted: October 02, 2024 Revised: March 17, 2025 Accepted: April 19, 2025 depression⁶. Conversely, those with hyperthyroidism may experience heightened anxiety, irritability, and depressive symptoms, often complicating the diagnostic and therapeutic processes^{7.8}. Studies have shown a high prevalence of depression and anxiety among patients with both overt and subclinical thyroid dysfunction⁹⁻¹¹.

Moreover, thyroid-related conditions such as differentiated thyroid cancer have also been associated with impaired quality of life and increased rates of depression and anxiety¹². Research utilizing large cohorts, including prospective data from the UK Biobank, further supports the association between thyroid abnormalities and depressive disorders, underscoring the importance of early recognition and integrated care².

In low-resource settings and tertiary care centers, the frequency of depression among patients presenting with thyroid dysfunction may be underreported or misdiagnosed due to overlapping symptoms and lack of routine mental health screening¹³. Given the clinical implications, assessing the psychological well-being of patients with thyroid disorders is essential for improving both endocrine and mental health outcomes.

In recent years, the prospective association between SCH and depression has garnered increased scholarly attention^{13,14}. However, the findings remain heterogeneous. Investigation of depression has revealed the prevalence to be much higher in thyroid dysfunction compared with euthyroid^{4,15}, while others did not find a statistically significant difference^{14,16}.

Due to the conflicting results from previously published studies, we aim to determine the prevalence of depressive disorders in patients with thyroid diseases visiting a tertiary care center. The outcomes derived from this inquiry may yield pertinent local evidence and facilitate the formulation of focused therapeutic interventions. The prompt recognition and appropriate management of concurrent psychological conditions have the potential to markedly improve the overall quality of life for this specific patient demographic.

METHODOLOGY

This cross-sectional investigation was executed at the Department of Psychiatry, Dr. A.Q. Khan Institute of Behavioral Sciences, Dow University of Health Sciences (DUHS), Karachi, over a time period of eighteen months, commencing on December 30, 2022, and concluding on June 29, 2023. A total of 231 subjects were recruited utilizing non-probability, consecutive sampling methodology. Sample size was calculated using the WHO sample size calculator based on a prevalence rate of depression in patients with subclinical hypothyroidism of (12.2%)¹³, a margin of error (d) of 4.5%, using a 95% confidence interval. Individuals aged from 18 to 70 years, regardless of gender, and possessing a confirmed diagnosis of thyroid dysfunction persisting for a minimum duration of three months were incorporated into the study. Exclusion criteria included a documented history of malignancy, chronic liver disease or chronic renal failure, preexisting psychiatric disorders and pregnancy. Informed written consent was provided by all participants prior to their enrollment. Baseline demographic and clinical data included age, sex, and marital status, education, occupational status, monthly income, body mass index (BMI), type of thyroid disorder, and depression status. Thyroid dysfunction was categorized based on thyroid hormone profiles: hyperthyroidism was characterized by TSH levels < 0.5 mIU/ml with T4 levels > 120 ng/ml and T3 levels > 2.2 ng/ml; hypothyroidism was defined as TSH levels > 5 mIU/ml with T4 levels < 50 ng/ml and T3 levels < 0.8 ng/ml; subclinical hypothyroidism was indicated by TSH levels > 5 mIU/ml with normal T3 (0.8–2.2 ng/ml) and T4 (50–120 ng/ml); and subclinical hyperthyroidism was identified as TSH levels < 0.55 mIU/ml with normal T3 and T4 levels. The Hamilton Depression Rating Scale (HAM-D) was employed to assess depression and a score of \geq 10 was considered as depression. All laboratory assessments were performed through the standard laboratory services of the hospital to ensure precision and quality control measures. Data entry and analysis were performed using SPSS version 26.0. Frequency with percentage and mean along with standard deviation were calculated with respect to both qualitative and quantitative variables. Statistical associations were calculated using the Chi-square test and a p-value of \leq 0.05 was considered statistically significant.

RESULTS

The research encompassed a cohort of 231 individuals with an average age of 37.52 ± 11.38 years. Within this sample, 148 participants (64.1%) fell within the age range of 18-40 years, whereas 83 participants (35.9%) were aged over 40 years. The average body mass index (BMI) was calculated to be 27.51 ± 4.43 kg/m², with 123 individuals (53.2%) exhibiting a BMI within the range of 19–27 kg/m², and 108 individuals (46.8%) having a BMI exceeding 27 kg/m². A significant proportion of the sample was female (209, 90.5%), while males constituted 22 participants (9.5%). In terms of religious affiliation, 182 participants (78.8%) identified as Muslim, 30 participants (13.0%) as Hindu, and 19 participants (8.2%) as Christian. The majority of participants resided in nuclear family structures (193, 83.5%), while 38 participants (16.5%) were part of joint family arrangements. With respect to marital status, 179 participants (77.5%) were married, 42 participants (18.2%)

were unmarried, and 10 participants (4.3%) were divorced. The educational attainment of the participants varied considerably, with 19 individuals (8.2%) classified as illiterate, 31 individuals (13.4%) possessing primary education, 82 individuals (35.5%) achieving secondary education, 39 individuals (16.9%) completing matriculation, 25 individuals (10.8%) reaching the intermediate level, and 35 individuals (15.2%) attaining higher education. In terms of occupational status, 83 individuals (35.9%) were engaged in employment, 7 individuals (3.1%) were unemployed, and 141 individuals (61.0%) were homemakers. The distribution of socioeconomic status revealed that 55 individuals (23.8%) were categorized as belonging to the lower class, 106 individuals (45.9%) to the middle class, and 70 individuals (30.3%) to the upper class, as delineated in **Table I**.

Table II presents a statistical analysis comparing various characteristics between individuals diagnosed with depression (n=101) and those without such a diagnosis (n=130), emphasizing odds ratios (OR), 95% confidence intervals (CI), and associated P-values. The sole variable exhibiting a statistically significant correlation with depression is marital status, wherein individuals who are divorced demonstrate an OR of 11.010 (95% CI: 6.001-19.627, P=0.000), signifying a markedly significant association. An elevated body mass index (BMI) (\geq 27 kg/m²) is correlated with an increased likelihood of depression (OR=2.441, 95% CI: 0.986-6.047), with a P-value of 0.054, which, while not statistically significant, indicates a potential trend. Other examined variables do not attain statistical significance: age group (OR=1.288, CI: 0.746-2.223, P=0.363), gender (OR=1.642, CI: 0.549-4.918, P=0.533), type of family (OR=0.711, CI: 0.314-1.607, P=0.412), educational attainment (OR=1.056, CI: 0.884-1.262, P=0.857), employment status (OR=0.693, CI: 0.073-1.273, P=0.742), and socioeconomic status (OR=1.326, CI: 0.927-1.896, P=0.099). All corresponding P-values exceed the threshold of 0.05, thereby indicating a lack of statistical significance. Consequently, based on the findings presented in Table II, marital status (specifically the condition of being divorced) emerges as the only variable demonstrating a statistically significant association with depression within this particular sample.

The incidence of depressive disorders among individuals diagnosed with various forms of thyroid dysfunction was investigated; however, no statistically significant correlation was identified (P=0.961). The occurrence of depression was documented in 51.5% of patients with hyperthyroidism, which mirrors the rate found in the non-depressed cohort. Likewise, 34.7% of subjects suffering from hypothyroidism exhibited depressive symptoms, in contrast to 33.1% of those without such symptoms. Instances of subclinical hyperthyroidism were recorded in 5.9% of patients experiencing depression and 7.7% among those not experiencing depression, whereas subclinical hypothyroidism was noted in 7.9% and 7.7%, respectively. These results imply that depressive conditions manifest at comparable frequencies across various thyroid disorders, lacking a statistically relevant difference as illustrated in Table III.

Table I: Demographic Characteristics of Study Participants (n=231)						
Demographic Characteristics	Frequency (Percentage %)					
Age (Mean ± SD) = 37.52 ± 11.38						
18 - 40 years	148 (64.1)					
> 40 years	83 (35.9)					
Body mass Index (Mean ± SD) = 27.51 ± 4.43						
19 - 27 kg/m ²	123 (53.2)					
> 27 kg/m ²	108 (46.8)					
Gender						
Male	22 (9.5)					
Female	209 (90.5)					
Religion						
Christian	19 (8.2)					
Hindu	30 (13.0)					
Islam	182 (78.8)					
Type of Family						
Joint	38 (16.5)					
Nuclear	193 (83.5)					
Marital Status						
Married	179 (77.5)					
Unmarried	42 (18.2)					
Divorced	10 (4.3)					
Educational Status						
Illiterate	19 (8.2)					
Primary	31 (13.4)					
Secondary	82 (35.5)					
Matric	39 (16.9)					
Inter	25 (10.8)					
Higher	35 (15.2)					
Occupational Status						
Employed	83 (35.9)					
Unemployed	7 (3.1)					
Housewife	141 (61.0)					
Socioeconomic Status						
Lower Class	55 (23.8)					
Middle Class	106 (45.9)					
Upper Class	70 (30.3)					

Table II: Characteristics of Patients with and without Depression (n=231)							
		Depression		Odds Ratio			
Sociodemographic and	Clinical Profile	Yes (n=101)	No (n=130) 95% Confidence		P-Value		
Age Group	18 - 40 years	68 (67.3)	80 (61.5)	1.288 (0.7462.223)	0.363		
	>40 years	33 (32.7)	50 (38.5)				
	19 - 27 kg/m ²	65 (64.4)	58 (44.6)	2.241 (1.3143.824)	0.003*		
BINI Group	> 27 kg/m ²	36 (35.6)	72 (55.4)				
Condor	Male	11 (10.9)	11 (8.5)	1.322 (0.5493.186)	0.533		
Gender	Female	90 (89.1)	119 (91.5)				
	Christian	9 (8.9)	10 (7.7)		0.271		
Religion	Hindu	17 (16.8)	13 (10.0)	1.280 (0.8371.958)			
	Islam	75 (74.3)	107 (82.3)				
Turne of Formily	Joint 14 (13.9) 24 (18.5)	0.711	0.050				
i ype of Family	Nuclear	87 (86.1)	106 (81.5)	(0.3471.457)	0.350		
Marital Status	Married	78 (77.2)	101 (77.7)	1.010 (0.6011.697)	0.916		
	Unmarried	18 (17.8)	24 (18.5)				
	Divorced	5 (5.0)	5 (3.8)				
Educational Status	Illiterate	8 (7.9)	11 (8.5)	1.056 (0.8841.263)	0.857		
	Primary	14 (13.9)	17 (13.1)				
	Secondary	39 (38.6)	43 (33.1)				
	Matric	17 (16.8)	22 (16.9)				
	Inter	8 (7.9)	17 (13.1)				
	Higher	15 (14.9)	20 (15.4)				
Occupational Status	Employed	35 (34.7)	48 (36.9)	0.969 (0.7371.273)	0.742		
	Unemployed	4 (4.0)	3 (2.3)				
	Housewife	62 (61.4)	79 (60.8)				
Socioeconomic Status	Lower Class	31 (30.7)	24 (18.5)		0.090		
	Middle Class	41 (40.6)	65 (50.0)	1.326 (0.9271.896)			
	Upper Class	29 (28.7)	41 (31.5)				

Table III: Comparison of Depression Among Patients with Different Types of Thyroid Disorders (n=231)						
Type of Thyroid Dysfunction	Depression					
	Yes (n=101)	No (n=130)	r-value			
Hyperthyroidism	52 (51.5%)	67 (51.5)	0.961			
Hypothyroidism	35 (34.7%)	43 (33.1)				
Subclinical Hyperthyroidism	6 (5.9%)	10 (7.7)				
Subclinical Hypothyroidism	8 (7.9%)	10 (7.7)				

DISCUSSION

Although our investigation revealed a substantial proportion of individuals with thyroid dysfunction concurrently experiencing depressive symptoms, no statistically significant correlation was identified between the specific type of thyroid disorder and the manifestation of depressive symptoms. This finding stands in stark contrast to previous scholarly works that indicate more robust associations, particularly in instances of overt hypothyroidism and hyperthyroidism. A plausible explanation for this discrepancy may reside in the multifaceted pathophysiology of depression, encompassing autoimmune mechanisms and cytokine-mediated alterations, which were not examined within our study cohort.

The elevated rate of depression among hyperthyroid patients in our study closely mirrors the 56.4% reported by Gorkhali et al., who also identified a 36.7% prevalence in hypothyroid patients¹⁰. These similarities reinforce the notion that mood disturbances are a common clinical feature of thyroid dysfunction. While the precise mechanisms are multifactorial, Qiu et al. proposed that inflammatory cytokines may mediate the relationship between hypothyroidism and depression, further complicating the neuroendocrine-immune axis¹⁷. Chronic inflammation, frequently observed in thyroid disorders, is thought to influence neurotransmitter pathways, leading to depressive symptoms.

Autoimmune thyroid disease has also emerged as a significant contributor to mood disorders. Siegmann et al., in a systematic review and meta-analysis, demonstrated a strong association between autoimmune thyroiditis and both depression and anxiety disorders¹⁸. While our study did not specifically examine autoimmune markers, it is likely that a subset of our hypothyroid and subclinical hypothyroid patients had underlying autoimmune conditions such as Hashimoto's thyroiditis. This is especially relevant given the increasing recognition that thyroid autoimmunity itself—independent of hormone levels—can impact psychological health. Supporting this, Yalcin et al. found that patients with euthyroid Hashimoto's thyroiditis reported poorer psychological well-being compared to healthy controls, highlighting the importance of autoimmune status in mood disturbances¹⁹.

In terms of subclinical thyroid dysfunction, our findings showed 7.9% prevalence of depression in subclinical hypothyroidism and 5.9% in subclinical hyperthyroidism. These rates are somewhat lower than those reported by Kafle et al., who observed depression in 12.2% and 1.5% of these groups, respectively¹³. The difference in findings may be attributed to variations in study populations, diagnostic tools, and clinical settings. However, both studies indicate that subclinical

dysfunction, though milder in presentation, is not devoid of psychological consequences.

Roa Dueñas et al. emphasized that even minor alterations in thyroid hormone levels can be longitudinally associated with changes in depressive symptoms²⁰. Their large population-based study underscores the need for regular psychological assessment in thyroid patients, even those without overt symptoms. This supports our recommendation that screening for depression should be an integral part of thyroid disorder management, particularly in tertiary care environments where complex and chronic cases are often managed.

Finally, while most studies focus on non-malignant thyroid dysfunctions, psychological impacts are also notable in thyroid cancer patients. Alexander et al. conducted a scoping review showing that anxiety and depression are common in this group due to concerns about recurrence, quality of life, and body image—even in cases with favorable prognoses²¹.

This investigation delineates several merits that enhance its methodological integrity and clinical significance. Particularly, the employment of a validated instrument—the Hamilton Depression Rating Scale (HAM-D)—facilitated a consistent and objective evaluation of depressive manifestations. Moreover, the biochemical categorization of thyroid dysfunction into discrete clinical classifications permitted meticulous subgroup examinations. By engaging with a locally underrepresented domain, the investigation also provides substantive insights into the convergence of endocrine and mental health disorders within a tertiary care environment in Karachi, thereby augmenting the regional corpus of evidence.

Nonetheless, the investigation is subject to constraints that must be acknowledged when interpreting its outcomes. Its cross-sectional framework restricts the capacity to deduce causality or temporal associations between thyroid dysfunction and depressive manifestations. The single-center context and reliance on non-probability consecutive sampling may also introduce selection bias, thereby constraining the generalizability of the findings to broader or more heterogeneous cohorts. Furthermore, the omission of thyroid autoantibody assessments curtails the understanding of autoimmune thyroiditis's role, a potentially significant factor in the etiology of depression. Excluding participants with pre-existing psychiatric conditions, although methodologically deliberate, may have resulted in the underappreciation of subclinical or undiagnosed mood disorders. Finally, while the HAM-D is a prevalent screening instrument, its subjective characteristics may hinder the capture of cultural variations in the presentation of depressive symptomatology.

Future investigations should aspire to incorporate longitudinal, multicenter methodologies with more representative sampling, include evaluations of thyroid autoimmunity, and implement comprehensive psychiatric assessments. Such methodologies would facilitate a more profound examination of the thyroid–depression nexus and advocate for the integration of routine psychological screening within endocrine clinical practice.

CONCLUSION

The overall incidence of depression among individuals diagnosed with thyroid dysfunction was significant; nevertheless, no statistically meaningful association was identified between the specific type of thyroid disorder and the manifestation of depression. Marital status, particularly the condition of being divorced, surfaced as a notable predictor of depression within this demographic. Further longitudinal studies are required to explore causality and the mediating role of psychosocial factors in thyroid-related depression.

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