

ORIGINAL ARTICLE

Personality Profile, Depression, and Anxiety in Female Patients with Hypothyroidism: A Case-Control Study

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ABSTRACT

Introduction: Thyroid dysfunction often presents with psychiatric symptoms, posing diagnostic challenges. This case-control study aims to assess personality profiles, depression, and anxiety in female hypothyroid patients compared to euthyroid individuals. **Methods:** Sixty-three hypothyroid cases and seventy-seven euthyroid controls were recruited from a medical outpatient department. Validated tools, including HADS, WHO-QOL BREF, and NEO-FFI-3, were used for assessment. **Results:** Hypothyroid patients exhibited elevated depression and anxiety levels, pronounced neuroticism, and reduced quality of life compared to controls. **Conclusion:** These findings underscore the importance of early recognition and management of psychiatric symptoms in hypothyroidism to optimize patient outcomes. This study sheds light on the complex interplay between thyroid dysfunction and psychological well-being, particularly in female patients.

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INTRODUCTION

Thyroid dysfunction is a complex medical condition that presents with a wide array of symptoms, extending far beyond the traditional somatic manifestations commonly associated with the disorder. While the physical symptoms of thyroid dysfunction are well-documented, its psychiatric presentations can often complicate both diagnosis and management. Among the various thyroid disorders, hypothyroidism stands out for its significant association with psychiatric symptoms, including depression, anxiety, and alterations in personality traits (1). Despite considerable research into these associations, our understanding of the precise mechanisms underlying the relationship between thyroid dysfunction and psychiatric symptoms remains incomplete.

In recent years, there has been growing recognition of the substantial impact that thyroid disorders, particularly hypothyroidism, can have on mental health. Studies have consistently demonstrated an increased risk of depression, bipolar affective disorder and anxiety (2,3) among individuals with hypothyroidism

compared to the general population (4). Additionally, alterations in personality traits, such as heightened neuroticism and decreased agreeableness, openness, and conscientiousness, have been observed in patients with hypothyroidism. Understanding these psychiatric manifestations of thyroid dysfunction is essential not only for accurate diagnosis but also for implementing effective treatment strategies that address both the physical and psychological aspects of the disorder(5). The terms frequently used in my study are defined as follows: A) Newly Diagnosed: Refers to female patients who have recently been identified as having hypothyroidism by a healthcare provider and have not yet started treatment for the condition. B) Euthyroid: Describes a condition where the thyroid gland is functioning normally, with thyroid hormone levels within the normal range, indicating that the patient does not have hypothyroidism or hyperthyroidism.

Of particular importance is the recognition of the unique challenges faced by female patients with thyroid dysfunction. Research in our nation has indicated that women may be more susceptible to certain psychiatric symptoms associated with hypothyroidism, further emphasizing the need for tailored approaches to diagnosis and management(6). Early identification of psychiatric symptoms in female patients with thyroid dysfunction is crucial for facilitating timely intervention and improving overall patient outcomes(7). By gaining

a deeper understanding of the psychological impact of thyroid dysfunction, healthcare professionals can better address the complex needs of individuals affected by this multifaceted disorder.

MATERIALS AND METHODS

This study employs a case-control design to compare personality profiles, depression, and anxiety levels between female hypothyroid patients and euthyroid individuals. The study is conducted at a medical outpatient department of Saveetha Medical College and Hospital.

The study includes female participants aged 20-65 years. Cases consist of newly diagnosed hypothyroid patients confirmed through thyroid function tests (elevated TSH levels and decreased free T4 levels), while controls are euthyroid individuals without thyroid dysfunction. Participants must provide informed consent and be available for follow-up assessments.

The sample size is calculated based on previous studies investigating psychiatric symptoms in hypothyroid patients, aiming for adequate statistical power to detect significant differences between groups.

The inclusion criteria for this study comprised female participants aged 20–65 years with newly diagnosed hypothyroidism confirmed via thyroid function tests, who provided informed consent and were available for follow-up assessments. Conversely, the study excluded individuals with a history of psychiatric disorders or treatment prior to their hypothyroidism diagnosis, as well as those with concurrent medical conditions or medications known to interfere with thyroid function or psychiatric symptoms. Additionally, participants were excluded if they were pregnant, lactating, possessed cognitive or language barriers preventing assessment completion, or had a history of thyroid surgery or radioactive iodine treatment.

Data collection involves administering validated assessment tools, including the Hospital Anxiety and Depression Scale (HADS) to measure depression and anxiety, the WHO-QOL BREF to assess quality of life, and the NEO Five-Factor Inventory (NEO-FFI-3) to evaluate personality traits.

Statistical analysis is performed using SPSS software version 23. Descriptive statistics are used to summarize demographic and clinical characteristics. Inferential statistics, including t-tests or Mann-Whitney U tests for continuous variables and chi-square tests for categorical variables, are utilized to compare outcomes between hypothyroid patients and controls. A p-value <0.05 is considered statistically significant.

Ethical approval is obtained from the institutional

review board of Saveetha Medical College and Hospital (SMCH/IEC/2023/08/046). Informed consent is obtained from all participants before enrollment in the study.

RESULTS

The analysis of thyroid function tests (TFT) in relation to psychological distress revealed several significant associations (Table I). T3 levels demonstrated a statistically significant negative correlation with depression scores ($r = -0.325, p = 0.001$). Conversely, T4 levels showed a significant positive correlation with anxiety scores ($r = 0.250, p = 0.003$) but no significant link to depression. Notably, TSH levels exhibited strong, statistically significant positive correlations with both depression ($r = 0.603, p = 0.001$) and anxiety scores ($r = 0.284, p = 0.001$).

Table I: Correlation between thyroid hormone levels and depression and anxiety

THYROID LEVELS		HADS-D	HADS-A
T3	Pearson Correlation	-0.325**	-0.14
	Sig. (2-tailed)	0.001	0.099
T4	Pearson Correlation	0.135	0.250**
	Sig. (2-tailed)	0.112	0.003
TSH	Pearson Correlation	0.603**	0.284**
	Sig. (2-tailed)	0.001	0.001

The impact of thyroid levels on the WHO Quality of Life (WHOQOL) domains varied across the hormonal markers (Table II). TSH levels showed a statistically significant negative correlation across all four domains: physical health ($r = -0.434$), psychological health ($r = -0.402$), social relationships ($r = -0.312$), and environmental factors ($r = -0.194$). T3 levels were significantly and positively correlated with both the physical ($r = 0.301, p = 0.001$) and psychological ($r = 0.227, p = 0.007$) domains, though social and environmental scores did not reach significance. T4 levels demonstrated no statistically significant correlation with any of the four QOL domains.

Assessment of the NEO FFI-3 personality domains highlighted distinct neurobiological correlates with thyroid function (Table III). T3 levels did not correlate significantly with most domains, except for a significant positive correlation with agreeableness ($r = 0.202, p = 0.017$).

T4 levels showed a significant positive correlation with neuroticism ($r = 0.293, p < 0.001$) and significant negative correlations with openness ($r = -0.377, p < 0.001$) and conscientiousness ($r = -0.369, p < 0.001$). Similarly, TSH levels correlated positively with neuroticism ($r = 0.227, p = 0.007$) and negatively with agreeableness

Table II: Correlation between thyroid hormone levels and quality of life

TFT	Kendall's tau-b Test	QOL-PHYSICAL HEALTH	QOL-PSYCHOLOGICAL	QOL-SOCIAL RELATIONSHIPS	QOL- ENVIRONMENT
T3	Pearson Correlation	0.301**	0.227**	0.136	0.069
	Sig. (2-tailed)	0.001	0.007	0.108	0.417
T4	Pearson Correlation	-0.085	-0.105	-0.085	0.003
	Sig. (2-tailed)	0.318	0.217	0.32	0.972
TSH	Pearson Correlation	-0.434**	-0.402**	-0.312**	-0.194*
	Sig. (2-tailed)	0.001	0.001	0.001	0.022

Table III: Correlation between thyroid hormone levels and personality profile

TFT		Neuroticism	Extrovertism	Openness	Agreeableness	Conscientiousness
T3	Pearson Correlation	-0.013	-0.106	-0.096	0.202*	-0.027
	Sig. (2-tailed)	0.875	0.214	0.258	0.017	0.754
T4	Pearson Correlation	0.293**	0.11	-0.377**	-0.166	-0.369**
	Sig. (2-tailed)	0	0.197	0	0.05	0
TSH	Pearson Correlation	0.227**	0.086	-0.139	-0.278**	-0.096
	Sig. (2-tailed)	0.007	0.313	0.101	0.001	0.257

($r = -0.278$, $p = 0.001$). Neither T4 nor TSH showed significant associations with extroversion.

DISCUSSION

This study explores the intricate relationship between hypothyroidism and psychological well-being in women, highlighting significant associations between hypothyroidism and changes in personality traits, increased levels of depression and anxiety, and diminished overall quality of life (8). In concordance with previous research findings, individuals diagnosed with hypothyroidism demonstrated higher levels of depression and anxiety compared to those without thyroid dysfunction (9). Additionally, hypothyroid patients exhibited distinct alterations in personality traits, with heightened neuroticism levels and reduced levels of agreeableness, openness, and conscientiousness.

The evaluation of quality of life further underscored the substantial impact of hypothyroidism on overall well-being, emphasizing the necessity of comprehensive management approaches that address both endocrine and psychiatric aspects (10). However, the study acknowledges limitations inherent in its cross-sectional design, which restricts the ability to draw causal conclusions. Furthermore, the composition of the sample primarily comprising newly diagnosed hypothyroid patients limits the broader generalizability of the findings.

The observed correlations between thyroid hormone levels and psychiatric symptoms, personality traits, and quality of life offer insights into the complex interplay between thyroid function and mental health outcomes. Dysregulation of neurotransmitter systems, particularly

serotonin and norepinephrine, may contribute to the psychiatric symptomatology observed in hypothyroid patients (11). Moreover, alterations in thyroid hormone levels have been implicated in changes in brain structure and function, also supporting this evidence. Future research utilizing neuroimaging techniques and molecular studies may provide deeper insights into these mechanisms (12).

Elevated levels of TSH, indicative of hypothyroidism, were found to be positively correlated with depression and anxiety scores, consistent with prior research findings (13). Similarly, the associations between thyroid hormones and personality dimensions suggest potential mechanisms contributing to the observed psychiatric symptoms (14).

Given the multifaceted nature of hypothyroidism's impact on psychological well-being, integrated management approaches are essential for optimizing patient outcomes. Combining pharmacological interventions with psychotherapy and lifestyle modifications can address both endocrine and psychiatric aspects of hypothyroidism. Furthermore, patient education and support programs play a crucial role in empowering individuals to manage their condition effectively and enhance their overall quality of life. By adopting a holistic approach to patient care, healthcare providers can better address the complex needs of hypothyroid patients.

CONCLUSION

In conclusion, this comprehensive review underscores the significant impact of hypothyroidism on psychological well-being in women. By elucidating the links between

hypothyroidism and alterations in personality traits, heightened levels of depression and anxiety, and reduced quality of life, this review contributes to a deeper understanding of the complex interplay between thyroid function and mental health outcomes. Integrated management approaches that address both endocrine and psychiatric aspects of hypothyroidism are essential for optimizing patient outcomes. Future research should focus on elucidating underlying mechanisms and evaluating the effectiveness of integrated treatment approaches in improving psychological well-being in hypothyroid patients.

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REFERENCES

1. Lekurwale V, Acharya S, Shukla S, Kumar S. Neuropsychiatric manifestations of thyroid diseases. *Cureus*. 2023 Jan 19;15(1):e33987. doi: 10.7759/cureus.33987.
2. Norman SJ, Carney AC, Algarin F, Witt B, Witzel IM, Rodriguez PM, et al. Thyroid dysfunction and bipolar disorder: A literature review integrating neurochemical, endocrine, and genetic perspectives. *Cureus*. 2024 Sep 27;16(9):e69182. doi: 10.7759/cureus.69182.
3. Wildisen L, Del Giovane C, Moutzouri E, Beglinger S, Syrogiannouli L, Collet TH, et al. An individual participant data analysis of prospective cohort studies on the association between subclinical thyroid dysfunction and depressive symptoms. *Sci Rep*. 2020 Nov 5;10(1):19111. doi: 10.1038/s41598-020-75776-1.
4. Mohamed MFH, Danjuma M, Mohammed M, Mohamed S, Siepmann M, Barlinn K, et al. Myxedema psychosis: Systematic review and pooled analysis. *Neuropsychiatr Dis Treat*. 2021 Aug 18;17:2713-2728. doi: 10.2147/NDT.S318651.
5. Fischer S, Strahler J, Markert C, Skoluda N, Doerr JM, Kappert M, et al. Effects of acute psychosocial stress on the hypothalamic-pituitary-thyroid (HPT) axis in healthy women. *Psychoneuroendocrinology*. 2019 Dec;110:104438. doi: 10.1016/j.psyneuen.2019.104438.
6. George S, Maiti R, Mishra A, Ranjan Mishra B, Jena M. Efficacy and safety of supraphysiologic doses of levothyroxine for patients with bipolar depression in adults: A systematic review. *J Psychopharmacol*. 2022 May;36(5):521-530. doi: 10.1177/02698811221078758.
7. Menon U, Sundaram KR, Unnikrishnan AG, Jayakumar RV, Nair V, Kumar H. High prevalence of undetected thyroid disorders in an iodine sufficient adult south Indian population. *J Indian Med Assoc*. 2009 Feb;107(2):72-77.
8. Biondi B, Cooper DS. The clinical significance of subclinical thyroid dysfunction. *Endocr Rev*. 2008 Feb 1;29(1):76-131. doi: 10.1210/er.2006-0043.
9. Ramezani M, Reisian M, Sajadi Hezaveh Z. The effect of synbiotic supplementation on hypothyroidism: A randomized double-blind placebo controlled clinical trial. *PLoS One*. 2023 Feb 6;18(2):e0277213. doi: 10.1371/journal.pone.0277213.
10. Karakatsoulis GN, Tsapakis EM, Mitkani C, Fountoulakis KN. Subclinical thyroid dysfunction and major depressive disorder. *Hormones (Athens)*. 2021 Dec;20(4):613-621. doi: 10.1007/s42000-021-00312-3.
11. Caye A, Pilz LK, Maia AL, Hidalgo MP, Furukawa TA, Kieling C. The impact of selective serotonin reuptake inhibitors on the thyroid function among patients with major depressive disorder: A systematic review and meta-analysis. *Eur Neuropsychopharmacol*. 2020 Apr;33:139-145. doi: 10.1016/j.euroneuro.2020.01.011.
12. Hage MP, Azar ST. The link between thyroid function and depression. *J Thyroid Res*. 2012;2012:590648. doi: 10.1155/2012/590648.
13. Demartini B, Ranieri R, Masu A, Selle V, Scarone S, Gambini O. Depressive symptoms and major depressive disorder in patients affected by subclinical hypothyroidism. *J Nerv Ment Dis*. 2014 Aug;202(8):603-607. doi: 10.1097/NMD.0000000000000168.
14. Ramezani M, Sajadi Hezaveh Z. The effect of synbiotic supplementation on thyroid hormones, blood pressure, depression and quality of life in hypothyroid patients: A study protocol for a randomized double-blind placebo controlled clinical trial. *Clin Nutr ESPEN*. 2022 Apr;48:472-478. doi: 10.1016/j.clnesp.2022.01.003.