



Brief Research

Incidence and Progression of Mental Health Alterations among Middle-Aged Females with Hypothyroidism

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Received: 15 October 2024

Accepted: 03 March 2025

Published: 05 September 2025

DOI

10.25259/JCH_44_2024

Quick Response Code:



ABSTRACT

Due to advancements in technology and lifestyle changes, non-communicable diseases are increasing at a faster rate. Hypothyroidism is one of the most deleterious and common chronic non-communicable diseases. Anxiety, depression, and memory problems are common and often unidentified, although they can cause severe effects on quality of life in the longer run, which are strongly associated with chronic diseases. We aimed to compare the association and severity of mental health and memory disturbances in hypothyroidism among middle-aged females. The study was a cross-sectional observational design. A sample of 103 subjects was assigned between two groups: Group-A (52 females with hypothyroidism), and Group-B (51 females with no chronic illness). All the groups were tested for anxiety using the Generalized Anxiety Disorder-7 (GAD-7), depression (Personal Health Questionnaire-9 [PHQ-9]), and memory (Postgraduate Institute Memory Scale [PGIMS]) and scored accordingly.

Keywords: Anxiety, Depression, Hypothyroidism, Memory

INTRODUCTION

Due to advancements in technology and lifestyle changes, non-communicable diseases are increasing rapidly. Hypothyroidism is one of the most common chronic hormonal imbalances.¹ Anxiety, depression, and problems in memorization are common comorbidities caused by chronic diseases and often unidentified, although they can cause severe effects on quality of life in the long run.¹ The prevalence of hypothyroidism among women was higher than men, approximately 13% in women and 0.2% in men. Several methodological and conceptual issues need to be addressed to advance the understanding of the neurocognitive correlation with hypothyroidism.^{2,3}

An association between hypothyroidism and depression has been accepted and taught in medicine for many years, although the nature of this relationship and what determines it have not been convincingly proven. The occurrence of depression is two to three times higher in people with metabolic disorders, the majority of the cases remaining undiagnosed.⁴

Depression is a common and very serious medical disease associated with chronic non-communicable diseases with a lifetime prevalence ranging from approximately 11% in low-income countries to 15% in high-income countries.⁵ Thyroid hormones play an important role in mood and behavior, and cognition is an established entity. Thus, the correlation between psychiatric disorders and thyroid status is a major area of concern. Furthermore, thyroid dysfunctions can lead to psychiatric co-morbidities such as depressive disorder, anxiety disorder,

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and disturbances in memory and learning, which are also evident.⁶⁻⁹ A higher incidence of anxiety and depressive disorders is observed in females.¹⁰

Despite established evidence linking hypothyroidism to various psychological disturbances, including anxiety, depression, and cognitive impairment, a significant research gap exists regarding the magnitude of these effects within the Indian demographic. This investigation seeks to quantify the comparative severity of mental health alterations and memory dysfunction in middle-aged female hypothyroid patients versus age-matched controls. Thus, the study aims to compare the level of disturbances in mental health in hypothyroid diseases with a normal population and identify the condition demanding early intervention in a biopsychosocial approach to treat the patients holistically and decrease comorbidities. These comorbidities lead to a deterioration in the quality of life, which can lead to an increase in the symptoms of the condition, stress-related musculoskeletal pain, poor concentration, and attention problems.

MATERIAL AND METHODS

This study used a cross-sectional observational design to compare memory, anxiety, and depression between middle-aged females having hypothyroidism, diagnosed by a physician at HAHC Hospital, New Delhi, and referred to Rehabilitation Center, Jamia Hamdard, New Delhi, India and were selected through convenience sampling method. Recruitment was done by a researcher at the Rehabilitation Center based on inclusion and exclusion criteria. The research samples were 52 female patients with hypothyroidism and 51 healthy females with no chronic disease, who were assigned to respective groups.

Participants

A sample of 103 subjects was selected on the basis of convenience sampling. The sample size was calculated using G*power version 3.1. having an effect size of 0.51 calculated using a pilot study and power of 80% at 95% confidence interval, the anticipated sample size was 98 subjects. Fifty-two females with hypothyroid and 51 normal females following the inclusion criteria [Table 1] were recruited into the study and divided into two groups accordingly.

Procedure

Following approval from the Institutional Ethics Committee of Jamia Hamdard, New Delhi, India, the research protocol was presented to a general physician at HAHC Hospital. Subsequently, diagnosed cases of hypothyroidism were referred to the Rehabilitation Center at Jamia Hamdard during operational hours for screening and enrollment of eligible participants. Before data collection, all subjects

were comprehensively informed about the study objectives and methodology, and written informed consent was obtained. Self-administered questionnaires were provided to participants, with researcher assistance offered for those unable to complete the forms independently. The investigator verbally administered the questionnaires to these participants and documented their responses on the assessment sheet. All personal identifiers and clinical information were maintained under strict confidentiality throughout the investigation.

Instruments

The data collection tool in the study was a 4-part questionnaire. In the first part, demographic details were gathered [Table 2]. The researchers developed a sociodemographic questionnaire, including questions on gender, age, marital status, educational status, socioeconomic status, type of disease, and duration of disease. These variables were implemented as control variables. The type and duration of hypothyroidism were determined by a general physician, and hypothyroidism was validated using patients' medical records from HAHC Hospital. The data were consistent.

In the second part, anxiety was assessed using the Generalized Anxiety Disorder-7 scale (Spitzer *et al.*, 2006).¹¹ This is a well-validated, seven-item, four-option response format instrument, with scale scores adjusted to fall between 0 and 21. Previous studies have identified that a score of 0–4 is considered mild anxiety, 5–9 is considered moderate anxiety, 10–14 is considered moderately severe anxiety, and 15–21 is considered severe anxiety.

In the third part, depression was assessed using the Personal Health Questionnaire-9 (Kroenke *et al.*, 2001).¹² This is a well-validated, nine-item, four-option format instrument, with scale scores falling between 0 and 27. Previous studies have identified a normative score of 21, below which is considered mild, moderate, and severe depression. In the fourth part the memory was assessed using PGI memory scale which consist of 10 subtests which were measured and were scored out of 115; the subtests were (1) remote memory, (2) recent memory, (3) mental balance, (4) digit span, (5) immediate

Table 1: Inclusion and exclusion criteria for recruitment of participants into the study

Inclusion criteria	Exclusion criteria
Group-A Hypothyroidism >4 years of duration	Disease <4 years of duration
Group-B No chronic disease	Severe comorbidity
Age between 22 and 50	Lack of willingness to participate
Females	Neurological illness
	Unable to read and write

recall, (6) delayed recall, (7) verbal retention-similar pairs, (8) verbal retention-dissimilar pair, (9) visual retention, (10) recognition. Each subtest had different score with maximum score of 6, 5, 9, 15, 15, 12, 5, 15, 13, and 10, respectively.

All the data were collected by two of the researchers between March 2024 and August 2024 in HAH Hospital, Jamia Hamdard, New Delhi, India.

Statistical analysis

The statistical analyses of the study were done using the Statistical Package for the Social Sciences, version 21.00 (IBM Corp Armonk, New York). Statistical analyses included descriptive statistics, reliability testing, and Pearson product-moment correlation among variables. In descriptive statistics, a proportion is used to describe categorical and numerical variables; mean and standard deviation are used to describe continuous variables. In association analyses,

Pearson correlation coefficients are calculated to examine the relationship among all variables. Levels of significance are indicated at both 0.05 and 0.01 in the correlation table. Participants who had given responses to at least 80% of items included in any scale were included in the study.

RESULTS

Fifty-two subjects (females) in Group-A and 51 subjects (females) in Group-B were studied. The minimum age in Group-A was 26 years, and the maximum age was 50 years, with a mean age of 47.88 ± 11.8 ; the minimum age in Group-B was 25 years, and the maximum age was 56 years, with a mean age of 41.65 ± 9.69 . Both groups were demographically uniform ($P > 0.01$). The demographic information of the samples studied is demonstrated in Table 2.

Different aspects of mental health were assessed and compared between the two groups using an independent *t*-test, and no significant difference was noted between Group-A and Group-B ($P = 0.4$). The mean score of Generalized Anxiety Disorder-7 (GAD-7) (anxiety) for Group-A was 14.18 (± 4.23) and Group-B was 11.3 (± 4.90); the mean score for PHQ-9 (depression) for Group-A was 12.18 (± 5.51) and Group-B was 10.9 (± 4.98) and mean scores for post-graduate institute memory scale for Group-A was 67.18 (± 15.42) and Group-B was 73.95 (± 14.27). Corresponding results are represented in Table 3.

Severe anxiety, depression, and moderate memory scores were higher in Group A as compared to Group B. The difference is shown in Table 4. These results show that hypothyroidism affects memory and mental health at an increased rate as compared to normal, healthy females.

DISCUSSION

The present study was performed to compare anxiety, depression, and memory between patients with hypothyroidism and normal healthy females. A total of 103 female patients were taken into the study, out of which 52 were in Group-A and 51 were in Group-B. The results did not show any significant difference in both the groups, but according to the level of severity, diabetic patients have more

Table 2: Sociodemographic and medical characteristics of the participants ($n=103$).

Variables	Group A ($n=52$) Mean (SD)	Group B ($n=51$) Mean (SD)
Age	47.88 (11.8)	41.65 (9.69)
Height	156.66 (6.7)	158.1 (6.08)
Weight	67.81 (13.0)	71.7 (17.02)
BMI	27.88 (6.05)	28.24 (5.90)
DOD	10.29 (4.60)	11.60 (5.28)

BMI: Body mass index, DOD: Duration of disease, SD: Standard deviation

Table 3: Mean scores of anxiety, depression, and memory.

Variable	Group-A Mean (SD)	Group-B Means (SD)
GAD-7	14.18 (4.23)	11.3 (4.90)
PHQ-9	12.18 (5.51)	10.05 (4.89)
PGIMS	67.18 (15.42)	73.95 (14.27)

GAD-7: Generalized Anxiety Disorder-7, PHQ-9: Personal Health Questionnaire-9, PGIMS: Post-Graduate Institute Memory scale, SD: Standard deviation

Table 4: Level of severity of condition in participants.

Variables	Group-A ($n=52$)			Group-B ($n=51$)		
	Mild	Moderate	Severe	Mild	Moderate	Severe
	<i>n</i> (%age)	<i>n</i> (%age)	<i>n</i> (%age)	<i>n</i> (%age)	<i>n</i> (%age)	<i>n</i> (%age)
GAD-7	3 (5.8)	27 (52.9)	22 (41.1)	33 (65)	13 (25)	5 (10)
PHQ-9	15 (29.4)	12 (23.5)	25 (47.05)	28 (55)	18 (35)	5 (10)
PGIMS	6 (11.83)	21 (41.17)	25 (47)	38 (75)	10 (20)	3 (5)

GAD-7: Generalized Anxiety Disorder-7, PHQ-9: Personal health questionnaire-9, PGIMS: Post-Graduate Institute Memory scale

severity of anxiety and depressive disorders, and memory was mildly affected in both groups.

Another research has noted that individuals with hypothyroidism are burdened with personal socio-demographic and behavioral factors, which contribute to the early onset of anxiety and depression symptoms. Moreover, the majority of the cases with increased levels of anxiety and depression are found in women with diabetes mellitus as compared to men.^{13,14}

There was also a compatible study that states the effects of hypothyroidism on anxiety. The findings of this study indicate that the assessment of patients with the disease should address their physical, psychological, social, and economic well-being, and the findings point to the significance of taking individual coping strategies into account when evaluating the impact of hypothyroidism on psychosocial well-being.⁴

Similarly, hypothyroidism leads to poor resistance to cold with mental and physical slowing, which is confirmed by an investigation that states that hypothyroidism increases about 30% of the variance of depressive and anxiety symptoms.¹⁵

There was also a compatible study that showed a significant relationship between physical condition and mental health. The study showed a U-shaped curve with depression and body mass index, which states that underweight as well as overweight individuals are equally affected by depression due to unrealistic feelings of general inadequacy caused by actually supposed inferiority.¹⁶

Moreover, some compatible studies show a significant correlation between mental health and hormonal imbalances. A study states that adrenergic hyperactivity is a major cause of psychiatric symptoms in hyperthyroidism. Genetic factors contribute to the development and treatment outcome of mental disorders in hypothyroidism. Oral hypoglycemic drugs may lead to depressive mood disorders; the results of this study demonstrate a strong correlation between mental health status and diabetic complications. In particular, patients who are depressed tend to have poor self-care, more physical symptoms, less interest in activities, and are less likely to adhere to prescribed care regimens. These findings raise the possibility that improving mental health as part of a comprehensive management plan for hypothyroidism may improve the overall long-term outcomes of these patients.^{17,18}

Scopes and limitations

The most important limitation was a lesser sample size, as the results can be more generalized in a larger sample size, and also the variation of age group should be more specific to get more accurate results. One of the limitations is not using the randomized sampling method, which could have provided more generalized results. More studies should be done to evaluate the optimal and mandatory guidelines for

integrating psychological management for patients with hypothyroidism. This research can be an initial stage for shifting the paradigm in the management of hypothyroidism.

CONCLUSION

Hypothyroidism, being a disease that chronically affects the majority of females, is always managed using medication; the study concluded that hypothyroidism has a significant effect on mental health alterations and memory problems in middle-aged females. Treatment of hypothyroidism should be planned holistically so as to gain maximum benefits and fewer complications.

Ethical approval: The research/study was approved by the Institutional Ethical Committee, Jamia Hamdard with reference number 03/2023, dated 12th April 2023.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation: The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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How to cite this article: Aziz R, Jawed F, Khan SA. Incidence and Progression of Mental Health Alterations among Middle-Aged Females with Hypothyroidism. *J Compr Health*. 2025;13:168-72. doi: 10.25259/JCH_44_2024