Original Article

Frequency and Determinants of Depression in Hypothyroidism Patients at a Tertiary Care Hospital in the Western Region of Saudi Arabia

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Abstract

Background: Several studies have reported a strong association between depression and hypothyroidism, including from several regions of Saudi Arabia. However, studies on the frequency of depression among patients with hypothyroidism from the Western region of Saudi Arabia is limited.

Objectives: To determine the frequency and risk factors of depression among patients with hypothyroidism in the Western Region of Saudi Arabia.

Materials and Methods: This cross-sectional study was conducted at a tertiary care hospital in Jeddah, Saudi Arabia, and included adult patients diagnosed with hypothyroidism. After contacting the patients through phone calls and obtaining their consent, a questionnaire weblink was sent. The first part of the questionnaire elicited details regarding demographics and history of hypothyroidism, while the second part comprised the Arabic version of the Patient Health Questionnaire-9 to evaluate depression.

Results: A total of 100 patients completed the survey, of which 80% were found to have depression (mild: 35%, moderate: 26%, moderate to severe: 12, severe: 7%). There was no significant association between depression and gender, age group, employment status, and marital status. In the bivariate analysis, a significant association was found between depression and reporting fatigue ($P < 0.001$), constipation ($P < 0.001$), hair loss ($P = 0.002$), cold intolerance ($P = 0.014$), dry skin ($P = 0.028$), memory problems ($P = 0.029$), and menorrhagia ($P = 0.037$). However, in the multivariate analysis, only reporting fatigue was found to be significantly associated with depression ($P = 0.040$; OR = 15.215).

Conclusion: This study found that the prevalence of depression was very high among patients with hypothyroidism in the Western region of Saudi Arabia, and that fatigue is an independent risk factor of depression.

Keywords: Depression, fatigue, hypothyroidism, Jeddah, prevalence, risk factor, Saudi Arabia

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INTRODUCTION

The thyroid gland is an essential endocrine gland that produces the crucial T3 and T4 hormones. Thyroid hormones affect body temperature and regulate the basal metabolic rate.[1] Hypothyroidism, an endocrine illness, occurs when the thyroid gland cannot produce sufficient thyroid hormones.[2-4] Hypothyroidism is associated with a variety of symptoms such as cold intolerance, fatigue, constipation, psychiatric disturbances, and weight gain.[5] Hypothyroidism is a condition that affects approximately 5% of the global population, with another 5% estimated to be undiagnosed.[6] In Saudi Arabia, the prevalence of hypothyroidism among patients attending a community-based hospital has been reported as 29.1%[7]

The thyroid hormone accelerates the development of neuronal processes, axons, and dendrites as well as the rate of neuronal proliferation, thereby helping the central nervous system function normally. Thyroid dysfunction has been linked to psychiatric diseases, particularly mood disorders, for >200 years.[8] Severe hypothyroidism can mimic melancholic depression and dementia.[9] There are various factors that increase the risk of depression in hypothyroid patients, including sociodemographic status (such as age and sex), the severity of their condition, and their thyroid-stimulating hormone (TSH) levels.[10] Excess body weight, often observed in patients with hypothyroidism, is also a significant risk factor for depression.[11]

Depression is characterized by low mood and a lack of motivation.[12,13] It can impact numerous human characteristics, such as ideas, behavior, inspiration, feelings, and perceptions of well-being.[14,15] In addition to significant changes in food and sleeping habits, symptoms may include dissatisfaction and problems with reasoning and attention.[16] It can result in feelings of hopelessness and despair, potentially leading to suicidal thoughts. Anhedonia, a loss of interest and desire for various behaviors that usually satisfy people, is the primary sign of depression.[17,18]

Several studies have found a strong association between depression and hypothyroidism.[9,19] In 2016, a study from Syria found that about one-third of the patients with clinical or subclinical hypothyroidism had a prevalence of depression.[20] In addition, two cross-sectional studies conducted from India found a 60% and 12.5% prevalence of depression in patients with hypothyroidism.[9,21]

In Saudi Arabia, a study conducted in Al Khobar, Eastern Province, between 2018 and 2019 found that 33.9% of the patients with hypothyroidism had depression of varying degree.[22] In 2019, another study from the Aseer region, Southern Province, found that 86.3% of the patients with hypothyroidism had depression, with 33.7% having major depressive disorders.[3] Further, a study conducted in Riyadh, Central Region, in 2020, revealed that patients with hypothyroidism who were taking levothyroxine for their condition had a 70% prevalence of depression, which is higher than the global prevalence.[23] However, studies on the prevalence of depression among patients with hypothyroidism from the Western region of Saudi Arabia is limited. Therefore, this study aimed to determine the frequency of depression and its risk factors among patients with hypothyroidism attending a tertiary care hospital in Jeddah, Western Region, Saudi Arabia.

MATERIALS AND METHODS

Study design, setting, and population

This cross-sectional survey included adults (aged ≥18 years) diagnosed with hypothyroidism who had attended King Abdulaziz University Hospital, Jeddah, between January 2010 and December 2021. Patients who had received a diagnosis of any psychiatric illness prior to developing hypothyroidism as well as those who did not understand Arabic or English were excluded. The study was approved by the institutional Biomedical Ethical Committee.

The study was conducted between June and August 2022. Medical information of all patients with hypothyroidism, including their phone numbers, was ordered from the Endocrinology outpatient clinic. Eligible patients were contacted through telephone to invite them to participate in the study. For patients who did not answer the call the first time, a further two attempts on separate days were made to contact them prior to their exclusion from the study. For those who agreed to participate, a Google Forms link was shared through WhatsApp. As a reminder, these patients were followed up the next day. All participants were notified of the objectives and confidentiality of their responses, and all provided informed written consent. For patients who were illiterate but expressed interest in participating, the responses were noted through the phone call; verbal informed consent was obtained from these patients before proceeding.

Data collection tool

There were two sections to the questionnaire. The first part elicited demographic information (sex, age, nationality, education, and employment) and a complete history of hypothyroidism (symptoms, drug taken or not, dosage, and adherence). TSH levels and body mass index (BMI) were

obtained from hospital records. The BMI was categorized in accordance with the World Health Organization (WHO) classification.[24] In the second section, the Patient Health Questionnaire-9 (PHQ-9) in Arabic, a valid and reliable screening tool for depression, was used.[25] The nine questions in the PHQ-9 were rated on a 4-point Likert scale (0 = not at all; 3 = almost every day). Symptom severity was classified as mild (grades 5–9), moderate (10–14), moderately severe (15–19), or severe (20–27).[26] Based on previous studies, participants with a PHQ-9 score of 10 were considered as having depression.[25]

Statistics

Data input was done in Excel, while data analysis and coding were done in SPSS version 21. Frequency distributions were used to analyze categorical variables, including the primary variables. The means and standard deviations were used to construct continuous variables with normally distributed values. To identify all potential risk factors, categorical variables were subjected to bivariate analysis using the Chi-square test. Binary logistic regression was used to create odds ratios (ORs), confidence intervals (CIs) for odds ratios, and *P* values for side effects. Statistical significance was set at $P < 0.05$.

RESULTS

Univariate data

Sociodemographic status

A total of 447 potentially eligible patients were identified; however, 327 patients did not respond to the calls, 15 had communication issues in Arabic or English, and 5 had previously been diagnosed with depression, and thus these patients were excluded. Therefore, the study included 100 patients who agreed to participate and completed the survey. The mean age of the participants were 53.4 ± 14.8 years (range: 18–60 years). Most patients were aged 41–60 years (49%), female (82%), Saudi nationals (58%), married (60%), and unemployed (66%). The most common level of education was secondary school education (42%); 9% were illiterate. Almost half (46.3%) the participants were obese (BMI Class I, II or III) [Table 1].

Hypothyroidism characteristics

Among the participants, 52% had been diagnosed with hypothyroidism for >10 years. All patients were taking medications for hypothyroidism, with 81% being compliant with their medications. The majority had been prescribed levothyroxine 25–125 μg. Since being diagnosed, 55.1% did not change their dose. However, 31.6% had their dose increased by their doctors and 13.3% had it decreased either by themselves or their doctors. A total of 35% of the patients reported annually measuring TSH levels. The last TSH level in 45% of the patients was between 0 mlU/L and 2.50 mlU/L, 28% had levels between 2.51 and 4.99 mlU/L, and 27% had levels of ≥ 5 mlU/L. The most common symptoms encountered included fatigue, hair loss, and cold intolerance (90%, 71%, and 70%, respectively).

Depression characteristics

Based on the PHQ-9 assessment, 80% of the participants were found to have depression, with 35% having mild

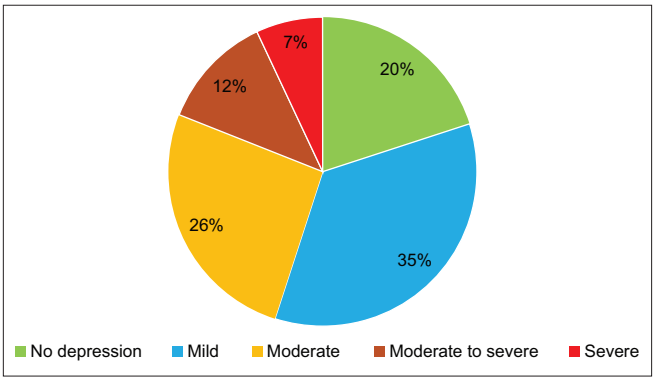

Figure 1: Severeity of depression severity based on the Patient Health Questionnaire-9 responses

Table 1: Sociodemographic data

Variables	*n* (%)
Age (mean±SD)	53.4±14.78
Age group	
18–40	18 (18)
41–60	49 (49)
61+	33 (33)
Sex	
Male	18 (18)
Female	82 (82)
Nationality	
Saudi	58 (58)
Non-Saudi	42 (42)
Marital status	
Single	15 (15)
Married	60 (60)
Divorced	5 (5)
Widow	20 (20)
Employment	
Employed	17 (17)
Nonemployed	66 (66)
Retired	17 (17)
Education	
University and above	33 (33)
Secondary school	42 (42)
Primary school	16 (16)
Illiterate	9 (9)
BMI	
Underweight	3 (3.2)
Normal weight	22 (23.2)
Overweight	26 (27.4)
Obese Class I	18 (18.9)
Obese Class II	15 (15.8)
Obese Class III	11 (11.6)

SD – Standard deviation; BMI – Body mass index

depression and 7% having severe depression [Figure 1]. The most common problems faced by the patients with hypothyroidism were family issues and economic difficulties (17% and 16%, respectively), while 17% of the patients experienced a combination of the listed problems. Chronic diseases affected 73% of the patients, with diabetes mellitus (52%), hypertension (45%), and hypercholesterolemia (27%) being the most frequent.

Table 2: Sociodemographic data and depression

Variables	*n*	With depression *n* (%)	Without depression *n* (%)	*P*
Sex				
Male	18	14 (77.8)	4 (22.2)	0.753
Female	82	66 (80.5)	16 (19.5)	
Age group				
18–40	18	13 (72.7)	5 (27.8)	0.508
41–60	49	41 (83.7)	8 (16.3)	
61+	33	26 (78.8)	7 (21.2)	
Marital status				
Single	15	11 (73.3)	4 (26.7)	0.142
Married	60	52 (86.7)	8 (13.3)	
Divorced	5	3 (60)	2 (40)	
Widow	20	14 (70)	6 (30)	
Employment				
Employed	17	10 (58.8)	7 (41.2)	0.072
Nonemployed	66	56 (84.8)	6 (15.2)	
Retired	17	14 (82.4)	3 (17.6)	

Bivariate data

Sociodemographic factors and depression

Depression did not differ across gender (male: 77.8%, female: 80.5%; $P = 0.753$). The largest proportions of hypothyroid patients with depression were those aged 41–60 years (83.7%), unemployed (84.8%), and married (86.7%); however, there was no significant association between depression and age group ($P = 0.508$), employment status ($P = 0.072$), and marital status ($P = 0.142$) [Table 2].

Hypothyroidism and depression

About 93.8% of patients diagnosed within 2–10 years and in 84.2% of patients not compliant with medications

Table 3: Hypothyroidism data and depression

Variables	*n*	With depression *n* (%)	Without depression *n* (%)	*P*
Time of diagnosis				
<6 months	6	4 (60)	2 (40)	0.058
6 months–12 months	10	7 (70)	3 (30)	
2 years–10 years	32	30 (93.8)	2 (6.2)	
>10 years	52	39 (75)	13 (25)	
Time of start taking medications				
<6 months	3	2 (66.7)	1 (33.3)	0.080
6 months–12 months	12	9 (75)	3 (25)	
2 years–10 years	31	29 (93.5)	2 (6.5)	
>10 years	54	40 (74.1)	14 (25.9)	
Compliant with medications?				
Yes	81	64 (79)	17 (21)	0.757
No	19	16 (84.2)	1 (15.8)	
Reason of noncompliance				
Refused	9	8 (89.9)	1 (11.1)	0.661
Forgetfulness	6	4 (60)	2 (40)	
Can't afford it	4	4 (100)	0	
I take the medications regularly	81	64 (79)	17 (21)	
Dose (μg)				
25–125	72	56 (77.8)	16 (22.2)	0.446
150 and above	11	10 (90.9)	1 (9.1)	
Change in dose lately				
No change	54	42 (77.8)	12 (22.2)	0.556
Increase in dose	31	27 (87.1)	4 (12.9)	
Decrease in dose	13	10 (76.9)	3 (23.1)	
Do you know your last TSH measurement?				
Yes	14	13 (92.9)	1 (7.1)	0.290
No	86	67 (77.9)	19 (22.1)	
Usual time to measure the TSH				
Every 3–6 months	32	22 (68.8)	10 (31.3)	0.137
Every 6–12 months	33	29 (87.9)	4 (12.1)	
Every 1 year and more	35	29 (82.9)	6 (17.1)	
Last TSH				
0–2.50	45	37 (82.8)	8 (17.2)	0.666
2.51–4.99	28	23 (82.1)	5 (17.9)	
5 and above	27	20 (74.1)	7 (25.9)	

TSH – Thyroid-stimulating hormone

were found to have depression; however, these factors were not significantly associated with depression. Regarding levothyroxine dose, 77.8% and 90.9% of patients prescribed 25–125 μg and ≥150 μg had depression (P = 0.446). In addition, 87.1% of the patients who had their dose increased experienced depression (P = 0.556) [Table 3]. In terms of symptoms, a significant association was found between depression and reporting fatigue (P < 0.001), constipation (P < 0.001), hair loss (P = 0.002), cold intolerance (P = 0.014), dry skin (P = 0.028), memory problems (P = 0.029), and menorrhagia (P = 0.037) [Table 4].

Stressful events and depression

Among patients with economic problems, 93.8% had depression, while 88.2% of patients with family problems had depression. Further, the majority of patients with several personal issues (94.1%) had depression. A significant relation was found between depression and how the patients dealt with personal problems (P = 0.002); all patients who described dealing with personal problems as "very difficult" or "unbearably difficult" had depression.

Multivariate data

Binary logistic regression analysis was conducted to assess factors influencing the occurrence of depression in patients with hypothyroidism patients. The model included age, sex, TSH, and hypothyroidism symptoms. The results showed that fatigue was the only variable that was significantly associated with the occurrence of depression (P = 0.040; OR = 15.215, 95% CI = 1.139–203.180) [Table 5].

Table 4: Association of hypothyroidism symptoms with presence or absence of depression

Variables	*n*	With depression *n* (%)	Without depression *n* (%)	*P*
Fatigue				
Yes	90	79 (87.8)	11 (12.2)	<0.001*
No	10	1 (10)	9 (90)	
Muscle Cramps				
Yes	51	43 (84.3)	8 (15.7)	0.395
No	49	37 (75.5)	1 (24.5)	
Constipations				
Yes	68	61 (89.7)	7 (10.3)	0.001*
No	32	19 (59.4)	13 (40.6)	
Cold intolerance				
Yes	70	61 (87.1)	9 (12.9)	0.014*
No	30	19 (63.3)	11 (36.7)	
Increase weight				
Yes	52	46 (88.5)	6 (11.5)	0.051
No	48	34 (70.8)	14 (29.2)	
Memory problem				
Yes	59	52 (88.1)	7 (11.9)	0.029*
No	41	28 (68.3)	13 (31.7)	
Gland enlargement				
Yes	24	22 (91.7)	2 (8.3)	0.144
No	76	58 (76.3)	18 (23.7)	
Hair loss				
Yes	71	63 (88.7)	8 (11.3)	0.002*
No	29	17 (58.6)	12 (41.4)	
Fertility problem				
Yes	15	13 (86.7)	2 (13.3)	0.729
No	85	67 (78.8)	18 (21.2)	
Dry skin				
Yes	68	59 (86.8)	9 (13.2)	0.028*
No	32	21 (65.6)	11 (34.4)	
Menorrhagia				
Yes	24	23 (95.8)	1 (4.2)	0.037*
No	76	57 (75)	19 (25)	

*Significance at P<0.05

Table 5: Factors affecting the presence of depression in hypothyroidism patients

Multivariate analysis	OR	95% CI	*P*
Sex			
Male	0.695	0.087–5.6587	0.733
Female	Reference	Reference	Reference
Age (years)	0.990	0.937–1.048	0.719
TSH	0.987	0.915–1.065	0.741
Symptoms of hypothyroidism			
Fatigue	15.215	1.139–203.180	0.040*
Muscle cramps	0.478	0.086–2.647	0.398
Constipation	2.123	0.430–10.477	0.355
Cold intolerance	2.676	0.609–11.755	0.192
Increase weight	3.014	0.639–14.219	0.163
Memory problem	2.299	0.531–9.946	0.265
Gland enlargement	2.024	0.186–22.020	0.562
Hair loss	2.387	0.324–17.592	0.393
Fertility problem	1.699	0.115–25.200	0.700
Dry skin	1.257	0.261–6.048	0.776

*Significant at P<0.05. OR – Odds ratio; CI – Confidence interval; TSH – Thyroid-stimulating hormone

DISCUSSION

This study found that the frequency of depression among patients with hypothyroidism was 80%. This was similar to the rates reported from the Aseer region and Riyadh, but substantially higher than that reported in the Eastern Province of Saudi Arabia.[3,22,23] Most patients in the current study were female but sex was not a significant factor associated with depression. While our findings are similar with those of Redmond[27] and Chaudhary *et al*.,[28] who also suggested that hypothyroidism is more common in women and is a predictor of depression, it emphasizes that hypothyroidism is a more significant risk factor for depression than sex.

The current study found that while the highest percentages of patients with depression were aged 41–60 years, unemployed, and married, this was not statistically significant. These results are similar to those of a study conducted in India, which found no association between these variables.[9] These findings suggest that broader risk

factors play a lesser role in depression in patients with hypothyroidism.

The current study found that although the majority of patients that were not compliant with medications had depression, this was not a significant association factor. This finding is in contrast with those of Sevinc and Savil, which found that non-compliance with hypothyroidism medication was associated with depression.[29] Several symptoms of hypothyroidism are similar to those of depression. Similarly, in the bivariate analysis, we found a significant association between depression and reporting fatigue, constipation, hair loss, cold intolerance, memory problems, dry skin, and menorrhagia. However, in a study from India, the only statistically significant characteristic of hypothyroid patients with depression were memory loss and cold intolerance.[21] We found no statistically significant association between depression and TSH levels. In contrast to our findings, higher TSH levels were significantly correlated with the prevalence of depression in the study by Naseem *et al*.[21] Another study found a statistically significant link between depressive symptoms and TSH levels >10 mIU/L.[30]

This study aimed to expand the research on depression in patients with hypothyroidism in Saudi Arabia. A limitation of this study is the small sample size, which increases the margin of error, and thus studies with larger sample size in this population are required. Nonetheless, based on the findings of this study and existing literature, we recommend that patients with hypothyroidism should be screened for depression.

CONCLUSION

This study found that the frequency of depression was very high among patients with hypothyroidism in the Western region of Saudi Arabia. In addition, fatigue, a symptom of hypothyroidism, is an independent risk factor of depression in these patients.

Ethical considerations

The study was approved by the Biomedical Ethical Committee of King Abdulaziz University Hospital (Ref. no.: 186-22; date: January 01, 2022), Jeddah, Saudi Arabia. All study participants provided consent (written or verbal) before inclusion in the study. The study adhered to the principles of the Declaration of Helsinki, 2013.

Peer review

This article was peer-reviewed by two independent and anonymous reviewers.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author contributions

Conceptualization: S.M.A. and A.M.A.; Methodology: A.A.A., T.W.M., A.S.F., I.M.A., A.K.A., and N.A.A.; Data analysis: A.A.A., T.W.M., A.S.F., I.M.A., A.K.A., and N.A.A.; Writing–original draft preparation: A.A.A., T.W.M., A.S.F., I.M.A., A.K.A., and N.A.A.; Writing – review and editing: A.A.A., T.W.M., A.S.F., I.M.A., A.K.A., and N.A.A.; Supervision: S.M.A. and A.M.A.

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Conflicts of interest

There are no conflicts of interest.

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