

# Prevalence of Depression in Hypothyroidism: A Hospital based Cross-Sectional Study

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**Abstract:** *Background: Hypothyroidism is the most prevalent endocrine disorder worldwide. Psychiatric comorbidities are common in thyroid disorder patients and complicate patients' life quality as well as disease management. Thyroid hormone has a role in neurological development, and hormone deficiency can be manifested by many neurological signs and symptoms such as behavioral disturbances, anxiety and depressive symptoms. The study aimed to explore prevalence of depression and identify associated characteristics among patients with thyroid function disorder. A descriptive, cross-sectional study was conducted on 210 thyroid disorder patients. A semi-structured questionnaire and Beck Depression Inventory Scale were used to collect information regarding sociodemographic characteristics and prevalence of depression respectively. Data were analyzed using the Statistical Package for the Social Science (SPSS) version 16. Continuous data were displayed using mean and standard deviation; categorical data were displayed in numbers and percentage. Chi-square test was used to assess the relationship between the variables. A P value of less than 0.05 was considered as statistically significant. Results: Patients' mean age was 38.60 (SD±10.50) years. Majority 79.5 % were females. Most of the patients 94.8% attending OPD were married. 86.7% were Hindus. 48.6% had clinical hypothyroidism and 51.4% had subclinical hypothyroidism. 57.1% were under medication. Associations with age, marital status, type of hypothyroidism and duration of illness were significant. 31% of the patients attending the GPOD and MOPD had depression. Depression was highly prevalent among hypothyroid patients and screening for depression among hypothyroid patients is recommended. Management of thyroid disorders should incorporate treatment of anxiety and depression; routine psychiatric screening of the groups with higher prevalence is advisable.*

**Keywords:** depression, prevalence, thyroid function disorders

## 1. Introduction

Hypothyroidism is an underactive thyroid gland. It means that the thyroid gland can't make enough thyroid hormone to keep the body in normal state. People are hypothyroid if they have too little thyroid hormone in the blood. Common causes are autoimmune disease, such as Hashimoto's disease, surgical removal of the thyroid gland and radiation treatment. When hormone levels are too low, the body's cells can't get enough hormone and therefore the body's processes start slowing down. (1)

Diseases of the thyroid gland are common in adults and the prevalence is increasing in all parts of the world. Hypothyroidism is the most common endocrine disorder both in primary and specialized care. Hypothyroidism is prevalent worldwide, with a prevalence of 4%–5%. (2) Diagnosis is confirmed biochemically by reduction in serum free T4 with increased serum thyrotropin (TSH; thyrotrophin). Different grades of depression are frequently encountered in patients with hypothyroidism. (3) There is a greater probability for hypothyroid patients to develop anxiety and depression symptoms. Since there is high prevalence of hypothyroidism and depression observed in clinical practice, depressive symptoms must be considered in patients with thyroid dysfunction and depressed patients should be tested for Thyroid stimulating hormone. (4)

Depression is known to be associated with changes in the hypothalamic-pituitary-thyroid (HPT) axis. It has positive correlation with overt hypothyroidism. SCH is defined as an elevated thyroid stimulating hormone (TSH) with normal tetraiodothyronine (T4) and triiodothyronine (T3) levels. It

affects 3 to 8.5% of the general population and most commonly it is seen in families with and a higher rate up to 20% among elderly people. (5)

Several factors may lead to depression in hypothyroid patients, such as the presence of chronic disease, socio-demographic factors, stressful life events, level of TSH, change in dose of levothyroxine and some medications. Depressed patients' quality of life will be degraded as they may encounter many difficulties in their daily lives, such as feeling hopeless and lacking energy. Suicidal thoughts may develop if they become severely depressed when treatment is delayed. (6)

Symptoms of hypothyroidism may include tiredness, mental depression, cold intolerance, weight gain, dry skin, hair changes, constipation and menstrual irregularities. An observational cross-sectional study was done in Saudi Arabia with the aim to study the prevalence, severity and risk factors of depression among patients with primary hypothyroidism. It included 114 adult patients with primary hypothyroidism. Patient Health Questionnaire-9 was used to detect depression and assess its severity. 23.7% of the patients had no or minimal depression, while 37.7% had mild depression, 23.7% had moderate depression and 7% had severe depression. Severe depression was detected to be significantly higher among those who were not compliant with medication than compliant patients ( $p = 0.027$ ). It was concluded that different grades of depression were common among patients with hypothyroidism. It is more common among females and it also runs in the families. (7)

A cross sectional study was done to assess the prevalence of psychiatric disorders and symptoms in patients with subclinical hypothyroidism. Ninety-four outpatients with at least two elevated serum thyrotrophin levels ( $> 4$  microU/ml) and normal T4 and 43 euthyroid outpatients, both groups, were evaluated. There was an increased prevalence of psychiatric disorders among the subclinical hypothyroidism patients when compared to the euthyroid group (45.7% vs. 25.6%;  $p = 0.025$ ), mood disorders being the most frequent. The prevalence of depressive symptoms based on Beck's Scale among subclinical hypothyroidism patients was about 2.3 times higher than among euthyroid ones (45.6% vs 20.9%,  $p = 0.006$ ). Anxiety symptoms were also more frequent among subclinical hypothyroidism patients (87.0% vs 60.5%,  $p < 0.001$ ), mainly clinical anxiety (44.6% vs 23.3%;  $p = 0.001$ ). (8)

A cross-sectional study was conducted to estimate the prevalence of depression among hypothyroid patients attending the primary healthcare and endocrine clinics of King Fahad Hospital of the University in Al Khobar. Patient Health Questionnaire-9 screening tool was used for screening them for depression. Information regarding sociodemographic data, details of their thyroid function status and other risk factors for depression was also collected using semistructured questionnaire. It was found that 33.9% of patients were depressed with varying degree of depression. Certain symptoms were found to be associated with higher risk of depression such as fatigue, memory problems, hair loss and gland enlargement. Depression was concluded to be prevalent among hypothyroid patients. Screening for depression among hypothyroid patients was recommended. (9)

Depression and thyroid function are interrelated. A cross sectional study was done to assess the prevalence of anxiety and depressive symptoms among patients with hypothyroidism. 100 patients diagnosed as hypothyroidism were evaluated using Hamilton depression rating scale (HDRS) and Hamilton scale for anxiety (HAM-A). The study result reveals that 60% had some degree of depression based on HDRS (males - 56.63% and females - 64.29%) whereas about 63% out of the total patients screened had some degree of anxiety (males -56.66% and females - 65.72%) based on HAM-A. (73.3%) males had depressed mood and among females (68.54%) had gastrointestinal somatic symptoms. The most common anxiety symptom among the males was anxious mood (70.0%) and among females was anxious mood (92.85%). The study concluded that psychiatric symptoms/disorders are common in patients with thyroid dysfunction. (10)

## 2. Materials and Methodology

### Study design and setting

A descriptive cross-sectional study was conducted at GP OPD and MOPD of BPKIHS, Dharan, NEPAL. Institutional Ethical Committee approval was obtained before the study. The study was conducted for the period of one year.

### Sampling Technique:

The sampling technique for the study was purposive for the selection of participants who meet the inclusion criteria.

### Study population

The total sample size was 210. After obtaining written informed consent, a total of 210 patients, those who fulfilled the inclusion criteria were recruited for the study. Patient who were diagnosed with primary clinical /subclinical hypothyroidism per thyroid function test were included in the study.

### Inclusion criteria

- Age: 16 years to 65 years
- diagnosed case of clinical/ subclinical hypothyroidism
- patient willing to participate

### Exclusion criteria

- Patient diagnosed as case of depression prior to diagnosing hypothyroidism
- Established case of depression
- Pregnant and lactating women
- Severe psychiatry morbidity/ other co-morbidities

A semi structured questionnaire was used to collect the data. The questionnaire included the demographic profiles of the patients including treatment for hypothyroidism and Thyroid function test reports. The patients enrolled were handed over the pro forma with the questionnaire to be filled by the patient party or patients themselves. The questionnaires were provided in the OPDs by the researcher to the patients. If the patient was illiterate then the pro forma were filled up by the researcher after questioning the patient from the questionnaire. The filled pro forma were collected by the researcher for statistical review. Patients' depression levels were measured by using validated Nepali translations of Beck Depression Inventory (BDI). Levels of depression were categorized as no, mild, moderate, and severe anxiety/depression by the BDI scores of 0-9, 10-18, 19- 29, and 30-63 respectively. In that way, a score of 10 or more was regarded as presence of depression. The prevalence of depression was in different groups of patients was compared by Chi square test. SPSS version 16.0 statistical tool was used and level of significance was set at a p value of 0.05 for all analyses. Informed written consent was obtained from all participants. The study was approved by the Institutional Review Board of the IRC BPKIHS, Dharan.

## 3. Results

### Socio-demographic characteristics

The sample size was 210 hypothyroid patients. Patients' mean age was 38.60 (SD $\pm$ 10.50) years.

The majority 79.52 % of patients were females. Most of the patients 94.8% were married; more than half 56.7 % of the patients were Hindu. [Table 1]

(51.4%) had subclinical hypothyroidism and (48.6%) had clinical hypothyroidism. (57.1 %) of the patients were under medication. %). [Table 2]

**Table 1:** Distribution of the hypothyroid patient according to sociodemographic data, n=210

SNo	Characteristics	Frequency	Percentage%
1.	Age		
	Young adults (<36 yrs)	91	43.3
	Middle aged adults (36 - 55 years)	105	50.0
	Older adults (55 -65 years)	14	6.7
2.	Gender		
	Male	43	20.47
	Female	167	79.52
3.	Marital status		
	Married	199	94.8
	Unmarried	11	5.2
4.	Religion		
	Hindu	182	86.7
	Buddhist	16	7.6
	Christian	4	1.9
	Muslim	3	1.4
	Kirat	5	2.4

Distribution of the hypothyroid patient according to duration of diagnosis, type of hypothyroidism and treatment

**Table 2**

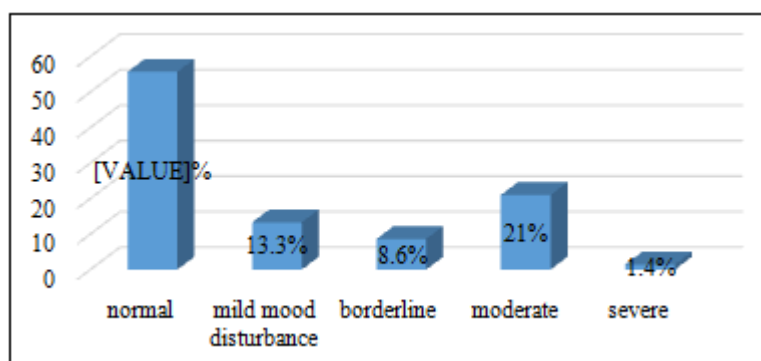
Characteristics	N=210	Percentage=100%
Less than 3 months	114	54.3
3-6 months	75	35.7
More than 6 months	21	10.0
Type of hypothyroidism		
Clinical	102	48.6
Subclinical	108	51.4
Medication		
Under medication	120	57.1
No medication	90	42.9

Among the study group, 114 patients were diagnosed as case of hypothyroidism, duration being less than 3 months and included most of the patients being diagnosed for the first time and not under medication. 75 patients were diagnosed for 3-6 months, most of whose TFT was done for second time with some on medication and some not. 21 patients included were diagnosed for more than 6 months, almost all of them were under medication but thyroid function was not under control. All the patients despite of the duration had abnormal TFT reports at the time of study showing that they

were in some kind of primary hypothyroidism (clinical or subclinical) at the time of study.

**Depression-related characteristics**

According to Beck inventory scale as shown in Figure 1, it was found that only (21%) of the hypothyroid patients were moderately depressed ,13.3 had mild mood disturbance, 8.6% had borderline mood disturbance and 1.4 had severe depression.



**Figure 1:** Hypothyroid patient according to depression level

As shown in fig 2 among the study group, 65 patients were found to have some level of depression which came out to be 31% on the basis of BDI scale score of more than 17.

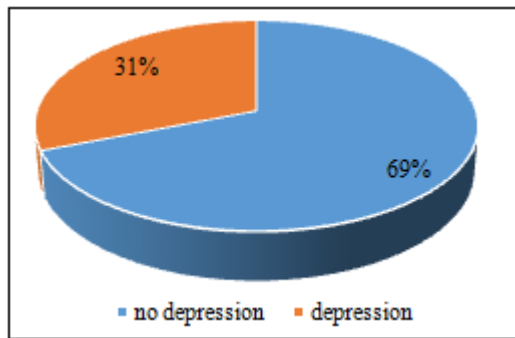


Figure 2: Hypothyroid patients according to presence of depression.

## Bivariate Analysis

Table 3: Relationship between depression and sociodemographic characteristics

Characteristics		No depression	Depressive features present	N=210	X <sup>2</sup>	df	p value
Age	Young adults	78	13	91	21.67	1	0.000025
	Middle aged adults	60	45	105			
	Older adults	7	7	14			
Marital status	Married	134	65	199	5.204	1	0.0193#
	Unmarried	11	0	11			
Hypothyroidism	Clinical	57	45	102	16.085	1	0.000061
	Subclinical	88	20	108			

The table below shows that there is significant association of depression with sociodemographic variables such as age, marital status and type of hypothyroidism whereas other demographic variables were not significantly associated. (significant \*, # fisher exact test value where  $P < 0.05$ )

## 4. Discussion

The study was conducted on 210 thyroid disorder patients. The patients under the study had a mean age of 38.60 (SD±10.50) with preponderance of middle aged adult population (50). The age ranged from 16 years to 65 years. Majority 79.5% were female. Most of the subjects 94.8% included were married. It was found that (21%) of the hypothyroid patients were moderately depressed, (13.3%) had mild mood disturbance, (8.6%) had borderline mood disturbance and (1.4%) had severe depression. Among the study group, 65 patients were found to have some level of depression which came out to be 31% on the basis of BDI scale score of more than 17. It was found that there is significant association of depression with sociodemographic variables such as age, marital status and type of hypothyroidism whereas other demographic variables were not significantly associated.

Another similar study was done among 110 hypothyroid patients which showed the prevalence of anxiety and depression 50.4% and 42.6% respectively. Anxiety was more prevalent in females (54.9% vs 33.3% in males,  $p=0.046$ ), low economic status (73.9% vs 35.5% in higher status,  $p=0.019$ ), and hyperthyroid (64.1% vs 44.4% in hypothyroid,  $p=0.040$ ). Depression was more prevalent in females (47.1% vs 25.9% in males,  $p=0.048$ ). (6)

A similar study done was done to assess the prevalence of depression among hypothyroid patients attending the primary healthcare and endocrine clinics of King Fahad Hospital of the University (KFHU). The mean age was 42.05

± 11.49 years, ranging from a minimum of 23 years to a maximum of 72 years. The majority of patients were females and two-thirds of patients were married (66.1%). (9)

People with a chronic disease and on lifelong medication are more likely to have poorer mental health than those with no illnesses. A similar cross-sectional study aimed to measure the prevalence and associated factors of depressive symptoms in adults with overt hypothyroidism on treatment in primary care clinics in Riyadh. 369 patients with overt hypothyroidism visiting primary care clinics and endocrine outpatient clinics at in Prince Mohammed bin Abdul-Aziz hospital were included. Prevalence of depression among adult patients with hypothyroidism on treatment was 56.1%. It was moderately severe and severe among 58.7% and 33.3% of depressed patients. The study concluded that depression is a common health problem among patients with overt hypothyroidism on thyroxin treatment, majority of patients has moderately severe to severe depression. Depression was more observed among older ( $\geq 40$  years), female, divorced/widowed and lower educated patients compared to their counterparts (11)



A descriptive, cross-sectional study was conducted on 129 thyroid disorder patients aged  $\geq 20$  years to assess the prevalence of anxiety and depression. A semi-structured questionnaire, Beck Anxiety Inventory, and Beck Depression Inventory were used for socio-demographic characteristics, anxiety, and depression respectively. Patients' mean age was  $38.09 \pm 12.68$  years; most were females (102, 79.1%) and hypothyroid (90, 69.8%). Overall prevalence of anxiety and depression were 50.4% and 42.6% respectively. Anxiety was more prevalent in females (54.9% vs 33.3% in males,  $p=0.046$ ), low economic status (73.9% vs 35.5% in higher status,  $p=0.019$ ), and hyperthyroid (64.1% vs 44.4% in hypothyroid,  $p=0.040$ ). Depression was more prevalent in females (47.1% vs 5.9% in males,  $p=0.048$ ), Janajati ethnic group (54.8% vs 31.1% in Brahmin-Chhetri,  $p=0.002$ ), lower economic status (69.6% vs 35.5% in higher status,  $p=0.016$ ), and hyperthyroid (56.4% vs 36.7% in hypothyroid,  $p=0.037$ ). (1)

The prevalence of depressive symptoms in hypothyroidism is near to 50%. A cross sectional study was conducted to determine the status of depression in patients with hypothyroidism attending in a tertiary level hospital in Bangladesh. The mean ages were  $30.97 \pm 6.62$  years. Out of all respondents 77.8% were Female, 72.2% were married. Majority of the respondents 84.4% were under treatment within 5 years and the rest 15.6% were taking treatment over 5 year. 64.4% of the respondents were under control, 20% were deteriorated and 15.6% were same as before. Among the respondents, 51.1% had no depression, 11.1% had mild depression, 35.6% had moderate depression and 2.2% had severe depression. The study showed that depression was found 48.9% in hypothyroid patients. (12)

## 5. Conclusion

The study identified a high prevalence of as depression in patients with thyroid function disorder attending the OPD of a tertiary hospital. The study findings favor early and routine screening for depression among individuals with hypothyroidism. More well-designed population-based prospective studies or randomized controlled trials are needed to gain more insights history of depression in subclinical hypothyroidism. The study can also be done in larger population to generalize the findings.

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