*Research Report*

# PREVALENCE AND CHARACTERISTICS OF THYROID DYSFUNCTION IN PATIENTS WITH DEPRESSIVE DISORDERS PRESENTING TO TERTIARY CARE CENTER- A CROSS-SECTIONAL STUDY

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ABSTRACT

**Background:** Thyroid dysfunctions, hypothyroidism and hyperthyroidism, can lead to mood disorders like depression and mania. Conversely, depressive disorders are associated with subtle variations in thyroid hormone levels. **Objectives:** The objective of the study was to examine the prevalence and characteristics of thyroid dysfunction in patients with Depressive disorders. **Methodology:** A cross-sectional study was conducted on patients diagnosed with depressive disorders who presented to outpatient and inpatient setting in the psychiatry department. Consecutive sampling method was used till the calculated sample size of 82 patients was reached. Diagnosis of depressive disorder was done as per the International Classification of Diseases, 10th revision (ICD-10). Hamilton depression rating scale (HAM-D) was administered to assess the severity of depressive symptoms. Thyroid Dysfunction was diagnosed based on the morning (8 AM) serum levels of T3, T4 and TSH levels. Data analysis was done using statistical package for the social sciences (version 24), and results were presented as mean and percentages. **Results:** Among 82 patients with depression, the prevalence of thyroid dysfunction was 15% (12), and subclinical hypothyroidism was the most common type with prevalence of 11% (9), followed by hypothyroidism. There was no significant association between the severity of depressive episode and the type of thyroid dysfunction ($x^2$-14.208, df-9, *p*-.115). **Conclusion:** Prevalence of thyroid dysfunction is higher in depressive disorders. Regular monitoring of Thyroid functions tests should be considered during follow up to prevent relapse of symptoms.

**Keywords:** Depressive disorders, HAM-D, Thyroid dysfunction, TSH.

## INTRODUCTION

World Health Organisation (WHO) has ranked depression fourth on the list of health problems worldwide.[1] Average lifetime prevalence of major Depressive disorders is 12%. The presence of thyroid dysfunction, either hypothyroidism or hyperthyroidism can increase this rate to 30-40%[2]. Bahl et al., who studied the relationship between thyroid function and depression, reported that the precise relationship between the Hypothalamo-Pituitary-Thyroid axis and

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depressive disorders remains obscure, and the mechanism underlying the thyroid abnormalities in depressive patients remains indeterminate.[3] However, research findings have established the relationship between thyroid dysfunction and mood disorders. It is recognized that frank hypothyroidism may cause depressive episodes,[4] and conversely, depressed patients demonstrate a high prevalence of subclinical hypothyroidism.[5] It is also postulated that minute variations in thyroid function status might be related to the alteration of brain function that leads to depression even though the exact role of free 3,5,3'-triiodothyronine (T3), thyroxin (T4) and thyroid-stimulating-hormone (TSH) in the pathophysiology of mental disorders is not clear.[2] Studies assessing the association between severity of depression and thyroid dysfunction have found mixed results. Ojha et al. found a positive correlation between the severity of depression and thyroid dysfunction, i.e. more severe the depressive symptoms, the more is the prevalence of thyroid dysfunction.[6] However, the study by Thapa et al. involving 249 depression patients found no significant association.[7]

### Objectives:

The primary objective was to examine the prevalence and characteristics of thyroid dysfunction in patients with Depressive disorders.

The secondary objective was to assess the association between thyroid dysfunction and the severity of depressive symptoms.

## MATERIALS AND METHODS

This cross-sectional study was conducted on patients presenting to the outpatient clinic and inpatient wards of a tertiary care centre in Karnataka, India. The study was conducted for a duration of six months, from September 2018 to February 2019. Based on prevalence of 22.1% and absolute precision of 9, and 95% CI, the sample size was calculated to be 82.[2] Data collection was started after obtaining approval from Institutional Ethical Committee.

### Inclusion criteria: -

- All genders in the age group 18 to 60 years.
- Diagnosed with, Depressive episode, Dysthymia and Recurrent depressive disorder according to International Classification of Diseases, tenth revision (ICD-10).
- Depressive disorders in symptomatic phase.

### Exclusion criteria: -

- Diagnosed with thyroid dysfunction before the onset of depressive disorders
- On thyroid supplementation therapy.
- Having substance use disorders or substance-induced mood disorders.
- Bipolar Affective Disorder who presented with a depressive episode.
- Undergoing treatment with lithium carbonate.
- Diagnosed with a medical illness like Diabetes mellitus, hypertension and other chronic disorders associated with depressive symptoms.

### Procedure:

- Patients diagnosed with Depressive disorders as per ICD-10 from outpatient and inpatient settings, meeting inclusion and exclusion criteria, were included in the study. Patients with depressive disorders in symptomatic phase were included in

Table 1 –Characteristic thyroid dysfunction according to TFT

| Level of FT3 and/or FT4 | Level of TSH | Interpretation |
|---|---|---|
| Elevated | Low | Hyperthyroidism |
| Normal | Low | Subclinical hyperthyroidism |
| Elevated | Normal or Elevated | Inappropriate TSH secretion |
| Low | Elevated | Hypothyroidism |
| Normal | Elevated | Subclinical hypothyroidism |
| Low | Normal or low | Secondary hypothyroidism |

the present study. On average, 50-60 patients visiting inpatient and outpatient services of tertiary care center are diagnosed with depressive disorder per month, excluding follow up patients. The majority of these patients were excluded as they did not meet inclusion criteria. Consecutive sampling method was adopted till a sample size of 82 patients was reached. Semi-structured proforma was used to collect socio-demographic and clinical variables. The severity of depressive symptoms was assessed using the Hamilton depression rating scale (HAM-D). A score of 10 - 13 indicates mild; 14-17 mild to moderate; >17 moderate to severe depression. A study by Olden M et al. assessing the validity and reliability of HAM-D in 422 depressive patients reported that it has high reliability and concurrent validity.[8] Morning 8 AM venous blood samples, around five millilitres, were collected and centrifuged at 3000 revolutions per minute (rpm) for 10 minutes to separate serum and stored at -20 degrees celsius till analysis of Thyroid function test (TFT). The laboratory of the tertiary care centre where this study was conducted is accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL). Patients with TFT reports from the same tertiary care centre were considered for the study to avoid bias, and those with reports from other laboratories were not considered. Patients treated on an outpatient basis were asked to get TFT the next morning of consultation, and those who were not willing for the same were excluded from the study. Characteristic thyroid dysfunction in these patients was diagnosed depending on the levels of freeT3, freeT4 and TSH, as mentioned in Table 1.[2] Data was analyzed using SPSS version 24 and data were explained in mean and percentages.

## RESULTS

There were 52% females and 48% males with a mean age of 42.48±11.26. The majority of the study sample were educated below high school. 64.6% of the study sample belonged to the Hindu religion, and the rest belonged to the Muslim and Christian faiths. 68% of the study sample were married, whereas 31% were unmarried. 58.5% of the study sample belonged to the rural area, and 31.5% were from the urban area (Table 2).

The study found that there was no statistically significant association between socio-demographic variables and characteristic thyroid dysfunction.

Table 2. Data regarding socio-demographic profile

| | | Frequency (%) |
|---|---|---|
| Sex | Male | 39(47.6) |
| | Female | 43(52.4) |
| Age | <25 | 14(17.1) |
| | 26 -35 | 16(19.5) |
| | 36 -45 | 24(29.3) |
| | 46 - 65 | 28(34.1) |
| Education | Illiterate | 4(4.9) |
| | Primary | 6(7.3) |
| | Middle | 15(18.3) |
| | High school | 24(29.3) |
| | PUC | 16(19.5) |
| | Degree | 16(19.5) |
| | Postgraduate | 1(1.2) |
| Religion | Hindu | 53(64.6) |
| | Muslim | 17(20.7) |
| | Christian | 12(14.6) |
| Marital status | Single | 25(30.5) |
| | Married | 56(68.3) |
| | Divorced | 1(1.2) |
| Occupation | Unskilled | 23(28.0) |
| | Skilled | 25(30.5) |
| | Govt employee | 3(3.7) |
| | Private employee | 8(9.8) |
| | Self-employment | 6(7.3) |
| | Business | 4(4.9) |
| | Others | 13(15.9) |
| Location | Urban | 34(41.5) |
| | Rural | 48(58.5) |
| Type of family | Nuclear | 69(84.1) |
| | Joint | 2(2.4) |
| | Extended | 11(13.4) |

Among 82 patients with depressive disorders, 25.6% had dysthymia, 41.6% had moderate depressive episodes, 25.6% had mild depressive episodes, and only 7.3% had severe depressive episodes (Table 3).

Table 3. Data regarding Depressive disorders.

| Depressive disorders | Frequency (%) |
|---|---|
| Mild | 21(25.6) |
| Moderate | 34(41.5) |
| Severe | 6(7.3) |
| Dysthymia | 21(25.6) |

Prevalence of thyroid dysfunction was found to be 15% in this study. Thyroid dysfunction was found more in female patients than male patients. However, there was no statistically significant association. Among the eight

Table 4. Data regarding prevalence of characteristic Thyroid dysfunction

| Thyroid dysfunction | Frequency (%) |
|---|---|
| Normal | 70(85.4) |
| Hyperthyroidism | 1(1.2) |
| Hypothyroidism | 2(2.4) |
| Subclinical Hypothyroidism | 9(11.0) |

females who had thyroid dysfunction, six patients were found to have sub-clinical hypothyroidism, and two had hypothyroidism. Four male subjects had thyroid dysfunction, among which one patient had hyperthyroidism, and three had sub-clinical hypothyroidism (Table 4).

The study found no significant statistical association between the severity of depressive episode and characteristic thyroid dysfunction (*p*-value =0.115), which indicates that the severity of Depressive disorders does not play a role in determining the characteristic thyroid dysfunction (Table 5).

## DISCUSSION

The present observational, cross-sectional study was conducted in a tertiary care centre on 82 patients diagnosed with Depressive disorders. Prevalence of thyroid dysfunction was found to be 15% which is higher compared to the general population, in whom it ranges from one to ten percent.[9] However, the findings of the study are similar to the study by Lokesh Jain et al. (2013), who reported that the frequency of thyroid dysfunction in depression is 20% and found a significant correlation between hypothyroidism and Depressive disorder.[10]

The prevalence of thyroid dysfunction was higher in female patients than in male patients. However, there was no statistically significant association (Pearson chi-square value $x^2$- 0.2.98, df-3, *p*-value=0..395), and also, there was no significant association with other socio-demographic profiles. The findings of this study are in concordance with other studies done in India and other countries.[11, 12]

In this study, subclinical hypothyroidism was the most common type of thyroid dysfunction, followed by hypothyroidism. This finding of the study is in concordance with the study done by Ojha et al., which was a cross-sectional study to examine the prevalence of thyroid dysfunction in depressive patients. The prevalence of thyroid dysfunction was 21%, among which 11.8% had subclinical hypothyroidism, and 5.7% had overt hypothyroidism.[6] In another study by Chawanun Charnsil and Sutrak Pilakanta et al., subclinical hyperthyroidism and the remaining 4.3%

Table 5 Association between Thyroid dysfunction and Depressive disorders

| | Depression | | | | Total | Chi-Square (p-value) |
|---|---|---|---|---|---|---|
| | Mild | Moderate | Severe | Dysthymia | | |
| Normal | 21(100) | 29(85.3) | 4(66.7) | 16(76.2) | 70 | |
| Hyperthyroidism | 0(0) | 1(2.9) | 0(0) | 0(0) | 1 | 14.208 |
| Hypothyroidism | 0(0) | 2(0) | 0(0) | 0(0) | 2 | (0.115) |
| Subclinical hypothyroidism | 0(0) | 2(0) | 2(33.3) | 5(23.8) | 9 | |
| Total | 21 | 34 | 6 | 21 | 82 | |

involving 140 patients with depressive disorder, 31 patients had thyroid dysfunction accounting for 22.1%.[2] Some studies have reported a higher prevalence of thyroid dysfunction (26%) than the present study.[13]

Another important finding of this study was that there was no significant association between the severity of depressive symptoms and characteristic thyroid dysfunction, which is similar to the findings of Charnsil et al. [2] However, this finding is in contrast with a study by Ojha et al., who reported significant correlation that is, more severe the depression higher is the prevalence of thyroid dysfunction.[6] Possible explanations could be differences in diagnostic criteria used for diagnosis and differences in severity of depressive episodes included in both the studies.

Merits of this study include the involvement of appropriate participants with the diagnosis of depressive disorders as a study sample from a tertiary care centre. Also, in the study, a standardized and widely used HAM-D scale with good reliability and validity was used to assess the severity of depression.

Limitations of our study include the hospital-based cross-sectional nature of the study, including participants from in and outpatient settings. The findings cannot be generalized to the general population and need prospective studies. The second limitation is the small study sample, and also during the study, the duration of depressive symptoms was not taken into consideration, which may affect thyroid function.

## Conclusion and future recommendations:

The prevalence of thyroid dysfunction is higher in patients with Depressive disorders than in the general population. Regular monitoring of TFT should be considered during follow up of these patients to prevent treatment resistance and relapse of depressive symptoms. A longitudinal, follow up study taking into consideration the duration of depression can be conducted to reveal the underlying risk factors and pathophysiology of Thyroid dysfunction in these patients.

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## Conflict of interest:

None declared.

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