e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(3); 22-27

Original Research Article

# Relationship between Depression and Thyroid Dysfunction in Patients Attending a Tertiary Care Hospital

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**Received: 30-12-2022 / Revised: 30-01-2023 / Accepted: 20-02-2023**
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**Conflict of interest: Nil**

**Abstract**

**Introduction:** Patients with thyroid disorders are more prone for depression and depression may be accompanied by various thyroid abnormalities. In the advancement of technologies and adoption of modern lifestyle practices, people are more prone to stress or depression and if it is left untreated, may results in serious complications. Beck depression inventory scale is a simple, self-rating scale is used to assess the mental status of the patient.

**Objective:** The main objective of the study is to explore the association between depression and thyroid dysfunction.

**Materials and Methods:** This prospective observational study consists of 100 patients who attended the medicine outpatient department. Their mental status was assessed by using Beck's depression inventory scale and Free T3, Free T4, TSH was estimated from their serum samples. Frequencies and proportion were used. The association between depression and thyroid dysfunction was determined using chi-square test.

**Results:** Majority (59%) of the study subjects was above the age group of 40 years of age and 57% of them were females. About 52% of them had thyroid dysfunction and almost 74% o had co-morbidities other than thyroid dysfunction. The prevalence of depression was found to be 65% among the study subjects. Also the depression was found to higher (77%) among the patients with

subclinical hypothyroidism than those with normal and other thyroid derangements which is statistically significant.

**Conclusion:** Our present study even though of 100 patients, it is concluded that whenever the diagnosis of depressive psychosis is confirmed, we may also have to rule out subclinical hypothyroidism.

**Keywords:** Thyroid Profile, Beck Depression Scale, Mental Health.

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## Introduction

Depression is the most common mental disorder and leading cause of disability contributing to a major overall disease burden. Approximately, 280 million people in the world are affected by depression [1]. About 10 to 25 % of women and 5 to 12 % of men are estimated to be suffer from major depressive disorder during their entire life period [2]. Due to modernization and urbanization, people are at increased lifetime risk of developing depression. There some diseases of modernity like diabetes, atherosclerosis, osteoporosis, hormone - related and gastrointestinal cancers [3].

Disturbances in thyroid function affect the mental status including cognition and emotion. Both increased and decreased level of thyroid hormones can cause mood abnormalities including depression [4]. Thyroid hormones play a major role in the neural tissue maturation and differentiation [5]. Hypothyroidism if left untreated may have the risk of developing depression [6]. It has been observed that there are similarities in symptoms among the severely depressed and thyroid abnormalities. In addition, the thyroid hormones have been used therapeutically in the management of depression and also there are abnormalities in the hypothalamic –pituitary –thyroid axis among the subjects with depression. All these above findings has lead to an observation of association between depression and thyroid dysfunction [7]. Hence the current study was conducted among the patients attending a tertiary care hospital to find out association between the depression and thyroid dysfunction.

There are many rating scales for depression. The most commonly used are Hamilton depression rating scale, Beck depression inventory scale, Zung self-rating scale, etc [8]. Beck depression inventory scale is used because it is a self-rating scale and it is designed in such a way that it can be easily filled by the patient. The advantage of using the beck depression inventory scale is that it take less time, no need of trained personnel, and scoring process is much more standardized [9]. Henceforth, the present study used the beck depression inventory scale to assess the mental status of the patient and identify the depression score. This depression score is correlated with the thyroid function tests of the patient.

## Materials and Methods

This prospective observational study was conducted among the patients admitted in tertiary care hospital, Trichy, Tamilnadu. The study was carried out over a period of 3 months from October 2022 to December 2022.All patients both male and female in the age group of 20-70, without any treatment for thyroid or psychiatric disorders are included in the study. Paediatric patients, patient with known thyroid and psychiatric disorders are excluded from the study. A total of 100 patients are included in the study. Basic socio-demographic profile was collected using a standard questionnaire. Beck depression inventory scale was used to assess

the depression score. BDI score of 1-10 is considered normal,11-16 indicate mild mood disturbance,17-20 represents borderline clinical depression,21-30 as moderate depression,31-40 as severe depression and score more than 40 indicate extreme depression. Fasting blood samples were collected from the patient for the estimation of thyroid hormones namely, TSH, Free T3, Free T4. Thyroid function test was estimated in fully automated analyser, cobas e311 in the clinical biochemistry lab. The study was approved from the institutional ethical committee. Informed consent was obtained from the study participants before enrolling in the study. The data collected was entered in MS excel and statistics was performed using SPSS software version.20. Frequency /percentage was used to describe the sociodemographic and clinical details of the study participants' association between depression and thyroid dysfunction was done by the chi-square test.

## Results

The mean age of the study subjects was 44.9 ±1.35 years. Majority of the study participants (59%) were more than 40 years of age. There was high female gender preponderance (67%). Majority were belonging to rural areas (69%) and 3/4$^{th}$ of the study subjects were found to be having some form of co-morbidity. About half (52 %) of the study subjects were found to be having subclinical thyroid status while 29 % of the study participants were found to be having deranged thyroid profile either hyperthyroidism and hypothyroidism. (Table- 1). Fig-1 shows the severity of depression among study subjects in which about only 8% of the study subjects had severe form of depression and 35 % of the study participants were found to be normal as per assessment done using Beck depression scale.

In the current study, the prevalence of depression was found to be higher among females (73.4%) when compared to males (48.4%). Also the proportion of depression (86.4%) was found to be higher among those had any co-morbidity than those didn't have (42.3%). Depression was found to higher among those subjects with sub-clinical hypothyroidism (77%)than those compared to those subjects with deranged and normal thyroid profile status.

The above findings were to be statistically significant. Other study variables such as age and the residence of the study subjects was not associated with depression. (Table-2)

**Table 1: Basic socio-demographic and clinical details of the study subjects N-100**

| S. No. | Characteristics | Frequency/ percentage N-100 |
|---|---|---|
| 1 | **Age** | |
| | <40 years | 41 |
| | >40 years | 59 |
| 2 | **Gender** | |
| | Male | 33 |
| | Female | 67 |
| 3 | **Residence** | |
| | Rural | 85 |
| | Urban | 15 |
| 4 | **Comorbidity** | |
| | Present | 74 |
| | Absent | 26 |

| | | |
|---|---|---|
| 5 | **Thyroid profile status** | |
| | Normal | 19 |
| | Sub-clinical hypothyroid | 52 |
| | Hyperthyroidism | 9 |
| | Hypothyroidism | 20 |

**Table 2: Association between study variables and depression (N-100)**

| S. No. | Characteristics | Depression Present (n-65) | Depression Absent (n-35) | Total | $X^2$ | P value |
|---|---|---|---|---|---|---|
| 1 | **Age** | | | | | |
| | <40 years | 24 (58.5) | 17 (41.5) | 41 | 1.276 | 0.259 |
| | >40 years | 41(69.4) | 18 (30.6) | 59 | | |
| 2 | **Gender** | | | | | |
| | Male | 16 (48.4) | 17 (51.6) | 33 | 5.905 | 0.015* |
| | Female | 49 (73) | 18 (27) | 67 | | |
| 3 | **Residence** | | | | | |
| | Rural | 55 (61.1) | 30 (38.9) | 85 | 0.022 | 0.883 |
| | Urban | 10 (66.6) | 5 (33.4) | 15 | | |
| 4 | **Co-morbidity** | | | | | |
| | Present | 58 (86.4) | 16(13.6) | 74 | 22.39 | <0.05* |
| | Absent | 7 (42.3) | 19 (57.7) | 26 | | |
| 5 | **Thyroid profile status** | 40(77) | 12(23) | 52 | 12.95 | <0.05* |
| | Sub-clinical | 10(52) | 9(48) | 19 | | |
| | hypothyroid | 7(50) | 7(50) | 14 | | |
| | Normal | 8(53) | 7(47) | 15 | | |
| | Hyperthyroidism | | | | | |
| | Hypothyroidism | | | | | |

Chi-square test. p value <0.05- significant

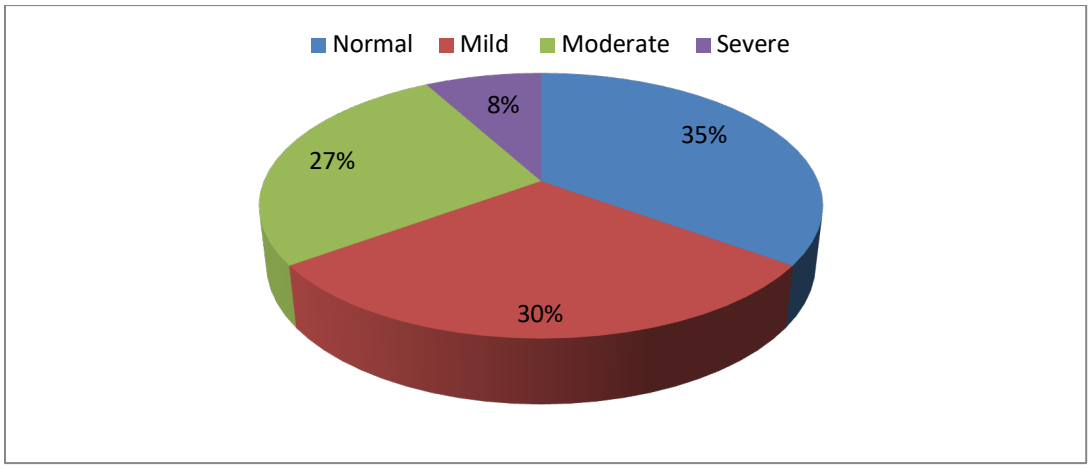


**Figure 1: Severity of depression among study subjects (N-100) using Beck inventory depression scale**

## Discussion

In the current study, the mean age of the subjects was 44.9 which was concurrent with the study conducted by Kusalic M *et al* [10]. Almost 2/3rd of the current study population were females. This finding was similar to earlier studies conducted to evaluate depression among thyroid deranged patients [11,12]. The present study showed that prevalence of depression was higher among females which was comparable to a study conducted by Gorkhali B *et al* [13]. Also, even in general population, there is higher risk of depression and it is attributed to the different personality, societal factors and responsibility and difficulty in coping with life stress [14,15].

The present study showed that depression was higher among those subjects with any type of comorbidity when comapared to those without co-morbidity. This finding was consistent with the similar studies conducted by Moledina SM *et al* [16] Mathias K *et al*,Gupta C *et al* [17] and Rahman S *et al* [18]. Also, the current study, there is significant asoociation between depression and thyroid profile status with higher prevalence of depression among subclinical hypothyroidism. These findings were comparable to the studies conducted in the different parts of the world [19-23]. It was well known fact that mood disorders were reported with hyper/hypothyroidism. The exact mechanism of depression in subclinical- thyroidism though not clear, literature shows that decrease in serotonin level in depressed patients leads to cause alterations in hypothalamo-pituitary axis leading to sub-clinical hypothyroidism [24].

The current study was conducted in a tertiary care setting and hence the findings cannot be generalized. Since it was a cross-sectional study, the cause to effect relationship cannot be established. But the findings of the study could help the researchers in the further exploration of depression in relation to thyroid dysfunction especially sub-clinical hypothyroidism

## Conclusion

The present study identified that the depression was higher among those subjects with sub-clinical hypothyroidism and those with co-morbidity. With the results of the study and also the proven evidence, it is recommended to evaluate the thyroid profile status among those where the suspicion of depression is made.

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