

Original Article**Thyroid Dysfunction Among Patients with Depression
in a Tertiary Care Hospital in Puducherry****S Sajeesh¹, S Arun², K Vinoth Krishnadass³, R Kumar⁴****Author Affiliation**

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Received on 11.04.2019

Accepted on 04.05.2019

Abstract

Background: The association between depression and thyroid disorders are studied extensively but still remains disputable. Hence, the current study was designed to estimate the proportion of thyroid dysfunction among depressive patients and also to study their association. *Material and Methods:* This was a hospital based cross sectional study done in a tertiary care centre in rural Puducherry. Eighty eligible patients with depression of any severity were included. They were interviewed with structured pretested questionnaire. The Hamilton Depression Rating Scale was used to measure the level of severity of depression. Thyroid functions test was carried out. Ethical principles were adhered throughout the study. SPSS version 24.0 was used for analysis and Chi-square test was used to find out association between severity of depression and thyroid status. *Results:* Of 80 depressed participants 45% were more than 45 years, females (72.5%) were the maximum and so 35% were homemakers. Participants belonging to upper middle socio-economic class were the majority (42.5%) and 65% were from rural area. Of the study participants 60, (75%) had normal thyroid function tests, one (5%) had hyperthyroid state and the remaining 19 (95%) had hypothyroidism. Among the depressed patients 67.5% had mild to moderate depression and 32.5% had severe depression. Increasing age and hypothyroid status were statistically associated. *Conclusions:* Majority of the depressed patients had moderate level of severity and hypothyroidism was the most common thyroid abnormality identified. Increasing age and hypothyroid status were associated with depression. Periodic screening of depressed patients for thyroid abnormality is recommended.

Keywords: Association; Depression; Hypothyroid; Screening.

How to cite this article:

S Sajeesh, S Arun, K Vinoth Krishnadass *et al.* Thyroid Dysfunction Among Patients with Depression in a Tertiary Care Hospital in Puducherry. Indian J Law Hum Behav. 2019;5(2):103-109.

Introduction

Depression is one of the most common mental illnesses causing significant impairment in standard of life globally. It is considered as the second leading cause of Disability Adjusted Life Years (DALYS) and has been ranked fourth of all dreadful health problems in the world by World

Health Organization [1]. By 2020, it is expected to be the second largest killer after heart disease in all countries including India [2].

The etiology of depression is most frequently studied, but it is never ideally understood. There are various factors which predispose people to develop a depressive disorder. Many major/chronic medical illnesses also make individuals vulnerable

to suffer depression. Hence the relationship between medical illnesses and depression has been under active research for many decades. Of these, issues with hypothalamic-pituitary-adrenal and hypothalamic-pituitary-thyroid axis and its association with depression have been found by many researchers [3,4].

Currently, it is well known that any disruption in thyroid function may markedly influence the mental status including the emotion and cognition of the individual [5]. Although, the link between clinical disorders of the thyroid gland and depression has been well established, the significance of the association between thyroid function and major depression is much less clear. Hence, the possibility of a relationship between thyroid gland, brain and depression has been of interest to both clinicians and researchers for more than two centuries [6].

Association between depression and hypothyroidism has been accepted and taught in medicine for many years, although the nature of this relationship and determinants of this association have not been convincingly proven. The similarity of symptoms in severely depressed and hypothyroid patients, the therapeutic use of thyroid hormones in the management of depression and the apparent abnormalities in the hypothalamic-pituitary-thyroid axis of subjects with depression are the clues that stimulated to do research on this aspect [7,8]. However, there have been many conflicting studies in this area.

Though numerous researches have been done in this field worldwide relatively little research has been done in India and there are conflicting data's for the same. Hence there is an utmost need to evaluate the association between thyroid disorder and depression. So the present study was conducted to evaluate for thyroid abnormalities in depression to establish the association between both illnesses. The objectives of the study were to estimate the proportion of patients diagnosed with depression having thyroid disorders and to find out the association between level of depression with socio-demographic and thyroid status of the study participants.

Materials and Methods

Study setting and design

This present study was conducted in the Department of Psychiatry of a tertiary care teaching hospital situated in rural part of the Union Territory of Puducherry. The college is found in the midway

of the Villupuram and Puducherry highway. The average OPD strength of the Psychiatry department was 45 patients per day and it is visited predominantly by the patients from neighbouring districts of Tamil Nadu and Puducherry. It was a hospital based cross sectional study carried out for a period of 18 months from November 2015 to June 2017.

Study subjects

The study subjects were the patients, in the age group of 18 to 65 years, both genders, who were attending Psychiatry OPD with symptoms and signs suggestive of depression and those who were referred from General Medicine department and finally diagnosed to have depression as per ICD-10, DCR criteria. Patients who were pregnant and lactating women, those with other psychiatric illness (schizophrenia, delusional disorder, anxiety disorders and mood disorders and known cases of mental retardation or dementia), medical co-morbidities and consuming medications that can affect the level of thyroid hormones or cause depression were excluded.

Sample size and sampling

Sample size was calculated to be 80 using the formula $4pq/d^2$, taking into consideration the prevalence of thyroid disorders among depressive patients as 72% based on a previous study [9], with 15% relative precision, 95% confidence interval and 10% non-response rate. Every patient diagnosed with depression was assessed for eligibility and those fulfilling the criteria were recruited consecutively till the desired sample size was achieved during the study period of 18 months.

Study procedure and study tool

The study was carried out after obtaining Institute Ethical Committee clearance (IEC Code No: 42/2015). Patients attending Psychiatry Department and having signs and symptoms suggestive of depression were assessed for the depression. If the patients were found to have depression they were assessed for the eligibility to get into the study by the principal investigator. Written informed consent was obtained from all study participants before recruiting them and collecting information from them related to the objectives. The participants were interviewed using a pilot tested structured questionnaire. The information on socio-demographic features like age, education, occupation, socio-economic status

(SES), history of comorbidities and intake of drugs that affect thyroid hormone level were collected using the questionnaire. The Hamilton Depression Rating Scale (HAM-D) was used to measure the level of severity of patients. They were then asked to carry out thyroid function test. The reports were collected by the Principal Investigator. They were then classified into patients having normal and abnormal thyroid function tests. Ethical principles were adhered throughout the study.

The HAM-D has proven useful for determining a patient's level of depression before, during, and after treatment. It was administered by the investigator experienced in working with psychiatric patients. It has lists of 21 items but the scoring was based on the first 17 items. It took approximately 15-20 minutes to complete the interview and score the results. Eight items were scored on a 5-point scale, ranging from 0 (not present) to 4 (severe). Nine were scored from 0 to 2. Sensitivity of the tool is 86.4% and the specificity is 92.2% [10].

Statistical analysis

Collected data were entered in EpiInfo software, version 7.2.2.6 and analysed using software SPSS version 24. Categorical study variables were summarized in frequency and percentages. Association between severity of depression and the socio-demographic details of study participants were identified using Chi-square test. All tests were two tailed and the p value <0.05 was considered statistically significant.

Results

Eighty study participants who were diagnosed to have depression were recruited into the study. Of these 45% belong to the age group 45 years and above, 30 (24%) were in the age group 30 to 40 years and 25% were in the age category of 18 to 30 years. Females (72.5%) were the maximum in number and so 35% were homemakers. Very few (2.5%) were students and 12.5% of them were unemployed. Education was assessed in completed years of schooling and it was found that 42.5% of them had 6 to 8 years of schooling and only 16 (20%) had more than nine years of schooling. Participants belonging to upper middle socio-economic class were the majority (42.5%) followed by lower middle (35%) and lower (22.5%) class. Most of them were from rural (65%) background and the rest from urban area. Married participants were the maximum (82.5%) and only 5% were widowed or divorced.

Almost all (95%) were Hindu by religion and very few (2.5% each) were Christian and Muslims. Of them 77% were consuming mixed diet (Table 1).

Table 1: Socio-demographic details and clinical features of study participants (N=80)

Characteristics	Frequency (%)
<i>Age category in years</i>	
18-30	20 (25)
30-40	24 (30)
> 40	36 (45)
<i>Gender</i>	
Male	22 (27.5)
Female	58 (72.5)
<i>Occupation</i>	
Homemaker	28 (35)
Employed	40 (50)
Student	2 (2.5)
Unemployed	10 (12.5)
<i>Education*</i>	
0-5	30 (37.5)
6-8	34 (42.5)
>9	16 (20)
<i>Socio-economic status</i>	
Lower	18 (22.5)
Lower Middle	28 (35)
Upper Middle	34 (42.5)
<i>Residence</i>	
Rural	52 (65)
Urban	28 (35)
<i>Marital status</i>	
Married	66 (82.5)
Unmarried	10 (12.5)
Widow/Divorced	4 (5)
<i>Religion</i>	
Hindu	76 (95)
Muslim	2 (2.5)
Christian	2 (2.5)
<i>Diet</i>	
Vegetarian	18 (22.5)
Mixed	62 (77.5)

Note: *Completed years of schooling

Of the study participants 60, (75%) had normal thyroid function tests and 20, (25%) were having abnormal thyroid status either hyper or hypothyroidism. Of the 20 dysthyroid patients, one (5%) had hyperthyroid state and the remaining 19 (95%) had hypothyroidism. In our study, 19 (23.7%) of depressed patients had hypothyroidism in which subclinical and overt hypothyroidism was seen in 12 (15%) and 7 (8.7%) of the depressed subjects respectively. Among the depressed patients 67.5% had mild to moderate

depression and 32.5% had severe depression (Figure 1 & 2).

Participants in the age group less than forty has more mild form of depression and the moderate depression increases after 40 years and this association was statistically significant (p value 0.03). Compared to males (22.7%), females had more moderate form of depression (36.2%) but this association was not significant. Employed person had more moderate degree of depression (40%), compared to that of housewife (28.6%) and unemployed (20%) and this finding was also

not significant. As education level increases the degree of depression also increases but this was not significant. Participants belonging to lower middle SES had higher level depression than others and it was insignificant association. There was no association between the residence and severity of depression. Compared to unmarried (10%), married persons (37.9%) had higher level of depression. Other than Hindus all those who belong to other religion had higher level of depression. People consuming mixed diet had more depression (33.9%) than vegetarians (27.8%).

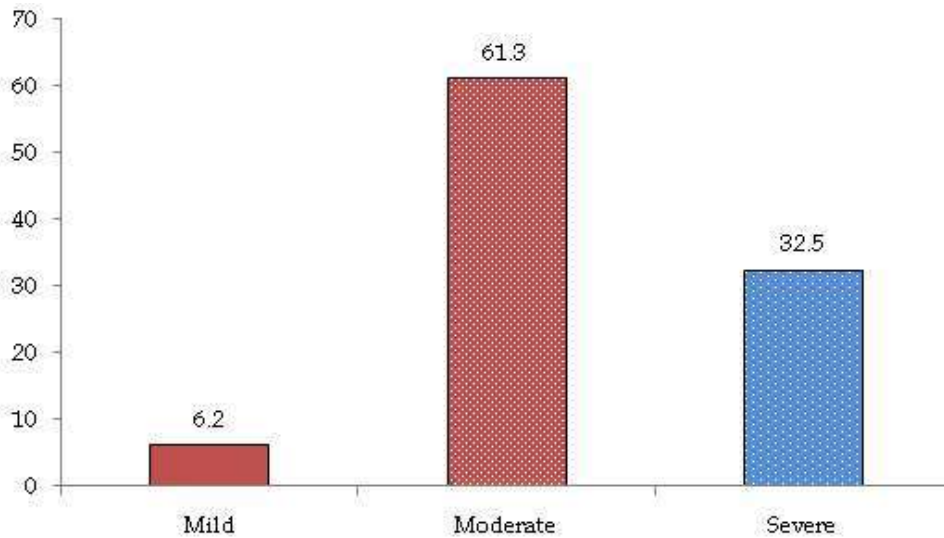


Fig. 1: Details of severity of depression among study participants (N=80)

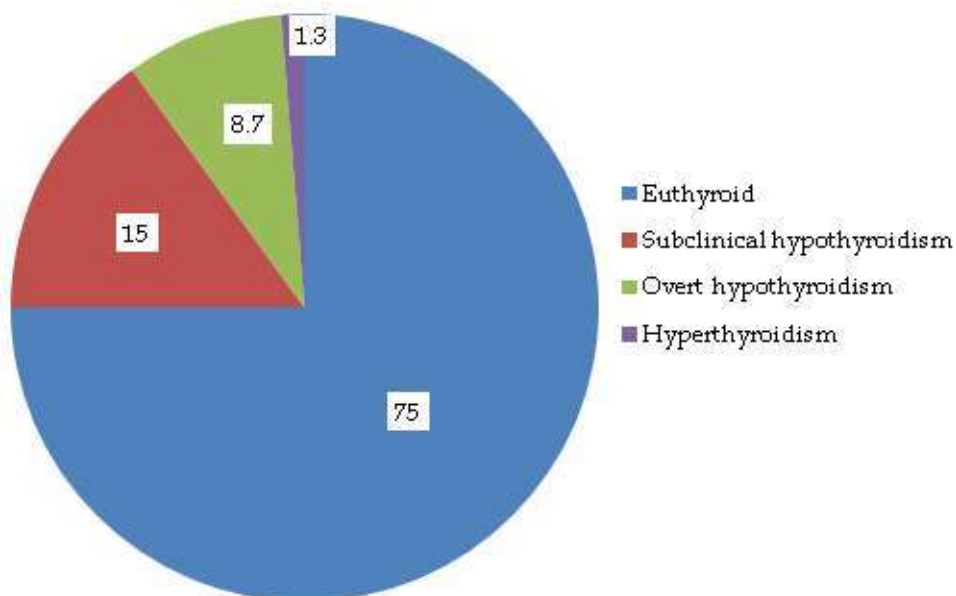


Fig. 2: Details of the result of thyroid function test done among study participants (N=80)

Table 2: Association between socio-demographic and clinical features of patents with types of depression (N=80)

Socio-demographic details	Depression status		p value#
	Mild - moderate n (%)	Severe n (%)	
<i>Age category in years</i>			
18-30	15 (75)	5 (25)	0.03*
30-40	20 (83.3)	4 (16.7)	
> 40	19 (52.8)	17 (47.2)	
<i>Gender</i>			
Male	17 (77.3)	5 (22.7)	0.25
Female	37 (63.8)	21 (36.2)	
<i>Occupation</i>			
Housewife	20 (71.4)	8 (28.6)	0.40
Employed	24 (60)	16 (40)	
Student	2 (100)	0	
Unemployed	8 (80)	2 (20)	
<i>Education in completed years of schooling</i>			
0-5	21 (70)	9 (30)	0.87
6-8	23 (67.6)	11 (32.4)	
>9	10 (62.5)	6 (37.5)	
<i>Socio-economic status</i>			
Lower	12 (66.7)	6 (33.3)	0.27
Lower Middle	16 (57.1)	12 (42.9)	
Upper Middle	26 (76.5)	8 (23.5)	
<i>Residence</i>			
Rural	37 (71.2)	15 (28.8)	0.34
Urban	17 (60.7)	11 (39.3)	
<i>Marital status</i>			
Married	41 (62.1)	25 (37.9)	0.07
Unmarried	9 (90)	1 (10)	
Widow	4 (100)	0	
<i>Religion</i>			
Hindu	53 (69.7)	23 (30.3)	0.10
Muslim	1 (50)	1 (50)	
Christian	0	2 (100)	
<i>Diet</i>			
Vegetarian	13 (72.2)	5 (27.8)	0.63
Mixed	41 (66.1)	21 (33.9)	
<i>Thyroid status</i>			
Normal	49 (81.7)	11 (18.3)	<0.001*
Abnormal	5 (25)	15 (75)	

Note: p value based on Chi-square test, * statistically significant ($p < 0.05$).

Marital status, religion and dietary associations with severity of depression were insignificant. Compared to patients with normal thyroid function (18.3%), those with abnormal thyroid function tests had higher level of depression and this finding was statistically significant ($p < 0.001$) (Table 2).

Discussion

Our study showed 75% of the depressed patients had Euthyroid status. Among the 25% of the

dysthyroid patients, 5% had hyperthyroidism and 95% had hypothyroidism. Previous studies done around the world showed 60-80% of the patients with depressive symptoms had normal thyroid state [6,9,11,12]. This finding was in concordance with our study. Thyroid dysfunction was seen in 25% of the study subjects belonging to depression group. Previous studies done on depressed patients in both developing and developed countries showed

that about 20–43% had thyroid dysfunction which was similar to our finding [9,11,12].

In our study, the prevalence of mild to moderate depression was found to be more than severe depression. These findings are congruent with a previous review done among Indian population on depression [13]. The number of patients seeking medical attention in psychiatric outpatient department basis was found to be higher among moderately depressed patients. It could also be due to the real difference in the prevalence of various grades of depression in the real context. There was no significant association found between socio-demographic profile and severity of depression other than age group and this result was in concordance with finding observed in a hospital based study done in New Delhi [14]. Increasing age and female gender had higher prevalence of depression and this finding was similar to the results of previous study done [9,15].

In our study, 23.7% of depressed patients had hypothyroidism in which subclinical hypothyroid patients were maximum than the overt hypothyroidism. Other studies on depressed patients showed that about 19–36% had hypothyroidism either as subclinical hypothyroidism (4–40%) and overt hypothyroidism (4–7%) [14,16]. The association between depression and thyroid disorder especially hypothyroid was evident from the previous studies [7]. Moreover a meta-analysis of double-blind placebo controlled trials concluded that thyroid hormones were effective in improving the clinical response of patients diagnosed with non-refractory depression to tricyclic antidepressants [17,18]. The effects of this acceleration appeared to be more remarkably more among females than males [19].

Current study found 5% of the depressed patients had hyperthyroidism. Similar to our result other studies done on depressed patients demonstrated that 1–12% of the study subjects had hyperthyroidism either in the overt or subclinical form. In recent onset psychiatric disorders including depression, there is a high frequency of hyperthyroxinemia [19,20]. In most instances, the thyroid function tests normalize within two weeks, and treatment directed toward the thyroid gland is not warranted. Various medications prescribed for depressive patients have diverse effects on thyroid function and can cause diagnostic difficulty.

The limitations of the present study include, hospital based design, because of which the results could not be generalised to all depressive patients. The lack of control group also was a limitation to

compare the risk factors against them and identify their role in the association with depressive patients. The cross sectional nature of study lacks temporal relationship and hence do not reflect causality, that is whether thyroid dysfunction is a cause or a result of depressive disorder and its treatment. Despite these limitations, the study highlighted the fact that abnormal thyroid hormonal status was frequently seen in depressed patient population.

Conclusion and Recommendation

Clinical investigators and epidemiologist have long recognized the link between thyroid and depression however the precise association and causation is unclear. While patients with depression have subclinical and overt hypothyroidism screening patients presenting with depression for thyroid dysfunction seems reasonable. This helps the treatment plan for those patients particularly those with refractory symptoms. The continuing research in the biochemical, genetic, and neuroimaging fields provide a deeper understanding of the thyroid-depression interactions. The implications with regard to screening and treatment of abnormal thyroid hormonal status and cost-effectiveness in the management of depressive disorders warrant further study.

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