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Research Article

Prevalence of Thyroid Dysfunction and Its Relationship with the severity of Major Depressive Disorder

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Abstract

Aim: To examine the prevalence of thyroid dysfunction in Major Depressive Disorder and its correlation with the severity of MDD.

Method: 140 major depressive disorder patients received blood sampling to identify any thyroid dysfunction. The severity of illness was determined by using the Hamilton rating scale for depression (HAM-D), frequency of admission and suicidal attempts.

Results: There were 140 subjects recruited. (95 female, 45 male) 31 of 140(22.1 percents) had thyroid dysfunction. Comparing patient who had thyroid dysfunction with patient who had normal blood level, there is no significant different in duration of illness, Hamilton rating scale for depression (HAM-D), frequency of admission and suicidal frequency ($p = 0.22$). But by using Spearman correlation there is negative correlation between free 3,5,3'-triiodothyronine (T3) and score of HAM-D($p = 0.024$).

Conclusion: MDD patients had high prevalence of thyroid dysfunction that did not correlate with their severity.

ABBREVIATIONS

MDD: Major Depressive Disorder; Ham-D: The Hamilton Rating Scale For Depression; T3: Free 3,5,3'-Triiodothyronine; T4: Thyroxin; TSH:Thyroid-Stimulating-Hormone

INTRODUCTION

The average life time prevalence of major depressive disorder is 12% [1]. There is a strong possibility that the etiology and treatment outcomes of depression can be related to the condition of their thyroid. Although the role of free 3,5,3'-triiodothyronine (T3), thyroxin (T4) and thyroid-stimulating-hormone (TSH) in the pathophysiology of mental disorders is not clear, it has been suggested that small changes of thyroid hormone levels might be related to the alteration of brain function that causes depression [2-4] an increase [5] and decrease [6] in plasma TSH levels, a decrease in T3 or both T3 and TSH levels, or an increase in T4 and TSH with no changes in T3 levels. Patients with depression were observed for any of these symptoms along with a control group [7]. Few studies have examined the prevalence of thyroid dysfunction in major depressive patients. Ojha et al., (2013) performed across-sectional study to examine the prevalence of thyroid dysfunction in depressive patients had found that 21% of depressive patients had abnormal thyroid function tests, 11.8% had subclinical hypothyroidism, 5.7% had subclinical hyperthyroidism, and the remaining 4.3% had overt hypothyroidism [8]. Their study, however, excluded patients who had a history of thyroid disease and included all types of depressive disorder. This research aimed to examine the prevalence of thyroid dysfunction in patients with major depressive disorder (MDD).

OBJECTIVE

To examine the prevalence of thyroid dysfunction in major depressive disorder and whether there is any correlation between the former and severity of the latter

MATERIAL AND METHODS

This research was approved by the Ethics Committee of the Faculty of Medicine Chiang Mai University. Patients with Major Depressive Disorder who came to the Psychiatric Outpatient Unit of Maharaj Nakorn Chiang Mai University Hospital were invited to participate. The inclusion criteria required that patients were at least 18 of age and had agreed to join this research. MDD was diagnosed by an experienced psychiatrist using the Mini-

International Neuropsychiatric Interview (M.I.N.I) based on DSM- IV criteria [9]. The M.I.N.I Thai-version was validated and found that the Kappa, sensitivity and positive predictive value on the diagnosis of current major depressive episode was very high (> 0.75). The specificity, the negative predictive value and efficiency was very high on diagnosis (> 0.81) [10]. Subjects whose condition affected their ability to give general information were excluded. All subjects were interviewed for their background information, history of illness, age of onset, number of hospitalizations and history of suicidal attempts. All subjects scored the Hamilton Rating Scale for Depression (HAM-D) to determine their severity of depressive symptoms. As in DSM-V Criteria for Major Depressive Disorder determine severity of disorder by five functional domains, we used frequency of admissions and suicidal attempts determine work and suicidal domain.

Blood samples were withdrawn from all participants to perform thyroid function testing; sampling was made at 8:00 am after an overnight fast to avoid the influence of circadian rhythms and dietary factors. Serum levels from the total T3, T4 and TSH were determined with electrochemiluminescence immunoassay technique. The normality ranges are as follows: T3: 2-4.4 pg/ml; T4: 0.3-1.7 ng/dl; TSH: 0.27-4.2 micro IU/mL). Subjects who were being treated for thyroid dysfunction were also included in this study and labeled as a thyroid dysfunction group.

Thyroid dysfunction is defined by the level of triiodothyronine (freeT3), thyroxine (free T4) and thyroid-stimulating hormone (TSH) as show in Table (1) [11]. Subjects who were being treated for thyroid dysfunction were classified by their diagnosis.

STATISTICAL ANALYSIS

The number of thyroid dysfunction patients and subtypes were shown in percentages. We used the Spearman correlation coefficients to determine the correlation between the thyroid hormone level and the severity of depression.

RESULTS

140 patients with major depressive disorder joined the study which consisted of45 males (32.2%) and 95 females (67.8%) respectively. Demographic data is shown in Table (2). Of 140 participants, 31 (22.1%) had a thyroid dysfunction. Six patients had hyperthyroidism, four had subclinical hyperthyroidism, six had inappropriate TSH secretion, eight had hypothyroidism, seven had subclinical hypothyroidism and six patients had secondary hypothyroidism (Table 3). The characteristics of the subjects who had thyroid dysfunction and normal thyroid function are shown in Table (4). The results demonstrated no significant association between thyroid dysfunction with the duration of depressive illness, HAMD, admission frequency or suicidal attempts frequency (Table 4). When we examined each of the hormone levels with those factors, we found that the level of free T3 had a significant negative correlation with the HAMD (p = 0.024) (Table 5).

DISCUSSION

The prevalence of thyroid dysfunction in our study (22.1%) is quite high compared with the studies in the general population (7.2%) [12]. But it is closer to other studies in patients with MDD.

Table 1: Definition of Thyroid Dysfunction [10].

Level of Free T4 and/or Free T3	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	Low or Normal	Secondary Hypothyroidism

Table 2: Characteristics of Subjects in Study.

Sex	
Male	45 (32.2%)
Female	95 (67.8%)
Age Group	
≤ 30	2 (1.9%)
31-45	26 (9.4%)
46-60	90 (60.4%)
≥ 61	22 (28.3%)
Duration of Illness	
< 1 year	65 (52.8%)
1 to < 3 years	57 (32.1%)
≥ 3 years	18 (15.1%)

Table 3: Distribution of patients on basis of thyroids status.

Status of Thyroid	N (%)
Normal	109 (77.9%)
Hyperthyroidism	6 (4.3%)
Subclinical hyperthyroidisms	4 (2.8%)
Inappropriate TSH Secretions	6 (4.3%)
Hypothyroidism	0 (0%)
Subclinical Hypothyroidism	8 (5.7%)
Secondary Hyperthyroidism	7 (5%)

Table 4: Thyroid Function Test and Major Depressive Disorder.

Variables	Thyroid Function Test		T-Test (p-value)
	Normal (n = 109)	Abnormal (n = 31)	
Age	48.92	51.3	-.810 (.419)
Duration of MDD (months)	71.91	89.19	-1.226 (.222)
HAMD	8.35	10.81	-1.938 (.060)
Admission Frequency	0.53	0.45	.389 (.698)
Suicide Frequency	0.45	1.17	-1.062 (.296)

Table 5: Spearman's rho correlation coefficients (p-value).

Variables	FT3	FT4	TSH
Age	-.079 (.351)	-.088 (.300)	-.044 (.606)
Duration of Illness	-.104 (.221)	-.113 (.184)	-.022 (.793)
HAMD	-0.190 (0.024)	-0.096 (0.261)	0.103 (0.224)
Admission Frequency	.061 (.476)	-.009 (.916)	0.077 (0.364)
Suicide Frequency	0.081 (0.345)	0.050 (0.560)	0.077 (0.368)

Ojha's and Loosen's findings were 21% and 25% respectively [8,13]. 17of 140 (12%) subjects had subclinical thyroid dysfunction which was the same as Gold et al., (15%). [14] This confirmed that thyroid dysfunction is a common co morbidity with MDD, although Ojha's study included all types of depressive disorders. From our finding there was no specific kind of thyroid dysfunction in major depressive disorder, which was the same finding as Ojha et al., [8].

There was no significant correlation between thyroid dysfunction and severity of MDD (duration of depressive illness, HAMD, admission frequency and suicidal attempts frequency). This contrasted with Ojha's finding which showed a correlation between severity of depression and thyroid dysfunction. The reason may be because the onset of thyroid dysfunction in our group may have differed from Ojha's. Also, there are many factors that affect the severity of MDD that may be different in our population than Ojha's population.

The finding that the level of free T3 had a significantly negative correlation with HAMD, supported the hypothesis that thyroid hormone may affect depressive disorder. Our findings regardingT3 activity corresponded with Stipcevic et al., (2008) who examined thyroid activity in major depressive patients. She found that significantly lower T3 activity in MDD patients compared with the control group [15]. Joffe et al., examined thyroid hormone levels and the recurrence of major depression, and found that the time for each recurrence of an episode was inversely correlated to serum T3 [16]. This confirms that T3 had some correlation with the course and the severity of MDD.

One limitation of our study was the fact that it was a cross-sectional study which limits the demonstration the effects of thyroid dysfunction had over the course or severity of depression.

CONCLUSION

Thyroid dysfunction is a common co morbidity associated with major depressive disorder. Although there was no correlation between any kind of thyroid dysfunction and severity of illness the level of freeT3 showed a correlation with the severity of major depressive disorder. A prospective study may add to knowledge about this effect.

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