IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 6 Ver. XIV (June 2016), PP 115-118
www.iosrjournals.org

A Study of Thyroid Dysfunction among Patients with Major Psychiatric Disorders at a Tertiary Care Centre in Mangalore

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Abstract: *Studies in areas of psychiatric and thyroid disorders have shown positive correlation with duration and type of treatment. This has a lot of implication for prognosis and treatment response. Studies on the coexistence of thyroid dysfunction and major psychiatric disorders in the Indian population are limited. Hence this observational analytical study was carried out to evaluate and compare the presence of thyroid dysfunction in psychiatric patients and vice versa in a tertiary hospital-based inpatient sample. 221 patients aged above 20 years diagnosed with psychiatric disorder (defined by ICD-10 criteria) were included in the study. Data collected was analyzed using SPSS 15.0 by frequency, percentage, mean and standard deviation, student t test, Chi-square test and multiple regression tests. Our study found that there is a higher prevalence of thyroid dysfunctions in patients with psychiatric disorders mainly schizophrenia, schizophrenia spectrum disorders and Mood disorders. Long term treatment especially with lithium and Valproate was strongly linked with Hyperthyroidism while Olanzapine was linked with hypothyroidism in our study sample. Our results confirm that there is a higher prevalence of thyroid dysfunctions in patients with schizophrenia, schizophrenia-spectrum disorders and mood disorders. This is a useful finding as this calls for frequent monitoring of Thyroid function tests in all psychiatric patients on treatment, to enable proper management.*

Keywords: *Lithium, Mood disorders, Olanzapine, Psychiatric disorders, Schizophrenia, Thyroid dysfunction, Valproate*

I. Introduction

The hormones regulating the rate of metabolism in the human body are thyroxine (T4) and triiodothyronine (T3), which are produced by the thyroid gland after receiving stimulation from the thyroid-stimulating hormone (also known as thyrotropin) which is synthesized and secreted by thyrotrope cells in the anterior pituitary gland. This is the hormone which regulates the endocrine function of the thyroid gland. Thyroid hormones are essential for neurogenesis and neurodevelopment i.e. for myelination, dendrite proliferation and formation of synapses [1].

Most antipsychotic medications with the exception of Quietapin either block dopaminergic transmission or cause elevated levels of TSH by any of the following mechanisms- inhibition of the uptake of iodine into follicular cells, alteration of the structure of thyroglobulin, interfering with the coupling of iodotyrosine residues and thus blocking the formation of iodothyronines or by directly inhibiting thyroid hormone secretion [8].

This is an important factor in the treatment of psychiatric illnesses as studies show that TSH levels are directly linked with the severity of psychiatric co morbidity [9]

ICD-10 defines various psychiatric disorders- Schizophrenia, Schizoaffective disorder, Major depressive disorder, Bipolar disorder, Acute psychosis, Dissociate disorder, Panic disorder, Substance use disorder etc. Among these, Schizophrenia, anxiety disorder, bipolar disorder, depression are considered to be few of the severe psychiatric disorders owing to higher prevalence and chronicity of the illnesses which lead to difficulty in the treatment aspect as most patients do not follow up regularly and hence the dosages of medication may produce disparity. [2] While the diagnosis of psychiatric disorders depends on various criteria, Thyroid function tests are currently used to assist the diagnosis, treatment and prognosis of various psychiatric conditions. This is because both hypothyroidism and hyperthyroidism have been found to be associated with neuropsychiatric manifestations such as psychosis, anxiety, depression and mood disorders. [3],[4], [5]

Similarly antipsychotic medications have been positively correlated with fluctuations in serum thyroid hormone levels. [6] Studies suggest that this could be due to increased dopaminergic activity which has an effect on pituitary secretory functions and may result in reduced TSH levels. [7]

Thyroid disorders can lead to dementia and depression; studies show that in younger age groups hypothyroidism is the main cause leading to this while in the elderly age group it is usually hyperthyroidism that produces such symptoms. [10]

As stated earlier, research suggests that this co-incidence of psychiatric and thyroid disorders may be due to biochemical abnormalities. [11] This makes a case for screening, and has implication for prognosis and

treatment response. Studies on the coexistence of thyroid dysfunction and major psychiatric disorders in the Indian population are limited. Hence this study was carried out to evaluate and compare the presence of thyroid dysfunction in psychiatric patients and vice versa in a tertiary hospital-based inpatient sample.

II. Objectives

To study the type and degree of thyroid dysfunction among patients with major psychiatric disorders.

III. Material And Methods

3.1 Source Of Data: Patients admitted at Father Muller Medical College Hospital, Mangalore, aged more than 20 years, diagnosed with psychiatric disorders.

3.2 Study Design: This was an observational analytical study on 221 patients over a period of 4 months from March to June 2016, at Father Muller Medical College Mangalore. Informed consent was taken from the individuals prior to including them in the study. Patient details, detailed history and clinical features along with laboratory investigations were documented in a preformatted sheet.
Sample size was calculated taking Confidence interval of 95%, p-0.3557 and allowable error as 7%. Formula: n=Z2 p (1-p)/e2

3.3 Inclusion Criteria: All patients above 20 years diagnosed with psychiatric disorder (Both newly diagnosed newly as well as previously diagnosed).

3.4 Exclusion Criteria: Patients with history of cerebrovascular disease, renal dysfunction, ischemic heart disease.Psychiatric disorders (defined by ICD-10 criteria) included in the study were: Schizophrenia, Schizoaffective disorders, Major depressive disorders, Bipolar disorder, Acute psychosis, Dissociative disorder, Panic disorder, Substance abuse disorder.
Biochemical derangements in thyroid function tests were considered as defined by the ranges given below.
S.T3:0.8 to 2 ng/ml, S.T4:5.1 to 14.1 mcg/dl, S.TSH:0.27 to 4.2 mIU/ml, S.FT4:0.03 to 1.7 ng/dl

3.5 Statistical Analysis: Data collected was analyzed using SPSS 15.0 by frequency, percentage, mean and standard deviation, student t test, Chi-square test and multiple regression tests.

IV. Results

A total of 221 psychiatric patients were assessed during the data collection period. Table 1 shows demographic characteristics of the study participants. Most of our study subjects belonged to the age group of 26-40 years (54.24%). Males and females were in almost equal numbers; 49.32% and 51.13% respectively. There was no statistical significance in terms of age group and gender in the study population.

Tables 2 and 3 show the documentation of duration of psychiatric and thyroid disorders respectively. In our study sample there were 98 (44.34%) patients with schizophrenia, 45 (20.36%) with schizoaffective disorder, 32 (14.47%) with bipolar disorder, 12 (5.42%) with dissociative disorder, 5 (2.26%) with anxiety disorder, 1(0.45%) each with psychosis and panic disorder, 2(0.9%) with substance abuse disorder and 22 (9.94%) with depression ranging from mild to severe degrees.

Similarly, Hypothyroidism was observed in 79(35.74%), Hyperthyroidism in 77 (34.84%) and sick euthyroid syndrome in 65 (29.41%) of the study population as shown in Table 5.

With regard to antipsychotic and mood-stabilizer medications, 66 (29.86%) were found to be on Lithium, 19 (8.51%) on Olanzapine, 1 (0.45%) on Quetiapine, 26 (11.76%) Clozapine, 81 (36.65%) on Valproate, 23 (10.4%) on Haloperidol and 5 (2.26%) on Risperidol.

There was found to be a significant difference in TSH levels among the patients on different types of antipsychotics. Thyroid abnormalities were found to be least with quetiapine and highest with Lithium and Valproate. This was found to be statistically significant with p=0.01.

V. Tables And Charts

Table 1: Demographic profile of study subjects

Demographic categories	Characteristics	N	(%)	P value
Age group	20-30 yrs	113	51.13	P=0.06
	31-40 yrs	59	26.69	
	41-50 yrs	28	12.66	
	>50 yrs	21	9.50	
Gender	Male	108	49.32	P=0.9
	Female	113	51.13	
Total		**221**	**100**	

Table 2: Duration Of Psychiatric Morbidity

Duration	Frequency	Percentage (%)
Newly diagnosed	0	0
2-6 months	12	5.42
6 months-1yr	89	40.27
> 1 year	120	54.29
Total	**221**	**100**

Table 3: Duration Of Thyroid Disorder

Duration	Frequency	Percentage (%)
Newly diagnosed	45	20.36
2-6 months	55	24.88
6 months-1yr	49	22.17
> 1 year	72	32.57
Total	**221**	**100**

Table 4: Type Of Psychiatric Illness

Type		Frequency (n)	Percentage (%)
Schizophrenia		98	44.34
Schizoaffective disorder		45	20.36
Bipolar Disorder		32	14.47
Dissociative Disorder		12	5.42
Major Depressive Disorder		5	2.26
Anxiety		3	1.35
Psychosis		1	0.45
Panic Disorder		1	0.45
Substance abuse disorder		2	0.9
Depression	Mild	2	0.9
	Moderate	13	5.88
	Severe	7	3.16
Total		**221**	**100**

Table 5: Type Of Thyroid Disorder

Type	Frequency(n)	Percentage (%)
Hypothyroidism	79	35.74
Hyperthyroidism	77	34.84
Sick Euthyroid syndrome	65	29.41
Total	**221**	**100**

Table 6: Univariate Analysis Of Duration Of Thyroid Disorders With Psychiatric Morbidity

		Thyroid Disorders				Total
		Newly diagnosed	2-6 months	6 month- 1 year	>1 year	
Psychiatric morbidity	Schizophrenia	0	1	44	53	98
	Schizoaffective disorder	0	3	19	23	45
	Bipolar Disorder	0	3	7	22	32
	Dissociative Disorder	0	2	5	5	12
	Major Depressive Disorder	0	1	2	2	5
	Anxiety	0	1	1	1	3
	Psychosis	0	1	0	0	1
	Panic Disorder	0	0	1	0	1
	Substance abuse disorder	0	0	0	2	2
	Depression	0	0	10	12	22
Total		**0**	**12**	**89**	**120**	**221**

X^2 value 5.71, P=0.03

Table 7: Univariate Analysis Of Duration Of Psychiatric Morbidity With Thyroid Disorders

		Duration of Psychiatric morbidity				Total
		Newly diagnosed	2-6 months	6 month- 1 year	>1 year	
Thyroid Disorders	Hyperthyroidism	0	3	34	42	79
	Hypothyroidism	0	4	23	50	77
	Sick Euthyroid syndrome	0	5	32	28	65
Total		**0**	**12**	**89**	**120**	**221**

X^2 value 11.2, P=0.0038

Table 8: Univariate Analysis Of Type Of Antipsychotics Used With Thyroid Disorder

		Type of Thyroid Disorder			Total
		Hypothyroidism	Hyperthyroidism	Sick Euthyroid syndrome	
Antipsychotic	Lithium	55	2	9	66
	Olanzapine	2	2	15	19
	Quetiapine	0	0	1	1
	Clozapine	3	8	15	26
	Valproate	10	59	12	81
	Haloperidol	8	5	10	23
	Risperidone	1	1	3	5
Total		**79**	**77**	**65**	**221**

X^2 value 8.82, P=0.010

VI. Discussion

Thyroid disorders were found to be present in 64.7% of the patients with schizophrenia and schizophrenia-spectrum disorders in our study. This was similar to a study conducted by Sim et al [12] in South-East Asia which showed that among the majority of patients with thyroid disorders, most were schizophrenics.

Duration of the illness was also found to be an important factor with patients with long term psychiatric disorders presenting with thyroid dysfunction more than the newly diagnosed ones. This was similar to a study conducted by Fardella et al in Chile. [13]

Thyroid dysfunction in bipolar disorder seen in our study was 14.47% which was comparable with that of a study done by Cassidy et al [14].

Most antipsychotic medications are known to cause elevated levels of TSH due to block in the dopaminergic transmission. Lithium, especially, is known to cause hyperthyroidism as a result of direct toxicity to thyroid follicles.[15]

Thyroid hormone abnormalities can also be present in nonthyroidal illness such as "euthyroid sick syndrome" as a response to chronic illness or stress.

Our study had 6 individuals with sick euthyroid syndrome. These were the cases with a significant decline in the T3 level and an elevation in the T4 level, similar to the findings of a study conducted by Kamble et al [16] where they observed the presence of thyroid dysfunction among the depressive cases, characterized as the "Lower Thyroid Syndrome".

VII. Conclusion

In conclusion, our results confirm that there is a higher prevalence of thyroid dysfunctions in patients with schizophrenia, schizophrenia-spectrum disorders and mood disorders. This is a useful finding as this calls for frequent monitoring of Thyroid function tests in all psychiatric patients on treatment, to enable proper management.

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