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A STUDY OF THYROID HORMONES (T_3, T_4 & TSH) IN PATIENTS OF DEPRESSION

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ABSTRACT

In this study, 32 unmedicated patients of unipolar depression were included and blood samples were analysed for T_3, T_4 and TSH. These were compared with age and sex matched controls. Subnormal T_3 and T_4 levels in 90.6% and 9.3% respectively and an increase of TSH levels in 18.7% of the total patients was observed in this study. The patients were classified into mild, moderate and severe grade of depression as per DSM-IV criteria. Of the mild 66.6%, 93.3% of moderate and all of the severe grade depression patients had low T_3 levels.

Of the moderately depressed patients 13.3% and 9.0% of severe depression patients had low T_4 levels. TSH was increased than normal in 54.5% of the patients and all these patients were of severe grade. ANOVA with multiple comparison testing shows significant decrease in levels of T_3 ($F_{2,29}$ >3.33) and significant increase in TSH levels ($F_{2,29}$ >3.33) at 5% level of significance amongst mild, moderate and severe grade of depression patients. This study suggests a subclinical hypothyroidism in most of the patients which could lead to nonresponsiveness to the conventional antidepressant therapy. Therefore, evaluation of thyroid status prior to antidepressant therapy and subsequent thyroid hormone substitution in subclinical hypothyroid patients is suggested.

Key words : Thyroid hormones, depression

Abnormal thyroid hormone levels are common in psychiatric disorders. Hyperthyroxinemia has been reported in variety of acute psychiatric disorders e.g. schizophrenia, functional psychosis, major affective disorders, personality disorders (Spratt et al.,1982). Subtle abnormality in thyroid hormone levels without any clinical evidence of hypothyroidism have been reported in depression patients. Slightly higher levels of T_4 with lower levels of T_3 and TSH (Baumgartner et al.,1992), decreased T_4 along with lower levels of T_3 and TSH (Bauer et al., 1994), lower levels of T_3 (Bottai et al.,1991) and lower T_3 and raised TSH (Wahby et al., 1989), higher levels of T_4 (Garbutt et al.,1986) have been reported. While T_4 and TSH data are variable in various studies, lower T_3 levels have been reported in most of the studies. The type of patients of study group viz. study group of the patients on antidepressants, patients of bipolar category, patients in acute phase of disease etc. could be the factors for inconsistency in the thyroid status of the patients of depression. Further, there are reports on thyroid hormones having bearing on the outcome of the conventional antidepressants therapy in such patients. In view of the above inconsistent reports regarding thyroid status, we planned this study on unmedicated patients of unipolar depression.

MATERIAL AND METHOD

In this study, 32 patients (21 males and 11 females) of major unipolar depression of the age of 16-52 years (mean age=36.2, 11.8 years) at their first visit to psychiatric out patient department without prior intake of antidepressants were included. The patients had

the first episode of depression for two weeks to three months. Grading of depression was into mild (296.21), moderate (296.22) and severe (296.23) according to DSM-IV criteria and ICD-10 (F32.00, F32.10, F32.2) by two psychiatrists. Exclusion of thyroid dysfunction, hypertension and diabetes mellitus was done clinically. The blood samples were drawn between 9 A.M. and 11 A.M. for estimation of T_3, T_4 and TSH. Control group included 11 healthy volunteers (5 males and 6 females) aged between 15 to 52 years (mean age=30.54, 12.6 years).

T_3, T_4 were estimated by competitive solid phase enzyme linked immunosorbant assay (ELISA) TSH was estimated by sandwich ELISA employing monoclonal antibodies. The statistical analysis of data was done by student 't' test. ANOVA with multiple comparison testing was applied among three grades of severity of the depression.

RESULTS

Out of 32 patients of this study, 6 patients had mild, 15 had moderate and 11 had severe grade of depression. Thyroid profile of the patients shows subnormal T_3 and T_4 levels in 90.6% (n=29) and 9.3% (n=3) respectively and raised TSH levels in 18.7% (n=6) of the patients. Four patients (66.6%) of mild depression and 14 (93.3%) of moderate depression and all (100%) of the severe grade depression patients had low T_3 levels. T_4 was lower in 2 (13.3%) of moderate and 1 (9%) of severe depression patients. None had raised T_4 levels. The TSH was increased than normal in 6(54.5%) all from the severe grade of depression. Comparison of T_3, T_4 and TSH levels between patients group and control subjects are shown in table. T_3 and T_4 levels were significantly lower in the depressed patients as compared to the control group. However, mean TSH levels were not significantly different from control. Analysis of the data of different grades of severity of illness shows significantly lower T_3 and T_4 in all grades of depression. In case of TSH, mildly depressed patients had significantly lower and severely depressed patients had significantly higher levels. ANOVA with multiple comparison testing between the three groups of the patients of mild, moderate and severe depression showed significantly low T_3 levels ($F_{2,29}$ >3.33) and significantly higher TSH levels ($F_{2,29}$ >3.33) at 5% level of significance.

DISCUSSION

The T_3 and T_4 levels observed in the patients indicate existence of biochemical hypothyroidism. Similar low T_3 levels in depression patients have been reported by Tappy et al. (1987), Wahby et al. (1989), Bottai et al. (1991), Baumgartner et al. (1992) and Orsulak et al. (1995). While Bauer et al. (1994) and Fava et al. (1995) have reported low T_3 levels in 62% and 7.6% respectively, our study indicates low T_3 levels in 90.6% of the patients. Low T_3 in higher number of patients in our study could have been due to existence of iodine deficiency reported in this region (Singh et al.,1988). Our data on T_3 in different grades of depression also suggests further aggravation of biochemical hypothyroidism with increase in severity of depression.

Although most of the reports suggest increased T_4 levels in depression patients as compared to normal (Stewart,1982; Wahby et al.,1989; Roca et al.,1990; Duval et al.,1994). Our study shows T_4 within normal limits but

TABLE

T_3, T_4 & TSH IN HEALTHY CONTROLS AND DEPRESSION PATIENTS OF MILD, MODERATE AND SEVERE GRADE

Thyroid hormones	Control subjects	Total patients	Depression		
			Mild	Moderate	Severe
T_3 (ng/dL)	117.3±36.3	47.7±24.2***	70.8±23.7***	41.8±20.7***	43.4±23.4***
T_4 (ug/dL)	10.57±2.61	6.63±3.37***	6.70±2.03**	5.64±1.67**	7.10±3.99*
TSH (uU/mL)	3.27±0.97	3.51±1.78	2.38±1.02*	2.93±1.23	5.08±1.78**

*p<0.05, **p<0.01, ***p<0.001

significantly lower than healthy control subjects. Similar normal levels of T_4 were reported by Maes et al. (1993) and Fava et al. (1995) while Tappy et al. (1987), Nakamura & Nomura (1992) and Bauer et al. (1994) have reported significantly lower levels of T_4 as in our study.

Normal TSH levels without any significant variation from control as observed in this study, has also been reported by Stewart (1982) and Fava et al. (1995). On the contrary, lower TSH levels than normal (Bauer et al.,1994) or significantly lower than control (Maes et al.,1994) and higher than normal or significantly more than control T_4 levels have also been reported (Tappy et al.,1987; Wahby et al.,1989). In our study, though, all TSH values of the patients were within normal limits, mildly depressed patients had significantly lower while the severely depressed patients had significantly increased levels than control subjects.

Normal TSH levels of total patients in our study with subnormal T_3 levels indicates hyporesponsiveness of the hypothalmic area to various stimuli including T_3 responsible for Thyrotropin (TRH) secretion. Though there is no report available on hypothalmic TRH response to various levels of T_3, blunted TSH response to provocative TRH stimulus have been shown by Targum (1984) and Duval et al. (1994).

Our result corroborates the findings of other workers with lower T_3 levels in depressive patients and it could lead to subclinical hypothyroidism and refractiveness. Therefore, thyroid profile in refractive patients is suggested. However, preferential conversion of T_4 to rT_3 in these patients is also needed to be explored.

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