Level of Thyroid Hormones in Elderly Postmenopausal Women with Depression in Mumbai

Pallavi Janrao Kamble[1], Sankalp Kumar Tripathi[2], Ritu S. Chandel[3]

[1]Assistant Professor, Department of Biochemistry, Government Medical College, Gondia, Maharashtra, India
[2]Assistant Professor, Department of Biochemistry, ABV Government Medical College, Vidisha, Madhya Pradesh, India
[3]Junior Biochemist, Breach Candy Hospital, Mumbai, Maharashtra, India

Abstract

Bavkground: Risk of hypothyroidism increases with the age particularly in women. Postmenopausal elderly women are also at risk of developing depression. Objective of this study is to determine the serum level of T3, T4 and TSH in elderly postmenopausal women with depression as compared to the elderly postmenopausal women without depression in Mumbai.

Methods: Study included thirty postmenopausal women greater than 50 years who were newly diagnosed with depression. Their T3, T4 and TSH were compared with postmenopausal elderly women without depression.

Results: Significant high level of TSH was found in elderly women with depression as compared to control. No significant difference was found in T3 and T4 level.

Conclusion: Mild alterations of the thyroid function mimic depression or increase the vulnerability for affective disorder. All the elderly women with depressive symptoms should be screened for hypothyroidism. Hypothyroidism should be treated before starting anti-depressive treatment.

Keywords: hypothyroidism, depression, postmenopausal, elderly women.

Introduction

Studies have shown that risk of developing hypothyroidism increases with age. The prevalence of sub-clinical hypothyroidism may be overestimated because serum TSH level increases with age. So an age-specific range for TSH should be used for its diagnosis[1]. Thyroid hormone production and metabolism change with age with decreased secretion of both total T4 and total T3. However, serum concentrations of T4 remain relatively unchanged, while T3 levels are reduced due to reduced peripheral conversion of T4[2]. Women are at higher risk for developing hypothyroidism in old age. In the Colorado Thyroid Disease Prevalence Study, which was carried out in individuals older than 64 years, the prevalence of sub-clinical hypothyroidism was found to be 21% in women compared with 16% in men[3].

In a study depression was observed in 49.7% of patients with subclinical hypothyroidism as compared to 16.8% of patients with overt hypothyroidism. Also, subclinical hypothyroidism increased the risk for depression more than four times[4]. Elderly people with sub-clinical hypothyroidism have associated mood and cognitive deficits. Untreated sub-clinical hypothyroidism may have significant adverse long-term mental and physical health outcomes that could be ameliorated with treatment[5]. Studies have found significant differences in physical, mood and cognitive measures between subclinical hypothyroidism subjects and healthy controls[5,6].

Depression is an important feature of hypothyroidism and it can only be differentiated from the primary psychiatric disorder by thyroid function tests[7]. Autoimmune thyroid disorders are frequently accompanied by depression[8]. Auto immune thyroiditis was found in 15% of depressed patients with exaggerated response to the TRH stimulation test[9]. Symptomless autoimmune thyroiditis is an important finding in patients with depression. A study done in 45 depressed patients found 20% prevalence of anti-thyroid antibodies and 3 to 5 times more frequent in women[10].

In hypothyroid patients, depression may be more responsive to a replacement regimen that includes

Corresponding Author:
Dr. Sankalp Kumar Tripathi,
Department of Biochemistry, ABV Government Medical College, Vidisha, Madhya Pradesh, India
E-mail: dr.sankalp.tripathi@gmail.com

T3 rather than T4 alone[11]. Study suggests that thyroid hormone supplementation accelerates and augments the effect of tri-cyclic antidepressant[12]. Major depression with subclinical hypothyroidism is reported to be associated with concurrent panic disorder and a poorer antidepressant response[13] The effects of T3 acceleration is more in women with antidepressant treatment and a decrease in T4 level is noticed in treatment responders[14]. A study has shown the relationship between response of selective serotonin reuptake inhibitors and peripheral thyroid hormones. Low TSH values strongly correlated with improvement in depressive symptoms[15]. The objective of this study is to determine the serum level of T3, T4 and TSH in elderly postmenopausal women with depression as compared to the elderly postmenopausal women without depression in Mumbai.

Material and Methods

A complete medical history and informed consent was obtained from all participants included in the study. Diagnosis of depression was made by psychiatrist by using DSM-IV criteria and assessment of severity of depression was done by 21 items Hamilton rating scale for depression. Kuppuswamy's socioeconomic status scale with update of income range for the year 2012 was used to determine the socioeconomic status of the patients enrolled in the study. Due to limited sample size patients were classified into upper, middle and lower class on the basis of their socioeconomic status[16]. Thirty postmenopausal women more than 50 years and newly diagnosed with major depression were enrolled in the study as cases. Thirty normal postmenopausal women more than 50 years without any past history of depression were enrolled in the study as controls.

a. Inclusion criteria for cases: Postmenopausal women older than 50 years who were newly diagnosed cases of depression.
b. Inclusion criteria for controls: Postmenopausal women older than 50 years who had no past/ present history of depression.
c. Exclusion criteria for cases: Subjects who had past history of thyroid/ adrenal disorder, liver/ renal/ heart disease, HIV, diabetes, hypertension, cancer, epilepsy, major surgery, hormone replacement therapy.
d. Exclusion criteria for controls: Subjects who had past history of thyroid/ adrenal disorder, liver/ renal/ heart disease, HIV, diabetes, hypertension, cancer, epilepsy, major surgery, hormone replacement therapy.

Ethical clearance was obtained from Ethical Committee of Grant Medical College, Mumbai.

Statistical analysis was done using MedCalc software. Sample size calculation was done by using mean difference and standard deviation with 95% confidence level and 80% power.

Results

Thirty postmenopausal female patients diagnosed with major depression and thirty postmenopausal females without depression fulfilling inclusion criteria were enrolled in the study. All the postmenopausal women with depression had a score of 18 and above on depression scale. Table no.1 reveals that, 63.3% of subject among case group and 56.7% of subject among control group belong to age group 52-56years.

Table 1: Age Wise Distribution Between Two Groups

Age (yrs)	Case (N = 30)	Control (N = 30)
52-56	19 (63.3%)	17 (56.7%)
> 56	11 (36.7%)	13 (43.3%)

By Chi Square Test p-value = 0.598 (Not Significant)

In present study, 46.7% of subject among Case group belong to Middle Class which were less as compared to 60.0% of subject among Control group but difference was not statistically significant (Table no.2).

Table 2: Comparison of socio-economic status between two groups

	Socio-Economic Status		
	Lower Class	Middle Class	Upper Class
Case	14 (46.7%)	14 (46.7%)	02 (6.7%)
Control	10 (33.3%)	18 (60.0%)	02 (6.7%)

By Chi Square Test p-value = 0.301(Not Significant)

Mean Total Circulating Tri-iodothyronine was 106.62 ± 20.79 among Case group as compared with 109.03 ± 25.13 among Control group and difference was not statistically significant (Table. no. 3). Mean Total Circulating Thyroxine was 7.9 ± 2.04 among Case group as compared with 8.78 ± 2.41 among Control group but difference was not statistically significant. Mean Thyroid Stimulating Hormone was 4.3 ± 3.14 among Case group which was significantly more as compared to 2.58 ± 1.42 among Control group. Among cases, 17 were found euthyroid, 12 were found subclinical hypothyroid and 1 was found overt hypothyroid. Among controls, 27 were found euthyroid and 3 were found subclinical hypothyroid.

Table 3: Comparison of T3, T4, TSH between both groups

	Cases	Controls	p-value
T3 (ng/dl)	106.62 ± 20.79	109.03 ± 25.13	0.6872
T4 (μg/dl)	7.9 ± 2.04	8.78 ± 2.41	0.1323
TSH (μIU/ml)	4.3 ± 3.14	2.58 ± 1.42	0.0083

Discussion

Our study shows significant increase in the TSH level in depressive subjects as compared to non-depressive controls. This is in accordance with the study done by Haggerty *et al*. who found a history of treatment for depression in 50% of those with TSH values more than 3.0 IU compared with 18% of those with TSH value less than 3.0IU[17]. Another study by same group revealed 56% life time prevalence of depression in those who had subclinical hypothyroidism compared with 18% prevalence in the euthyroid patients[18]. Kirkeguard *et al* found high serum TSH in depressed patients suggesting some degree of thyroid over stimulation in non treated depressed patients[19]. Investigators have reported that patients with either mild hypothyroidism or with antithyroid antibodies are less likely to respond well to standard antidepressant treatment than otherwise similar euthyroid patients[20]. However, Maes *et al*. found a reduced serum TSH level in depressed patients, but it was within the normal range[21].

Our study found 12 subclinical hypothyroid patients in depressives as compared to 3 subclinical hypothyroid patients in controls. Patients suffering from refractory depression have higher prevalence of subclinical hypothyroidism as compared to general depression. Howland *et al* found 52% patients of refractory depression suffering from subclinical hypothyroidism. In contrast only 8-17% depressed patients in general had subclinical hypothyroidism in[22]. Studies have found relationship between depression and hypothyroidism in not only elderly but also during post partum period. Harris *et al* found high depression score in autoimmune thyroid antibody positive women as compared to antibody negative women during 8 months of postpartum period[23].

Our study didn't find any significant difference in T3 and T4 level in between both groups. However, in India Boral *et al* studied thyroid functions in 12 patients of affective psychosis and reported that depressives have low levels of T3 & T4 and patients with mania have high thyroid hormones[24]. Thyroid hormones are essential for the normal development and functioning of the brain, especially thyroxin (T4), for maturation of the foetal brain. In 1999 Haddow *et al* demonstrated that maternal deficiency of thyroid hormone during pregnancy leads to a delay in the neuro-psychomotor development of children. Thyroid hormones regulate the neuronal cytoarchitecture, the normal neuronal growth and synaptogenesis[25]. A study showed T4 levels tend to decrease as soon as depression is remitted. Hendrick *et al* reported transient T4 elevation in patients recently hospitalized with psychiatric problems, with spontaneous normalization within a two week period. The decrease in the T4 level after treatment may be due to a stress decreasing effect[26].

Conclusion: Mild alterations of the thyroid function mimic depression or increase the vulnerability for affective disorder. All the elderly women with depressive symptoms should be screened for hypothyroidism. Hypothyroidism should be treated before starting anti-depressive treatment.

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