



## Research Article

### EFFECT OF THYROID REPLACEMENT THERAPY ON COGNITION IN HYPOTHYROIDISM PATIENTS

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#### ABSTRACT

The aim of the study was to evaluate the effect of thyroid replacement therapy on cognition in hypothyroidism patients using mini mental state examination and to compare the cognitive status in hypothyroidism replacement therapy along with folic acid supplement. Prospective observational study for the duration of 6 months was conducted. Among 120 subjects, 60 were prescribed with thyroid replacement therapy alone and the other 60 were prescribed with thyroid replacement therapy with folic acid supplement. The Cognition was improved in patients prescribed with folic acid supplement along with thyroid replacement therapy. This study shows that the patients prescribed with folic acid supplement have good cognition level rather than the patients prescribed with only hypothyroidism drug.

**Keywords:** Hypothyroidism, Folic acid supplement, Cognition, MMSE.

#### INTRODUCTION

Hypothyroidism can occur as a result of failure of thyroid gland and also decreased stimulation of hypothalamus and pituitary gland. Low thyroid hormones level slows down the body functions.<sup>1</sup> Hypothyroidism readily affect the thought and speech; hypothyroid patients may experience decreased attention and apathy. Abnormalities in thyroid hormone signaling can lead to neurocognitive impairment. Hypothyroidism can cause cognitive decline. Many study reports shows that there were decrements in general intelligence, attention, concentration, memory, perceptual function, language, psychomotor function, executive function.<sup>2</sup> Impairment of cognition in hypothyroidism is found more than a century but the nature, progress, severity of this not known and unclear. Many studies observed deficits in visuospatial, verbal and associative memory. Cognitive impairment in overt and SCH hypothyroidism is reversible after thyroid replacement therapy.<sup>3</sup> However, early detection and treatment of hypothyroidism can prevent severe mental disability cognitive deficits.<sup>4</sup> Some studies left a note that folate prevents degeneration of neurons in adults, improves cognitive functions and helps in psychological disorder.<sup>5</sup> There is an accurate both clinical and experimental evidence that excess folic acid deficiency shall be directly or indirectly affect to the nervous system and blood.<sup>6</sup> Folic acid plays a major role in neurotransmitter synthesis. Folate and Vitamin B12, Vitamin B6 are important for new cell synthesis. So, in this study, we are going to analyze the cognition of subjects on thyroid replacement therapy and thyroid replacement therapy with folic acid. Since some studies indicate that folic acid

supplement will have a positive impact on cognitive abilities.<sup>7</sup> Folic acid supplementation will have a significant role in improving cognition.<sup>8</sup>

#### MATERIALS AND METHODS

This was a Prospective Observational study, which was conducted in Vivekananda Medical Care Hospital, Elayampalayam, Tiruchengode with the approval of the Institutional Ethical Committee. (IECVMCH-2019) patients between age 18-65 years and on stable Thyroid Replacement therapy were included in the study. Pregnant and Lactating women, patients with Psychological disorder were excluded from the study. 180 patients were recruited for the study. Among the total population 120 patients were selected according to inclusion and exclusion criteria. Study subjects were divided into groups, first group consist of patient taking thyroid replacement therapy and another group consists of patients taking thyroid replacement therapy with folic acid. Cognition status in both groups was assessed with the help of MMSE (Mini Mental State Examination) Scale and then cognition status in both groups was compared.

#### Statistical Analysis

The data obtained was analyzed using SPSS version 16.0. Results were analyzed by using Paired sample t test. P value < 0.05 was considered significant.

**RESULTS**

**Gender Wise Categorization**

**Table 1: Gender Wise Categorization**

Category	No of male patients	No of female patients	Percentage of male patients (%)	Percentage of female patients (%)
Thyroid replacement alone	20	40	17	33
Thyroid replacement with folic acid	22	38	18	32

The study included 120 patients with hypothyroidism, which consists of 2 groups; In group A (thyroid hormone replacement therapy) in which 17% accounts for male and 33% accounts for females. In group B (thyroid hormone replacement therapy and

folic acid) in which 18% accounts for the male and 32% accounts for the females. This study shows that hypothyroidism is more prevalent in females as shown in Table 1.

**Body Mass Index**

**Table 2: Body Mass Index**

BMI	Under Weight (<18.5) (%)	Normal (18.5-24.9) (%)	Overweight (25-29.9) (%)	Obese (>30) (%)
Thyroid replacement alone	1 (1)	21 (18)	29 (24)	9 (8)
Thyroid replacement with Folic acid	0 (0)	21 (18)	24 (20)	15 (13)

Among 60 patients in group A, 1% patient was under weight, 18% had normal BMI, 24% was overweight and 8% was found to be obese. In group B, 18% had a normal BMI, 20% was overweight

and 13% was found to be obese. This study shows that hypothyroidism leads to weight gain which is given in Table 2.

**Age Distribution**

**Table 3: Age Distribution**

Category	Below 25 (%)	26-35 (%)	36-45 (%)	46-55 (%)	56-65 (%)
Thyroid replacement alone	12 (10)	15 (13)	11 (9)	14 (12)	8 (7)
Thyroid replacement with Folic acid	7 (6)	19 (16)	17 (14)	14 (12)	3 (3)

Among 60 patients in group A, 10% comprises of those within the age group below 25 years, 13% comprises of those within the age group 26- 35 years, 9% comprises of those within age group 36-45 years, 12% comprises of those within age group 46-55 years and 7% comprises of those who within the age group 56-65 years. Among 60 patients in group B, 6 % comprises of those within the age group below 25 years, 16% comprises of those

within the age group 26- 35 years, 14% comprises of those within age group 36-45 years, 12 % comprises of those within age group 46-55 years and 3% comprises of those who within the age group 56-65 years. The study shows that hypothyroidism prevalence increases with middle age group as given in the Table 3.

**Education Status**

**Table 4: Education Status**

Category	Primary (<6 <sup>th</sup> ) (%)	Secondary (6 <sup>th</sup> -12 <sup>th</sup> ) (%)	Graduate (12 <sup>th</sup> <) (%)
Thyroid replacement alone	18 (15)	27 (23)	15 (13)
Thyroid replacement with Folic acid	14 (12)	27 (23)	19 (16)

In group A, 15% subjects had primary education, 23% had secondary education and 13% were graduates. In group B, 12% subjects had primary education, 23% had secondary education and 16% were graduates.

### MMSE Scale Score Comparison between Two Groups

Table 5: MMSE Scale Score Comparison between Two Groups (N = 120)

Category	Normal (24-30) (%)	Mild (20-23) (%)	Moderate (10-19) (%)	Severe (0-9) (%)	Mean ± S.D	p Value
Thyroid replacement alone	17 (14.16)	27 (22.5)	16 (13.33)	0 (0)	21.55± 4.817	0.005
Thyroid replacement with Folic acid	49 (40.8)	8 (6.66)	3 (2.5)	0 (0)	26.10± 3.511	

In patients who are on thyroid replacement therapy alone (group A), 28.3% had normal cognitive function, 45% had mild cognitive impairment, 26.6% had moderate cognitive impairment. In patients who are on thyroid replacement therapy with folic acid (group B) 81.6% had normal cognitive function, 13.3% had mild cognitive impairment, 5% had moderate cognitive impairment. This study shows that patients who are on thyroid replacement therapy with folic acid had less cognitive impairment when compared to the patient with thyroid replacement therapy. The difference was statistically significant (p value = 0.005). The study shows that thyroid replacement therapy with folic acid supplements have significant improvement in cognitive function when compared to patient with thyroid replacement therapy.

### DISCUSSION

Among 120 patients, hypothyroidism is more prevalent in females. This result shows similarity with the study conducted by Anand Kumar *et al*<sup>9</sup>. This study shows that hypothyroidism leads to weight gain and this result coincides with another study conducted by Sanyal D *et al*<sup>10</sup>. The study shows that thyroid replacement therapy with folic acid supplement shows significant improvement in cognitive function when compared to patient with thyroid replacement therapy. These results are similar to the study held by Ziaee A *et al*.<sup>5</sup>

### CONCLUSION

Hypothyroidism patients who are on thyroid replacement alone had cognitive dysfunction but patients who are on folic acid combination therapy had showed improvement on cognitive function.

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