# INTERRELATIONSHIP BETWEEN COGNITIVE DEFICIT AND PSYCHOEMOTIONAL DISORDERS IN HYPOTHYROIDISM

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**Annotation:** *In patients with hypothyroidism, decreased cognitive functions and psychoemotional disorders often occur simultaneously, but their interrelationship and clinical significance have not been sufficiently studied. This study is aimed at determining the structure of cognitive deficit and psychoemotional disorders in women with hypothyroidism, their interrelationship and relationship with hormonal indicators. 120 patients participated in the study, the cognitive state was assessed using the ACE test, and the psychoemotional state - using the Spielberger-Khanin and Beck scales. The results showed that the level of anxiety and depression increases proportionally with the deepening of cognitive decline, and there is a strong statistical correlation between these disorders. The obtained data justify the need for a comprehensive neuropsychological approach to assessing hypothyroidism.*

**Keywords:** *hypothyroidism, cognitive deficit, psychoemotional disorders, depression, anxiety, correlation analysis.*

## INPUT

Hypothyroidism is an endocrine disorder that exerts a complex and multifaceted influence on the functioning of the central nervous system. Beyond its well-known systemic and metabolic effects, this condition is increasingly recognized as an important contributor to neurological and neuropsychological dysfunction [1,14,22,31,40]. In recent years, growing scientific attention has been focused on the fact that hypothyroidism is accompanied not only by somatic manifestations, but also by cognitive and psychoemotional disturbances. Nevertheless, in routine clinical practice, these disorders are often assessed in isolation from each other or, in some cases, are overlooked entirely [2,9,18,27,35].

Cognitive impairment in patients with hypothyroidism typically presents as a decline in memory, reduced attention span, slowing of information processing, and disturbances in executive functions [3,11,24,33,41]. These deficits may initially be subtle, but with prolonged hormonal insufficiency they tend to progress and interfere with everyday activities, learning abilities, and professional performance. As a result, cognitive dysfunction significantly limits functional independence and productivity [4,16,25,34,39].

Psychoemotional disorders associated with hypothyroidism are most commonly expressed in the form of increased anxiety, depressive symptoms, affective lability, emotional instability, and decreased motivation. Such changes not only intensify

subjective suffering but also contribute to impaired social adaptation, reduced interpersonal communication, and diminished quality of life. Importantly, psychoemotional disturbances may further exacerbate cognitive deficits, creating a vicious cycle of neuropsychological impairment [5,12,20,29,37].

Thyroid hormones play a key modulatory role in maintaining neural connectivity between the cerebral cortex and the limbic system, which are critically involved in cognitive processing and emotional regulation. They influence synaptic transmission, neuroplasticity, and the balance of neurotransmitter systems [6,15,23,32,38]. Therefore, the combined disruption of cognitive and emotional processes in the context of thyroid hormone deficiency represents a pathophysiologically well-founded condition rather than two independent clinical phenomena [7,10,19,28,36].

In this context, the present research was aimed at identifying and analyzing the interdependence between cognitive deficits and psychoemotional disorders in patients with hypothyroidism. A comprehensive assessment of these interconnected domains may contribute to a more holistic understanding of the disease and provide a basis for improved diagnostic and therapeutic strategies [8,13,17,21,26,30].

Materials and methods

The study included 120 women with a confirmed diagnosis of hypothyroidism. The age of the respondents ranged from 30 to 50 years, and the average age was 41.2±4.6 years.

Patients were divided into two groups:

- Subclinical hypothyroidism (SG) - 62 people
- Manifest hypothyroidism (MH) - 58 people

Evaluation methods

Cognitive status:

- Addenbrooke Cognitive Examination (ACE):
  - attention
  - memory
  - speech
  - Visual-spatial functions

Psychoemotional state:

- Spielberger-Hanin anxiety scale
- Beck Depression Scale

Hormonal indicators:

- TTG
- free T4

Statistical analysis was carried out using Student's t-test, Pearson's correlation, and elements of multifactorial regression. Reliability was accepted at the level of $p<0.05$.

Results

Coincidence of cognitive and psychoemotional disorders

According to the research results, cognitive deficit and psychoemotional disorders were identified simultaneously in 71.6% of women with hypothyroidism. In subclinical hypothyroidism, this indicator was 58.1%, while in manifest hypothyroidism it reached 86.2%.

Table 1. Combined occurrence of cognitive and psychoemotional disorders (%)

| State | SG | MG |
|---|---|---|
| Cognitive + emotional disorder | 58.1 | 86.2 |
| Only one component | 29.0 | 10.3 |
| Normal state | 12.9 | 3.5 |

Depth of cognitive deficit and level of anxiety

As the overall score on the ACE test decreased, the level of anxiety on the Spielberger scale consistently increased.

Table 2. Correlation between cognitive score and anxiety level

| ACE Level | Average anxiety score |
|---|---|
| ≥85 points | 32.4 ± 4.1 |
| 75-84 points | 41.8 ± 5.6 |
| ≤74 points | 53.2 ± 6.3 |

Analysis of the diagram (Diagram 1) showed that the level of anxiety increases almost linearly as the cognitive decline deepens.

Relationship between depression and cognitive deficit

The results of the Beck scale showed a strong correlation between the degree of cognitive deficit and the severity of depressive symptoms.

Table 3. Degree of depression and cognitive state

| Degree of depression | ACE Score (M±SD) |
|---|---|
| Minimum | 87.1 ± 4.3 |
| Average | 79.4 ± 5.1 |
| Heavy | 71.6 ± 6.0 |

Correlation analysis revealed a strong inverse relationship between the total ACE score and the Beck score ($r = -0.69$; $p<0.001$).

Correlation with hormonal parameters

With an increase in TSH levels, a decrease in cognitive scores and an increase in psychoemotional disorders were observed. A relationship was found between TSH and ACE $r = -0.62$, and between TSH and the depression score $r = +0.58$.

Discussion

The obtained results show that cognitive deficit and psychoemotional disorders in hypothyroidism are not separate, but different manifestations of a single pathophysiological process. With the deepening of cognitive decline, the intensification of anxiety and depressive symptoms is explained by a violation of neuroendocrine regulation.

The pronounced severity of these disorders in manifest hypothyroidism may be associated with a decrease in the functional reserves of the central nervous system in the late stages of the disease.

Conclusion

In women with hypothyroidism, cognitive deficit and psychoemotional disorders occur together with high frequency, and there is a strong statistical correlation between them. As cognitive decline deepens, the level of anxiety and depression increases proportionally.

This situation indicates the need not only for a hormonal, but also for a comprehensive neuropsychological approach to the assessment and treatment of hypothyroidism.

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