
CONFERENCE ARTICLE**Neuropsychological Features Of Patients With Primary Hypothyroidism In The Ecologically Unfavorable Region Of The Pre-Aral Area****Bakhadirova M.A.¹, Artikov N.K.², Abdujamilova R.M.³**^{1,2,3} Center for the Development of Professional Qualifications of Medical Workers under the Ministry of Health of Uzbekistan

Abstract: Primary hypothyroidism is associated not only with endocrine dysfunction but also with cognitive, emotional, and affective disorders that may significantly reduce patients' quality of life. This study aimed to assess the neuropsychological characteristics of patients with primary hypothyroidism living in the ecologically unfavorable region of the Pre-Aral Area. The research was conducted at the Khorezm Regional Multidisciplinary Medical Center during 2023–2025 and included 143 participants divided into four groups: patients with primary hypothyroidism and neurological complications living in the Pre-Aral Area, patients with primary hypothyroidism without neurological complications living in the same region, patients with primary hypothyroidism living outside ecologically unfavorable territories, and practically healthy controls. Neuropsychological assessment was performed using the MoCA, MMSE, HADS, and SF-36 scales. The most pronounced cognitive impairment was observed in patients with primary hypothyroidism and neurological complications from the Pre-Aral Area, with lower MoCA and MMSE scores compared with other groups. These patients also demonstrated higher levels of anxiety and depressive symptoms according to HADS and a marked decrease in both physical and mental components of quality of life according to SF-36. The findings indicate that the combination of thyroid insufficiency, neurological complications, and unfavorable environmental conditions may aggravate cognitive and emotional disturbances. The results support the inclusion of MoCA/MMSE and HADS in early screening algorithms for patients with primary hypothyroidism, especially among residents of the Pre-Aral Area.

Keywords: Primary hypothyroidism, neuropsychological features, cognitive impairment, MoCA, MMSE, anxiety, depression, HADS, quality of life, SF-36, Pre-Aral Area, ecological factors.

Introduction

Primary hypothyroidism is accompanied not only by endocrine disorders but also by pronounced cognitive and emotional-affective impairments, which significantly reduce patients' quality of life. In ecologically unfavorable regions, including the Pre-Aral Area, adverse environmental factors may increase the severity of neurological manifestations of the disease. The study of neuropsychological status in patients with primary hypothyroidism is of great importance for the early diagnosis of cognitive impairment and the improvement of preventive measures [1–3].

Materials and Methods. The study was conducted at the Khorezm Regional Multidisciplinary Medical Center during the period from 2023 to 2025. A total of 143 examined individuals were included in the study and divided into four groups. Group I consisted of 42 patients with primary hypothyroidism living in the Pre-Aral Area who had clinically confirmed neurological complications. Group II included 38 patients with primary hypothyroidism living in the Pre-Aral Area without clinical signs of neurological complications. Group III consisted of 37 patients with primary hypothyroidism living outside ecologically unfavorable territories. Group IV, the control group, included 26 practically healthy individuals comparable by sex and age.

Research Results

The analysis of the neuropsychological examination results revealed clear intergroup differences, reflecting the influence of primary hypothyroidism and regional factors on the cognitive and emotional-affective state of patients. The most pronounced impairments were recorded in patients of the main group, Group I, which corresponds to their clinical profile: primary hypothyroidism in the conditions of the Pre-Aral Area with the presence of neurological complications.

According to the MoCA scale, a decrease in cognitive functions was observed in patients with primary hypothyroidism, with the most pronounced impairment found in Group I. The mean score in this group was 22.6 ± 2.9 points, indicating the presence of cognitive deficit. In Group II, MoCA scores were higher, at 25.8 ± 2.4 points, while in Group III they were even closer to normal values, at 26.4 ± 2.2 points. In the control group, the mean score was the highest, at 27.9 ± 1.8 points, which corresponds to preserved cognitive status. Thus, the obtained data demonstrate a consistent pattern: when primary hypothyroidism is combined with neurological complications and residence in an ecologically unfavorable region, cognitive impairments are more pronounced.

The MMSE results confirm the identified trends. In Group I, the mean score was 25.1 ± 3.2 points, whereas in Group II it was 27.3 ± 2.6 points, in Group III 28.0 ± 1.9 points, and in the control group 28.9 ± 1.4 points. Despite the relatively lower sensitivity of the MMSE compared with the MoCA, the reduced scores in the main group indicate clinically significant deterioration of cognitive functions and may reflect slowed psychomotor processes, decreased concentration of attention, and impaired working memory,

which are characteristic of hypothyroidism.

Emotional-affective disorders assessed using the HADS scale were also most pronounced in Group I. The level of anxiety, according to HADS-A, in the main group was 10.4 ± 2.5 points, which approaches the clinically significant range and indicates the presence of anxiety symptoms. In Group II, this indicator was lower, at 8.7 ± 2.1 points; in Group III, it was 7.2 ± 1.8 points; and in the control group, it was 6.3 ± 1.5 points. A similar trend was observed on the depression subscale, HADS-D: 9.8 ± 2.7 points in Group I compared with 7.9 ± 2.2 points in Group II, 6.8 ± 1.6 points in Group III, and 5.4 ± 1.3 points in the control group. This suggests that emotional-affective disorders in patients of the main group are not random accompanying manifestations, but more likely reflect the systemic influence of thyroid insufficiency combined with the chronic stress and environmental burden of the region.

The decline in quality of life was confirmed by the results of the SF-36 questionnaire. The physical component summary (PCS) scores were lowest in Group I, at 41.6 ± 8.9 points, and gradually increased in Group II, at 47.8 ± 9.1 points, and Group III, at 49.4 ± 8.6 points, reaching the highest value in the control group, at 54.7 ± 7.8 points. The mental component summary (MCS) showed a similar pattern: 39.8 ± 9.4 points in Group I, 45.6 ± 8.8 points in Group II, 47.9 ± 8.1 points in Group III, and 53.1 ± 7.6 points in Group IV. These data indicate that patients with a complicated course of primary hypothyroidism demonstrate a significant decrease in both physical and mental well-being, which has direct clinical importance when planning comprehensive therapy and preventive measures.

Conclusion. The neuropsychological assessment showed that patients with primary hypothyroidism and neurological complications are characterized by a more pronounced decline in cognitive functions, as reflected by the lowest MoCA and MMSE scores, a higher severity of anxiety-depressive symptoms according to HADS-A and HADS-D, and a substantial decrease in quality of life according to the SF-36 questionnaire, compared with patients without clinically significant neurological disorders and the control group. The obtained results justify the need to include MoCA/MMSE and HADS in the algorithm of early screening for primary hypothyroidism, especially among residents of the Pre-Aral Area, followed by risk stratification and referral for in-depth examination and preventive measures.

References

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