



Socio-Behavioral Risk Factors for Neurological Complications in Residents of the Pre-Aral Area with Primary Hypothyroidism

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ABSTRACT

Socio-behavioral factors play an important role in the course of primary hypothyroidism and may contribute to the development of neurological complications, especially in ecologically unfavorable regions. This study aimed to assess socio-behavioral risk factors for neurological complications among residents of the Pre-Aral Area with primary hypothyroidism. 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 living in the Pre-Aral Area with neurological complications, patients with primary hypothyroidism living in the same region without neurological complications, patients with primary hypothyroidism living outside ecologically unfavorable territories, and practically healthy controls. Socio-behavioral factors such as education level, dietary habits, use of iodized salt, adherence to levothyroxine replacement therapy, regular medical follow-up, physical activity, harmful habits, occupational exposures, chronic stress, comorbidity, and disease duration were assessed. Clinical-neurological examination and thyroid status evaluation were performed in all participants. Statistical analysis was conducted using IBM SPSS Statistics 27.0, including correlation analysis and multivariate logistic regression.

The results showed that residents of the Pre-Aral Area had a less favorable socio-behavioral profile, characterized by insufficient use of iodized salt, low consumption of fish, seafood, vegetables, and fruits, a higher prevalence of comorbid conditions, metabolic disorders, chronic stress, and occupational hazards. The most unfavorable combination of risk factors was observed in patients with primary hypothyroidism and neurological complications. Regular use of iodized salt and iodine-rich foods was lower among residents of the Pre-Aral Area, while dyslipidemia, arterial hypertension, chronic stress, and professional exposure to dust or chemicals were more common in the main group. These findings indicate that socio-behavioral and environmental factors may aggravate the course of primary hypothyroidism and increase the risk of neurological complications. The results support the need to include nutritional correction, iodine prophylaxis, metabolic risk reduction, stress assessment, and regular medical monitoring in early prevention programs for residents of the Pre-Aral Area with primary hypothyroidism.

KEYWORDS: Primary hypothyroidism, socio-behavioral risk factors, neurological complications, Pre-Aral Area, iodized salt, iodine deficiency, dietary habits, comorbidity, dyslipidemia, chronic stress, occupational hazards, prevention.

INTRODUCTION

Socio-behavioral factors, including dietary patterns, the use of iodized salt, adherence to replacement therapy, level of physical activity, and access to medical care, have a significant impact on the course of primary hypothyroidism and the risk of developing its complications [1,2]. For residents of the ecologically unfavorable Pre-Aral Area, the combination of adverse social conditions, iodine deficiency, and exposure to environmental factors contributes to a higher frequency of cognitive impairment and peripheral nervous system damage [2,3]. The study of socio-behavioral risk factors is of great importance for the development of effective prevention programs and the early detection of neurological complications in patients with primary hypothyroidism.

Materials and Methods. The study was conducted at the Khorezm Regional Multidisciplinary Medical Center during the period from 2023 to 2025. A comparative analytical study was carried out involving 143 examined individuals who were divided into four groups: Group 1 included 42 patients with primary hypothyroidism (PH) living in the Pre-Aral Area and having neurological complications; Group 2 included 38 patients with PH without neurological complications living in the Pre-Aral Area; Group 3 included 37 patients with PH living outside ecologically unfavorable territories; and Group 4 included 26 practically healthy individuals serving as the control group. Socio-behavioral factors were assessed, including education level, dietary habits, use of iodized salt, adherence to levothyroxine replacement therapy, regular medical follow-up, physical activity, presence of harmful habits, and disease duration. All examined individuals underwent clinical-neurological examination and assessment of thyroid status. Statistical data processing was performed using IBM SPSS Statistics 27.0. Correlation analysis and multivariate logistic regression were used to identify independent risk factors. Differences were considered statistically significant at $p < 0.05$.

Research Results

The analysis of socio-behavioral factors showed that dietary patterns, insufficient use of iodized salt, a high prevalence of comorbidity, and chronic stress create an unfavorable background in patients with primary hypothyroidism (PH), especially among residents of the Pre-Aral Area. The most pronounced combination of risk factors was observed in the main group, Group 1, which may contribute to a higher frequency of neurological complications and a more severe course of the disease.

Regular use of iodized salt, defined as ≥ 5 days per week, was most common among patients living outside the Pre-Aral Area, Group 3, at 73.0%, whereas this indicator was noticeably lower among residents of the Pre-Aral Area: 40.5% in Group 1, 50.0% in Group 2, and 46.2% in the control group. Accordingly, low consumption of iodized salt, defined as ≤ 2 days per week, was more frequently observed in the Pre-Aral Area groups: 59.5% in Group 1, 50.0% in Group 2, and 53.8% in Group 4. This reflects a persistent regional deficiency of iodine prophylaxis at the household level. These data are consistent with the previously identified high level of iodine deficiency based on urinary iodine levels among residents of the Pre-Aral Area and emphasize that insufficient use of iodized salt remains an important behavioral risk factor.

Dietary intake of iodine sources also showed marked differences. Consumption of fish and seafood ≥ 2 times per week was rarely reported in the Pre-Aral Area groups: 19.0% in Group 1, 23.7% in Group 2, and 23.1% in Group 4, whereas this indicator was higher in Group 3, at

43.2%. In contrast, low consumption of fish and seafood, defined as ≤ 1 time per week, predominated in the Pre-Aral Area groups and amounted to 66.7% in Group 1, 60.5% in Group 2, and 61.5% in the control group; in Group 3, it was 37.8%. This allows insufficient intake of dietary iodine and omega-3 fatty acids to be considered a factor capable of aggravating both thyroid dysfunction and neurometabolic manifestations, including asthenia and reduced cognitive functions.

In addition, low consumption of vegetables and fruits, defined as < 400 g per day, was more frequently observed in patients with primary hypothyroidism (PH), especially in Group 1 (61.9%) and Group 2 (52.6%), as well as among healthy residents of the Pre-Aral Area (53.8%). This reflects the specific characteristics of the regional diet. In Group 3, this indicator was lower (37.8%), which may potentially explain the more favorable nutritional profile among individuals living outside ecologically unfavorable territories.

The presence of pronounced comorbidity, defined as ≥ 2 chronic diseases, was more common in Group 1 (45.2%) compared with Group 2 (34.2%) and Group 3 (29.7%), while it was observed less frequently in the control group (23.1%). Arterial hypertension was also more prevalent among patients with PH: 38.1% in Group 1, 31.6% in Group 2, and 27.0% in Group 3, compared with 19.2% in the control group. The prevalence of dyslipidemia identified according to biochemical criteria was particularly indicative: it was observed in 69.0% of patients in Group 1, 60.5% in Group 2, and 54.1% in Group 3, whereas in the control group it was found in 26.9%. These findings emphasize that the metabolic background, including arterial hypertension and dyslipidemia, may serve as an important additional risk factor for cerebrovascular and cognitive disorders and should be taken into account when stratifying the risk of PH complications.

Chronic stress, defined as a high questionnaire score and/or the presence of ≥ 3 stress factors, was more frequently observed in patients of Group 1 (52.4%) and Group 2 (42.1%) than in patients of Group 3 (29.7%). In the control group, the stress burden was also notable (34.6%), which may reflect the socio-economic characteristics of the region. Occupational hazards, including exposure to dust and/or chemicals, were also more frequently reported in patients of Group 1 (33.3%) and Group 2 (26.3%) compared with Group 3 (16.2%). This may increase the overall somatic and psycho-emotional burden and reduce adaptive capacity.

Conclusion. Socio-behavioral risk factors among residents of the Pre-Aral Area are characterized by a combination of insufficient use of iodized salt, low consumption of fish, seafood, vegetables, and fruits, a higher prevalence of comorbidity and metabolic disorders, especially dyslipidemia, as well as significant stress burden and occupational hazards. The most unfavorable profile was observed in patients with primary hypothyroidism (PH) and neurological complications, which allows the listed factors to be considered important targets for prevention. Dietary correction and iodine prophylaxis, reduction of metabolic risks, and assessment of stress factors should be included in the algorithm for early diagnosis and prevention of the complicated course of PH among residents of the Pre-Aral Area.

References

1. Chaker L., Peeters R.P., Bianco A.C., Jonklaas J. Hypothyroidism // The Lancet. – 2017. – Vol. 390, № 10101. – P. 1550–1562.

2. Taylor P.N., Albrecht D., Scholz A., et al. Global epidemiology of hyperthyroidism and hypothyroidism // Nature Reviews Endocrinology. – 2023. – Vol. 19, № 5. – P. 301–316.
3. World Health Organization. Compendium of WHO and other UN guidance on health and environment. – Geneva: World Health Organization, 2024.

