

**FEATURES OF THE COGNITIVE STATUS IN WOMEN WITH IRON DEFICIENCY ANEMIA**

Uzokov Jurabek Bakhtiyorovich
Samarkand State Medical University, Samarkand, Uzbekistan

Abstract

Goal. To give a comparative characteristic of the cognitive status in women, depending on the presence of iron deficiency anemia, to study the possibility of restoring the existing cognitive deficit against the background of correction of anemia with iron preparations. **Materials and methods.** The study included 40 women aged 18-44 years with an established diagnosis of mild and moderate iron deficiency anemia. A comprehensive clinical (laboratory and neuropsychological examination was performed using the MoCA test, the Gotland, Spielberger–Hanin scales, the asthenia assessment scale (MFI(20), initially (before the start of anemia therapy), after 12 and 24 weeks. The comparison was carried out with a control group of women without anemia. **Results.** During the examination of patients with mild and moderate iron deficiency anemia aged 18-44 years before the start of therapy, we revealed mild cognitive impairment, mainly of attention functions, fluency of speech, memory. Correction of anemia, normalization of hemoglobin, iron and serum ferritin against the background of anemia therapy with iron is associated with a decrease in the severity of cognitive impairment. **Conclusions.** The results of the study showed that ferrotherapy reliably restores the existing cognitive deficit in young patients diagnosed with mild and moderate iron deficiency anemia. However, with the restoration of hematological parameters, correction of cognitive deficits and improvement of the general well-being of patients, the asthenic component remains.

Keywords: Cognitive status, iron deficiency anemia, asthenia, young age, female gender.

Introduction

An increase in the prevalence of cognitive impairment in the population and, in particular, in people not only the elderly, but also young people is one of the urgent problems of interest to doctors of various specialties. Over the past few years, researchers have been paying attention to mild cognitive impairment in young people. Young patients may present a sting, but more often the cognitive deficit remains unnoticed or is accidentally detected during neuropsychological examination. As you know, mild cognitive impairment they may increase and turn into a moderate cognitive defect, but many may have an improvement in their neuropsychological status. The risk of developing dementia in the future remains unexplored in people with mild reversible cognitive impairment. Frequent complaints of patients with different diagnoses at outpatient appointments include complaints of memory loss compared to the past, deterioration of mental performance, difficulty concentrating attention, increased fatigue during mental work. Any of the above complaints is the basis for conducting an objective assessment of the state of cognitive functions using neuropsychological research methods. As many investigators note, first of all, attention



should be paid to active complaints without leading questions from the doctor, especially in young patients. It is known that many healthy individuals are dissatisfied with their memory, and it is possible that absolutely cognitively sound individuals will complain of poor memory. On the other hand, it should be remembered that the absence of complaints of a cognitive nature does not mean the absence of an objective cognitive deficit. Data on cognitive impairment in various somatic pathologies are few and actively studied. For example, a number of researchers present data on the relationship of cognitive impairment with hemoglobin and serum iron levels in patients with iron deficiency anemia. However, the incidence of cognitive deficits against the background of anemia correction has not been studied. Iron deficiency anemia is a disease characterized by a decrease in the iron content in the body due to various pathological and physiological processes. Iron deficiency It is the most common alimentary disorder in the world. According to WHO, about 1.8 billion people on Earth suffer from anemia. Up to 30% of women of childbearing age suffer from iron deficiency disorders, which indicates the undoubted relevance of the study of this disease in young women. The aim of our study was to provide a comparative assessment of the cognitive status of young women depending on the presence of iron deficiency anemia.

MATERIALS AND METHODS OF RESEARCH

The selection of patients for the study was carried out in a therapeutic appointment in the period from September 2021 to December 2023. The criteria for inclusion in the study were: female, age 18-44 years, established diagnosis of iron deficiency anemia 1-2 degrees ($70 \leq \text{Hb} \leq 120$ g/l, serum iron ≤ 10.7 mmol/l, ferritin ≤ 15 ng/ml), all concomitant diseases in remission, informed consent of the patient, absence of contraindications to taking iron supplements. The study did not include pregnant women, women with anemia due to other causes other than deficiency (that gland, or other somatic pathology in the acute stage, as well as severe diseases (oncological diseases, surgical interventions for diseases of the gastrointestinal tract, diabetes mellitus, GB) and diseases known as a potential cause of cognitive impairment (after cranial (brain injury, epilepsy, cerebrovascular diseases, intoxication, infectious diseases, etc.), as well as those receiving medical therapy for any concomitant diseases lasting more than 2 weeks and/or non-especially before conducting the study. The comparison was carried out with a control group of women aged 18-44 years without anemia, comparable in age, marital status, level of education. The examination was carried out initially (before the start of anemia therapy in the main group), after 12 and 24 weeks. During the examination of PA (patients), complaints, somatic status, general and biochemical blood tests were evaluated, neuropsychological examination was performed using the Montreal Cognitive Function Assessment Scale (MoCA), Gotland scales were filled in and Spielberger-Khanin to assess the level of anxiety and depression, as well as subjective Asthenia Assessment Scale (MFI(20)). To correct anemia, women received an iron preparation during or after meals 2 times a day for 24 weeks (iron (III) hydroxide polymaltosate). The clinical trial was conducted according to the rules of High-quality clinical practice (Good Clinical Practice) and the principles of the Helsinki Declaration, approved by the local ethics committee. All patients signed an informed consent to participate in the study. Statistical processing of the results was carried out using the software package Microsoft Excel, Statistica 8.0 with software using methods of descriptive statistics, parametric and nonparametric methods of analysis. The comparison of the groups is carried out by a two-sample t(criterion with different variances and a significance level of 5% (0.05).



THE RESULTS AND THEIR DISCUSSION

In the group of women with iron deficiency anemia, the initial level was significantly lower (the highest score on the MoCA scale (at a rate of 26-30 points) in comparison with the control group. The average score was 25.8 ± 0.21 in the main group and, respectively, 29.25 ± 0.11 in the control ($p = 0.0001$). A detailed analysis of errors during the MoCA test in the main group revealed cognitive disorders in the form of attention disorders counting numbers in forward and reverse order, reaction, sequential subtraction of seven, fluency of speech, memory (delayed reproduction). When evaluating a function attention the most common errors are fixed when performing sequential subtraction of seven and naming numbers in reverse order. With regard to speech function, significant differences between groups were revealed precisely when performing a speed task (naming words for a certain letter in 1 minute). Patients with anemia showed a lower result of delayed reproduction, however, it should be noted that taking into account 1-2 hints this task was completed by everyone. So, for example, the average error score initially in the main group for commemoration and delayed reproduction of 5 words amounted to 4.08 ± 0.15 , with an attention test – 3.15 ± 0.09 . Thus, before the start of therapy, mainly neurodynamic disorders were observed in the form of decreased attention and operational memory. According to the Gotland and Spielberger scales—Initially, there was no statistically significant difference between the groups. Before the start of anemia treatment, patients from the main group complained of fatigue (38 people), weakness according to the criteria of somatogenic asthenia (22 people), decreased performance (14 people), daytime drowsiness (7 people (century), sleep disturbance (11 people), anxiety (5 people), irritability (4 people), hyperhidrosis (18 people), impaired attention (mania (32 people), absent-mindedness (28 people (century), memory loss (16 a person). The overall score on the MFI(20scale was 63.4 ± 6.2 (with normal values less than 30). Thus, when contacting a doctor, 100% of the subjects revealed 3 or more complaints indicating increased exhaustion of mental functions and existing emotional (hypersthenic manifestations, somatovegetative disorders, motivational disorders, cognitive impairments. The increase in the overall score relative to the norm was more related to general asthenia and decreased activity, and to a lesser extent to a decrease in motivation, physical and mental asthenia. Against the background of correction of anemia, there was a significant improvement in the parameters of hemoglobin, iron and ferritin in blood serum. Dynamics of the average score on the MoCA, Gotland and Spielberger scales—Hanina, MFI(20 in the main group against the background of correction of anemia after 12 and 24 weeks. General The score of the MoCA scale in the main group is through 12 weeks of follow-up was 26.98 ± 0.21 , in the control group – 29.33 ± 0.09 ($p = 0.0001$), after 24 weeks – 29.18 ± 0.11 and $29.45 + 0.09$ accordingly ($p = 0.0651$, unreliable). Against the background of correction of anemia, a statistical difference between the groups in this indicator remained after 12 weeks, whereas after 24 weeks there was no statistically significant difference in MoCA scores (test). When comparing the parameters of the MoCA test in the process of correcting anemia, there were significant differences between the main and control in groups when performing the tasks described above naming numbers in forward and reverse order, sequential deduction of seven, fluency of speech, delayed reproduction after 12 and 24 weeks. At the same time, according to the total test score after 24 weeks, there was no statistical difference between the main and control groups. According to the Gotland and Spielberger scales—There is no statistically significant difference between the groups after 12 and 24 non-(Delhi) observations. It is necessary to note a significant decrease in the number of points on the Gotland depression assessment scale in the



basics (in the first group after 24 weeks of anemia treatment ($p = 0,009$). However, the overall score of this scale during the entire observation period corresponded to the criteria of the norm. All patients noted a significant improvement in their condition after 12 weeks of follow-up. Through For 24 weeks, 14 people have already complained of fatigue (initially 38), fatigue – 2 (initially 22), decreased working ability – 4 (initially 14), daytime drowsiness – 1 (initially 7), sleep disturbance – 2 (initially 11), anxiety – 2 (outcome (no – 5), irritability – 2 (initial –4), hyperhidrosis – 12 (initial – 18), attenuation – 7 (initial – 32), dispersion – 8 (initial – 28), decrease in memory - 4 (initial – 16). The initial score of 63.4 ± 6.2 of the MFI test (20 after 12 weeks of DO) decreased to 38.4 ± 3.2 , and after 24 weeks – up to 32.6 ± 5.2 .

CONCLUSIONS

In patients with mild to moderate iron deficiency anemia aged 18-44 years before the start of anemia therapy, we identified mild cognitive impairments, mainly of attention functions (naming numbers in forward and reverse order, sequential subtraction of seven), fluency of speech, memory (delayed reproduction). Correction of anemia, normalization of hemoglobin, iron and serum ferritin against the background of anemia therapy with iron is associated with a decrease in the severity of cognitive impairment. After 24 weeks of iron therapy, there was no significant difference in the overall score of the MoCA scale compared with the control group (patients without anemia). Thus, the results obtained in our study indicate that ferrotherapy reliably restores the existing mild cognitive deficit in real clinical conditions practices. The revealed patterns are typical for young patients with an established diagnosis of iron deficiency anemia and mild cognitive impairment. However, when restoring hematological parameters, correcting cognitive deficits and improving the general well-being of patients, the remaining asthenic component attracts attention. This aspect is interesting for further research.

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