



Evaluation of Cognitive Functions of Patients with Anemia

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Research Article

History

Received: 23/12/2022

Accepted: 26/03/2023

ABSTRACT

Abstract: Iron deficiency anemia is the most common anemia type in the population. It causes many systemic clinical symptoms, including the effects on cognitive functions. Therefore, this study aimed to observe individuals' cognitive changes resulting from iron deficiency, a preventable cause.

Method: Cognitive scores of 112 individuals (56 with iron deficiency anemia-test group and 56 healthy individuals-control group) from the Montreal Cognitive Assessment (MoCA) were recorded. In addition, hemoglobin levels and recurrent anemia histories of individuals with iron deficiency anemia were also considered.

Results: Cognitive functions were lower in the test group (individuals with iron deficiency anemia) compared to the control group. The mean MoCA score of the test and control groups were 19.80 ± 3.46 and 22.98 ± 3.59 , respectively, and the difference was significant ($p < 0.05$). In addition, a direct relationship ($R = 0.22$) was found between the hemoglobin level and the MoCA score in individuals with anemia.

Conclusion: Cognitive functions and B12 deficiency come to the fore in these patients whose cognitive functions are also affected by iron deficiency. Therefore, besides examining cardiovascular and gastrointestinal systems, these patients' neurological systems should also be evaluated in terms of cognitive functions.

Keywords: Anemia, iron deficiency anemia, Montreal cognitive assessment scale, cognitive functions

Demir Eksikliği Anemisi Olan Bireylerin Control Grubuyla Karşılaştırılmalı Montreal Bilişsel Değerlendirme Ölçeği İle Bilişsel Fonksiyonlarının Kıyaslanması

Süreç

Geliş: 23/12/2022

Kabul: 26/03/2023

Öz

Giriş ve Amaç: Demir eksikliği anemisi toplumda en sık görülen anemi türüdür. Bilişsel işlevler üzerindeki etkileri de dahil olmak üzere birçok sistemik klinik belirtiyeye neden olur. Bu nedenle bu çalışma, önlenebilir bir neden olan demir eksikliğine bağlı olarak bireylerin bilişsel değişimlerini gözlemlemeyi amaçlamıştır.

Materyal ve Metod: 112 kişinin (56 demir eksikliği anemisi test grubu ve 56 sağlıklı birey-kontrol grubu) Montreal Cognitive Assessment (MoCA) kognitif skorları kaydedildi. Ayrıca demir eksikliği anemisi olan bireylerin hemoglobin düzeyleri ve tekrarlayan anemi öyküleri de dikkate alındı.

Bulgular: Bilişsel işlevler test grubunda (demir eksikliği anemisi olan bireylerde) kontrol grubuna göre daha düşüktü. Test ve kontrol gruplarının ortalama MoCA puanları sırasıyla $19,80 \pm 3,46$ ve $22,98 \pm 3,59$ olup aradaki fark anlamlıdır ($p < 0,05$). Ayrıca anemisi olan bireylerde hemoglobin düzeyi ile MoCA skoru arasında direkt bir ilişki ($R = 0,22$) bulundu.

Sonuç: Bilişsel işlevleri demir eksikliğinden etkilenen bu hastalarda bilişsel işlevler ve B12 eksikliği ön plana çıkmaktadır. Bu nedenle bu hastaların kardiyovasküler ve gastrointestinal sistemlerini incelemenin yanı sıra bilişsel işlevleri açısından nörolojik sistemlerini de değerlendirmek gerekir.

Anahtar sözcükler: Anemi, demir eksikliği anemisi, Montreal biliş değerlendirme skalası, bilişsel fonksiyonlar

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How to Cite: Felek D (2023) Evaluation of Cognitive Functions of Patients with Anemia, Cumhuriyet Medical Journal, March 2023, 45 (1): 62-65

Introduction

Anemia is a prevalent health problem in society. According to the World Health Organization (WHO), it is defined as the hemoglobin level being below 13 in men and 12 in women. The majority of anemia is iron deficiency anemia, which is preventable ^{1,2}.

Iron deficiency anemia affects more than one system; thus, patients' clinical symptoms are very diverse; skin changes, weakness, fatigue, shortness of breath, tachycardia, headache, slowing of memory and movements, and syncope can be observed. Although the cause has not been fully elucidated, cognitive functions decline due to the decrease in the oxygen transport capacity resulting from decreasing number of hemoglobin and the decrease in the iron capacity ³⁻⁵. Therefore, many methods have been developed to evaluate individuals cognitively, among which standardized scales are the most commonly used in the clinic. The Montreal Cognitive Assessment (MoCA) is one of them. It allows the evaluation of fully integrated functions such as attention and concentration, executive functions, memory, language, abstract thinking, calculation, and orientation. It was developed by Nasreddine et al. and is recommended for mild cognitive functions. The validity and reliability studies of the scale in Turkey were carried out by Selekler et al. It helps compare healthy people with individuals having mild cognitive disorders ^{6,7}.

Material and method

The study was designed prospectively. First, data collection was started after getting the approval of the local ethics committee. Then, it was conducted by applying MoCA after getting the consent of the patients who applied to the internal medicine clinic of our hospital and were diagnosed with iron deficiency. A total of 112 patients 18-65 years old, 56 in the test

group (diagnosed with iron deficiency anemia) and 56 in the control group, were included in the study.

The patient's age, gender, education, and recurrent anemia histories were questioned, and their hemoglobin levels were recorded. Finally, the MoCA was applied to the test and control groups, and their scores were recorded.

SPSS (Statistical Package for the Social Sciences) 22.0 was used to analyze the data. Categorical measurements were given as numbers & percentages, and continuous measurements as mean & standard deviation (median and min-max where appropriate). The data fulfilled parametric test assumptions (Kolmogrev-Simirrow). The significance test was used to analyze the difference between the means of two independent groups, and the Chi-square test was used for correlations and categorical data.

Results

56 patients with iron deficiency anemia (test group) and 56 healthy people (control group) were included in the study. MoCA was applied to evaluate their cognitive functions. There was no statistically significant difference between these two groups regarding gender, age, and education ($p>0.05$).

Regarding the cognitive functions of the groups, the test group scored lower than the control group; the test group's mean score was 19.80 ± 3.46 , whereas the control group's mean score was 22.98 ± 3.59 , and the difference between them was significant ($p<0.05$). (table.1)

A direct relationship ($R=0.22$) was found between the hemoglobin level and the MoCA score in individuals with anemia. However, this relationship is statistically insignificant ($p>0.05$). In addition, no statistical correlation was found between the MoCA score and the hemoglobin level in individuals with a history of recurrent anemia ($p>0.05$). (table 2)

Table 1. The results of the groups according to the Montreal cognitive assessment scale

	n (person)	mean	Std deviation	result
Anemia	56	19,8036	3,46105	p = 0,001*
Control	56	22,9821	3,59035	
Total	112			

* $p<0,05$ significant

Table 2. Montreal cognitive assessment scale results according to the history of recurrent anemia

Story	n (person)	mean	Std. deviation	result
Yes	29	19,8276	3,25213	p = 0,958
No	27	19,7778	3,73480	

p > 0,05 insignificant

Discussion

Cognitive functions are affected by many conditions and diseases. Age comes first. Physical and mental slowing down with age is a physiological process of old age. There is a certain level of intellectual regression. For this reason, individuals under 65 were included in the study to exclude the effect of age, which is the most significant factor ^{8,9}.

It is known that individuals regress cognitively in neurological disorders such as Alzheimer's and Parkinson's. This criterion is used in many studies for diagnosing diseases. Some studies addressed multisystem involvement, such as multiple sclerosis and systemic lupus erythematosus. In addition, studies aiming to see the mental integrity of individuals with chronic diseases such as heart failure and diabetes have also evaluated cognitive functions ¹⁰⁻¹⁵. In iron deficiency anemia, oxygen capacity decreases, resulting from both anemia and the decrease of iron in the body. It is thought that this change may affect cognitive functions directly and through hypoxia. The study's results were also in this direction, and a correlation was found between the degree of anemia and the MoCA score.

The study's results, aiming to show the cognitive impairment caused by iron deficiency anemia, are as follows; The MoCA average score of the test group without any history of other disease was 19.80 ± 3.46 ; The mean score of the control group was 22.98 ± 3.59 . This result proves that cognitive functions are affected by anemia. Furthermore, a similar study conducted on individuals with sickle cell anemia supports these results ¹⁶.

Iron deficiency can be seen with low intake, malabsorption or loss of iron. Low intake can be a problem that starts from childhood. Iron deficiency, which is very common in children with nutritional problems, causes chronic damage and negative effects on mental health in the future ¹⁷. For this reason, awareness and screening programs on anemia should be expanded from childhood. Thus, a transition should be made with mental health in adulthood. In another iron deficiency disorder, absorption disorder, many diseases such as intestinal pathologies and diseases can be listed. In fact, when they observed the intestinal microbiota, cognitive dysfunction attracted the attention of scientists ^{18,19}. Losses are especially frequent in young women, but when they go with menstrual cycles, gastrointestinal system diseases in advanced age should be considered. There is chronic vacinia disease in cases of reducing hemin absorption and spreading the loss. Although there are many anemia factors in people followed up with hemodialysis treatment due to stage-5 chronic birth pregnancy; One preventable cause of anemia is iron deficiency. Since

hemodialysis and peritoneal dialysis can be compared, cognitive functioning is better preserved in peritoneal dialysis. During anemia is one of the causative factors of cognitive function assignment in hemodialysis ²⁰. In iron deficiency anemia, it is very important to reduce iron for mental operations without affecting the daily lives of individuals.

Conclusion

Iron deficiency is prevalent in society, and our study showed that both this deficiency and anemia affect cognitive functions. Iron deficiency anemia, a preventable type of anemia, occurs mainly in the retrospective period. Therefore, life expectancy, early diagnosis and treatment of iron deficiency are very important to protect people's cognitive functions for many years and let them spend their remaining life most efficiently.

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