

The status of iron absorption in older patients with iron deficiency anemia

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Abstract. – OBJECTIVE: The aim of this study is to evaluate the iron absorption status by using the oral iron absorption test (OIAT) in older patients with iron deficiency anemia (IDA) in comparison with younger patients.

PATIENTS AND METHODS: This is a cross-sectional study including 100 patients with iron deficiency anemia. Patients were divided in two groups; group 1 who is 65 and older and group 2 who is younger than 65. OIAT in which a fasting serum iron level is compared with a second serum iron level obtained three hours following oral ingestion of iron sulfate was performed. An increase in serum iron of at least 100 mcg/dL indicates that oral iron absorption is adequate. The Independent-Samples t-test was used to show the statistical difference between the means of two groups.

RESULTS: There were 100 patients in the study; 69 of them have completed the study. The means of the oral iron absorption test results of the groups was compared with an independent t-test, which showed that the mean of group 1 was lower than group 2 and this was statistically significant ($p = 0.001$). The mean of OIAT results was 86.1 and 163.5 in group 1 and 2 respectively.

CONCLUSIONS: In our knowledge, the present study is among the first that shows the status of iron absorption objectively by using OIAT in older patients. Our study shows iron absorption is decreased in older patients with IDA in comparison with younger patients. In the light of this finding; OIAT should be offered before initiating treatment in older patients when IDA is diagnosed and intravenous iron treatment should be considered more on the base of results.

Key Words:

Iron deficiency anemia, Oral iron absorption test, Older patients, Parenteral iron.

Introduction

Anemia is a common problem in older people. Even though the proposed definitions differ by sex, age, race, and ethnicity, according to the World Health Organization the definition of anemia is; hemoglobin level less than 13 g/dL in men and less than 12 g/dL in women. Hemoglobin and hematocrit in older adult are generally lower than younger's¹⁻³. At present, there is not a uniformly accepted definition of anemia for the older adult. The prevalence of anemia in older people ranges between 3 and 61 %, depending on the definition used and the population studied⁴. Prevalence increases with age, with the frequency of anemia doubling in individuals aged 85 years and older compared with individuals aged 65-84 years⁴⁻⁶.

Iron deficiency anemia (IDA) is still considered the most common nutrition deficiency worldwide^{7,8}. Although the etiology of IDA is multifactorial, it generally results when the iron demands by the body are not met by iron absorption, regardless of the reason. Individuals with IDA have inadequate intake, impaired absorption or transport, physiologic losses associated with chronological or reproductive age, or chronic blood loss secondary to disease.

Oral iron therapy still remains the first-line approach for treating IDA⁹. It is safer, more cost-effective, and convenient when compared with parenteral iron therapy. Oral iron provides an inexpensive and effective treatment option by restoring iron balance in a patient with iron deficiency without complicating co-morbid conditions.

On occasion, a patient may not respond to oral iron therapy. The potential causes are coexisting

disease interfering with marrow response, patient is not iron deficient, patient is not taking medication, medication is being taken but is not being absorbed, continued blood loss or need in excess of iron dose ingested. In some conditions (e.g., sprue, atrophic gastritis, *H. pylori* infection, gastrectomy and gastric bypass procedures) dietary and/or medicinal iron may not be adequately absorbed. Normal iron balance is tightly regulated via alterations in absorption rather than excretion¹⁰. Also age related changes might play a role. The greatest change in gastrointestinal physiology affecting nutrient bioavailability that has been identified with advancing age is atrophic gastritis. An oral iron absorption test (OIAT) has been proposed for detecting these patients. The aim of this study is to evaluate the iron absorption status by using the oral iron absorption test in older patients with iron deficiency anemia in comparison with younger patients.

Patients and Methods

Study Design and Patients

This is a cross-sectional study including 100 patients with iron deficiency anemia, who presented to hematology and geriatric clinics between January, 2014 and January, 2015. Out of 100 patients 69 (52 female, 17 male) of them completed the study. 39 of them were older than 65 (56.5%) and 30 of them less than 65 (43.5%). The exclusion criteria were the following: anemia other than IDA, malignancy, malabsorption syndrome, history of gastrointestinal surgery, pregnancy and use of any systemic medication that might affect the iron absorption. An oral iron absorption test has been performed. In OIAT a fasting serum iron level is compared with a second serum iron level obtained three hours following oral ingestion of one 325 mg tablet of iron sulfate (iron content 65 mg) along with water. An increase in serum iron of at least 100 mcg/dL indicates that oral iron absorption is generally adequate¹¹⁻¹³.

The patients have been informed about the test. Participants' iron level was measured at baseline and 3 hours after receiving oral iron pills. After overnight fasting at 8 am 80 mg of iron sulfate (Ferrosi sulfate) (Tardyferon®, Biopharma Pharmaceutical Industry Co. Inc, Istanbul, Turkey) was given orally. Serum iron was measured just before and 3 hours after taking of iron. The patients were not allowed to ingest

food before the last blood sample was drawn at 11 am. The difference between two measurements was noted.

Statistical Analysis

For the statistics of the study SPSS.20 software (SPSS Inc., Chicago, IL, USA) was used. Demographic and laboratory characteristics of participants were summarized using descriptive statistics. The Independent-Samples *t*-test was used to show the statistical difference between the means of two groups based on oral iron absorption test. The relation between OIAT and age, gender evaluated with chi square statistical analysis. Two sided *p* value ≤ 0.05 was considered statistically significant.

Results

There were 100 patients in the study but only 69 of them have completed the study including 52 female and 17 male. Patients were divided in two groups based on their age; group 1 who is 65 and older ($n=39$) and group 2 who is younger than 65 ($n=30$). The median age is 66 (range 19-89). The median hemoglobin and ferritin level is 11 g/dL and 9 ng/mL, respectively. The means of the oral iron absorption test results of the groups was compared with an independent *t*-test, which showed that the mean of group 1 was lower than group 2 and this was statistically significant ($p=0.001$) (Table I). The mean of OIAT results was 86.1 and 163.5 in group 1 and 2 respectively. The association between age and OIAT is found statistically significant ($p=0.03$). The association between gender and OIAT is found statistically insignificant ($p=0.27$).

Discussion

Since anemia is associated with increased morbidity and mortality in older patients, adequate diagnosis and treatment is crucial. Anemia in the older people is also associated with impaired cognitive performance, depressive symptoms, reduced quality of life and increased number of hospital admissions¹⁴⁻¹⁹. A recent systematic review has showed that oral iron supplementation is mildly effective in increasing hemoglobin in older patients²⁰. According to the study oral iron raises hemoglobin levels in elderly people

Table I. The means of pre-iron, post-iron and difference between pre- and post- iron levels based on oral iron absorption test.

	Pre-iron level	Post-iron level	Difference between pre- and post-iron levels
Group 1	56.21	141.05	66.15
Group 2	35.20	197.37	163.57
p-value	0.249	0.001	0.001

with iron deficiency anemia by 0.35 g/dL after 4-6 weeks. Further randomized trials are recommended to show whether oral iron treatment is effective or not in older patients²⁰.

As far as we know, the present study is among the first that shows the status of iron absorption objectively by using oral iron absorption test in older patients. We showed that iron absorption is decreased in older patients with IDA in comparison with younger patients. As shown in Table I; while the mean of the difference between pre-iron and post-iron was 86.1 in older patients, it was 163.5 in younger patients. We agree that; age related structural or physiological gastrointestinal changes might play a role. Absorption of oral iron supplements from the aged gut may be poor due to atrophic gastritis²¹ and concurrent use of proton pump inhibitors, which are commonly prescribed to the older population²². Also the high rate of comorbid conditions and polypharmacy might be responsible from the low absorption rate in older patients since absorption is influenced by a variety of nutrients and drugs.

We recommend performing OIAT in older patients with IDA. OIAT is a simple test, easy to perform and gives important clues about whether patient will benefit from oral iron treatment or not.

For patients who have a history of intolerance to oral iron therapy, published evidence supports a larger and earlier role for intravenous iron (IV). Intravenous iron is considered frontline therapy in Europe for iron deficiency anemia associated with inflammatory bowel disease with or without oral iron intolerance or ineffectiveness²³. Given the high prevalence of co-morbidities in older adult patients, chronic kidney disease and functional iron deficiency, it has been shown that the administration of intravenous iron offers an effective treatment option for those not tolerating, or not responding to treatment with, oral iron²⁴.

In addition, based on our study findings, IV iron might be offered to older patients who have decreased iron absorption with oral iron absorption test.

Parenteral iron treatment is recommended for patients with excessive continuing blood loss, inflammatory bowel disease, chronic kidney disease, cancer and heart failure. Given the safety and efficacy of IV iron in a broad spectrum of diseases associated with iron deficiency, the current paradigm that oral iron is first line therapy should be reconsidered in older patients.

Conclusions

As far as we know, the present study is among the first that shows the status of iron absorption objectively by using oral iron absorption test in older patients. Our study shows iron absorption is decreased in older patients with IDA in comparison with younger patients. In the light of this finding; OIAT should be offered before initiating treatment in older patients when IDA is diagnosed and intravenous iron treatment should be considered more on the base of results. Well controlled, randomized studies are needed to determine the underlying mechanisms of decreased iron absorption in older patients with iron deficiency anemia.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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