

Depression, anxiety, stress and cognition in females with Iron deficiency anemia

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Abstract

Introduction: Iron deficiency anemia (IDA) is characterized by defect in the synthesis of hemoglobin leading to the poor delivery of oxygen to the cells and tissues expressing the clinical symptoms like lethargy, dizziness, shortness of breath and pale conjunctiva. **Objectives:** The present study is taken up to learn the levels of depression, anxiety, stress with IDA in females. The effect of IDA on cognitive skills was also studied. **Methods:** The present cross sectional study included thirty female participants with diagnosed iron deficiency anemia and thirty age matched controls, after obtaining voluntary, written informed consent. DASS-42 was used to assess depression, anxiety and stress. Spatial and verbal memory test was used to assess spatial and verbal memory test. **Results:** We have observed higher levels of depression, anxiety and stress and decreased spatial memory scores in females with iron deficiency anemia. **Conclusion:** We recommend further detailed studies in this area to explore the association of iron status with stress and cognition for planning better treatment options for the benefit of the patients.

Key words: Cognition, Iron deficiency anemia, spatial memory, Verbal memory.

Introduction

The concentration of hemoglobin (Hb) below 12 g/dl in non-pregnant women over 15 years of age and below 11 g/dl in pregnant women is defined as anemia given by the World Health Organization [1]. Iron deficiency anemia (IDA) is characterized by defect in the synthesis of hemoglobin leading to the poor delivery of oxygen to the cells and tissues expressing the clinical symptoms like lethargy, dizziness, shortness of breath and pale conjunctiva [2-5].

The adverse consequences of IDA are decreased academic performance, decreased cognitive skills, low reproductivity, neural dysfunction, immune system disorders [6] and also express the signs and symptoms of depression, stress and anxiety. Certain studies reported that the prevalence of depression in females of reproductive ages is twice when compare to men [7,8]. Nutrition plays a key role in correcting and preventing

depression. Studies stated that supplementation of iron alone can resolve most of the sign and symptoms of depression in subjects with IDA [9]. As many studies stated that IDA in females leads to many abnormalities effecting the normal life of the individual and increasing the complications during pregnancy too. Female being the most versatile person of the society contributing to the growth and development of the family and society is vulnerable for the IDA and its effects due to increased requirements, poor intake & absorption, menstrual loss & adolescent pregnancies. The present study is taken up to learn the levels of depression, anxiety, stress with IDA in females. The effect of IDA on cognitive skills was also studied.

Materials and Methods

Study design: The present cross sectional study.

Participants: The present study included thirty female participants with diagnosed iron deficiency anemia and thirty age matched controls, after obtaining voluntary,

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written informed consent. The following criteria were used in the selection of cases.

Inclusion criteria

1. Willing participants with in age group of 30-50 years
2. Hemoglobin levels less than 12 mg/dL
3. Not having any other complications.

Exclusion criteria

1. Participants with systematic diseases such as diabetes mellitus, hypertension, congestive heart failure, chronic obstructive pulmonary disease, coronary artery disease.
2. Participants using any medication.
3. Pregnant women

Results

Results are presented in table no 1 and 2. Demographic data was presented in table no 1. Significantly higher level of depression, anxiety and stress was observed in cases when compared with controls. Significantly lower scores of spatial memory were observed in cases when compared with controls. No significant difference was observed in verbal memory scores.

Table-1: Demographic data of the participants.

| Parameter | Cases | Controls | P value |
|-----------|-----------|-----------|---------|
| Age | 35±8 | 34±10 | 0.6705 |
| Height | 144±13.66 | 141±16.92 | 0.4529 |
| Weight | 62±15.42 | 66±12.71 | 0.2774 |

Data was presented as Mean ± SD. P<0.05 is significant, **P<0.01 is significant, ***P<0.001 is significant.

Table- 2: Depression, anxiety, stress and memory scores of the participants.

| Parameter | Cases | Controls | P value |
|----------------|--------|----------|------------|
| Depression | 21±7 | 12±9 | <0.0001*** |
| Anxiety | 17±5.4 | 12±3.56 | <0.0001*** |
| Stress | 26±8.2 | 15±6.88 | <0.0001*** |
| Spatial memory | 7±1 | 4±2 | <0.0001*** |
| Verbal memory | 4±3 | 3±2 | 0.1342 |

Data was presented as Mean ± SD. P<0.05 is significant, **P<0.01 is significant, ***P<0.001 is significant.

Discussion

Iron deficiency, defined by two or more unusual measurements (serum ferritin, erythrocyte protoporphyrin, transferrin saturation), is dangerous and uneasily revealed by patients themselves and may not establish definite clinical symptoms. IDA is represented

After collection of socio-demographic data of the participants, they were requested to fill the questionnaire for depression, anxiety and stress and conducted spatial and verbal memory test.

Assessment of depression, anxiety and stress: DASS-42 was used to assess depression, anxiety and stress [10]

Assessment of spatial and verbal memory: Spatial and verbal memory test was used to assess spatial and verbal memory test [11].

Statistical analysis: Data was analyzed by SPSS 16.0. Student t test was applied to observe significance of difference between the groups. P<0.05 was considered as significant.

Setting: The study was conducted at Department of Pathology, Katari Medical College, Guntur, India.

hazards for IDA and ID include a low intake of iron, poor absorption of iron from diets, chronic loss of iron (i.e.,ulcer,metrorrhagia), adolescent girls and pregnancy [12,13,14,15].

Iron is a basic element of hemoglobin, myoglobin, and many enzymes in cellular metabolism and DNA replication and repair. It also plays a main part in the development of the central neurological system [16,17,18,19], autoimmune system [20,21,22], endocrine system [23,24,25,26], and cardiovascular system [27,28].

In both developed and developing countries anemia is known to be the most common nutritional disorder in the world. In the development of the brain, iron accounted for the myelination of white matter [29]. Many researchers had shown their interest to learn the deficiency of iron and its relationship with brain function, cognition, and behavior (including emotional behavior) [30].

Patients with depression had being noticed with the changes in iron metabolism and suggested it as a potential pathological marker. In the present study we noticed a significantly higher level of depression, anxiety and stress in cases when compared with healthy individuals. Significantly lower scores of spatial memory were observed in cases when compared with controls further we noticed no significant difference in verbal memory scores. Certain studies reported that supplementation of iron alone had resolved the levels of depression and reduced the levels of stress and anxiety prior to the improvement in RBC counts.

They assumed that this effect may be due to the improvement in the levels of neurotransmitters and iron dependent enzymes that are not related to the concentration of hemoglobin (hb) [31]. In contrast, other studies reported that there was no significant association between symptoms of depression and serum ferritin levels [32]. John L Beard et al., reported strong correlation between depression, anxiety and stress, cognitive functions with iron status. In the present study, we have observed significantly higher levels of depression, anxiety and stress and lower spatial memory in females with iron deficiency anemia when compared with controls.

Limitations: The major limitation of our study was lower sample size.

Conclusion

We have observed higher levels of depression, anxiety and stress and decreased spatial memory scores in females with iron deficiency anemia. We recommend further detailed studies in this area to explore the association of iron status with stress and cognition for planning better treatment options for the benefit of the patients.

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