Journal of Microscopy and Ultrastructure 3 (2015) 25–28

Contents lists available at ScienceDirect

Journal of Microscopy and Ultrastructure

journal homepage: www.elsevier.com/locate/jmau

Original Article

The prevalence of iron deficiency anemia in a Saudi University female students

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ARTICLE INFO

Article history:
Received 28 August 2014
Received in revised form
12 November 2014
Accepted 16 November 2014
Available online 23 November 2014

Keywords:
Anemia
Iron deficiency
Nutritional habits

ABSTRACT

The study aims to determine the prevalence of anemia in apparently healthy university female students. This study was conducted in 2007–2008 at Taibah University and a total of 268 female students participated in this research. In order to assess iron deficiency and iron deficiency anemia, the venous blood samples were collected from consecutive female students at the medical center of Taibah University excluding those already on iron supplementation for iron-deficiency anemia. One hundred and seventy-one (64%) students were found to be anemic. The overall prevalence of mild (10–11 g/dL), moderate (7–10 g/dL), and severe (Hb <7 g/dL) anemia was 45%, 49%, and 6%, respectively. Out of the anemic students, 81% showed microcytic (MCV <80 fL) and 1.6% had macrocytic (MCV >96 fL) variety. The results of this study warrant further evidence-based surveys on a larger scale to validate these findings and eventually set a stage to develop well-organized educational and nutritional programs to safeguard and improve the nation's health. The high prevalence of iron deficiency anemia in the present study might be related to life style of female students as well as to their dietary habits. It is recommended that female students never skip breakfast as it is essential for their cognitive functions and physical activities.

1. Introduction

Nutritional anemia occurs due to insufficient intake of nutrients by cells. Among the most important nutrients whose deficiency can lead to nutritional anemia are iron, folic acid, vitamin B12, vitamin B6, vitamin C and protein. Iron deficiency anemia is one of the most frequent health problems in the world [1]. The World Health Organization recently reported that 1.62 billion of the world population is anemic. The rate among students is 25.4% and in preschool age children anemia reaches its highest percentage of 47.4 [2]. Iron deficiency anemia accounts for 75% of all types of anemia in the third world, affecting 30% of population [3]. In females of childbearing age, the most frequent cause of iron-deficiency anemia is loss of iron in blood due to significant menstruation or pregnancy. Iron-deficiency anemia can also be caused by a poor diet or by certain intestinal diseases that affect how the body absorbs iron. The condition is normally treated with iron supplements.

Literature about anemia in adolescents and youth is scarce, as compared to that focusing on women and children. In Saudi Arabia the overall country prevalence of iron deficiency anemia was 30–56% [4]. A cross-sectional study conducted in Riyadh City among schoolgirls showed that the prevalence was 40.5% among female adolescents (16–18) years old [5].

The current study is an attempt to present a glimpse of prevalence of iron deficiency anemia in the Saudi female students of Taibah University Almadinah Almunawwarah Saudi Arabia. The clinical associations of iron deficiency anemia are discussed with a view to highlight the need for

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http://dx.doi.org/10.1016/j.jmau.2014.11.003
2213-879X/

the establishment of a national level program to overcome the nutritional deficiencies of the Saudi nation.

2. Materials and methods

During this cross-sectional observational study done through year 2007–2008, the hemoglobin levels of the apparently healthy female students of medicine, science, and education colleges of Taibah University Almadinah Almunawwarah Saudi Arabia were analyzed. A written informed consent was taken from all the participants entailing the purpose of the investigation and ensuring the confidentiality of the results. The venous blood samples were collected from consecutive female students at the medical center of Taibah University excluding those already on iron supplementation for iron-deficiency anemia. The results were produced from venous blood samples collected in 3 ml EDTA vacuum tubes (Becton Dickenson, USA) and were tested by the laboratory technologist using the semi-automated Medonic CA 620 hematology analyzer (Adolphsberg Svagen, Sweden). The cut-off value for the determination of anemia was defined as blood Hb concentration <12 g/dL [6]. The analysis was done on day-to-day basis and the results were saved in excel sheets for further analysis.

A secondary analysis of those found to be anemic was carried out including hematocrit (Hct), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC). The severity of anemia was classified into three stages: mild (10–11 g/dL), moderate (7–10 g/dL), or severe (Hb <7 g/dL). On the basis of RBC indices, an anemia with MCV <80 fL was classified as microcytic, an MCV >96fL as macrocytic and an MCH <27 pg for hypochromic anemia. The data was stored and analyzed on Microsoft Excel 2007.

3. Results

A total of 268 female students were incorporated in this research; age range 20–31 years with a mean of 24.5 years. One hundred and seventy-one (64%) students were found to be anemic (Table 1 and Fig. 1). The mean Hb concentration for the study sample was 9.8 ± 7 g/dL with a range from 5.7 to 17.4 g/dL. Forty-one percent students from the education college, 40% from the science college and 39% from the medical college were reported to have hemoglobin less than 12 g/dL (Figs. 2–7). The overall prevalence of mild (10–11 g/dL), moderate (7–10 g/dL), and severe (Hb <7 g/dL) anemia was 45%, 49%, and 6%, respectively.

The distribution of anemia among the investigated population is also illustrated in Figs. 3, 5 and 7 which show that the medical college students had the lowest prevalence of anemia. Out of the anemic students, 81% showed microcytic (MCV <80 fL) and 1.6% had macrocytic (MCV >96 fL) variety.

Table 1
Shows the pre-treatment and post-treatment hemoglobin levels in the study group.

Hemoglobin levels (mg%)	No. of students	Percentage of anemia
Less than or equal to 12	171	64%
More than 12	97	36%
Total	268	100%

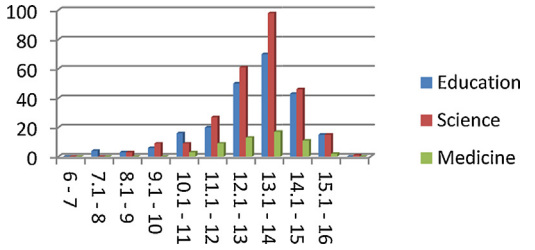

Fig. 1. The overall distribution of hemoglobin for students of three colleges.

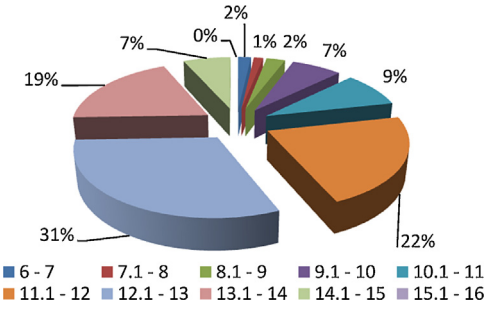

Fig. 2. Distribution of hemoglobin in the college of education.

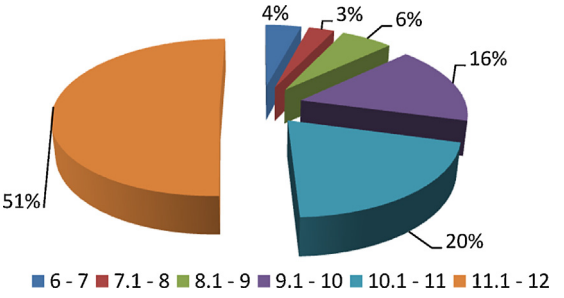

Fig. 3. Distribution of anemia in college of education.

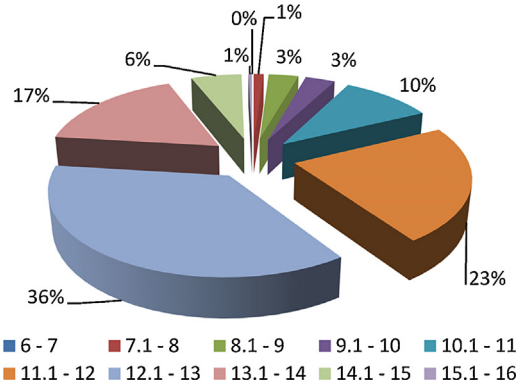

Fig. 4. Distribution of hemoglobin in college of science.