

The Frequency Rates of Iron Deficiency Anaemia among Saudi Female Who Attending to Before Marriage Clinic Examination, At Taif

Rania G. Zaini

Department of Medical Laboratories, College of Applied Medical Sciences, Taif University, Taif, Kingdom of Saudi Arabia

Abstract

Iron deficiency anaemia is the most severe consequence of iron depletion, is still considered as the most severe and important nutritional deficiency worldwide. According to the World Health Organization and World Bank iron deficiency anaemia (IDA) have been ranked as the third leading cause of disability-adjusted life years (DALYs) lost for women of reproductive age. Thus, the aim of this study was to investigate the prevalence and frequency rates of iron deficiency anaemia among un-married Saudi female of reproductive age, who attending to before marriage clinic examination, in Taif city. The majority of female participants samples 94% (n=33), were characterized with low haemoglobin and red blood cells with low serum iron, serum ferritin and high iron binding capacity. All participants were free of any chronic diseases and aged between 18-40 years. Thus, the results of this study illustrated that iron deficiency anemia is highly prevalent (94%) among females in the study area.

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Introduction

Iron deficiency anaemia is the most severe consequence of iron depletion, is still considered as the most severe and important nutritional deficiency worldwide [1,2]. In low-income countries the common cause of iron deficiency among women is that they require about twice as much iron as men and consume only half of their need. They often eat less liver, meat, fish and fruit, the best sources of available iron [3]. World Health Organization and World Bank have ranked iron deficiency anaemia as the third leading cause of disability-adjusted life years (DALYs) lost for women of reproductive age [4]. Moreover, refugees are a highly susceptible population group that has been suffering from nutrition deficiency disease including IDA.

A study done in Riyadh city, reported that Saudi female have higher incidence of IDA in a comparison with Saudi male and suggested action to eradicate iron deficiency anaemia include: increase nutritional awareness, education for the purpose to change inappropriate consumption patterns as eating certain types of food in combination with iron supplements [5]. More recent study performed in Jeddah, western Saudi Arabia among female university students age between 18-23 years and detected about 24% of participants had undiagnosed iron deficiency anaemia. Within the same study they found relationship between iron deficiency anaemia and inadequate meat intake [6]. Similarly, at western region of the Kingdom, at Elkhorma it has been found that the prevalence and frequency rate of iron deficiency anaemia higher in women than men, and the highest prevalence of iron deficiency anaemia was found in age group between 27-35 years [7].

Measurements of haemoglobin, serum ferritin, serum iron, and transferrin (total iron-binding capacity, TIBC) capacitate iron status to be characterized in detail of anaemia [8]. In clinical terms anaemia is defined as that an insufficient mass of RBCs circulating in the blood; in public health terms anaemia is also defined as a condition with haemoglobin concentration below the thresholds given by WHO, UNICEF & UNU [3].

The main objective of this study was to investigate the prevalence and frequency rates of iron deficiency anaemia among un-married Saudi female of reproductive age (18-40 years), who attending to before marriage clinic examination, in Taif city at the western region of Saudi Arabia. Also, this study suggests some recommendations to reduce and prevent this disorder among female.

Material and Methods

This is analytical and laboratory survey analysis study, conducted to determine the prevalence of anaemia among un-married Saudi female of reproductive age (18-40 years), who attending to before marriage clinic examination. The study was performed between September to December 2015. A total of 35 blood samples of un-married female patients who have diagnosed as anaemic patient and agreed to participate in the study were investigated to detect the type of anaemia.

Firstly, 5 ml of the venous blood specimens of the patients were collected in ethylene demine tetra-acetic acid (EDTA) to beat administration of laboratories and blood bank in Taif. All samples were examined for complete blood count (CBC), and were categorized with low level of hemoglobin (HB), low Mean corpuscular volume (MCV) and low mean corpuscular hemoglobin (MCH), using CELL-DYN Ruby machine and calibrated by using standard quality assurance at the hematological laboratory. However, the type of anaemia was not recognized at this stage of the study. Thus, further investigations were required to determine the type of anaemia. Additional 5 ml of patient blood sample was drawn into a tube without anticoagulant to be tested at chemistry department at children hospital in Taif. At chemistry lab modular (Hitachi) machine was used to measure the serum iron, serum ferritin and total iron binding capacity (TIBC) level. Calibration was done by using standard quality assurance at the beginning of samples run. WHO criteria for the diagnosis of iron deficiency anaemia was defined according to hemoglobin levels in adult females (≤ 11 g/dl).

The age and other needed information about patients were recorded by the technicians in the clinic. All participants were un-married, Saudi female and aged between 18-40 years. Study proposal was approved by the research ethical committee of laboratories administration and blood bank at Taif and committee of the children hospital in Taif.

Corresponding Author: Prof. Rania G. Zaini, Department of Medical Laboratories, College of Applied Medical Sciences, Taif University, Taif, Kingdom of Saudi Arabia; E-mail: ranazaini2@tu.edu.sa

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The data were exported to Statistical Package of Social Sciences (SPSS) and Microsoft Office Excel. All data were manually input SPSS and analyzed by statistical program SPSS, version 16.0 for Windows.

Results

All participants EDTA samples were subjected to CBC analysis to classify the type of anaemia. Among the 35 non-pregnant female aged between 18 and 40 years, all participants 100% (n=35) were having low Hb (≤ 11 g/dl) level, low RBCs (≤ 4.2), low MCV (≤ 80 FL) and low MCH (≤ 26 PG) (Figure 1). Thus, these results indicate the presence of microcytic and hypochromic anaemia.

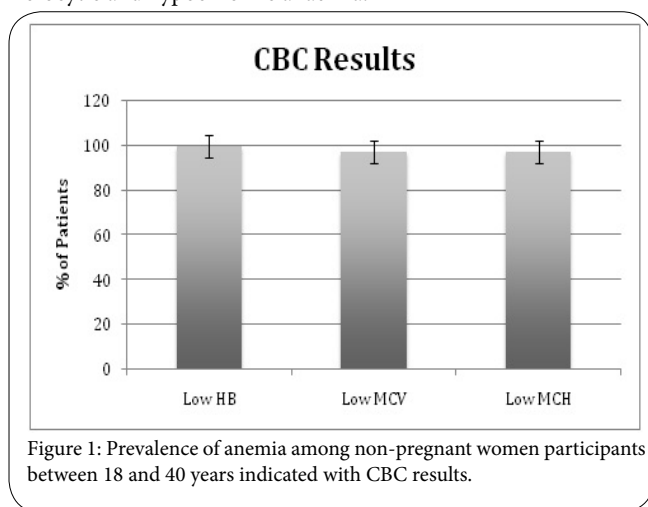


Figure 1: Prevalence of anemia among non-pregnant women participants between 18 and 40 years indicated with CBC results.

The prevalence rate of iron deficiency anaemia in all samples was determined with further laboratory tests including; serum iron, Serum ferritin and TIBC.

Serum iron concentration showed a low level (≤ 50 μ g/dL) among the majority of participants 94% (n=33) (Figure 2). Serum ferritin, which indicates the amount of iron stored in the body, showed low results, ($\leq 18-160$ ng/mL) among all samples 100% (n=35) (Figure 3). Therefore, the results generated from CBC, serum iron and serum ferritin investigations indicated that 94% of Saudi females participant were diagnosed with iron deficiency anaemia.

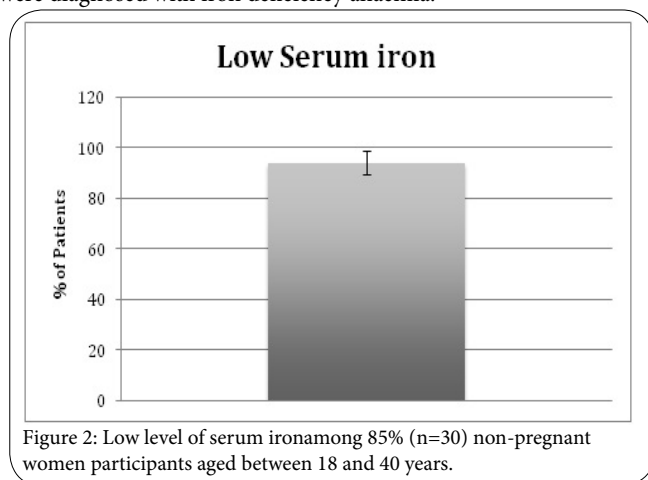


Figure 2: Low level of serum iron among 94% (n=33) non-pregnant women participants aged between 18 and 40 years.

The results of TIBC were variable among participants sample. The normal range should be between the range 250 to 450 mcg/dL. The results with low TIBC level were seen on 3% (n=1), 34% (n=12) with normal TIBC and 63% (n=22) with high TIBC level (Figure 4).

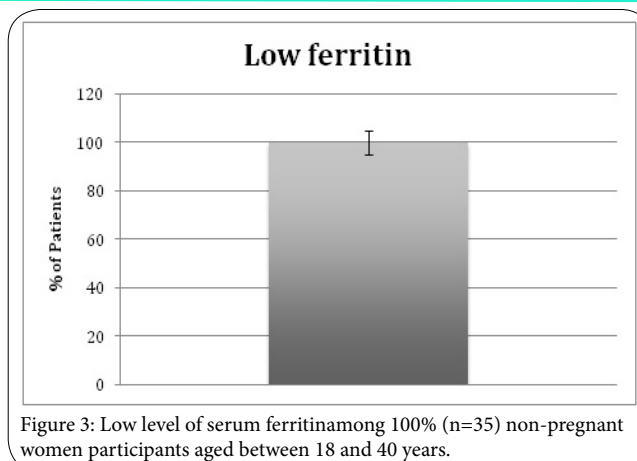


Figure 3: Low level of serum ferritin among 100% (n=35) non-pregnant women participants aged between 18 and 40 years.

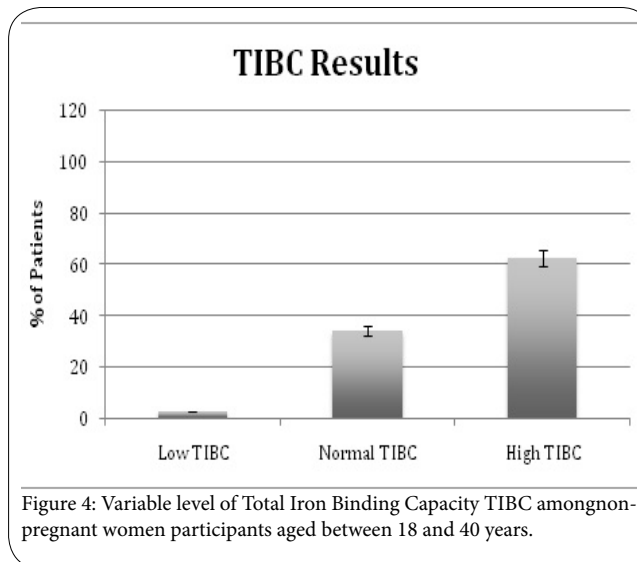


Figure 4: Variable level of Total Iron Binding Capacity TIBC among non-pregnant women participants aged between 18 and 40 years.

Discussion

Iron deficiency, the most common nutritional deficiency worldwide, has negative effects on work capacity and overall health of infant, children, adolescents and women [7,9]. Iron deficiency anaemia (IDA) is most prevalent and severe among women of reproductive age [10]. According to the National Health and Nutrition Examination Survey, the prevalence of iron deficiency anaemia was greatest among adult females than male aged 12 to 49 years in United State between 1999 -2000 [11].

In Saudi Arabia, a recent study (2015) conducted in 2007-2008 at Taibah University and showed that the prevalence of iron deficiency anaemia was (64%) among female students [12]. They linked the high prevalence of iron deficiency anaemia to life style of female students as well as to their dietary habits [12]. Another study, reported IDA with 23.9% among Saudi young females between (18 and 23) years apparently healthy at University stage, in Jeddah city [6]. There was a significant correlation between iron deficiency and iron deficiency anaemia with inadequate meat intake and impaired exercise capacity. Furthermore, pallor and past medical history of iron deficiency anaemia were statically significant variables among female participants [6]. This result contraveneour finding, which showed that all participants were un-symptomatic when they attending to before marriage clinic examination.

The present study conducted between September and December 2015 on 35 non-pregnant anemic female of reproductive age (18-40 years) to investigate the most commonly reported anaemia. Firstly, the complete blood count (CBC) was performed to all the participants samples to measure red blood cell (RBC) count, hemoglobin level, mean corpuscular volume (MCV) and Mean corpuscular hemoglobin (MCH). All investigated samples were reported with low RBC, low Hb, low MCV and low MCH. Thus, all the investigated samples were reported as microcytic hypochromic anaemia. According to the Centers for Disease Control and Prevention (CDC) and World Health Organization (WHO), iron deficiency anaemia is classically described as a microcytic anaemia [13]. Moreover, red blood cells in iron deficiency anaemia are usually described as being microcytic (i.e., mean corpuscular volume less than 80 fL and hypochromic [13].

Further laboratory tests were done and low level of serum iron was reported among 94% (n=33) of the participants and low level of serum ferritin among 100% (n=35), which is high indication for the iron deficiency anaemia. According to the CDC the definition of iron deficiency is characterized with an abnormal value for at least two of the following three indicators: serum ferritin, transferin saturation and free erythrocyte protoporphyrin [12]. Persons with iron deficiency and low hemoglobin value were considered to have iron deficiency anaemia [10, 14]. However, results of TIBC were variable among 35 un-married female participants; where 3% (n=1) showed low level, 34% (n=12) with normal TIBC level and 63% (n=22) found with high TIBC level. Similar to our finding, Peter and Wang have identified three groups diagnosed with iron deficiency anaemia with three different TIBC values; group one with low iron and high TIBC, group two with low iron and normal TIBC values and the third group with low iron and low TIBC values [15].

According to different research studies, ferritin test is much more effective in detecting iron deficiency than is the transferrin saturation value [13,15]. Thus, in this study measuring serum iron and serum ferritin were the main diagnostic tests used for IDA.

Recommendation

The basic principles on the prevention of IDA can be manipulated of the diet [16, 17]. Strategies of prevention by WHO, include the agriculture, health, commerce, industry, education and communication sectors should be working together to reducing of IDA [3]. Further strategies for the prevention and treatment of anaemia among women which suggested reducing poverty, promote the consumption of a diversified diet, improve health services and sanitation, and promote better care and feeding practices [3]. The strategies of UNHCR to control and reduce the anaemia's prevalence among the refugee, women and children population will developed by improving the general dietary intake of micronutrients and reduce micronutrient malnutrition as a whole.

Additionally to prevent iron deficiency, women of reproductive age should be encouraged to eat iron-rich foods or use iron-fortified. Primary prevention of iron deficiency for non-pregnant women of reproductive age also through diet and annually screen for anaemia among women having risk factors for iron deficiency (e.g., extensive menstrual or other blood loss, low iron intake, or a previous diagnosis of iron-deficiency anaemia). Secondary prevention involves screening for, diagnosing, and treating iron-deficiency anaemia according to the patient's needs and overall health.

Competing Interests

The authors declare that they have no competing interests.

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