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IRON DEFICIENCY ANAEMIA IN REPRODUCTIVE AGE WOMEN ATTENDING OBSTETRICS AND GYNECOLOGY OUTPATIENT OF UNIVERSITY HEALTH CENTRE IN AL-AHSA, SAUDI ARABIA

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Abstract

Background: Iron deficiency is the most common nutritional disorder in the world. The aim of this questionnaire based survey study was to determine the prevalence of iron deficiency anemia in reproductive age women, and their relation to variables such as age, marital status, education with those attending obstetrics and gynecology outpatient of King Faisal University Health Centre in Al-Ahsa in eastern region of Kingdom of Saudi Arabia. **Materials and Methods:** This study was conducted for the period of 6 month staring from September 2012 to February 2013. The questionnaire had three sections on personal information: their educational indicators, gynecological clinical history, and hematological indices.

Results: The average age was 25.97±7.17 years. According to the gynecological clinical history of the respondents, 15 (48.4%) respondents were pregnant while 16 (51.6%) were not pregnant. There was significant effect of pregnancy status on Hb level. Majority of the anemic respondents 15/17 were married. Moreover 14/17 anemic women were experiencing severe menstrual bleeding, 11/17 respondents were pregnant. 54.8% of respondents were hemoglobin deficient while 77.4% were found to have low Hct. In 87.1 % of the respondents, transferrin saturation was found to be abnormal.

Conclusion: In this study iron deficiency anemia is quite prevalent in the university community especially among pregnant women. The fetus's and newborn infant's iron status depends on the iron status of the pregnant woman and therefore, iron deficiency in the mother-to-be means that growing fetus probably will be iron deficient as well. Thus iron deficiency anemia during pregnancy in well-educated set up needs more attention by the concerned authorities.

Keywords: Iron deficiency Anemia (IDA), Hemoglobin, Female, Reproductive Age.

Introduction

Iron deficiency is the most common nutritional disorder in the world. It is a global public health problem affecting both developing and developed countries with major consequences for human health [WHO, 2008] as well as social and economic development. In 2002, iron deficiency anemia (IDA) was considered to be among the most important contributing factors to the global burden of anemia [WHO, 2002]. In a recent review of the prevalence of iron deficiency anemia in the United States, 9% of toddlers and up to 11% of adolescent girls were iron deficient [McCann and Ames, 2007] The highest prevalence is found in Africa (47.5%) and in South-East Asia (35.7%). It is 17.8% in Americans [WHO, 2008], 14% in the residents of United Arab Emirates; 11% in Egyptians; and 40% in the Syrian Arab Republic and Oman among women of child-bearing age [Al-Buhairan et al., 2001; Al-Quaiz 2001; Djazayery 2001; Bagchi 2004].

Anemia occurs at all stages of the life cycle, but is more prevalent in pregnant women and young children[WHO 2008; Atamna and Walter, 2002]. It is the most prevalent hematological disorder in childhood, especially in female children, and it affects particularly women of reproductive age[Khan et al., 2013; Azhar et al., 2013]with increased rates of maternal and prenatal mortality, premature delivery, low birth weight, and other adverse outcomes [Azhar et al., 2012a]. Most cases of anemia are due to iron deficiency, which often work in symphony with folate deficiency and/or vitamin B12 deficiency as well as with infections [Azhar et al., 2012b]. Moreover it has been shown to affect mental development and learning capacity. In infancy it may cause a permanent loss of intelligence later in life, shortened attention span, irritability and fatigue, difficulty with concentration, lethargy, weakness and increased susceptibility to infection. Consequently, anemic children tend to do poorly on vocabulary, reading, and other tests [Kordas 2004].

In Saudi Arabia most of the studies on anemia werebased on nutritional status and concentrated on preschool children who were under six years old [El Hazmi et al., 1998; Rasheed et al., 1989; Sabai et al., 1981; Sadeghipour et al., 1996].In Saudi Arabia, anemia is often aggravated by repeated and closely spaced pregnancies. Al-Ahsa is a small city located in the eastern province of Saudi Arabia. Epidemiological studies carried out in this region are insufficient; therefore it was necessary to have a study about the above problem among the educated females of the university.

Therefore, the aim of this study was to determine theprevalence of iron deficiency anemia in reproductive age women, and their relation to variables such as age, marital status, and education with those attending obstetrics and gynecology (OB GYN) outpatient of King Faisal University Health Centre in Al-Ahsa in eastern region of Kingdom of Saudi Arabia.

Materials and Methods

Study design

This study was conducted for the period of 6 month staring from September, 2012 to February, 2013. The questionnaire had three sections on personal information:educational indicators, gynecological clinical history, and hematological indices. This was adopted from the questionnaire used and validated for content [Sadeghipour et al., 1996]. Each section of the questionnaire included a set of statements. Section one of the questionnaires gave the personal information along with their educational level; section two comprised of gynecological clinical

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history which may be etiology factors probably responsible for iron deficiency anemia and section three contained detailed hematological data. The questionnaire was validated for its content by seven respondents.
The aim of this study was explained to all participants. Verbal and written consent was obtained from all the women who agreed to participate. The study was approved By King Faisal University Ethics Committee.
The study respondents were 31 women of reproductive age. The age ranged was from 12 to 44 years attending university health clinic OB GYN clinic for routine gynecological and obstetrical examination. All 31 women conformed to the following criteria.

1. Received supplemental iron during previous year
2. Blood donation or transfusion during the previous year
3. History of chronic illness
4. Family history of anemia
5. Breast feeding
6. On oral contraceptives

Anemia was defined as Hb below 12g/dl (World Health Organisation 1968). Iron deficiency was defined as serum ferritin below 12µg/l with or without transferring saturation below 16% (Jacobs et al. 1972).iron deficiency anemia was defined as either Hb< 12 g/dl and transferring saturation < 16%; Hb<12 g/dl and serum ferritin <12µg/l; or all three indices below normal.
The women accordingly were classified into two groups of anemic Vs normal depending on the diagnosis.

Laboratory Methods

Blood samples were obtained in the morning from the antecubital vein of overnight fasting subjects in order to remove the effect of lipemia and plasma cloudiness.
10 ml of venous blood was taken from each subject. 2 ml was collected into tubes containing EDTA for the determination of Hb, Hct, red cell number by an automated analyser.
The remainder 8 ml was centrifuged at 1060 xg for 10 minutes. After centrifugation, the serum was used to assay serum ferritin, iron level and TIBC.
Serum iron and TIBC are determined by an autoanalyser spectrophotometer. Serum ferritin level was measured by radioimmunoassay using an automatic gamma counting system. Transferring saturation (%) was calculated by dividing serum iron level by TIBC and multiplying the results by 100. The above mentioned detailed hematological data was obtained at the end of the experimental period from the biochemical laboratory of university health clinic.

Statistical Analysis

The data were computed and analyzed using Statistical Package for Social Sciences (SPSS version 15) and descriptive analysis were conducted. The results on each item on the questionnaire were reported, as percentage and frequencies. The chi-square test was used to test the significance association between the independent variables (hemoglobin, serum ferritin, serum iron, and transferrin saturation) with the dependent variable (number of days of menstrual bleeding and pregnancy status). Statistical significance was accepted at $P<0.05$.

Results

During the period of six months, only 31 respondents covered the inclusion criteria, the total number of questionnaires were 50, 31 questionnaires were completely filled, giving the response rate of (62%).The demographic data of the respondents is summarized in Table 1.The average age of study subjects was 25.97±7.17 years). The majority of the respondents were Saudi nationals. In Table 2, gynaecological clinical history of the respondents is given. The pregnant and non-pregnant respondents were 15 (48.4%) and 16(51.6%), respectively. More than 5 times pregnancy was reported in 22.6% of the respondents while 77.4% were pregnant less than 5 times. Moreover, 64.5% of the respondents had less than 1 year intervals between successive pregnancies which can be an important factor for IDA. Cross tabulation is done in Table 3.The number of days of menstrual bleeding and pregnancy status was compared with hematological factors. The value was found to be significant with respect to pregnancy status and hemoglobin with a value of P=0.045. In Table 4,attempts are made to compare continuous and categorical variables in two groups of anemia versus normal. Majority of the anemic respondents (15/17) were married. Moreover, 14/17 anemic women were experiencing severe menstrual bleeding and 11/17 respondents were pregnant. In Table 5, comparing variable with normal and abnormal, findings have shown that 54.8% were hemoglobin deficient while 77.4% were found to have low Hct. In 87.1% of the respondents, transferrin saturation was found to be abnormal.

Discussion

Anemia is one of the important health problems among women of 18-45 years of age in the world and especially in developing countries[Jacobs et al., 1972]. This is first survey of anemia carried out in the female population of all the reproduction age groups in the university clinic in eastern region of Saudi Arabia.

It has been identified from many surveys that the major risk groups for IDA are young children and, after childhood, individuals of female gender, i.e., adolescent females who grow rapidly and women of reproductive age who lose iron with their menstrual periods, pregnant women with an increased need for iron, and lactating women [Azhar et al., 2012b].

On the basis of results obtained, it can be suggested that the prevalence of anemia in pregnant women is more than the non-pregnant women, 64.7% of anemic respondents were pregnant at the time of study. From our study it is worth noting that 64.5% of females had less than 1 year intervals between successive pregnancies which may be a major contributing factor for IDA both for the female and the fetus.
There was no significant relationship between occurrence of iron deficiency anemia and serum ferritin levels. It has been reported that in healthy individuals the concentration of serum ferritin parallels the amount of storage iron [Cook et al., 1974]. However, once iron stores become exhausted, serum ferritin concentrations no longer reflect the severity of iron deficiency. the intra individual variability on serum ferritin concentrations is high and serum ferritin is not an appropriate indicator of iron deficiency in presence of inflammation [Gibson 2005] during pregnancy, in women with adequate iron stores at conception, the serum ferritin concentration initially increases, followed by a progressive fall

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by 32 weeks [Asif et al., 2007]. As reported in this study, majority of anemic subjects are pregnant, this may be the reason for lowered relationship between iron deficiency anemia and serum ferritin.

Table 1: Demography and educational indicators

Variables	n (%)
Age	
12-22	13(41.9)
23-33	13(41.9)
34-44	5(16.1)
>50	0
Marital Status	
Married	25(80.6)
Unmarried	5(16.1)
Divorced	1(3.2)
Nationality	
Saudi	25(80.6)
Non Saudi	6(19.4)
Education	
Primary	0 (0)
Secondary	10(32.3)
Higher	21(67.7)
Spouses education	
Primary	3(9.7)
Secondary	23(74.2)
Higher	5(16.1)
Occupation	
Employed	7(22.6)
Unemployed	24(77.4)
Spouse's occupation	
Employed	25(80.6)
Unemployed	1(3.2)
Smoking status	
Non smoker	31(100)
Smoker	0(0)
Ex-smoker	0(0)

Table 2: Gynecological clinical history

Variable	n (%)
Number of days of menstrual bleeding	
1-5	9(29.0)
6-10	22(71.0)
Pregnancy status	
Pregnant	15(48.4)
Not pregnant	16(51.6)
Number of pregnancies	
0-5	24(77.4)
>5	7(22.6)
Number of deliveries	
0-5	27(87.1)
>5	4(12.9)
Intervals between successive pregnancies	
Less than 1 year	20(64.5)
1-3	10(32.3)
More than 3	1(3.2)

Table 3: Prevalence rate of anemia on the basis of serum hemoglobin, ferritin, iron, and transferring saturation

Index status	P-value* (Chi-square)			
	Hemoglobin	Serum Ferritin	Serum Iron	Transferrin Saturation
Number of days of menstrual bleeding	0.124	0.863	0.935	0.849
Pregnancy status	0.045*	0.505	0.519	0.948

Table 4: Incidence of categorical variables in normal and abnormal subjects

Variables	Normal (n=14)	Abnormal (n=17)
Marital Status Married	10/14	15/17
Women education- (High school)	9/14	12/17
Spouse education (High school)	9/14	14/17
Women Occupation (employed)	3/14	4/17
Spouse Occupation (employed)	10/14	15/17
Number of days of menstrual bleeding (severe)	8/14	14/17
Pregnancy status, pregnant	4/14	11/17

Table 5: Hematological indices

Variable	Normal	Abnormal
Hb	14/14	17(54.8)
Hct	7(22.6)	24(77.4)
Red Cell Count	28(90.3)	3(9.7)
MCH	19(61.3)	12(38.7)
MCV	17(54.8)	14(35.2)
MCHC	30(96.8)	1(3.2)
Serum Ferritin	21(67.7)	10(32.3)
Serum Iron	28(90.3)	3(9.7)
TIBC	20(64.5)	11(35.5)
Transferrin Saturation	4(12.9)	27(87.1)

Iron deficiency occurs in several stages with anemia as a late manifestation. It has been reported that iron deficiency usually develops slowly and insidiously and many patients have no specific complaints [Andrews 2000]. Transferrin saturation represents the nutritional status

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with respect to intake of iron and low transferrin saturation as obtained in 87% respondents suggests that they may develop iron deficiency anemia at a later stage.

In the study of etiological factors, a greater but not significant relationship was observed between the number of days of menstrual bleeding and the occurrence of iron deficiency anemia. However significant relationship is profoundly observed when comparison is made between normal and anemic subjects. This is in accordance with the study conducted by Jacobs and Butler, 1965.However other etiological factors showed no significant relationship to the occurrence of IDA. Moreover the lack of such relationship was obtained from a comparison of data in normal Vs anemic group.

It has been known that either spouse's education or occupation can directly determine the socioeconomic level of the family. Low income levels therefore can cause poor nutrition and improper diet which in turn can put women at risk of suffering IDA [Aziz-Karim et al., 1990]. Since no relationship was found between above factors and prevalence of anemia in our study as the respondents, it may be because the respondents belong to the university community and share more or less equal socioeconomic levels.

Marriage in our study was not found to be a causative factor for IDA. This could mean that marriage has not made the women of this study prone to factors causing IDA.

Recommendations: Nutrition education programs should be conducted for the women of child bearing especially pregnant women to incorporate healthy dietary habits in their everyday lives.

1. Regular screening for iron deficiency should be conducted among high risk groups including adolescents and pregnant women.
2. Greater awareness of ID and IDA should be done at Primary care level and a definitive diagnosis should be established to understand underlying causes.
3. Fortification of some foods can help to reduce this common problem.
4. Future research is needed to evaluate the adequacy of dietary iron, in order to avoid both iron deficiency and iron overload in Saudi population.

Limitation of study: Due to time constraint, the sample size was limited, only those forms were included in the study in which all the parameters were fulfilled. Many of the subjects were university faculty and according to the polyclinic policy, their information is excluded from the study.

Conclusion

In this study, iron deficiency anemia is quite prevalent in the university community especially among pregnant women. The fetus's and newborn infant's iron status depends on the iron status of the pregnant woman and therefore, iron deficiency in the mother-to-be means that growing fetus probably will be iron deficient as well. Thus IDA during pregnancy in well-educated set up needs more attention by the concerned authorities.

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