



Full Length Research Paper

The Prevalence of Asymptomatic Nutritional Anemia among Women during Premarital Screening in Southern Area of Saudi Arabia

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To find out the prevalence of Asymptomatic Nutritional Anemia among Women during Premarital Screening (PMS) in Southern Area of Saudi Arabia. Despite worldwide economic and scientific development, more than a quarter of the world's population remains anemic. Nutritional anemia is a major public health problem worldwide particularly in developing countries among women of reproductive age. studies have reported that Sickle cell diseases is a relatively common genetic disorder in Saudi Arabia which varies significantly in different parts of the country, with the highest prevalence is in the Eastern province, followed by the southwestern provinces. The national prevalence of consanguinity in the Kingdom of Saudi Arabia remains high. In addition, there are significant variations in the prevalence of consanguinity between certain regions as well as between rural and urban settlements that should be taken into consideration in further studies. This is retrospective study; all the females have Hb below 10 included in the study. Data was entered in SPSS version 20 for further analysis and investigation. Descriptive statistics were obtained regarding the demographic variables and laboratory examinations. 4.5% of the females have asymptomatic anemia; PMS testing played a vital role in the determination of anemia. PMS testing proved that it is mandatory process before the marriages not only to detect hereditary blood disorders of anemia but also to discover acquired anemia.

Keywords: Nutritional Anemia, Women, Premarital Screening

List of variables

Age; Age, **RBC;** Red Blood Cells, **Hb;** Hemoglobin, **Hct;** Hematocrit, **MCV;** Mean Corpuscular Volume, **MCH;** Mean Corpuscular Hemoglobin, **MCHC;** Mean Corpuscular Hemoglobin Concentration, **RDW;** Red blood cell Distribution Width, **Retic;** Reticulocyte index, **HbA;** Hemoglobin A, **Hb A2;** Hemoglobin A2, **Hb F;** Hemoglobin F, **Hb S;** Hemoglobin S.

INTRODUCTION

Nutritional anemia is a major public health problem

worldwide particularly in developing countries among women of reproductive age. Nutritional anemia is defined by WHO as "a condition in which the hemoglobin content of blood is lower than normal as a result of deficiency of one or more essential nutrients regardless of the cause of such deficiency (WHO, 1968).

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Saudi Arabia is well-known for its high prevalence of hereditary blood disorders. In a study conducted in Saudi Arabia and published in June 2007, 4.20% of the participants had sickle cell trait, 0.26% had sickle cell disease, and 3.22% had B-thalassemia trait, while 0.07% had β -thalassemia disease (Alhamdan et al., 2007). Certain cultural factors in Saudi Arabia, including the high frequency of consanguineous marriages (exceeding 55%), the large family size, may contribute to the high prevalence of sickle-cell disease and β -thalassemia in Saudi Arabia (El-Mouzan et al., 2007; El-Hazmi et al., 1995; Al-Gazali et al., 2006). However, nutritional anemia was not addressed among pre-consanguineous families.

A premarital test is defined as a test in which couples that are going to get married are tested for some inherited (sickle cell disease and thalassemia), hepatitis B,C and HIV to prevent any risk of transmitting any disease to their children (Tamhankar et al., 2009). Premarital screening can potentially reduce the burden of inherited hemoglobin diseases by reducing the number of high-risk marriages (Alswaidi and O'Brien, 2009; Meyer, 2005). Nowadays, premarital testing is considered an important issue, as a result of the increasing in the number of children affected with blood transmitted diseases.

According to WHO (2006), methods of preventing genetic diseases include pre-marital screening and genetic counseling, prenatal diagnosis, preconception diagnosis and implantation of normal embryos after in-vitro-fertilization, and in-utero therapy using stem cell transplantation (Wild and Bain, 2001).

Prevention of the disease through carrier identification and genetic counseling remains the only realistic approach to reduce the impact of the disease and allow better use of available resources in the low-income countries where the condition is most prevalent (Wild and Bain, 2001).

To reduce these problems and their impact on the social, emotional psychological and cost dimensions of the family and the health system in KSA, it is essential to practice premarital counseling (PMC) which was successful in some Western and Arab countries. Knowledge of pre-marital genetic screening allows a person to take steps to reduce his or her risk. For people at an increased risk of certain disorders, healthcare professionals may recommend more frequent screening starting at an earlier age (Abd-Al-Azeem et al., 2011).

In the light of scarcity of such studies in our region, the present study is undertaken to find out the prevalence of asymptomatic nutritional anemia among women of reproductive age in southern area of Saudi Arabia.

METHODS

In this cross sectional study we used the national data of the Saudi Premarital Screening and Genetic Counseling

(PMSGC) Program of 5923 females. The program was stipulated by law in December 2003 and implemented in February 2004. The mandatory nature of the program was preceded by national debates at the scientific, social, and religious levels and was followed by widespread media advertising. The main program objective was to reduce the prevalence of sickle-cell disease and β -thalassemia by a reduction of the number of at-risk marriages. The Data was collected from the huge referring center in Aseer region for Premarital Screening Program which is the first center in Aseer approved by Ministry of Health from 15th January, 2010 to 30th December, 2012. Statistical Package for Social Sciences (SPSS ver.20) was used for analysis.

By late 2003, comprehensive PMSGC program guidelines were distributed to all workers in the program. According to these guidelines, couples with marriage proposals had to report to the nearest health care clinic to apply for premarital certificates. At the health care clinics, the program staff collected basic demographic information age, family income, awareness about anemia, a blood sample (in EDTA anticoagulant), and offered educational materials about the program to the applying couples. Blood samples were then sent to the designated laboratory for testing for sickle cell disease and β -thalassemia using hemoglobin electrophoresis. Other blood tests included a complete blood count, and a sickling test. The results were interpreted in accordance with standard laboratory diagnostic protocols (Wild and Bain, 2001; Abd-Al-Azeem et al., 2011; Khoja and Farid, 2000; Bittles, 2008).

Test results were shared with examined couples before issuing the premarital compatibility certificates. The test results sort the individuals of potential couples into free (healthy), carriers (carrying the trait) and cases (having the disease) as regards the genetic make-up of sickle-cell disease and/or β -thalassemia. A safe marriage was declared when both or at least one of the couple were healthy. At-risk marriage was declared when both couples were carriers or cases (or one was a case and the other was a carrier) of sickle-cell disease and/or β -thalassemia. Couples with safe marriage test results were issued instant compatibility certificates while at-risk couples were asked to attend personal genetic counseling meetings before issuing incompatibility certificates. During these meetings the counselors explained to the couple members the potential hazards of their proposed marriages and the voluntary nature of their compliance. The program staff followed-up (by phone call) with at-risk couple members and the Ministry of Justice (responsible for issuing marriage certificates) to verify the marriage proposals among at-risk couples.

Type of study

It is a retrospective, cross sectional type of study.

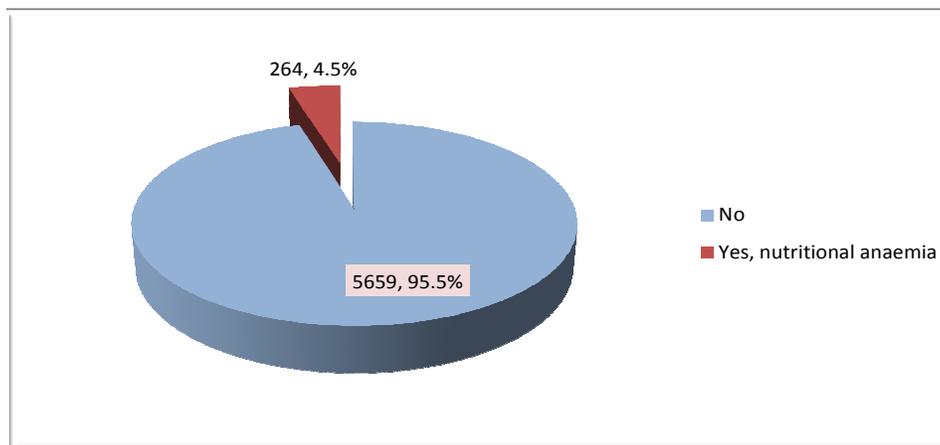


Figure 1. Prevalence of asymptomatic hypochromic microcytic anemia during pre-marital screening

Duration of study

15th January, 2010 to 30th December, 2012

Ethical considerations

Ethical Principles for Medical Research Involving Human Subjects, principal investigator and all other co- staff members have followed all those ethical principals i.e. protect the life, health, dignity, integrity, right to self-determination, privacy, and confidentiality of personal information of research subjects.

Type of sampling

Non Probability, purposive sampling

Inclusion criteria

All the females had Hb less than 10 g/dl in the study program were included in the study with normal hemoglobin electrophoresis.

Exclusion criteria

- Abnormal hemoglobin electrophoresis.
- Exposure to any investigations, drug or procedure within 1 month prior to study entry or enrolled in a concurrent study that may confound results of this study.
- History of cancer (other than non-melanoma skin cancer or in-situ cervical cancer) in the last two years.

Sickling Test

This test detects if a red blood cell inappropriately changes into a sickle shape (crescent shape) after a blood sample is mixed with a chemical that will reduce

the amount of oxygen it carries. This test is used to screen for an abnormal type of hemoglobin called Hemoglobin S in blood. Hemoglobin is a protein that helps the red blood cell carry oxygen to all parts of the body. This test is also used when other sickle cell diseases are suspected (Sickle Cell, 2001).

Data Analysis

Statistical Package for Social Sciences (SPSS) ver. 20 (IBM Corp, 2011) was used for entering and analyzing the data. Data were coded for entering purpose

Statistical Analyses

Descriptive statistics i.e. mean, standard deviation, maxima, minima, range, percentages of Socio-demographic variables were calculated. To check the significance differences among the variables i.e. age and Hb test was used.

Level of significance

We fixed the level of significance at 95% means any p-value less than 0.05 considered significant.

RESULTS

The study included 5923 screened females in National pre-marital screening program. Out of whom 264 were suffering from asymptotic nutritional anemia, their ages ranged between 15 and 43 years with a mean of 23.2 years and standard deviation of 4.7 years.

Figure 1 depicts that, hypochromic microcytic (nutritional) anemia was reported in 264 females giving a response rate of 4.5%.

Table 1 depicts that Hemoglobin F and hemoglobin S were not reported among any case of nutritional anemia

Table 1. Laboratory data of females with asymptomatic hypochromic microcytic anemia with age.

	Age	Hb	Hb f	Hbs
Minimum	15	5.9	0	0
Maximum	43	9.9	0	0
Average	23.2	8.88	0	0
S.D	4.7	0.91	0	0

Table 2. Laboratory data of females with asymptomatic hypochromic microcytic anemia.

Laboratory items	Number	Minimum	Maximum	Mean	Standard deviation
RBCs	264	2.12	3.38	4.80	0.52
Hb	264	5.9	9.9	8.88	0.91
Hct	264	18.3	37.4	28.87	2.79
MCV	264	46.4	72.4	60.40	6.01
MCH	264	13.4	34.9	18.70	2.74
RDW	264	17	30.4	19.10	2.51
Reticulocytes	264	0.6	3.0	1.37	0.45
Hd_A	264	96.6	99.3	97.96	0.62
Hb_A2	264	0.70	3.42	2.04	0.62

Table 3. The Average Monthly income for families who detected to have anemia

Socio economic status of the respondents Family income in Saudi Riyals (Average per month)		
Salary Range (Thousands)	Frequency	Percentage
02-04	8	3.03%
05-07	160	60.61%
08-10	94	35.61%
Above 10	2	0.76%
Total	264	100%

P-value less than 0.05

Table 4. Sources of Information regarding anemia

Awareness about anemia		
Sources of information	Frequency	Percentages
Friends	161	60.98%
Family	79	29.92%
Internet	24	9.09%

P-value less than 0.05

furthermore Sickling cell test was negative in all cases of nutritional anemia. By applying t-test to measure the significance between age and nutritional anemia, and p-value less than 0.05 indicating that there is a significant relation between age and anemia.

Table 2 summarizes the results of the laboratory investigations of females with nutritional anemia. Red blood cell count ranged between 2.12 and 6.65 c/cmm

with a mean of 4.80 ± 0.52 c/cmm. Haemoglobin level ranged between 5.9 and 9.9 g/dl with a mean of 8.88 ± 0.91 .

Table 3 depicts that more than 60% of the samples have family income in between 2-7 thousands riyals per month, while around 35.61% and less than 1 percent have family incomes between 08 10 and more 10 thousands riyals per month respectively.

Table 5. Comparison between salary ranges, treatments and follow up

Salary Range	Treatment	Percentages of treatment	Follow up	Percentages of follow up
02-04	6	75.00%	6	100%
05-07	144	90.00%	137	95%
08-10	94	100 %	83	88%
Above 10	2	100.00%	2	100%
Total	248	93.94%	228	92%

Table 4 illustrates that almost 60% of the respondents got the awareness about anemia from the Friends and around 30% got the awareness about anemia from family while the rest got it from internet.

DISCUSSION

Anemia is the most common disorder of the blood diseases. The several kinds of anemia are produced by a variety of underlying causes. Anemia is a decrease in number of red blood cells (RBCs) or less than the normal quantity of hemoglobin in the blood (Whitehead, 2004).

Sickle cell anemia and thalassemia major are the most common inherited hemoglobinopathies and are a major public health problem worldwide, According to the World Health Organization (WHO), approximately 240 million people are carriers for these disorders and at least 200,000 affected individuals are born annually; approximately equally divided between sickle cell anemia and thalassemia. Most studies among Arabs have indicated that postnatal mortality is higher among offspring of consanguineous parents than among non-related parents Pedersen, 2002; Khoury and Massad, 2000. It is important to screen all Saudi couples for these diseases prior to marriage.

According to the United Nations (UN) estimates, approximately half of pregnant women suffer from anemia worldwide. Anemia prevalence's during pregnancy differed from 18% in developed countries to 75% in South Asia (Wang et al., 2002). Nutritionally related iron deficiency is the main cause of anemia throughout the world.

In the present study the majority of couples agreed with the importance of PMS in controlling the commonest hereditary diseases and supports the compulsory application of PMS. This is similar to results obtained from another study conducted in Riyadh 30 and agreed with results of another study conducted among university students in Jeddah 34 and another study conducted among decision makers in Palestine (El Sharif et al., 2006). Results of a study reported in 2010 from King AbdulAziz University found that most of students favor the PMS program but there were concerns regarding mandating the testing and interference with individual decision making (Al-Aama, 2010).

In contrast of our study, study conducted in east Anatolian province, Turkey shown that there is no significant relation between age and anemia, while in our study we found the significant relation between age and anemia, so in our study age factor may play some role in the anemia.

Statistical analyses of study conducted in Orissa (India) (Panigrahi and Sahoo, 2011) have shown that epidemiological factors like age, education of respondents, socioeconomic status, history of excessive menstrual bleeding and inadequate intake of green leafy vegetables and pulses were found to be significantly associated with anemia.

Our study shows the same findings of the study conducted in Yemen, 2003 that socio economic status reflects the anemia diseases (Bener and Alali, 2006; Jurdi and Saxena, 2003), better use of resources are required in the low income families to reduce the anemia. Prevention of the disease through carrier identification and genetic counseling remains the only realistic approach to reduce the impact of the disease and allow better use of available resources in the low- income countries where the condition is most prevalent (Oyegbade et al., 2009).

In our study more that 90% of the respondents got the information about anemia from friends and family, while only 10% got the knowledge of anemia from internet, so In light of our results, there is certainly a need for more information and education about the anemia diseases is required at academic levels and social mass media. Al Kindi, et al., (2012) concluded a study done in sultanate of Oman (2011) to assess of Knowledge and Attitude of University Students Towards Premarital Screening Program, a study done on 590 unmarried Omani students of both genders The vast majority of the participants (n=540; 92%) thought it is important to carry out premarital screening and agreed to do it. Around half of the participants (n=313; 53%) favored having premarital screening as an obligatory procedure before marriage and about one third (n=212; 36%) favored making laws and regulation to prevent marriage in case of positive results. Even though the majority of the participants thought it is important to carry out premarital screening; only half favored making it obligatory before marriage and one third favored making laws and regulations to prevent marriage in case of positive results. This reflects the

importance of health education as a keystone in improving knowledge and attitude towards premarital screening program (Ibrahim et al., 2013).

Nutritional anemia in the age of bearing children women is common and need further instructions and education regarding type of food and to be treated once discovered. Primary health care physicians need to be more aware about the prevalence of nutritional anemia and the high risk group and to introduce different types of education to their societies regarding this issue and it is not necessary to be detected if anyone undergoes premarital screening while it is asymptomatic in most of the time.

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