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The Etiologic and Demographic Factors Related to Anemia Prevalence in the Pregnant Women Admitting to an Education and Research Hospital in Istanbul

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Abstract

Objective: To detect the regional prevalence and etiology of anemia in the pregnant women admitting to our hospital and to determine the related demographic factors.

Methods: The study was conducted in our outpatient clinic between May 2007 and November 2007. A total of 237 consecutive patients between the ages of 17 – 44, having no systemic disease or obstetric vaginal bleeding and who did not use any iron and/or multivitamin supplements during pregnancy were enrolled to the study. The sociodemographic factors and the hemoglobin, hematocrit, serum iron, total iron binding capacity, ferritin, folic acid, vitamin B12 levels of the subjects were then studied. The pregnant women with hemoglobin levels <33% were defined as anemic. Chi-square test and Fisher's exact test were used for detecting the statistical difference between the normally distributed and unequally distributed variables; respectively.

Results: The mean hemoglobin, hematocrit, serum iron, ferritin, folic acid, vitamin B12 levels of the subjects were 12.0±1.24 g/dl, %35±5.31, 81.39±40.31 ugr/dl, 48.13±164.94 ng/dl, 18.33±62.89 ng/ml ve 224.5±92.47 pg/ml, respectively. Anemia was detected in 35 of 237 patients; therefore the prevalence of the anemia in our pregnant women was calculated to be 14.7%. The distribution of the etiologic factors for anemia were found as follows: iron deficiency anemia in 15 patients (42.9%), vitamin B12 deficiency in 16 patients (45.7%), folic acid deficiency in one patient (2.9%) and combination of vitamin B12 and iron deficiency in a total of nine patients.

Conclusion: In our study, the prevalence of anemia was found to be 14.7 % in our pregnant women population. Vitamin B12 deficiency was also found to be a major causative factor as well as iron deficiency in the etiology of anemia in pregnancy.

Keywords: Anemia, etiology, pregnancy, iron, Vitamin B12, micronutrient.

İstanbul'da Bir Eğitim ve Araştırma Hastanesine Başvuran Gebelerde Anemi Prevalansını Etkileyen Etyolojik ve Demografik Faktörler

Amaç: Antenatal bakım amacıyla hastanemize başvuran gebelerde anemi prevalansı ile etyolojisinin saptanması ve anemiyle ilişkili demografik faktörlerin tanımlanması.

Yöntem: Mayıs 2007-Kasım 2007 tarihleri arasında hastanemiz gebe polikliniğine ilk kez başvuran, yaş aralığı 17-44 arasında değişen, maternal sistemik bir hastalığı bulunmayan, obstetrik nedenli vajinal kanama geçirmemiş ve gebeliği süresince demir ve/veya multivitamin preparatı kullanmamış, toplam 237 ardışık gebe çalışmaya dahil edildi. Gebelere ait sosyodemografik veriler ile hemoglobin, hematokrit, serum demir, total demir bağlama kapasitesi, ferritin, folik asit, vitamin B12 seviyeleri incelendi. Hemoglobin değeri 11

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g/dl'nin ve hematokrit değeri %33'in altında olan gebeler anemik olarak kabul edildi. Normal dağılıma uyan verilerin karşılaştırılmasında ki-kare testi, normal dağılıma uymayan verilerin karşılaştırılmasında ise Fisher's exact testi uygulandı.

Bulgular: Çalışmaya katılan gebelerin ortalama hemoglobin, hematokrit düzeyleri, serum demir, ferritin, folik asid ve Vitamin B12 düzeyleri sırasıyla 12.0±1.24 g/dl, %35±5.31, 81.39±40.31 ugr/dl, 48.13±164.94 ng/dl, 18.33±62.89 ng/ml ve 224.5±92.47 pg/ml olarak bulundu. Çalışmaya dahil edilen toplam 237 gebenin 35'inde, anemi saptanmış olup, kliniğimize çalışma döneminde başvuran gebelerdeki anemi prevalansı %14.7 olarak hesaplandı. Anemik gebelerdeki etyolojik faktörlerin sıklığı incelendiğinde, 15 hastada demir eksikliği (%42.9), 16'sında vitamin B12 eksikliği (%45.7), birinde folik asit eksikliği (%2.9) ve toplam dokuz hastada ise vitamin B12 ve demir eksikliği bir arada bulundu.

Sonuç: Yaptığımız bu çalışmada, hastanemize başvuran gebelerde anemi prevalansı %14.7 olarak bulunmuş olup, etyolojide demir eksikliği kadar vitamin B12 eksikliğinin de rol olabileceği saptanmıştır.

Anahtar Sözcükler: Anemi, etyoloji, gebelik, demir, Vitamin B12, mikrobesin.

Introduction

It has been estimated that approximately 30% of the population worldwide and more than half of the pregnant women are anemic according to World Health Organisation (WHO). The prevalence of anemia during pregnancy is reported to be 35-100%.[1] There are different claims about the maternal and perinatal affects of anemia during pregnancy. WHO suggested that anemia may contribute to 20% of the maternal mortality.[1] Additionally, maternal anemia is found to be associated with fetal complications such as intrauterine growth retardation, preterm birth, low gestational weight and maternal complications such as preeclampsia and eclampsia; conversely in other studies it has been found not to be related to adverse perinatal outcomes.[2-5] Therefore, anemia is an important health condition from the point of woman and maternal health. In pregnancy, plasma volume is increased up to 50% to support fetal growth and provide sufficient placental blood flow. However, maternal still declines since the increase in erythrocyte mass lags far behind the the increase in plasma volume. This condition is called as the physiologic anemia of the pregnancy and the hematocrit value reaches its nadir at 30-34 weeks of gestation.[6,7] Some other factors triggering anemia during pregnancy are depletion of the iron stores due to malnutrition and frequent pregnancy intervals.[8,9] There are numerous regional studies about anemia in our country, where it is an important public health problem, studied on subjects from varying age groups. Prevalence of anemia during pregnancy is reported to be highly varying between 29.4% and 95.2% in these studies.[10-15] However, the data is limited about the etiology of anemia in these studies. Furthermore, their results are insufficient to reflect the prevalence of anemia all over the whole country. Accordingly, a national prevalence study is essential to determine the prevalence and etiology of anemia during pregnancy in Turkey. Nevertheless, until such an epidemiologic study is carried out, the regional anemia frequency has to be determined and follow-up and treatment has to be planned accordingly. The aim of the present study was to detect the regional prevalence and etiology of anemia in the pregnant women admitting to our hospital and to determine the related demographic factors.

Methods

The study was conducted in our outpatient clinic between May 2007 and November 2007.

A total of 237 consecutive patients between the ages of 17 – 44, having no systemic disease or obstetric vaginal bleeding and who did not use any iron and/or multivitamin supplements during pregnancy were enrolled to the study. Local ethics committee approval was obtained. The frequency and etiology of anemia was investigated in a cross-sectional fashion. The pregnant women with hemoglobin levels <11 g/dl and hematocrit levels < 33% were defined as anemic in accordance with the recommendations of Centers for Disease Control (CDC).[16] After receiving informed consent, all of the pregnant women attending to our outpatient clinics were asked to complete a survey questioning the risk factors. The demographic data included patient age, place of birth, healthcare insurance status, obstetric history, area of residence, highest level of education attained, employment status, annual household income. Hemoglobin (Hb), hematocrit (Htc), serum iron (Fe), total iron binding capacity (TIBC), ferritin, folic acid, vitamin B12 (vit B12) levels were then studied. Thirteen patients never gave a blood sample and the samples of 11 patients were not studied due to hemolysis. Hemogram analyses were performed by XT2000İ Sysmex and serum iron, ferritin, folate, vitamin B12 levels were studied by Modularanalytics E170, Cobas® (Roche, Germany). The descriptive and analytic statistical tests were performed by SPSS 13.0. Chi-square test and Fisher's exact test were used for detecting the statistical difference between the normally distributed and unequally distributed variables. Statistical significance was set to $p<0.05$.

Results

The demographics of the patients and mean values of serum vit B12, folic acid, iron, TIBC are shown in Table 1. Serum iron levels were above 37 ugr/dl in 73.8% of the participitants. Accordingly, the prevalence of iron deficiency in the study population was 12%. In 35 of the 237 women anemia was detected according to the pre-defined criteria (Hb <11 g/dl and/or Htc <33); the anemia prevalence in the pregnant women admitted to our clinic in the study interval was calculated to be 14.7%. In the anemic patients, the distribution of etiologic factors were as follows: iron deficiency anemia in 15 patients (42.9%), vitamin B12 deficiency in 16 patients (45.7%) and folic acid deficiency in one patient (2.9%). In a total of nine patients, a combination of vitamin B12 and iron deficiency were detected. The mean hematocrit and hemoglobin values of the patients are shown in Table 2. In our study, 45.7% of the anemic patients were found to be between ages of 20-25, 45.7% of them were gravida 3-5 and 77.1% were in their second trimester of the pregnancy. No statistically significant differences were detected between the anemic and non-anemic pregnant women when compared in terms of place of birth, area of residence, healthcare insurance status, employment status and annual household income. The mean serum iron level was statistically significantly lower and the mean TIBC was statistically significantly higher in the anemic population when compared to the non-anemic group (Table 3).

Discussion

It has been estimated that approximately 30% of the population worldwide and more than half of the pregnant women are anemic according to World Health Organisation (WHO).[1] WHO also estimated that the prevalence of iron deficiency anemia was 14% in Europe and 25% in Turkey.[12] In our study, the prevalence and etiologic factors of anemia in the pregnant women attending primarily and

who did not use any iron supplements during pregnancy were investigated; and the mean Hb and Htc levels were found to be 12 g/dl and 35%, respectively. According to the pre-defined criteria, anemia prevalence in the pregnant women attending to our clinic was calculated to be 14.7%. Considering the etiology of anemia, iron deficiency was found to be the responsible factor in half of the patients and combination of iron and vitamin B12 deficiency was detected in one forth of the patients. Consequently, the prevalence of iron deficiency anemia was identified to be 10.1% in our study group. In most of the studies of anemia in pregnancy, factors related to the etiology of anemia, such as serum Fe, TIBC, ferritin, vit B12, folic acid levels were seen not to be investigated, rather hemoglobin and hematocrit levels were studied. One of the few studies which investigated these parameters was conducted by Al Khatib et al.[17] In this study from Lebanon, iron deficiency anemia was detected in 7.7%, folic acid deficiency in 25.9% and vit B12 deficiency in 39.4% of the women of childbearing age. Therefore, the authers underlined the role of folic acid deficiency as well as iron deficiency in the etiology of anemia in women during their reproductive years. In another study from Africa, 23% of the study group demonstrated iron deficiency anemia solely, 32% demonstrated iron deficiency anemia together with deficiencies of different micronutrients (folic acid, vit B12, vit A), whereas 26% of the patients had only micronutrient deficiencies.[18] Our study is one of the few researches investigating the relation between anemia and micronutrients in Turkey and is valuable to underline the importance of vitamin B12 deficiency in the etiology of anemia in pregnancy. When we searched the national studies about the prevalence of anemia in our

Table 1. Demographic parameters and average values of Hb, Htc, iron, ferritin folic acid, vitamin B12 of pregnant women (N=213).

	Number of patients	%
Hematocrit		
Less than %30	10	4.2
%30-33	47	19.8
%34-39	126	53.2
%40 and above	16	6.8
Unkown	38	16.0
Hemoglobin (gr/dl)		
0-11	28	11.8
11 and above	184	77.6
Unkown	25	10.5
Fe (ugr/dl)		
<37	24	10.1
>37	174	73.8
Unkown	38	16.0
Ferritin (ng/ml)		
<13	55	23.2
>13	143	60.3
Unkown	39	16.5
Folic acid (ng/dl)		
<3,1	3	1.3
>3,1	189	79.7
Unkown	45	19.0
B12 vitamin (pg/ml)		
<197	82	34.6
>197	112	47.3
Unkown	43	18.1

Table 2. Demographic parameters and average values of iron,total iron binding capacity, folic acid, vitamin B12 of pregnant women with and without anemia.

	With anemia (average ± SD) (N=35)	Without anemia (average ± SD) (N=176)	P value
Demographic parameters			
Gestational age	22,65±6,62	20.80±8,16	0,153
Maternal age	26,05±5,49	27,20±5,38	0,250
Gravida	2,28±1,22	2,09±1,12	0,401
Parity	0,91±0,68	0,23±0,50	0,861
Abortus	0,34±0,68	0,23±0,50	0,366
Hematological parameters			
Iron	63,05±47,58	85,15±37,90	0,015
TIBC	437,31±106,14	394,22±82,88	0,014
Folic acid	25,19±87,47	16,80±16,80	0,449
Vitamin B12	210,11±128,66	228,29±83,12	0,328

country, we could not identify any epidemiologic study with a large sample size sufficient to represent the whole country population. The national studies are usually designed for detection of anemia prevalence in pregnant women attending to the primary care centers, performed with relatively small sample size. The frequency of anemia shows a great variation among different regions of the country ranging between 29.4% and 95.2%.[10-15] Accordingly, the lowest and highest frequencies are in Afyon; and Diyarbakır and Karadeniz Region, respectively. We think that, regional differences in dietary habits and parturition rates may be the causative factors for this high variation. As an example, in a study investigating the dietary habits, anemia was seen 3.5 times more frequently in pregnant women consuming boiled grape juice (pekmez) in comparison to women who do not.[12] However, we did not investigate the nutritional status of the women in our study. On the other hand, we searched for the possible effects of the socioeconomical status parameters which may indirectly reflect the nutritional status (e.g. annual household income, employment status, area of residence, healthcare insurance status, highest level of education attained) but we found no relationship between these and the prevalence of anemia. One other factor assumed to have an effect on the anemia frequency is the total number of pregnancies. In a study from Turkey, a significant association was found between the number of pregnancies and anemia.[15] On the contrary, no significant association between the number of pregnancies and anemia could be demonstrated in the studies conducted by Pirinçci et al, Toksöz et al and Mersin et al.[10-12] Similarly, we also could not detect any statistically significant relationship. However, 67.2% of the patients included in our study were women with a gravida 2 or less. When we investigated the frequency of the the adolescent pregnancy, we found that 82% of our patients were between ages of 20-35 and 5.2% were adolescents (<19 years of age). According to TNSA (Türkiye Nüfus ve Sağlık Araştırması – Turkey Population and Health Investigation) 1998 revision, the prevalence of adolescent pregnancy in Turkey was reported to be 14.6%.[19] According to WHO data, severe anemia causes a five times increase in the maternal mortality rates.[1] When the prevalence of anemia is <40%, WHO suggests an intake of 60 mg iron supplement daily starting after the second trimester, and when the prevalence of anemia is ≥ 40%, WHO suggests an intake of 60 mg iron supplement daily for six months after the second trimester and for three months postpartum, for a total of nine months. In our country, in the light of these suggestions, the Ministry of Health and AÇSAP (Mother's and child's health-family planning center) started an iron supplement program.[20] According to this program, an intake of 50- 60 mg iron supplement daily for six months after the second trimester and for three months postpartum, for a total of 9 months has been advised. On the contrary, National Institute for Clinical Excellence (NICE) from England does not advise the routine iron supplement, because its benefits are not proven for mother and the fetus and this suggestion is reported to based on an evidence level A.[21] Upon literature review, there exists only one study comparing the effects of routine and selective iron supplementation in pregnancy and this study consists of 2912 patients.[22] According to the results of this study, although there was an increase in cesarean sections and postpartum blood transfusions in the selective iron supplementation

group, the perinatal mortality rate was detected to be lower. Additionally, in the studies regarding anemia in pregnancy, high maternal hemoglobin levels were not found to have improved the maternal outcome in cases with obstetric hemorrhage. In a Cochrane review by Mahomed et al, routine iron and folic acid supplementation during pregnancy was found not to improve perinatal morbidity and mortality; it was only found to prevent low hemoglobin levels at birth and six weeks postpartum.[23] In another Cochrane review published in 2006, in a meta-analysis of 40 studies conducted with 12,706 women, routine iron supplementation during pregnancy was detected to increase antenatal and postpartum hemoglobin levels but also cause significant gastrointestinal side effects and hemoconcentration.[24] Hemococentration in pregnancy has been linked to some serious adverse events such as low birth weight, preterm birth and small-for-gestational-age (SGA) neonates and high hemoglobin levels has been advised not to be taken as a reflection of good levels of iron stores (25). Selective iron supplemention during pregnancy seems to be wiser than routine supplemention especially in the areas where iron deficiency anemia is not prevalent. Therefore, we advise that the markers of iron stores and other micronutrients should as well be studied as the levels of hemoglobin and hematocrit during screening for anemia during pregnancy.

Conclusion

As a conclusion, we found a lower prevalence of anemia than expected among our pregnant women population; and vitamin B12 deficiency also detected as an important etiologic factor together with iron deficiency. The factors that affect anemia in pregnancy and the regional differences in anemia still have to be determined. For this to be achieved, a large database of the patients should be established with the contributions of an important number of the health services among the whole country; such as local health offices, teaching and research hospitals and university hospitals.

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