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Research Article

The Impact of Iron Deficiency Anemia on Health Related Quality of Life in the Last Trimester of Pregnancy

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Abstract

Objectives: Our aim was to investigate the impact of iron deficiency anemia on HRQoL in the last trimester of pregnancy.

Methods: 250 pregnant women in third trimester, visiting the Obstetrics Department of a tertiary medical center in Ankara city for their routine antenatal follow-up were included in the study. After obtaining sociodemographic and obstetric information in a face-to-face interview, the self-reported SF-36 Scale (SF-36) was administered with supervision. The study group was divided into two groups according to presence of anemia; non-anemic group (Hb≥11 g/dL, ferritine ≥12 mg/L; n=187) and anemic group (Hb<11 g/dL, ferritin <12 mg/L; n=63) and SF-36 scores were compared.

Results: IDA frequency was found as 25.2% (n=63). The physical component summary (PCS), the mental component summary (MCS) and all of the QoL subscores were found to be signifcantly lower in the anemic group (p=0.000). A significant relationship was found between Hb-ferritin levels and PCS-MCS scores; the scores of PCS and MCS increased progressively with increasing Hb-ferritin leves and decreased progressively with decreasing levels (p<0.05).

Conclusion: Healthcare professionals need to be aware of the importance of anemia on QoL during pregnancy period and consider that QoL in anemic pregnant patients is an important part of treatment.

Keywords: Iron deficiency, pregnancy, quality of life

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Quality of Life (QOL) is a broad multidimensional concept that usually includes subjective evaluations of both positive and negative aspects of life. According to the definiton of World Health Organisation, quality of life is the perception of an individual of his/her own position in life in the context of the culture and value systems in which he/she lives and in relation to his/her aims, expectancies, standards and worries.[1] Health related quality of life is the patient's self report of how her/his well-being and functioning level are affected by individual health or medical treatment received. Although health is one of the important domains of overall quality of life, there are other domains as well, social aspects that principally regard personal relationships, environmental aspects, security, finances, leisure, psychological aspects-emotional well being, perceptions of body image and apperance, self-esteem, physical aspects-pain, fatigue, energy, sleep and rest. Changes that occur during pregnancy may alter a womens ability to carry out her usual roles in her daily life so as to reduce her quality of life.[2]

In the last two decades, the importance of iron deficiency anemia (IDA)- which is the most common widespread

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nutritional disorder in the world that accounts for approximately one-half of anemia cases- as a serious public problem has been increasingly recognised by health professionals.[3] Two billion people worldwide are estimated to be anemic or iron deficient.[4] Especially pregnant women constitutes a high risk group of IDA; nearly half of the pregnant women in the world are estimated to be anemic (52% in developing- 23% in developed countries).[5] According to the World Health Organization (WHO) and the American College of Obstetricians and Gynecologists (ACOG), hemoglobin level below 11gm/dl in pregnant women consitutes anemia and serum ferritin below 12 microgm/L constitutes IDA.[6,7] Serum ferritin is the most adequate and reliable marker to estimate total body iron stores in the absence of infection (as serum apoferritin is an acute-phase reactant protein) with low levels indicating iron deficiency. IDA has often been reported to be associated with adverse pregnancy outcomes such as increased maternal mortality, prenatal and perinatal infant loss, low birth weight and prematurity.[8,9] According to existing literature, normal functional changes caused by pregnancy itself, may interfere the ability of pregnant women to carry out the usual roles in their daily life so as to reduce her quality of life. Moreover fatigue and lethargy caused by anemia, may reduce pregnants' well-being, and impair physical capacity and performance and decrease the health related quality of life. Regardless of the maternal complications of anemia, its psychological aspects are important when considering QoL of anemic pregnants. However the impact of anemia on HRQoL of the pregnant women has not yet been sufficiently studied. In this study, our aim was to investigate the impact of iron deficiency anemia on HRQL in the last trimester of pregnancy.

Methods

This cross-sectional study was conducted in the antenatal clinics of a tertiary hospital in Turkey from June 2018-September 2018. The hospital is one of the major maternity hospitals in the capital town Ankara, which is located in a good neighborhood with middle to high socioecomic level. The study population consisted of 250 pregnant women who were in viable singleton pregnancies without congenital malformations and who attended the clinic during their third trimester for their routine antenatal follow ups. Patients with chronic disease (thyroid dysfunction, diabetes, liver-kidney-gastrointestinal system diseases, inflamatory bowel diseases, blood disorders) and patients who have high risk bearing pregnancy (gestational diabetes, preeclampsia etc.) were excluded from the study. The study was approved by the Ethics Committee, all patients were informed about the study, and informed written consent was obtained.

Obstetric ultrasonography findings and complete blood counts of patients were recorded. Hemoglobin (Hb) concentration was measured by applying the venous blood sample on a fully automated hematology analyzer (Hemaque; Eurotrol® B.V., Netherlands) and serum ferritin level was measured by Elisa method (Siemens Advia Centaur XP Device). Ferritin concentration was measured by serum using electrochemiluminescence immunoassay (ECLIA). The anemia was defined as a hemoglobin concentration lower than 11.0 g/dL according to WHO's anemia definition during pregnancy and iron deficiency anemia as ferritin concentration lower than 12 mg/L.[6,7]

Socio-demographic characteristics of women who agreed to participate in the study was obtained through a questionnaire which included questions such as age, marital status, educational level, presence of health security, employment status, educational level and employment status of the husband, total monthly income, obstetric history, antenatal care status and whether the baby was planned or not.

The effects of anemia on pregnancy and fetus and complications seen during pregnancy attributed to anemia, were explained to all women in the study group and they were all consulted by internal medicine specialist.

Health-related quality of life outcomes were measured with the Short Form-36 Health Survey (SF-36) which is one of the most widely used screening tool of HRQoL. It is a self-assesment scale with 36 item which can be completed in a short time. It was developed by the Rand Corporation in 1992.[10] It has been translated into several languages including Turkish and its validity and reliability was established in 1999 by Kocyigit et al.[11] Determination of the population norms for the Turkish version of SF-36 were made by Demiral et al.[12] in 2006. It contains 36 questions in eight subscales, which include physical functioning, role limitations due to physical health problems, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems and mental health perceptions. It evaluates the symptoms of the last four weeks.[13] The first four scales are summarized into the physical summary component (PCS) and the last four scales into the mental summary component (MCS). The score for each subscale ranges from 0-100 and is directly proportional to the QoL; the lower the score the more disability, the higher the score the less disability.

Statistical Analysis

Statistical analyses were performed using SPSS software version 24.0 (SPSS Inc, Chicago, IL). Continuous variables were

presented as median with min-max values and categorical variables were presented as percentages (%). It was found that the data for each of the quantitative variables were not appropriate for normal distribution after normality assumption was applied for each variable in the binary comparison. So in comparison of two independent groups Mann–Whitney U test was applied. Categorical variables were analysed with "Chi-Square Test" statistics. Spearman correlation coefficient was used in the analysis of non-normally distributed quantitative variables. Binary Logistic Regression Model was used in the analysis of the factors affecting the risk of anemia. We considered $p<0.05$ as statistically significant.

Results

Socio-demographic Characteristics

Socio-demographic characteristics of the study group are shown in Table 1. No differences were found between the groups in socio-demographic characteristics, such as age, gestational week, educational level, working status, income, educational level and working status of the spouse, health security, income, voluntary marriage, regular antepartum control and first control week.

At the end of the measurements, the subjects were divided into two group according to precense of iron deficiency anemia; non-anemic group (Group 1) (Hb≥11 g/dL, ferri-

Table 1. Socio-demographics and obstetric characteristics of the groups

Parameters	Groups		p
	Group 1 (n=187) Hb≥11 g/dL ferritin ≥12 mg/L	Group 1 (n=63) Hb<11 g/dL ferritin <12 mg/L	
Age, years	28 (20-35)	27 (20.0-35.0)	p=0.285
Gestational weeks	35 (32-40)	35 (32.0-40.0)	p=0.749
Hemoglobin (g/dL)	12.3 (11.0-15.3)	10.4 (7.9-10.9)	p=0.000
Ferritin (mg/L)	15.9 (12.0-68.8)	4.3 (0.5-10.9)	p=0.000
Educational level (%)			
Elementary school	66 (35.3)	22 (34.9)	p=0.957
High school	121 (64.7)	41 (65.1)	
Employment status (%)			
Employed	26 (13.9)	4 (6.3)	p=0.170
Unemployed	161 (86.1)	59 (93.7)	
Education level of spouse (%)			
Elementary school	41 (21.9)	8 (12.7)	p=0.158
High school	146 (78.1)	55 (87.3)	
Employment status of spouse (%)			
Employed	184 (98.4)	63 (100)	p=0.732
Unemployed	3 (1.6)	-	
Health Insurance (%)			
Yes	183 (97.9)	60 (95.2)	p=0.516
No	4 (2.1)	3 (4.8)	
Income (Turkish Lira) (%)			
≤3000 TL	59 (31.6)	25 (39.7)	p=0.152
3001-5000 TL	104 (55.6)	35 (55.6)	
≥5001 TL	24 (12.8)	3 (4.8)	
Planned pregnancy (%)			
Yes	154 (82.4)	49 (77.8)	p=0.537
No	33 (17.6)	14 (22.2)	
Regular antepartum control (%)			
Yes	165 (88.2)	50 (79.4)	p=0.122
No	22 (11.8)	13 (20.6)	
First control (week)	6 (4-30)	6 (4-28)	p=0.929

Continuous variables are reported as median, max-min. Categorical variables are reported as number (percentage).

Table 2. Health-related quality of life scores for the groups for each of the domains of the Short Form 36 Health Survey

Domain	HRQoL Scores		P
	Group 1 (n=187)	Group 2 (n=63)	
Physical functioning	75 (5-100)	50 (10-100)	Z=-5.859 p=0.000
Role physical	50 (0-100)	0 (0-100)	Z=-4.869 p=0.000
Bodily Pain	72 (12-100)	41 (12-100)	Z=-5.618 p=0.000
General Health	77 (10-100)	52 (0-92)	Z=-5.049 p=0.000
Energy	55 (0-95)	30 (0-85)	Z=-5.563 p=0.000
Social function	75 (0-100)	35 (0-100)	Z=-6.200 p=0.000
Role Emotional	33.3 (0-100)	0 (0-100)	Z=-4.986 p=0.000
Mental Health	72 (16-100)	52 (12-96)	Z=-5.238 p=0.000
Physical summary component	44.4 (0.0-63.8)	36.2 (0.0-66.7)	Z=-5.510 p=0.000
Mental summary component	46.7 (21.4-65.2)	35.9 (18.1-60.0)	Z=-6.091 p=0.000

Data are shown as median (minimum-maximum) HRQoL = health related quality of life.

tine ≥12 mg/L; n=187) and anemic group (Group 2) (Hb<11 g/dL, ferritin <12 mg/L; n=63) (p=0.000). In our study, iron deficency anemia frequency was found as 25.2%.

SF-36 Scores

As for SF-36, the PCS median score was found as 44,4 (min 0.0-max 63.8) and MCS score as 46.7 (min 21.4-max 65.2) in group 1 and 36.2 (min 0.0-max 66.7) and 35.9 44.4 (min 18.1-max 60.0) in group 2, respectively (p<0.05). According to the results of the subscores of SF-36, statistically significant difference were found in terms of physical functioning, role physical, bodily pain, general health, vitality, social function, role emotional and mental health between the groups (p<0.05) (Table 2). A significant decrease in the scores were observed in group 2.

When the relationship between hemoglobin-ferritin scores and PCS-MCS were examined, a statistically significant relationship was found between them (p<0.05). The scores of PCS and MCS increased progressively with increasing Hb-ferritin leves and decreased progressively with decreasing levels (Table 3).

Binary logistic regression analysis was done to determine the effects of the socio-demographic variables on anemia. The only factor that had an effect on anemia was regular antepartum control, and those who did not go to regular control had a 2.2 fold higher risk of developing anemia than those who had regular (Table 4).

Discussion

IDA is the most common widespread nutritional disorder in the world and has often been reported to be associated with adverse pregnancy outcomes. Although many studies about IDA and pregnancy outcomes have been reported,

Table 3. Relationship between hemoglobin-ferritin scores and PCS-MCS

Correlation*	Hemoglobin	Ferritin	PCS	MCS
Hemoglobin				
r	1.000	0.754	0.468	0.431
p	-	**0.000**	**0.000**	**0.000**
Ferritin				
r	0.754	1.000	0.379	0.400
p	**0.000**	-	**0.000**	**0.000**
PCS				
r	0.468	0.379	1.000	0.388
p	**0.000**	**0.000**	-	**0.000**
MCS				
r	0.431	0.400	0.388	1.000
p	**0.000**	**0.000**	**0.000**	-

*Spearman correlation coefficient.

Table 4. Relationship between socio-demographic variables and anemia

Parameter	B	Standard Error	Wald	SD	p	OR	95% OR C.I.	
							Lower Limit	Upper Limit
Educational level (spouse)[A]	-0.532	0.432	1.516	1	0.218	0.587	0.252	1.370
Working status (spouse)[B]	20.531	22676.34	0.000	1	0.999	1.000	0.997	1.004
Income	0.000	0.000	2.514	1	0.113	1.000	0.999	1.000
Regular antepartum control[C]	0.790	0.396	3.972	1	0.046	2.204	1.013	4.793
Constant	-21.169	22676.95	0.000	1	0.999			
CCR=78.4%				$\chi^2_{(7)}$=2.315, p=0.940				

[A] Elementary school; [B] Employed; [C] Regular antepartum control.

the impact of IDA on HRQL in pregnant women have received limited attention. This study demonstrated two important findings. The presence of IDA had negative impact on both PCS and MCS and the other subscores of SF-36; with the highest scores in the non-anemic group and a progressive decrease in all scores with the increased severity IDA. Second, a very close relationship were observed between Hb-ferritin levels and PCS-MCS scores; namely The scores of PCS and MCS increased progressively with increasing hb-ferritin leves and decreased progressively with decreasing levels.

IDA is a common medical condition during gestation which can adversely affect both the well being of the pregnant women and the development of the fetus and is linked to increased morbidity and fetal death. Although antenatal iron supplementation is recommended universally, prevalence of IDA in pregnant women remains high especially in low and middle income countries.[14] According to the Nutrition Impact Model Study's 2011 estimates, the worldwide prevalence of anaemia in pregnant women was 38%, translating into 32 million pregnant women globally.[15] In our study group, the frequency of IDA was found as 25.2%. According to WHO Global Database on anemia, anemia prevalence in pregnant women in Turkey is 40.2% which is defined as a severe public health problem.[16] No national epidemiologic study on the prevalence of anemia has been conducted in Turkey but some regional studies have been performed. Similar to our results, Bucak et al.[17] reported anemia prevelance during pregnancy as 23.3%. According to studies performed in different parts of Turkey, prevalence of anemia in pregnancy varies between 23.1-40% in our country.[17–20] The lower frequency determined in our study group may be due to the fact that our hospital is located in a good neighborhood which serves to a relatively better socio-economic level when compared to the entire country.

Iron deficiency is the second most common cause of anemia in pregnancy after physiologic anemia. Certain underlying conditions that preclude adequate iron intake or impair iron absorption can increase the risk of iron deficiency during pregnancy. No significant relationship was found between age, education level, income level and IDA in the study group. The only factor that had an effect on anemia was regular antepartum control, and those who did not go to regular control had a 2.204-fold higher risk of developing anemia than those who had regular control. Late patronage of antenatal care by women makes timely intervention at correcting anaemia difficult. Despite efforts being made to reduce burden of anemia, as its prevalence is still high in developing countries, it is necessary to emphasize regular antepartum control to ensure early detection and timely treatment of IDA.[21]

The impact of anemia on health-related quality of life (HRQoL) has been studied in different patient populations, including patients with hearth failure, cancer, chronic obstructive pulmonary disease, and a significant relationship was reported between anemia and low quality of life scores.[22–24] Farag et al.[25] (2011), investigated the relationship between quality of life and anemia in patients with chronic renal failure and expressed that reduced HRQOL in anemic patients is likely related to both anemic and inflammatory status. Ferrari et al.[24] (2015), studied the effect of chronic obstructive pulmonary disease (COPD) on HRQL and functional status and concluded that anemia in COPD was a risk factor for poorer exercise capacity and quality of life, and these outcomes were linearly associated with hemoglobin.

Peuranpaa et al.[26] (2014), assessed the impact of anemia and iron deficiency on HRQoL in women treated for heavy menstrual bleeding (HMB) in Finland and concluded that improved HRQoL after treatment of HMB is associated with correction of anemia. Clinicians should consider that quality of life in anemic patients is an important part of treatment and emphasize early iron substitution as an integral part of treatment.

IDA during pregnancy causes frequently breathing difficul-

ties, fainting, tiredness, palpitations, and sleep difficulties. It also has negative affects on cognitive function, mood, short-term memory, verbal learning, attention span/concentration and intelligence. All these symptoms can affect negatively the mood of the pregnant women and decrease HRQL. Especially impairment in physical functioning due to fatigue caused by anemia decreases PCS and physical functioning scores of HRQL. Studies have shown that the treatment of anemia decreases fatigue and energy loss and increases the quality of life. Glaspy et al.,[27] worked with anemic cancer patients receiving chemotherapy, and stated that anemia-induced fatigue and energy loss were the main cause of decreased HRQL. Both the functional status and quality of life improved significantly when anemia was treated and hemoglobin levels were increased.

Khalafallah et al, conducted a follow-up study on 126 Caucasian anemic pregnant women with iron deficiency and found that HRQoL during and after pregnancy was improved significantly in anemic pregnant women by repletion of their iron stores during pregnancy.[28] Ando et al., worked with 92 patients in Japan, and found that vitality and general health scores were significantly lower than the Japanese national norms. In the same study they found that after iron supplementation, physical functioning and vitality scores of patients with a lower hemoglobin level at baseline showed a dramatic improvement. They concluded that iron supplementation in IDA patients improves not only hemoglobin levels, but also physical function, vitality, and general health perception.[29]

In our study, PCS and MCS and all subscores (physical functioning, role physical, bodily pain, general health, vitality, social function, role emotional and mental health) were found to be lower in the anemic group. Although there are several studies investigating the quality of life in many diseases during pregnancy, studies investigating the effect of anemia are limited. In recent literature, in few studies which investigated the relationship with anemia and HRQL during pregnancy, different sub-scores of HRQL were found to be lower in different studies consistent with our study. In a study, conducted to determine anemia prevelance and the relationship between anemia and quality of life in pregnant women in Eskişehir (one of the greatest city in our country), Kartal T, Sayıner FD (2016) found anemia prevelance as 43.6% during pregnancy which is higher compared to our study. On the other hand, they found that MCS and all sub-scores were lower in anemic group similar to our study.[30] Another important finding of our study was the relationship between hemoglobin-ferritin scores and PCS-MCS; the scores of PCS and MCS increased progressively with increasing Hb-ferritin leves and decreased progressively with decreasing levels. In recent literature, it is stated that compared to the period prior to delivery, role limitations due to physical health and emotional problems worsen in the early postpartum period.[31] Therefore, especially treatment of severe anemia should be emphasized in order to improve quality of life in both antepartum and postpartum periods.

The limitations of this study are its cross-sectional nature, the small number of participants, its homogenity and the use of SF-36 as a diagnostic tool. Additionally, since the study was carried out with a population that had similar socioeconomic characteristics, it is difficult to generalize the results more broadly. As we do not know the health status of women prior to pregnancy, it is hard to say that all the low scores of HRQoL were related to anemia. Studies are generally focused on pregnancy and neonatal outcomes of anemia during antepartum period. So despite these limitations, our study expands our understanding of the importance of life quality in anemic pregnant women. Larger studies are needed to clarify the role of anemia on HRQL in pregnant population.

Conclusion

We demonstrated that both the presence and severity of anemia have a significant influence on QoL in pregnant women. It should be kept in mind that a healthy pregnancy process is important in terms of both obstetric and neonatal outcomes. As health is not merely the absence of disease or infirmity but a state of complete physical, mental and social well-being, healthcare professionals need to be aware of the importance of anemia on QoL during pregnancy period and consider that QoL in anemic pregnant patients is an important part of treatment.

Disclosures

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