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Prevalence and associated factors of anemia among pregnant women in Sana'a, Yemen

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ABSTRACT

Objectives: According to the World Health Organization estimates, approximately half of the pregnant women suffer from anemia worldwide. Anemia prevalence during pregnancy ranges from 18% in developed countries to 75% in South Asia. This study aimed at determining the prevalence and associated factors of anemia among pregnant women in the second and third trimesters in Sho'ub District of Sana'a City, Yemen.

Material and Methods: A cross-sectional study was conducted on 384 pregnant women aged between 15 and 49 years. Convenience sampling method was used to select the study participants. Information on the participants' sociodemographic characteristics and nutritional and health status was collected using a structured questionnaire through face-to-face interview with participants. The hemoglobin level measurements were assessed using the Sysmex analyzer. Both descriptive and inferential analyses were utilized.

Results: The prevalence of anemia among study participants was 25%; of which 70.83% had mild anemia, 28.13% had moderate anemia, and only 1.04% had severe anemia. Risk factors associated with anemia were low family monthly income (odds ratio [OR] = 0.357, 95% confidence interval [CI] = 0.215–0.590; p =0.001), short pregnancy spacing (OR = 3.106, 95% CI = 1.375–7.016; p = 0.06), never consumed liver (OR = 3.004; 95% CI = 1.528-5.790; p =0.001), and presence of health problems (OR = 2.260; 95% CI = 1.342–3.806; p = 0.002).

Conclusion: Findings of the study revealed a high prevalence rate of anemia (25%) among pregnant women in Sana'a, Yemen, with low socioeconomic status, short pregnancy intervals, and having other health problems were the associated factors of anemia among the women studied. The findings suggest the need for implementing effective preventive strategies, especially advocacy and monitoring of the iron and folic acid supplementation.

Keywords: Anemia, Prevalence, Associated factors, Pregnant women, Second and third trimester, Yemen

INTRODUCTION

According to the World Health Organization (WHO), globally anemia affects 1.62 billion people which corresponds to 24.8% of the population worldwide.[1] The highest proportion of affected is in developing countries, particularly in Africa (47.5–67.6%), while the greatest number affected is in South Asia where 315 million people suffer from anemia.[1]

Anemia in pregnancy is an important public health problem worldwide. The WHO estimates that more than half of pregnant women in the world have a low hemoglobin level (<11.0 g/dl), the prevalence may, however, be as high as 61% in developing countries.[2]

Anemia accounted for 8.8% of the total disability from all conditions in 2010. Anemia prevalence over this time period decreased from 40.2% (35.8–46.0%) in 1990 to 32.9% (28.9–38.5%) in 2010.[3]

In the Eastern Mediterranean Region during the past four decades, remarkable changes have been noted in social, economic, health, and lifestyle patterns.

In Bahrain, a study was carried out on 366 pregnant women from five antenatal care health centers and the results showed that 26.2% of the women were anemic, of which 19.79% had iron deficiency anemia.[4] Besides, the study identified a lower educational level and close birth space (≤2 years) as the main risk factors of anemia among those women. Another study from Qatar found that the prevalence of anemia among pregnant women was 27.1%, of which 74.5% were mildly anemic and 25.5% were moderately anemic.[4]

Yemen is one of the poorest countries in the Middle East which has been devastated by civil wars. Anemia is one of the serious health problems among pregnant women, with a prevalence of 36% according to the World Bank.[5] Moreover, the previous studies have shown that the prevalence of anemia among pregnant women in Yemen varies between 26.5% and 81%.[6,7]

The Yemeni Civil War is an ongoing conflict that began in 2015. As consequences of war, there is a high prevalence of malnutrition, destruction of 50% of health facilities, and millions of people are lacking basic healthcare and many people are forced to flee from their homes. There is no updated information about the prevalence of anemia among Yemeni pregnant women since the ongoing civil war started in March 2015, especially in Sana'a City, the capital of Yemen. Consequently, the present study aims to determine the prevalence and risk factors of anemia among pregnant women in the second and third trimesters attending Safe Motherhood Specialized Hospital in Sho'ub District of Sana'a City, Yemen.

MATERIAL AND METHODS

A cross-sectional study was carried out at Safe Motherhood Specialized Hospital in Sho'ub District, Yemen. Based on anemia prevalence of 48.8% among pregnant women, the required sample size was calculated to be 383 pregnant women at 95% confidence interval (CI), and 5% desired precision. We included pregnant women aged between 15 and 49 years in their second and third trimesters. We excluded pregnant women who had chronic diseases causing to anemia such as cardiac, renal and lung diseases, and hemoglobinopathies. In addition, women who have recently had a blood transfusion during 3 months of the current pregnancy and pregnant women in their first trimester were also excluded from the study. This survey was conducted from January 28, 2018, to February 28, 2018.

Data collection

A structured questionnaire was developed in the English language based on a previously published questionnaire. Translation of questionnaire to Arabic language was performed. Forward and backward translation was achieved. Face validity was conducted before the beginning of the study on 30 pregnant women to ensure the clarity, comprehension, and simplicity of the study tool. A face-to-face interview was done by medical practitioners who were trained on how to administer the questionnaire for the purpose of this study. The questionnaire includes questions on the participant's sociodemographic characteristics, medical history, iron and folic acid supplementation, and dietary habits.

Hemoglobin concentration was measured using Sysmex instrument. Hb concentration was recorded as g/dL; women with Hb levels between 10 and 11 g/dL were considered as mildly anemic, those with Hb levels between 7 and 9.9 g/dL were considered as moderately anemic, and those with Hb levels lower than 7 g/dL were considered as severely anemic.[8]

Statistical analysis

Data were analyzed using the SPSS Version 19 software (IBM Corporation, New York, NY, USA). Both descriptive and inferential analyses were utilized. Univariate analysis was used to examine the association between anemia and potential associated factors. Moreover, binary logistic regression analysis was utilized to identify factors independently associated with anemia. Adjusted odds ratio and 95% CI were computed. $P < 0.05$ was considered statistically significant.

Ethical consideration

This study was approved by the Ethics Committee of the MAHSA University, Selangor, Malaysia. All participants were informed about the objectives and protocol of this study before their informed consent was obtained.

RESULTS

A total of 460 pregnant women were invited to participate in this study. However, the 384 women with complete questionnaire data were included in this study, with a response rate of 83%.

Sociodemographic characteristics of the study participants

About half (51.6%) of the pregnant women were between 25 and 34 years of age. Most of the pregnant women (93.5%) were from the capital (Sana'a City) and more than three-quarters of pregnant women (83.1%) were housewives. In addition, 35.4% of the study population had a secondary school level of education and 29.2% of them had college and university level of education. With regard to family monthly income, 59.9% of the respondents were of middle income and 39.8% were of low income [Table 1].

The obstetric and health history of the study participants

Table 2 shows the obstetric history of the study participants. The mean gestational age was 28 weeks (SD ± 0.500). The majority of the participants 203 (52.9%) were in the second trimester of pregnancy and 181 (47.1%) were in the third trimester of pregnancy. The women who had more than 5 children were 25 (6.5%). However, 125 women (32.6%) were primigravida, 63 women (16.4%) were multigravida, and 171 women (44.5%) had one or two children. In regard to birth spacing, 37.02% of the women had 3–4 years birth spacing.

Table 3 shows the antenatal clinic visits and iron and folic acid supplementation during the current pregnancy. The majority (85.9%) of the women had an iron and folic acid supplementation during the current pregnancy. All the participants had missed appointment during 3 months of the current pregnancy. Regarding the health conditions of the women during the current pregnancy, 133 women (34.6%) had reported health problems such as weakness, fatigue, dizziness, urinary tract infections (UTI), contractions, and constipation.

Table 1: Sociodemographic characteristics of the study participants (*n*=384).

Variables	Frequency, *n* (%)
Age in years	
15–24	161 (41.9)
25–34	198 (51.6)
35–44	25 (6.5)
Residence	
Sana'a	359 (93.5)
Other areas	25 (6.5)
Occupation	
Housewife	319 (83.1)
Student	28 (7.3)
Government or private employed	37 (9.6)
Level of education	
No formal education	28 (7.3)
Primary	108 (28.1)
Secondary	136 (35.4)
Graduate and postgraduate	112 (29.2)
Income status (in Yemeni Rial)	
Low (<YER 50,000)	153 (39.8)
Middle (YER 50,000–200,000)	230 (59.9)
High (>YER 200,000)	1 (0.3)

All values are number (%). YER, Yemen Rial; (US$1=YER500)

Table 2: The obstetric history of the study participants (*n*=384).

Variables	Frequency, *n* (%)
Gestational age (trimester)	
Second trimester	203 (52.9)
Third trimester	181 (47.1)
Number of children	
Primigravida	122 (32.6)
1–2 children	171 (44.5)
3–4 children	66 (16.4)
≥5 children	25 (6.5)
Spacing between pregnancies	
1–2 years	88 (33.6)
3–4 years	97 (37.02)
≥5 years	77 (29.38)

Prevalence of anemia

The study revealed that the overall prevalence of anemia among pregnant women at Safe Motherhood Specialized Hospital in Sho'ub District was 25.0% (96/384), of which 70.80% of them had mild anemia, 28.2% had moderate anemia, and only 1.04% of them had severe anemia [Table 4].

Dietary habits among the study participants

Table 5 shows the dietary habits of study participants, where 42.7% (164/384) of the pregnant women eat meat once per week and 44.8% (172/384) had the habit of eating fruit once a week. More than half (55.2%; 212/384) and one-third (33.6%; 129/384) of the study subjects had the habit of eating vegetables and drinking milk, respectively, daily. About three-quarters (72.7%) and a half (57.8%) of the women

Table 3: ANC attendance, iron and folic acid supplementation, and reported health problems among the study participant (*n*=384).

Variables	Frequency *n* (%)
Iron/folic acid supplementation	
Yes	330 (85.9)
No	54 (14.1)
Missed appointment for ANC visits	
1 time	93 (24.2)
2–3 times	158 (41.1)
≥4 times	133 (34.6)
Reported health problems during the current pregnancy	
Yes	133 (34.6)
No	251 (65.4)

ANC: Antenatal clinic

Table 4: Prevalence of anemia among pregnant women in this study (*n*=384).

Variables	Frequency, *n* (%)
Anemic status	
Yes	96 (25.0)
No	288 (75.0)
Severity of anemia	
Mild anemia (Hb 10–11.0 g/dl)	68 (70.83)
Moderate anemia (Hb 7–9.9 g/dl)	27 (28.13)
Severe anemia (Hb <7 g/dl)	1 (1.04)

Table 5: Dietary habits of the study participants (*n*=384).

Variables	*n* (%)
Ate cereal	
Daily	222 (57.8)
Once a week	101 (26.3)
Twice a week	24 (6.3)
Once a month	7 (1.8)
Never	30 (7.8)
Ate red meat	
Daily	24 (6.3)
Once a week	164 (42.7)
Twice a week	52 (13.5)
Once a month	69 (18.0)
Never	75 (19.5)
Ate liver	
Daily	21 (5.5)
Once a week	23 (6.0)
Twice a week	9 (2.3)
Once a month	117 (30.5)
Never	214 (55.7)
Ate vegetable	
Daily	212 (55.2)
Once a week	117 (30.5)
Twice a week	37 (9.6)
Once a month	6 (1.6)
Never	12 (3.1)
Ate fruit	
Daily	132 (34.4)
Once a week	172 (44.8)
Twice a week	57 (14.8)
Once a month	13 (3.4)
Never	10 (2.6)
Drinking milk	
Daily	129 (33.6)
Once a week	123 (32.0)
Twice a week	37 (9.6)
Once a month	48 (12.5)
Never	47 (12.2)
Drinking tea or coffee with meals	
Daily	279 (72.7)
Once a week	58 (15.1)
Twice a week	20 (5.2)
Once a month	4 (1.0)
Never	23 (6.0)

had the habit of drinking tea and/or coffee and consuming cereals, respectively, daily. Interestingly, over half (55.7%) of the women declared that they never ate liver.

The predictors of anemia in the studied pregnant women were evaluated individually using univariate logistic regression. Those factors that were significantly associated with anemia in the univariate model were included in the final multiple regression model.

Four factors were found to be significant in the univariate analysis which were included in the final logit model, namely, low family monthly income, a spacing between pregnancies, eating liver, and presence of health problems [Table 6].

Middle-income women were less likely to be anemic than those who had low income (OR = 0.357, 95% CI = 0.215–0.590; $P < 0.01$). Moreover, women who had a short space between pregnancies (1 and 2 years) were more likely to be anemic than those who had more than 5 years interval between deliveries (OR = 3.106, 95% CI = 1.375–7.016; $P = 0.06$). In addition, the relationship between health problems (weakness, fatigue, dizziness, UTI, contractions, and constipation) and anemia was found statistically significant where women having health problems were 2 times more likely to be anemic (OR = 2.260; 95% CI = 1.342–3.806; $P = 0.002$) compare to those without health problems. Furthermore, women who never eat liver were 3 times more probably to be anemic than who had consumed liver weekly or once a month (OR = 3.004; 95% CI = 1.528–5.790; $P = 0.001$) [Table 6].

DISCUSSION

Anemia in pregnancy is one of public health problems globally, particularly in developing countries. It has significant health, social, and economic consequences. Despite decades of efforts to improve the health status of pregnant women, women in developing countries are still suffering the effects of anemia during pregnancy.

The present study found that the overall prevalence of anemia among the study participants was 25.0%. This prevalence is lower than that reported in a survey conducted in Yemen by the WHO in 2011 which found that 36% of pregnant women were anemic.[5] This WHO estimation for Yemen was obtained from community-based surveys.

However, women with low monthly income were found to be significantly more susceptible to anemia than those of middle-income household monthly income. Ndukwu and Dienye[9] revealed an inverse association between the prevalence of anemia and socioeconomic status which was similar to our observation. Moreover, the severity of anemia was also detected to be contrariwise related to household income.[10] This is not unexpected considering the fact that women who had financial hardship might undergo the deleterious effects of poor nutrition and might have no access to health services.

In this study, a significant association between the presence of health problems and anemia was found. The highest prevalence of anemia was among pregnant women who had a health problem during pregnancy. A previous study at the maternity unit of Kenyatta National Hospital in Nairobi, Kenya, found that the prevalence of preterm birth was significantly associated with pregnancy who had UTI.[11] A similar finding was reported in India at Maternity Hospital, Bhimavaram, where the highest incidence of UTI was seen in pregnant women.[12]

Table 6: Factors associated with anemia in pregnant women in second and third trimesters using univariate and multivariate logistic regression analyses.

Variables	Crude OR (95%CI)	*P*-value	Adjusted OR (95% CI)	*P*-value
Family monthly income+				
Low income	Ref**			
Middle income	0.390 (0.232–0.655)	<0.001*	0.357 (0.215–0.590)	<0.001*
Spacing between pregnancy				
1–2 years	2.792 (1.258–6.197)	0.012*	3.106 (1.375–7.016)	0.006*
3–4 years	1.585 (0.711–3.532)	0.036*	2.634 (1.140–7.016)	0.023*
≥5 years	Ref**			
Health problems				
No	Ref**			
Yes	2.532 (1.576–4.067)	0.001*	2.260 (1.342–3.806)	0.002*
Ate liver				
Daily	Ref**			
Once a week	1.083 (0.263–0.745)	0.829	0.662 (0.377–1.162)	0.151
Twice a week	1.156 (632–2.113)	0.639	0.747 (0.375–1.488)	0.407
Once a month	0.401 (0.164–0.982)	0.045	1.285 (0.601–2.745)	0.518
Never	2.944 (1.506–5.755)	0.002*	3.004 (1.528–5.790)	0.001*

*Significant at *P*<0.05. **Ref: Reference. Other factors were not statistically significant, therefore, we did not include them in the table. +High income was excluded as only a single woman had reported a high household income. OD: Odds ratio, CI: Confidence interval

In addition, there is a significant association between the prevalence of anemia and short spacing between pregnancies (1–2 years or 3–4 years). This finding is in line with a study conducted previously in Qatar where they found women with interpregnancy space of more than 3 years had a higher prevalence of anemia compared to others.[4]

In the present study, women who never consumed liver were 3 times more likely to be anemic as compared to those who consumed liver. However, the association between other dietary habits and the prevalence of anemia was not statistically significant. For instance, drinking of tea and/or coffee was identified as a significant predictor of anemia among pregnant women, however, our findings showed no similar association.

The findings of this study showed that there was no significant association between the nulliparous and grand multiparous grouping and maternal anemia. This is similar to a study done by Ezugwu *et al*.[13] In contrast, Taner *et al*.[14] found that pregnancies with parity more than 3 were 2 times more likely to be anemic than those with parity <3. However, low percentage of grand multiparous women (6.8%) in our study participants might have influenced the involvement of parity to statistically insignificant levels.

Low educational level of pregnant woman was not a significant factor of anemia in this study. In contrast, Taner *et al*.[14] found that women with low educational were detected to be significantly more at risk to anemia than others.

Limitations

This study was conducted in urban area, further investigation is needed to assess the prevalence of anemia in rural areas that have inadequate health-care facilities and might be much affected by the war. In addition, the cross-sectional study design is not possible to infer causal relationship.

CONCLUSION

This study revealed that anemia is still a significant problem among Yemeni pregnant women, where a quarter of the studied pregnant women in the second and third trimesters were found to be anemic.

The study revealed that anemia during pregnancy is significantly associated with some factors, including income statues, a short spacing between pregnancy, and present of health problem during pregnancy. Based on the findings of this study, identification of these risk factors is a valuable consideration to reduce the anemia prevalence during and after delivery. This study recommends that socioeconomic factors, which may lead to limited access to healthy food and antenatal care, contribute to most of the anemia cases and, therefore, should be recognized as the main determinants for anemia in pregnant women. It is a time for the realization that health system should focus on various factors that contribute to the occurrence of anemia and include them as important indicators in the National Health Policy.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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