The Relationship between Anemia in Pregnancy and the Demographic Variables among Pregnant Women Attending Antenatal Clinic at Diwan Polyclinic: A Cohort Study in Oman

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Abstract

Background: Pregnancy-related anemia is a serious health problem worldwide and carries high risk of morbidity and mortality for mother and fetus alike. No national data on anemia in pregnancy in Oman.

Aim: This study is to explore the prevalence of anemia in pregnancy in Oman and its relationship to different demographic features to enable delivering optimum patient care.

Design: A retrospective quantitative study conducted for a cohort of pregnant ladies attending Diwan polyclinic-Muscat in Sultanate of Oman in 2015 looking at the prevalence of anemia in pregnancy and its relation to obstetric (gravidity and parity) and non-obstetric (age, education, employment, adherence to iron supplementation, BMI, nutritional history) demographic variables.

Method: A total of 1065 pregnant ladies attendee in year 2015. After identifying anemic ladies using WHO cut off point (Hb < 11.0 g/dL) at and after applying exclusion criteria (inherited blood disorder), the sample size was 169. Only 129 out of 169 were reached.

Questionnaires were distributed to participants after gaining verbal consent. Part A was about personal demographic data and was completed by participants while part B was clinical demographic data and was completed by researchers.

Results: Data was processed by SPSS (22). Average age was (29.45 ± 5.33). The prevalence of anemia was 16%. There was significant negative correlation between hemoglobin and gravidity ([r(129) = -0.312, P < 0.05) and between hemoglobin level and parity (r(129) = -0.287, P < 0.05) but no statistically significant relationship between hemoglobin level and other demographic variables.

Conclusion: Prevalence of anemia in pregnancy is 16%. Gravidity and parity are significant factors leading to anemia in pregnancy.

Keywords: Oman; Anemia; Pregnancy; Prevalence; Nutrition; Factors; Gravidity; Parity

Introduction

Iron deficiency anemia in pregnancy is defined by World Health Organization (WHO) [1] as a hemoglobin level below 11 g/dl. It is considered as one of the most frequent complications related to pregnancy and the most common type of anemia in pregnancy [1]. The commonest symptoms of anemia in pregnancy are headache, fatigue, lethargy, pallor, tachycardia, and sometimes tachypnea.

During pregnancy women's body undergo physiological changes to facilitate fetal growth. Maternal Blood volume expansion with

adequate Hb level is needed for fetal growth. However, low iron supply to the maternal body will lead to low Hb production and hence to anemia [1].

Anemia in pregnancy has a significant impact on the maternal and fetal health [2,3]. It is a major health problem in many developing countries and is associated with increased rates of maternal and perinatal mortality and morbidity such as preterm delivery, low birth weight, placenta previa, abruptio placenta, and postpartum hemorrhage [3].

The Relationship between Anemia in Pregnancy and the Demographic Variables among Pregnant Women Attending Antenatal Clinic at Diwan Polyclinic: A Cohort Study in Oman

03

Classification of anemia based on the Hb level as per WHO is: mild (10 - 10.9 g/dl), moderate (9.9 - 7 g/dl), sever (6.9 - 4 g/dl) and very sever which is below 4 g/dl. The WHO estimated 58% of pregnant women in developing countries are anemic.

In Oman there is no data at a national level about anemia in pregnancy. A study conducted at Sultan Qaboos University Hospital showed the prevalence of pregnancy related anemia is 41% [4] while another study conducted in governorate of Sharqiya South showed a prevalence of 43.6% [5].

In the Arab Gulf countries, maternal iron deficiency anemia is a major public health problem with a prevalence rate ranging from 22.6% to 54% [6,7].

Factors influencing prevalence of anemia across globe is socioeconomic status, lifestyles and health seeking behaviors, parity, gravidity, maternal age, maternal nutrition especial prior to conceiving, compliance with iron supplementation, and Body Mass Index (BMI) [1,4,5,8,9-24]. Effect of parity and maternal age on anemia in pregnancy in Oman was established [8,10].

Purpose of the Study

The purpose of this study is to explore the prevalence of anemia in pregnancy and its relationship with the obstetric and non-obstetric demographic variables (maternal age, parity, gravidity, BMI, nutritional history, level of education, employment, mode of last delivery and adherence to iron supply) among attendee of antenatal clinic at Diwan Polyclinic-Muscat in year 2015. Also, to assess the relationship between the classification of anemia (mild, moderate and sever) and the demographic variables.

Diwan Polyclinic is a governmental health institute established in 2013 and it provides medical services for employees of Diwan of Royal Court and their families and all other sectors entitled for treatment in it. The registered patients who benefit from its services are from all over the sultanate. Diwan Polyclinic provides primary and secondary care. All pregnancies will be referred to tertiary care in the 3rd trimester. As the attendee of Diwan Polyclinic are from all over the country and from different educational and socioeconomic background, this study might be more representative of the Omani population. Also, this study explores in the non-obstetric demographic data the nutritional and dietary history which was not addressed in previous studies in Oman.

Methodology and Procedures

Study design: This is a retrospective descriptive quantitative study of anemia among a cohort of pregnant women attending antenatal clinic at Diwan Polyclinic-Muscat during the period of 1st January 2015 till 31st December 2015.

Procedure: After gaining approval from the Research Ethical Committee at Diwan Polyclinic-Muscat-Oman, a list of all pregnant women in the year 2015 was obtained from the antenatal registry at Diwan Polyclinic-Muscat. Their electronic medical records were searched for anemic ladies in their first visit during the study period.

A study population of 1065 women were identified pregnant in year 2015 and therefore deemed eligible for the study. A sample group of 170 out of 1065 were identified as anemic (Hb < 11 g/dL). Women with inherited blood disorder are excluded from sample group, and therefore one woman was excluded because she has sickle cell disease. A total of 129 out of 169 agreed to participate as the rest were unreachable via phone call. After obtaining consent from participants, a questionnaire was distributed to the participants to complete section "A" which was bout age, educational level, employment, gravidity, parity, mode of last delivery, and nutrition during pregnancy. Nutrition during pregnancy data was obtained via three questions in multiple choices format. First question: How many main meals do you take daily, with options ranging from 1 to 3. Second question: How many snacks do you take daily, with choices from 1 to 3. Third question: How often do you eat a meal rich in iron (e.g. Green vegetables, fish, red meat, liver) per week, with choices a) 1 - 2, b) 3 - 4, c) 5 and more. Section" B" was completed by the first two researchers and it included data about height, weight, Body Mass Index (BMI), gestational age, hemoglobin level and hematocrit level in second and third trimesters.

Data management and data analysis

Data was managed using the Statistical Package for Social Sciences Software (SPSS) version 22.

Descriptive analysis

The average age of the studied participants was (29.45 ± 5.33) ranging from 18 to 44 years. Most of them fall in the age group 25 - 29 years (34.1%). Out of 129, 77 (60%) completed their post school education, 80 (62%) were employed, 96 (74%) take three main meals per day, 59 (46%) take two snacks per day, 62 (48%) take iron-rich meals five time per week, and 72 (56%) were adherent to iron supplementation.

Number of gravidities ranged between 1 and 10, but 84 out of 129 (65%) of participant had been pregnant three times or less (See table 1). Parity ranged between 1 and 9, but 96 out of 129 (74%) had two children or less (Table 1).

The Relationship between Anemia in Pregnancy and the Demographic Variables among Pregnant Women Attending Antenatal Clinic at Diwan Polyclinic: A Cohort Study in Oman

04

		Mild anemia Hb: 10.0 - 10.9 g/dL	Moderate anemia Hb: 7.0 - 9.9g/dL	Total	Low Hct <= 35.9	Normal Hct: 36.0 - 44.9
Parity	0 - 2	46	50	96	92	4
	3 - 5	12	19	31	29	2
	>= 6	0	2	2	2	0
	Total	58	71	129	123	6
Gravidity	0 - 3	40	44	84	81	3
	4 - 6	16	21	37	34	3
	>= 7	2	6	8	8	0
	Total	58	71	129	123	6
BMI	Underweight	2	2	4	4	0
	Normal	33	37	70	65	5
	Overweight	18	25	43	42	1
	Obese	5	7	12	12	0
	Total	58	71	129	123	6
Age Groups	18 - 24	9	13	22	21	1
	25 - 29	28	21	49	46	3
	30 - 34	12	18	30	29	1
	35 - 39	7	16	23	22	1
	>= 40	2	3	5	5	9
	Total	58	71	129	123	6
No. of main meals per day	1 meal	3	0	3	3	0
	2	10	20	30	28	2
	3	45	51	96	92	4
	Total	58	71	129	123	6
No. of iron-rich meals per week	1 - 2/wk	6	10	16	16	0
	3 - 4/wk	23	28	51	49	2
	>= 5/wk	29	33	62	58	4
	Total	58	71	129	123	6
No. of snacks/day	1	29	29	58	57	1
	2	25	34	59	54	5
	3	4	8	12	12	0
	Total	58	71	129	123	6
Taking supplement	Yes	40	32	72	67	5
	No	18	39	57	56	1
	Total	58	71	129	123	6
Employed	Yes	35	43	78	75	3
	No	23	28	51	48	3
	Total	58	71	129	123	6
Level of education	Primary	1	2	3	3	0
	Preparatory	1	2	3	3	0
	Secondary	21	25	46	44	2
	Advanced	35	42	77	73	4
	Total	58	71	129	123	6

Table 1: Type of anemia in different demographic variables base on Hb3.

The Relationship between Anemia in Pregnancy and the Demographic Variables among Pregnant Women Attending Antenatal Clinic at Diwan Polyclinic: A Cohort Study in Oman

05

The prevalence of anemia in pregnancy in Oman in this study is 16% (169/1065). Based on the WHO classification, 55% of the participants had moderate anemia, 45% had mild anemia and no one had severe anemia. Hemoglobin level in the first trimester was excluded from analysis as more than 44% of participants were first seen when they were in the second trimester. The average hemoglobin in the second trimester was (9.75 ± 0.79) and in the third trimester was (9.60 ± 0.87). The hemoglobin level in the third trimester (Hb3) was significantly lower than hemoglobin level in the second trimester (Hb2) [t (128), -2.039, P < 0.05] and hence Hb3 was included in the analysis of the relationship between anemia and demographic variables. Hemoglobin (Hb3) is normally distributed as seen in the histogram (Figure 1) and tested for skewness by Kurtosis test.
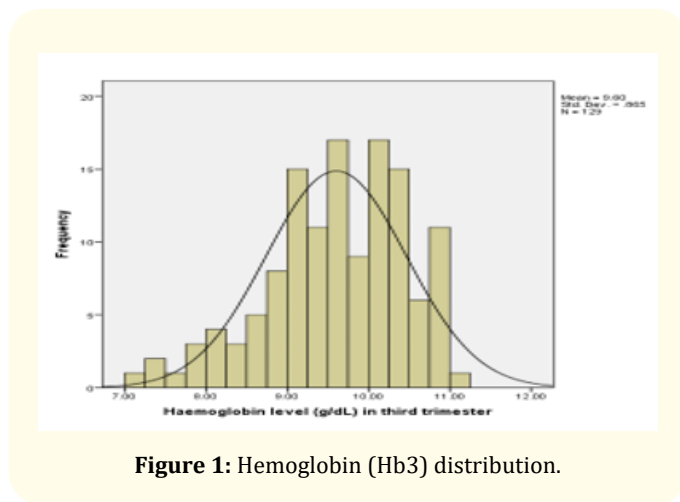

Figure 1: Hemoglobin (Hb3) distribution.

Relationship between anemia and demographic variables

One-way ANOVA was used to test relationship between Hb3 and: age, level of education, mode of delivery, BMI, number of main meals per day, No. of snacks per day, No. of iron-rich meals per week. Conducting independent- samples T- tests was used to test the relationship between Hb3 and: employment, adherence to iron supplementation, and taking supplementation with diary milk or coffee. Conducting Pearson's correlation between Hb3 and: parity and gravidity. The findings show: There is no statistically significant relationship between anemia and age, level of education, mode of delivery, employment, BMI, number of main meals per day, number of snacks per day, number of iron-rich meals per week, and adherence to medication. But there is a statistically significant negative correlation between anemia and parity [r(129) = -0.287, p = 0.001] and between anemia and gravidity [r(129) = -0.312, p = 0.000].

Discussion

Prevalence of anemia in pregnancy in this study is 16% which is lower than previous studies in Oman [4,5,8]. This could be because of higher level of maternal education in this study and the difference in the age of the data. Higher education might led to higher health awareness. Data of the previous study was gathered in year 2004 while in this study in 2015. Drops in level of anemia in pregnancy with time was reported in Africa in Trinidad and Tobago where the prevalence dropped from 51% in 1967 to 15.3% in 2010 [27]. The other possible explanation is that we excluded cases of hemoglobinopathy but in some of the previous studies conducted in Oman there was no exclusion of such cases. Moreover, in Seshan., *et al*. [4] study, pregnant ladies with Hb level above 11.0 g/dL were excluded from their study and that might have affected the prevalence to skew to anemia.

Both high gravidity and high parity are significantly linked to higher rate of anemia in pregnancy. High gravidity does not necessary means high parity as women might abort some of her pregnancies resulting in more gravidity number compared to parity. Link between high gravidity and high prevalence of anemia in pregnancy might be explained by the physiological changes during pregnancy regardless of the gestational age leading to iron deficiency. The iron deficiency in such case is worsen if the pregnancy ends with abortion due to blood loss.

The association between high parity and high prevalence of anemia during pregnancy in our study is consistent with national [4] and with international studies [26].

Unlike literature [8], age is not found to be a factor. This could be explained by the differences in the sample characteristics between both studies. The youngest participant in this study was 18 years old while in Al-Hadabi., *et al*. [8] study the youngest aged 14 years with age range of the whole sample ranging from 14 to 19 years. Bodies of people aged below 18 years are still growing and hence, the nutritional demand is higher than mature adult and expected to be even higher in pregnancy. However, in our study the sample was adult and therefore, no physiological growth is expected among the participants.

The Relationship between Anemia in Pregnancy and the Demographic Variables among Pregnant Women Attending Antenatal Clinic at Diwan Polyclinic: A Cohort Study in Oman

06

Adherence to medication and taking frequent meals and food rich in iron was high among participants in this study but it was not correlated to hemoglobin level. This is probably because of poor absorption of iron. Poor absorption of iron from diet is a known cause of iron deficiency anemia in pregnancy [25]. Taking iron supplementation or dietary iron with chelating factors such as milk and coffee would interferes with iron absorption and hence leads to iron deficiency. Literature shows that the cause of nutritional anemia in pregnancy is linked to micronutrient deficiency sometimes and not always because of iron deficiency [12].

Health education on nutrition addressing all above points is needed to be part of antenatal care and for high-school girls as pre-marriage.

Conclusion

Anemia in pregnancy is an important morbidity in pregnancy because of its major impact on the maternal and fetal health. The prevalence of anemia in pregnancy in Oman in this study is 16%.

Taking proper history from the mother might help indicating risk factors of anemia such as poor eating habit that might interfere with iron absorption. Gravidity as well as parity is the most risk factor for anemia in pregnancy.

Increasing awareness of birth spacing in addition to health education on diet might help in reducing prevalence of pregnancy related anemia.

The discrepancy in the prevalence of anemia in pregnancy in this study compare to literature calls for more structured national study address this issue.

Acknowledgment

Limitation of this Study

It is a single center study and it is a retrospective study which might be subjected to recall bias.

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The Relationship between Anemia in Pregnancy and the Demographic Variables among Pregnant Women Attending Antenatal Clinic at Diwan Polyclinic: A Cohort Study in Oman

07

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