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Prevalence of Anemia among Pregnant Women Attending Antenatal Clinic at Maternity and Children Hospital in Makah City at Saudi Arabia 2022

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Abstract

Background: Anemia among pregnant women is one of the most common public health problems in developing country. World health organization (WHO) estimates shows nearly half of pregnant women were affected by anemia. High burden of anemia is observed in Africa. Anemia in pregnancy is a condition with effects that may be deleterious to mothers and fetuses and it is a known risk factor for many maternal and fetal complications. It significantly increases fetal and maternal mortality and morbidity due to maternal vulnerability for infection and hemorrhage.

Anemia among pregnant women is one of the most common public health .was to identify determinant factors of anemia among pregnant women in "Prevalence and determinants of anemia in third trimester. Anemia in pregnancy is one of the most common preventable causes of maternal ranging from 22.6% to 54.0%. To increase awareness of anemia during pregnancy and its adverse effect on the maternal and fetal outcome . However, the prevalence and determinants that contribute to the occurrence of anemia were not exhaustively studied. Aim of the study: To evaluate the anemia and its determinants among pregnant women attending ANC at MCH in Makah city September 2022 . Method: Cross-sectional study , Our study conducted in Makah in the MCH in one of the most important city in Saudi Arabia, which is Makah, study sample population Pregnant women attending ANC in MCH in Makah city Our total participants were sample is (310) pregnant women September 2022 .Results: The overall

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prevalence of anemia in this study . The following variables were significantly associated with anemia: Age were (OR=0.333) , Nationality status were (OR=1.830) , Occupational status were (OR=0.649) , gestational age were (OR=0.580) , history drink tea immediately after main meals (OR=0.557) , eating green vegetables (OR=1.525) , Eating animal products (no contraception (OR=1.651) , gravidity were (OR=2.192) Conclusion: Conclusion: anemia is still a significant problem facing the pregnant women and jeopardizing their outcomes. Diet during pregnancy, consuming tea/coffee immediately after food, meat consumption, previous heavy menstrual blood flow, and occupational status of women were significant factors associated with anemia among pregnant women so, it is recommended to increase the efforts toward the health education of women in childbearing age.

Keywords: *Prevalence, Determinants, Anemia, Pregnant, Women, Antenatal, Makah.*

Introduction

Anemia refers to a condition in which the hemoglobin content of the blood is lower than normal for a person´s age, gender and environment, resulting in the oxygen carrying capacity of the blood being reduced [1,2].

Anemia in pregnancy state could be a major drawback worldwide. Because of the lack of data concerning the magnitude of anemia and the necessity to boost the standard of care [3] , the target of this study is to extend awareness the prevalence of anemia among pregnant women antenatal clinic at Maternity and Children Hospital in Makkah as well as to work out the association between anemia in pregnancy state and certain socio-demographic factors. During pregnancy state, more of changes occur within the body to accommodate the feto-placental system. Among these changes in the hematological system are physiologic anemia, neutrophilia, thrombocytopenia, exaggerated coagulant factors and decreased fibrinolysis. [4]

The mean minimum acceptable hemoglobin level all through being pregnant through WHO criteria is taken to be 11 g/dL [5].

In addition, WHO divides anemia in being pregnant into: mild anemia (hemoglobin 10-10.9 g/dL), moderate anemia (hemoglobin7.0-9.9 g/dL) and severe anemia (hemoglobin <7 g/dL) [6]

Estimates from the World Health Organization record that 35% to 75% of pregnant women in developing countries, and 18% in developed countries are anemic [2] . The greatest burden of anemia is born through Asia and Africa where it is estimated that 60% and 52% of pregnant women, respectively, are anemic and between 1% and 5% are severely anemic (hemoglobin <7 g/dl) and is related with ladies of age less than 20years, 1/3 trimester of pregnancy, rural residents, and multiparous women [6,7].

Anemia is observed as an indicator of both poor nutrition and poor health. It impairs health and well-being in women and increases the risk of maternal and neonatal adverse outcomes. During pregnancy, anemia is responsible for a lot of complications in women. Some of those associated problems are less exercise tolerability, puerperal infection, thromboembolic problems, postpartum hemorrhage, pregnancy induced hypertension, placenta previa, cardiac failure, low birth weight, preterm delivery, and prenatal death [8]. In the early pregnancy up to 12 week of gestation, the plasma volume extent will increase by 15 %. [1-8] It continues to become bigger until 30 to 34 weeks, after which there is solely a modest rise. At the end of pregnancy, the common expansion is about 1100 to 1600 mL and to a plasma extent of 4700 to 5200 mL, 30 to 50 % above the non-pregnant ladies level. [9]

Anemia occurs at all stages of the life cycle but its risk is higher in state of pregnancy due to an increased iron requirement, physiological demand, loss of blood and due to infections [10-11]. Anemia in being pregnant is one of the most frequent preventable causes of maternal morbidity and bad prenatal result [12].

Globally anemia affected 1.62 billion people, of these, 56 million anemia cases were found in pregnant women [13]. The primary care medical doctor who is the backbone of the health care system and additionally the first contact factor for a patient plays a crucial role in the identification and administration of anemia. Even in the public sector, majority of the antenatal cases are handled at the degree of primary health care. [14]

Also anemia is estimated to contribute to more than 115000 maternal deaths and 591000 prenatal deaths globally per year [15]. Although organic risk factors such as dietary deficiency, parasitic infestations, and chronic illnesses are accepted risk factors, it is essential for the doctor to apprehend the ecological or structural hazard elements that may be of regional interest. These consist of socio-demographic characteristics, obstetric variables, intellectual health, and dietary popularity mirrored with the aid of the body mass index (BMI). These elements are now not amenable to clinical administration with iron supplementation but can be comprehensively addressed at the degree of primary care. [16]

Even if anemia is a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development, its burden is more significant in developing countries [17]. Various studies confirmed that until recent time, anemia in pregnant women remains one of the most unresolved public health problems in developing countries because of various socio-cultural problems like poverty, lack of awareness, poor dietary habits, and high prevalence of parasitic infestation [18].

For instance, current estimates from the World Health organization (WHO) put prevalence of anemia at 41.8% among pregnant women, with the highest prevalence rate (61.3%) found among pregnant women in Africa and 52.5% among South East Asia. In Saudi Arabia, the prevalence of anemia among pregnant women was 20.4% according to the study about prevalence of anemia among pregnant women registered for ANC at AL-Wazarat Health Center in Riyadh during the period of January till December 2012.[19]

Also, there was some other study done in Saudi Arabia about occurrence of anemia amongst pregnant female attending sixty nine essential fitness care centers in Asir in the course of august 2012 which determined that incidence was 31.9%.[20]

Rationale :

1. It is a global health problem that can have worse impact on maternal and fetal outcome.

2. The researcher has an interest in subject of anemia among pregnant women as he had similar experience with his wife when she was pregnant.

3. Up to researcher’s knowledge, few similar studies have been conducted in MCH in Makkah city.

Aim :To evaluate anemia and its determinants among pregnant women. So that increasing awareness of anemia during pregnancy and its adverse effect on the maternal and fetal outcome.

Objectives :

1. To estimate the prevalence of anemia among pregnant women attending ANC at MCH in Makkah city during September 2022.

Methodology

Study area : The study has been carried out in MCH in one of the most important cities in Saudi Arabia, which is Makkah. It is the holy city for all Muslims, and is located in the western region in an area called Makkah region.

Study population : All Pregnant women attending to the ANC in MCH in Makah city throughout the period of the study and accept to participate in the study.

Study design Cross-sectional, analytic study.

Inclusion criteria:

- All pregnant women attending ANC for regular follow up during the study period.
- All nationalities
- All age groups

Exclusion criteria:

- Pregnant women known case of thalassemia or sickle cell disease or any other previously known cause of anemia.

Sample size:

According to MCH administration registries, average numbers of pregnant women attending antenatal clinic at MCH in Makkah city in one month is 1600. By using (http://www.raosoft.com/samplesize.html), the recommended sample is 310 to detect the prevalence of anemia at 95% confidence level, 5% estimation error and study response rate 50%. Then to compensate for the nonresponses and not completed questionnaires, 10% was added to the sample. Therefore, the final sample size had been 341 .

Sampling technique :There are four antenatal clinics daily(two in the morning and two in the afternoon), one antenatal clinic in the morning and one antenatal clinic in the afternoon had been chosen by simple random technique and within each clinic the pregnant women sample had been chosen using simple random sampling technique by using random number generator (http://www.random.org). Each pregnant woman was organized in visiting daily paper and coded by number.

Data collection tool : The researcher prepared a questionnaire which was validated by two family medicine consultants. An interview that was carried out between the researcher and each participant at ANC in MCH in Makkah city at September 2022, after which the researcher checked the medical record of the participant to determine her level of Hb or she was sent to hospital laboratory to measure her Hb level if it is the first visit as MCH protocol.

The questionnaire designed in English and consists of two main sections:

The first section is concerned with personal general information about the participants (age, nationality, job title, educational level).

The second section is concerned with anemia status and determinants of anemia.

Data collection technique:

- The researcher has visit the MCH in Makkah city .
- The researcher has given the official acceptance paper from health affairs to the manager of the hospital.

- The researcher has filled the questionnaires through the interview with pregnant women attending ANC who met the inclusion criteria after taking their verbal consent.

After obtaining necessary approvals, the researcher and one trained nurse used an appointment list of pregnant women assigned to the ANC clinic. From the list, the selected to make interviews with each participant in the waiting area near the clinic. They 1st explained the objectives of the research in an easy language to the participants and gained their consents before sitting, interviewing them and filling up the questionnaires. If one participant didn't show up for any reason, she will be replaced by the next one on the list. This process was continued until the involved participants were covered totally.

Data entry and analysis : The statistical package for social sciences (SPSS) software version 23 had been used for data entry and analysis. The necessary statistical tests had been used with a significance of P-value <0.05.

Pilot study : A pilot study has been conducted at Hera General Hospital in Makah city with 10% of the sample size whose results has be excluded from the final research. The aim of the pilot study has be to test for the comprehensibility of the questionnaire as has as to estimate the time needed to fill in the questionnaire and feasibility of the methods.

Ethical considerations:

- Permission from the Makkah joint program of family and community medicine has been obtained.
- Permission from the Directorate of Health Affairs of the Holy Capital has been obtained(IRB committee).
- Permission from the MCH has been obtained.
- Permission from the participants has been taken.
- All information has been kept confidential and results has been submitted to the department as feedback.

Budget :Self-funded

Results:

Table (1): The distribution of demographic data (age, Nationality, Educational level and Occupation) in our study (n=310)

	N	%
Age		
<20	8	2.6
20-35	239	77.1
>35	63	20.3
Nationality		
Saudi	229	73.9
Non-Saudi	81	26.1
Educational status		

Educated	310	100.0
Occupational status		
Housewife	227	73.2
Employee	83	26.8

Table (1) shows the socio-demographic details of 310 informed and consented pregnant women who came for their antenatal follow up and were enrolled in this study.

Regarding the age majority of the study groups were in the age range of (20-35) years were (77.1%) while participant women the age >35 were (20.3%).

Regarding the nationality many of the respondents were Saudi Nationality (73.9%) while non-Saudi were (26.1%).

Regarding the education status all the respondents had educational degree status (310).

Regarding the occupational status, the majority of participant were housewives (73.2) while employees were (26.8%)

Table (2): The distribution of Gravidity in our study (n=310)

Gravidity		
	N	%
Primigravida	46	14.8
Multigravida	264	85.2
Total	310	100.0

Table (2) shows the Gravidity in our study was (85.2%) and (14.8%) for multigravida and Primigravida, respectively.

Table (3): The distribution of Gestational age in our study (n=310)

Gestational age		
	N	%
First trimester	16	5.2
Second trimester	61	19.7
Third trimester	233	75.2
Total	310	100.0

Table (3) showing the highest prevalence was in the third trimester (75.2%) while in the second trimester was (19.7 %) and first trimester was (5.2%).

Table (4): The distribution of Type of pregnancy in our study (n=310)

Type of pregnancy		
	N	%
Single	309	99.7
Multiple	1	0.3

Total	310	100.0

Table (4) : showing a higher prevalence in single pregnancy (99.7%) than Multiple (0.3 %).

Table (5): The Distribution of Using any sort of iron supplement in our study (n=310)

Using any sort of iron supplement		
	N	%
Yes	199	64.2
No	111	35.8
Total	310	100.0

Table (5) showing the majority of the respondents were using iron supplements (64.2%) while the respondents who are not using were (35.8%).

Table (6): The distribution of Drink tea immediately after main meals in our study (n=310)

Drink tea immediately after main meals		
	N	%
Yes	81	26.1
No	229	73.9
Total	310	100.0

Table (6) shows that majority of the respondents were not drinking tea after meal (73.9%) while the respondents who had the habit of drinking tea immediately after meals were (26.1%).

Table (7): The distribution of Eating green vegetables in our study (n=310)

Eating green vegetables		
	N	%
Daily	87	28.1
Every other day	79	25.5
Weekly	71	22.9
Very rare	73	23.5
Total	310	100.0

Table (7) shows the majority of the respondents had the habit of eating green vegetables (28.1%) while the respondents (25.5 %), (23.5%), and (22.9%) had the habit of eating green vegetables every other day, very rare and weekly, respectively.

Table (8): The distribution of Eating animal products in our study (n=310)

Eating animal products		
	N	%
Daily	185	59.7
Every other day	93	30.0

Weekly	32	10.3
Total	310	100.0

Table (8) shows the majority of the respondents had the habit of eating animal products daily (59.7%) while the respondents eating animal products every other day, and weekly, respectively were (30.0%) and (10.3%).

Table (9): The distribution of Anemia status in our study (n=310)

Anemia status		
	N	%
Anemic	130	41.9
Non-anemic	180	58.1
Total	310	100.0

Table (9) shows the prevalence of anemia in this study reflecting that majority of the respondents were Non-anemic (58.1%) while the anemic respondents were (41.9%).

Table (10): The comparison between Anemic and Non-anemic patients and socio-demographic characteristics (Age) in our study (n=310)

			Anemia status		Total
			Anemic	Non-anemic	
Age	<20	N	4	4	8
		%	3.1%	2.2%	2.6%
	20-35	N	113	126	239
		%	86.9%	70.0%	77.1%
	>35	N	13	50	63
		%	10.0%	27.8%	20.3%
Total		N	130	180	310
		%	100.0%	100.0%	100.0%
Chi-square		X^2	15.800		
		P-value	<0.001*		

Table (10) shows a statistically significant association between anemic status and age groups (P-value <0.001). Those women between 20 and 35 years old were having the highest prevalence of anemia followed by those over 35 years and young ladies under 20 years old.

Table (11): The comparison between Anemic and Non-anemic patients regarding socio-demographic characteristics (Nationality) in our study (n=310)

			Anemia status		Total
			Anemic	Non-anemic	
Nationality	Saudi	N	87	142	229
		%	66.9%	78.9%	73.9%
	Non-Saudi	N	43	38	81
		%	33.1%	21.1%	26.1%
Total		N	130	180	310
		%	100.0%	100.0%	100.0%
Chi-square		X^2	5.549		
		P-value	0.018*		

Table (11) shows no statistically significant association between anemic status and nationality (P-value 0.018). About (66.9%, 33.1%) of the Saudi, Non-Saudi were anemic respectively.

Table (12): The comparison between Anemic and Non-anemic patients regarding socio-demographic characteristics (Occupational status) in our study (n=310)

			Anemia status		Total
			Anemic	Non-anemic	
Occupational status	Housewife	N	105	122	227
		%	80.8%	67.8%	73.2%
	Employee	N	25	58	83
		%	19.2%	32.2%	26.8%
Total		N	130	180	310
		%	100.0%	100.0%	100.0%
Chi-square		X^2	6.665		
		P-value	0.001*		

Table (12) shows a statistically significant association between anemic status and occupational status (P-value <0.001). About (80.8%) of the women who were housewives were anemic. While only (19.2%) of employees were anemic.

Table (13): The comparison between Anemic and Non-anemic patients regarding Obstetrics and other characteristics (Gravidity) in our study (n=310)

			Anemia status		Total
			Anemic	Non-anemic	
Gravidity	Prim gravida	N	13	33	46
		%	10.0%	18.3%	14.8%
	Multigravida	N	117	147	264
		%	90.0%	81.7%	85.2%
Total		N	130	180	310
		%	100.0%	100.0%	100.0%
Chi-square		X^2	4.309		
		P-value	0.038*		

Table (13) shows no statistically significant association between anemic status and gravidity status were P-value <0.038. The prevalence of anemia in this study was (90%, 10.0%) in multigravida and Primigravida, respectively.

Table (14): The comparison between Anemic and Non-anemic patients regarding Gestational age in our study (n=310)

			Anemia status		Total
			Anemic	Non-anemic	
Gestational age	First trimester	N	4	12	16
		%	3.1%	6.7%	5.2%
	Second trimester	N	45	16	61
		%	34.6%	8.9%	19.7%
	Third trimester	N	81	152	233
		%	62.3%	84.4%	75.2%
Total		N	130	180	310
		%	100.0%	100.0%	100.0%
Chi-square		X^2	32.429		
		P-value	<0.001*		

Table (14) shows a statistically significant association between anemic status and gestational age were P-value<0.001. The prevalence of anemic in this study were (62.3%,34.6%,3.1%) Third trimester, Second trimester and First trimester, respectively.

Table (15): The comparison between Anemic and Non-anemic patients regarding Using any sort of iron supplement in our study (n=310)

	Anemia status		Total
	Anemic	Non-anemic	

Using any sort of iron supplement	Yes	N	79	120	199
		%	60.8%	66.7%	64.2%
	No	N	51	60	111
		%	39.2%	33.3%	35.8%
Total		N	130	180	310
		%	100.0%	100.0%	100.0%
Chi-square		X^2	1.139		
		P-value	0.286		

Table (15) shows no statistically significant association between anemic status and Using any sort of iron supplement were P-value <0.286. The prevalence of anemia in this study in those who used sort of iron supplement (60.8%), while those who did not used sort of iron supplement (39.2%).

Table (16): The comparison between Anemic and Non-anemic patients regarding Drink tea immediately after main meals in our study (n=310)

			Anemia status		Total
			Anemic	Non-anemic	
Drink tea immediately after main meals	Yes	N	47	34	81
		%	36.2%	18.9%	26.1%
	No	N	83	146	229
		%	63.8%	81.1%	73.9%
Total		N	130	180	310
		%	100.0%	100.0%	100.0%
Chi-square		X^2	11.553		
		P-value	0.001*		

Table (16) shows a statistically significant association between anemic status and drinking tea immediately after main meals were P-value <0.001. The prevalence of anemia in this study in those who were not drinking tea immediately after main meals was (63.8%), while those who were drinking tea immediately after main meals was (39.2%).

Table (17): The comparison between Anemic and Non-anemic patients regarding Eating green vegetables in our study (n=310)

			Anemia status		Total
			Anemic	Non-anemic	
Eating green vegetables	Daily	N	33	54	87
		%	25.4%	30.0%	28.1%
	Every other day	N	34	45	79

		%	26.2%	25.0%	25.5%
	Weekly	N	18	53	71
		%	13.8%	29.4%	22.9%
	Very rare	N	45	28	73
		%	34.6%	15.6%	23.5%
Total		N	130	180	310
		%	100.0%	100.0%	100.0%
Chi-square		X^2	20.582		
		P-value	<0.001*		

Table (17) shows a statistically significant association between anemic status and eating green vegetables were P-value <0.001. The prevalence of anemia among the respondents who were eating green vegetables (very rare, every other day, daily, and weekly) was (34.6%, 26.2%, 25.4%,13.8%), respectively.

Table (18): The comparison between Anemic and Non-anemic patients regarding Eating animal products in our study (n=310)

			Anemia status		Total
			Anemic	Non-anemic	
Eat animal products	Daily	N	65	120	185
		%	50.0%	66.7%	59.7%
	Every other day	N	53	40	93
		%	40.8%	22.2%	30.0%
	Weekly	N	12	20	32
		%	9.2%	11.1%	10.3%
Total		N	130	180	310
		%	100.0%	100.0%	100.0%
Chi-square		X^2	12.346		
		P-value	0.002*		

Table (18) shows a statistically significant association between anemic status and eating animal products were P-value <0.002. The prevalence of anemia in the respondents who were eating animal products (daily, every other day, and weekly) was (50.0%, 40.8%, and 9.2%).

Table (19): The multiple logistic regression between Anemic and Non-anemic patients and (Age, Nationality, Occupational status, Gravidity, Gestational age, Drink tea immediately after main meals, Eating green vegetables and Eating animal products) in our study (n=310)

	B	S.E.	Wald	P-value	Odd ratio	95% C.I. for odd	
						Lower	Upper
Age	-1.099	0.327	11.328	0.001*	0.333	0.176	0.632

Nationality	0.604	0.304	3.959	0.047*	1.830	1.009	3.318
Occupational status	-0.432	0.301	2.058	0.151	0.649	0.360	1.171
Gravidity	0.785	0.395	3.959	0.047*	2.192	1.012	4.751
Gestational age	-0.544	0.241	5.109	0.024*	0.580	0.362	0.930
Drink tea immediately after main meals	-0.585	0.290	4.063	0.044*	0.557	0.316	0.984
Eating green vegetables	0.422	0.135	9.817	0.002*	1.525	1.171	1.986
Eating animal products	0.502	0.224	5.029	0.025*	1.651	1.065	2.560
Constant	1.040	1.381	0.568	0.451	2.831		

Discussion

In this study we estimated the prevalence of anemia among pregnant women and its association with certain risk factors such as socio-demographic factors (Age, Nationality, Occupational status), obstetrical and antenatal risk factors, (Gravidity, Gestational age), life style (Drinking tea immediately after main meals, Eating green vegetables and Eating animal products).

The overall prevalence of anemia was found to be 41.9% in our study, which reflects the burden of anemia among a group of pregnant women availing of antenatal care at a public-sector hospital. (See Table 9) Samuel et al. in a similar study, which was done at an urban public health facility in Bangalore, observed an almost similar prevalence rate of 30.3%. [22] As compared with other study findings done in an urban setup in South India, our study findings are higher than the prevalence rate of 23.16% observed in Vellore [23] but lower than the prevalence rate of 50.1% that was found. [24]

In Saudi Arabia, Earlier in 1994, the prevalence of anemia was 31.9% in the Southern region, [25] compared to higher prevalence of 41.3% in Eastern region in 2008. [26] The higher prevalence in the eastern region can be attributed to the endemicity of sickle cell. Also our study finding is higher than prevalence found in some Gulf countries like Kuwait 36.8% [27] and Oman 43.6% (comparable). [28]

Other Asian countries showed higher prevalence of pregnancy anemia, like in Malaysia 34.6% [29] and Vietnam 43.2%. [30] Lager studies done in India [31] and Bangladesh [32] reported higher prevalence of anemia of 84.9% and 50% respectively, reflecting a poor state of the nutritional health among pregnant women in these developing countries.

In our study, socio-demographic factors appear to be significantly associated with anemia particular in age group 20-35 were the percentage was (86.9%) (See Table 10).

Low socio-economic status are known to be associated with anemia as revealed in other research findings.[33],[34] Balarajan et al.[31] also in their analysis of epidemiology of anemia in low and middle-income countries noted a skew in the distribution of anemia in lower income groups. There was a statistically significant difference in the prevalence among housewives versus employee women where housewives (80.8%) had anemia while the employee who had anemia were (19.2%) (See table 12) in contrast to the result findings from a study which was done by Baig-Ansari et al. An example to that was the prevalence [35] in the United States found to be 22% indicating an improved economic status of the community and good nutritional support to pregnant women in those counties.[36]

We could not confirm the existence of association between obstetric variables such as gravidity with anemia in our study however, it showed that primigravida women (10%) are less likely than of multigravida women to develop anemia during pregnancy (90.0%) (See table 13 (which could be a consequence of depletion of iron reserves owing to repeated pregnancies. [37]

Nevertheless, similar to our study findings, Singh et al. [38] did not find any such association with gravidity, whereas Suryanarayana et al. [39] could not establish any linkage with parity.

In our study, we found that the advancing gestational age is significantly increasing the risk for anemia in the third trimester (62.3%) while second trimesters (34.6%) (See Table 14). This is similar to the findings in the other study conducted in Saudi Arabia. [25, 40] Compared to the first trimester, more cases of anemia found in the second and third trimesters are possibly attributed to the hemodilution and plasma expansion that occur physiologically with advancing gestational age. [41]

The development of anemia among pregnant mothers who were not drinking tea immediately after food was greater than the mothers who consumed tea immediately after food during their pregnancy. while non-anemic pregnant women who did not drink tea immediately after food were (81.1%) (See table 16). This result is in agreement with a study done in Egypt and Ethiopia, which showed significant association between anemia and consumption of tea [42] and this could be attributed to the effect on iron absorption which leads to inadequate dietary iron intake in the pregnant women.

A statistically significant association between anemic status and eating animal products was observed in our study P-value <0.002. The prevalence of anemia in this study the respondents had eat animal products ever daily compared to those who ate every other day had the likelihood of developing anemia. (See table 18)This result is consistent with other studies done in Ethiopia [43,44]. This significant association might be due to the reason that meat is an important source of hemeiron. According to this study odds of getting anemia in pregnant mothers among women Age show had a statistical significant were P-value 0.001(AOR=2.49, 95% CI:1.22- 5.08 (.

The result in The multiple logistic regression showed that the odds of getting anemia in pregnant mothers were higher among mothers whose birth interval was less in years (OR=2.192% , 95% CI: 1.012-4.751(

According to this study odds of getting anemia in pregnant mothers among women Nationality show had a statistical significant were P-value 0.047(AOR=1.830, 95% CI 1.009 - 3.318(Similar finding has also been documented in a study conducted at Jimma hospital [45]

Similarly, pregnant mothers who were gestational age show had a statistical significant were P-value 0.024 were (OR=0.580, 95% CI 0.362– 0.930) (See table 19). This table to assess different dietary risk factors associated with anemia. green leafy vegetables, taking fruit after meal and drinking tea did not show significant association with anemia on multivariate logistic regression which may be due to no difference in eating habit among the study participants.

Conclusion

This study identified factors important that determine anemia among pregnant women in the study area. Among the studied factors, drinking tea immediately after food intake, not eating meat, not taking additional diet during current pregnancy, average monthly income, taking iron supplementation irregularly and being housewife are the factors which was associated with anemia during pregnancy. It is recommended that community based early identification of

determinants of anemia and appropriate interventions have paramount importance in fighting anemia to help mothers enjoy their pregnancy. Strengthening health education and counseling on diversifying dietary intake. Regions with higher anemia prevalence among pregnant women should be given due attention. Further studies should be conducted to better understand the determinant factors in these regions. A community based study with large sample size and more strong study design should be conducted.

References

1. Sunguya, B. F., Ge, Y., Mlunde, L., Mpembeni, R., Leyna, G., & Huang, J. (2021). High burden of anemia among pregnant women in Tanzania: a call to address its determinants. Nutrition journal, 20, 1-11.
2. Bansal, R., Bedi, M., Kaur, J., Kaur, K., Shergill, H. K., Khaira, H. K., & Suri, V. (2020). Prevalence and factors associated with anemia among pregnant women attending antenatal clinic. Adesh University Journal of Medical Sciences & Research, 2(1), 42-48.
3. Tan, J., He, G., Qi, Y., Yang, H., Xiong, Y., Liu, C., ... & Liu, X. (2020). Prevalence of anemia and iron deficiency anemia in Chinese pregnant women (IRON WOMEN): a national cross-sectional survey. BMC Pregnancy and Childbirth, 20, 1-12.
4. Kare, A. P., & Gujo, A. B. (2021). Anemia among pregnant women attending ante natal care clinic in Adare General Hospital, southern Ethiopia: prevalence and associated factors. Health services insights, 14, 11786329211036303.
5. Teshome, M. S., Meskel, D. H., & Wondafrash, B. (2020). Determinants of anemia among pregnant women attending antenatal care clinic at public health facilities in Kacha Birra District, Southern Ethiopia. Journal of Multidisciplinary Healthcare, 1007-1015.
6. Abd Rahman, R., Idris, I. B., Isa, Z. M., Rahman, R. A., & Mahdy, Z. A. (2022). The prevalence and risk factors of iron deficiency anemia among pregnant women in Malaysia: a systematic review. Frontiers in nutrition, 9, 847693..
7. Mondal, B., Tripathy, V., & Gupta, R. (2006). Risk factors of Anemia during pregnancy among the Garo of Meghalaya, India. J Hum Ecol, 14, 27-32.
8. World Health Organization. (1994). Prevention and management of severe anaemia in pregnancy: report of a technical working group, Geneva, 20-22 May 1991 (No. WHO/FHE/MSM/93.5. Unpublished). World Health Organization.
9. Pritchard, J. A. (1965). Changes in the blood volume during pregnancy and delivery. Anesthesiology: The Journal of the American Society of Anesthesiologists, 26(4), 393-399.
10. McLean, E., Cogswell, M., Egli, I., Wojdyla, D., & De Benoist, B. (2009). Worldwide prevalence of anaemia, WHO vitamin and mineral nutrition information system, 1993–2005. Public health nutrition, 12(4), 444-454.
11. Mbule, M. A., Byaruhanga, Y. B., Kabahenda, M., & Lubowa, A. (2013). Determinants of anaemia among pregnant women in rural Uganda. Rural & Remote Health, 13(2).
12. World Health Organization. (2015). Guideline: sugars intake for adults and children. World Health Organization.
13. Balarajan, Y., Ramakrishnan, U., Özaltin, E., Shankar, A. H., & Subramanian, S. V. (2011). Anaemia in low-income and middle-income countries. The Lancet, 378(9809), 2123-2135.
14. Noronha, J. A., Bhaduri, A., Bhat, H. V., & Kamath, A. (2010). Maternal risk factors and anaemia in pregnancy: a prospective retrospective cohort study. Journal of Obstetrics and Gynaecology, 30(2), 132-136.

15. Salhan, S., Tripathi, V., Singh, R., & Gaikwad, H. S. (2012). Evaluation of hematological parameters in partial exchange and packed cell transfusion in treatment of severe anemia in pregnancy. Anemia, 2012.

16. Akhtar, M., & Hassan, I. (2012). Severe anaemia during late pregnancy. Case reports in obstetrics and gynecology, 2012.

17. De Benoist, B., Cogswell, M., Egli, I., & McLean, E. (2008). Worldwide prevalence of anaemia 1993-2005; WHO Global Database of anaemia.

18. Karaoglu, L., Pehlivan, E., Egri, M., Deprem, C., Gunes, G., Genc, M. F., & Temel, I. (2010). The prevalence of nutritional anemia in pregnancy in an east Anatolian province, Turkey. BMC Public Health, 10(1), 329.

19. Alghamdi, A. (2016). Prevalence of Anemia among Pregnant Women in Riyadh, Saudi Arabia. Int J Health Sci Res, 6(9), 54-60.

20. Enrera, J. A., Abdelrahman, E. A., & Abrar, R. A. (2015). Iron Deficiency Anemia among Pregnant Women in Hail Kingdom of Saudi Arabia. IOSR Journal of Nursing and Health Science (IOSR-JNHS), 4(2), 74-80.

21. Hosmer Jr, D. W., Lemeshow, S., & May, S. (2008). Applied survival analysis: regression modeling of time-to-event data (Vol. 618). Wiley-Interscience.

22. Samuel, T. M., Thomas, T., Finkelstein, J., Bosch, R., Rajendran, R., Virtanen, S. M.,... & Duggan, C. (2013). Correlates of anaemia in pregnant urban South Indian women: a possible role of dietary intake of nutrients that inhibit iron absorption. Public health nutrition, 16(2), 316-324.

23. Natarajan, M. P., Yadav, B., & Jose, R. (2017). Prevalence of anemia in pregnant women at booking visit in India. Indian Journal of Obstetrics and Gynecology Research, 4(3), 244-248.

24. Ogbeide, O., Wagbatsoma, V., & Orhue, A. (1994). Anaemia in pregnancy. East African medical journal, 71(10), 671-673.

25. Mahfouz, A., el Said, M., Alakija, W., Badawi, I., el Erian, R., & Moneim, M. (1994). Anemia among pregnant women in the Asir region, Saudi Arabia: an epidemiologic study. Send to Southeast Asian J Trop Med Public Health., 25(1), 84-87.

26. Rasheed, P., Koura, M. R., Al-Dabal, B. K., & Makki, S. M. (2008). Anemia in pregnancy: A study among attendees of primary health care centers. Annals of Saudi medicine, 28(6), 449-452.

27. Dawood, H. S., Parakash, P., & Shubber, K. M. R. (1990). Iron deficiency anemia among pregnant Arab women in Kuwait. The Journal of the Kuwait Medical Association; 24 (2), 167-72.

28. Afifi, M. (2003). Anemia in pregnancy at South Sharqiya health centers, Oman. The Journal of the Egyptian Public Health Association, 78(1-2), 39-54.

29. Hassan, R., Abdullah, W. Z., & Hussain, N. H. N. (2005). Anemia and iron status of Malay women attending an antenatal clinic in Kubang Kerian, Kelantan, Malaysia. Southeast Asian journal of tropical medicine and public health, 36(5), 1304.

30. Aikawa, R., Khan, N. C., Sasaki, S., & Binns, C. W. (2006). Risk factors for iron-deficiency anemia among pregnant women living in rural Vietnam. Public health nutrition, 9(4), 443-448.

31. Toteja, G. S., Singh, P., Dhillon, B. S., Saxena, B. N., Ahmed, F. U., Singh, R. P.,... & Sarma, U. C. (2006). Prevalence of anemia among pregnant women and adolescent girls in 16 districts of India. Food and Nutrition Bulletin, 27(4), 311-315.

32. Hyder, S. Z., Persson, L. Å., Chowdhury, M., Lönnerdal, B. O., & Ekström, E. C. (2004). Anaemia and iron deficiency during pregnancy in rural Bangladesh. Public health nutrition, 7(8), 1065-1070.

33. Lokare, P. O., Karanjekar, V. D., Gattani, P. L., & Kulkarni, A. P. (2012). A study of prevalence of anemia and sociodemographic factors associated with anemia among pregnant women in Aurangabad city, India. Annals of Nigerian Medicine, 6(1), 30.

34. Siddalingappa, H., MR, N. M., & Ashok, N. C. (2016). Prevalence and factors associated with anaemia among pregnant women in rural Mysore, Karnataka, India. International Journal of Community Medicine and Public Health, 3(9), 2532-2537.

35. Baig-Ansari, N., Badruddin, S. H., Karmaliani, R., Harris, H., Jehan, I., Pasha, O.,... & Goldenberg, R. L. (2008). Anemia prevalence and risk factors in pregnant women in an urban area of Pakistan. Food and nutrition bulletin, 29(2), 132-139.

36. ALPER, B. S., Kimber, R., & REDDY, A. K. (2000). Using ferritin levels to determine iron-deficiency anemia in pregnancy. Journal of Family Practice, 49(9), 829-829.

37. Kassa, G. M., Muche, A. A., Berhe, A. K., & Fekadu, G. A. (2017). Prevalence and determinants of anemia among pregnant women in Ethiopia; a systematic review and meta-analysis. BMC hematology, 17(1), 17.

38. Singh, R., Singh, A. K., Gupta, S. C., & Singh, H. K. (2015). Correlates of anemia in pregnant women. Indian journal of community health, 27(3), 351-355.

39. Suryanarayana, R., Chandrappa, M., Santhuram, A. N., Prathima, S., & Sheela, S. R. (2017). Prospective study on prevalence of anemia of pregnant women and its outcome: A community based study. Journal of family medicine and primary care, 6(4), 739.

40. Rasheed, P., Koura, M. R., Al-Dabal, B. K., & Makki, S. M. (2008). Anemia in pregnancy: A study among attendees of primary health care centers. Annals of Saudi medicine, 28(6), 449-452.

41. Whittaker, P. G., Macphail, S., & Lind, T. (1996). Serial hematologic changes and pregnancy outcome. Obstetrics & Gynecology, 88(1), 33-39.

42. El Ashiry, A., El Ghazali, S., & Habil, I. (2014). Prevalence and determinants of anaemia in third trimester pregnancy in Fayoum governorate-Egypt. Acta Medica Mediterranea, 30(10), 1045-1051.

43. Argaw, B., Argaw-Denboba, A., Taye, B., Worku, A., & Worku, A. (2015). Major risk factors predicting anemia development during pregnancy: unmatched-case control study. J Community Med Health Educ, 5(353), 2161-0711.

44. Bekele, A., Tilahun, M., & Mekuria, A. (2016). Prevalence of anemia and Its associated factors among pregnant women attending antenatal care in health institutions of Arba Minch town, Gamo Gofa Zone, Ethiopia: A Cross-sectional study. Anemia, 2016.

45. Belachew, T., & Legesse, Y. (2006). Risk factors for anemia among pregnant women attending antenatal clinic at Jimma University Hospital, southwest Ethiopia. Ethiopian Medical Journal, 44(3), 211-220.