

Anemia and Associated Factors among Pregnant Women Attending Antenatal Care in Karamara Hospital, Jigjiga Town, Eastern Ethiopia: A Cross-sectional Study

Alemnesh Petros^{1*}, Desalegn Kuche¹ and Tsehai Assefa Shibeshi¹

Ethiopian Public Health Institute, P.O.BOX 1242, Addis Ababa, Ethiopia

* Corresponding author: Alemnesh Petros; amenalem2005@gmail.com

Abstract

Background: Anemia occurs at all stages of human life cycle. It is more prevalent in pregnant women and young children. The burden of anemia in pregnant women remains unacceptably higher especially in the developing countries. The 2011 Ethiopian Demographic Health Survey reported 22% and 46.8% anemia prevalence among pregnant women for the National and Ethiopian Somali region, respectively.

Objective: The objective of this study was to assess the prevalence of anemia and its associated factors among pregnant women attending antenatal care in Karamara Hospital, Jigjiga, Ethiopia Somali Region.

Methods: Facility based cross sectional study was conducted on 411 pregnant women coming for first ANC service and permanent residents in the study area were included while those who were seriously ill were excluded.

Structured questionnaire was administered. Blood and stool samples were collected and diagnosed for hemoglobin and intestinal parasites, respectively. The data were entered into Epi Info version 3.5.1 then exported to SPSS version 16 and analyzed. The relationships between variables were examined through bivariate and multivariate logistic regression. P value of ≤ 0.05 was considered as statistically significant.

Result: The age of the study participants was ranging from 15 to 45 years. Hemoglobin value ranges from 11.49g/ dl to 42.81g/dl with the median and inter quartile range of 10.60 and 3.83, respectively. Of the participants, 44.2% had mild, 26.6% moderate, 27.9% severe and 1.3% very severe anemia. Age, third trimester, drinking tea immediately after meal and consumption of iron rich foods in the previous 24 hours were significantly associated with anemia during pregnancy.

Conclusion: The prevalence of anemia is high (55.8%). Age, third trimester, drinking tea after meal and organic iron rich foods consumption in the previous 24 hours are factors associated with anemia in pregnant women.

Key words: Anemia, Pregnant Women, Antenatal Care

Introduction

Anemia is a global public health problem, which affects the health as well as socio-economic development of people. Although, anemia occurs at all stages of human life cycle, it is more prevalent in pregnant women and young children. The burden of anemia in pregnant women remains unacceptably higher especially in developing countries. The currently estimated prevalence of anemia among pregnant women in the years 1993-2005 in the world was 41.8% with higher rates in African (61.3%) and Southeast Asian (52.5 %) countries (Panda *et al.* 2015). Multiple nutritional and environmental factors influence the prevalence and severity of anemia. In Sub-Saharan Africa, the causes of anemia during pregnancy include an iron and folate deficient diet and infections such as malaria, hookworm and increasingly human immunodeficiency virus (Shaw and Friedman 2011).

In Ethiopia, the proportion of anemia among pregnant women is 22%, which is the highest when compared to the proportion among breastfeeding women (19%) and neither pregnant nor breastfeeding women (15%). Although, the 2011 Ethiopian Demographic Health Survey (EDHS) showed higher rate of anemia (46.8%) among pregnant women in the Somali region (CSA

2012), studies conducted on the prevalence and associated factors with anemia in the study area are limited. Studies that assess the prevalence and associated factors with anemia are important to take appropriate intervention and reduce maternal and child mortality attributed to malnutrition due to anemia.

Evidences indicate that if anemia is not addressed in early pregnancy, it would lead to pregnancy related maternal deaths, preterm delivery, low birth weight and possibly inferior neonatal health. This study was therefore designed to determine the prevalence of anemia among antenatal care (ANC) attending women in Karamara Hospital and to identify factors associated with the anemia.

Materials and methods

The study was conducted in Karamara Hospital, Jigjiga town of Ethiopian, Somali region. It is 1669m above sea level. The dominant ethnic group living in the town is Somali and rice is the major staple food (Somali Region Health Bureau 2012). Facility based cross sectional study was conducted among pregnant women attending antenatal care in Karamara Hospital from March 11 to May 18, 2013. All pregnant women registered and attending their ANC in Karamara Hospital fulfilling the inclusion criteria and available

during the data collection period were the study population. Pregnant women who were coming for first ANC service and permanent residents in the study area were included whereas pregnant women who were seriously ill during data collection were excluded.

Sample size for this study was calculated by using single population proportion formula. According to 2011 EDHS survey report; prevalence rate of anemia among pregnant women in Ethiopian Somali Region was 46.8% (CSA 2012). By using the absolute precision of 5% with 95% confidence interval; the sample size was determined by the following formula:

$$n = \frac{z^2 p(1-p)}{d^2}$$

Where d = margin of error between the sample and the population, n = sample size, z =95% confidence interval and P = prevalence rate of 47%.

$n = \frac{1.96^2 (0.47)(0.53)}{0.05^2} = 383$. By adding 10% for non-response rate, the sample size was determined to be 421.

A structured questionnaire adopted from Food and Nutrition Technical Assistant (FANTA) for Dietary Diversity Questionnaire and Food Frequency Questionnaire (FAO Nutrition and Consumer Protection Division 2008) as well as tools from different literature sources for anemia assessment were adapted to local context. The questionnaire originally was developed in English and translated into Somali language. The questionnaire was pre-tested on 21 pregnant women in Kebribeyah health center. The questionnaire contained information on socio-demographic, socioeconomic, present and past medical history in pregnant women, ANC and current iron rich foods related questions.

Two trained midwifery nurses who can speak and read the local language (Somali) fluently administered the questionnaire. Furthermore, two senior laboratory technologists took 50 micro liter of blood from their fingertips using capillary tube. Gestational age was assessed by midwifery nurses and principal investigator using fundal height (if measurable) and the last menstrual period, and occasionally by immunological pregnancy tests.

Clean, dry, disinfectant-free wide-necked container and clean applicator sticks were used to collect fresh stool specimen. Stool smear was prepared using a drop

of saline and a piece of stick was used to mix the specimen with each drop; then, covered with a cover glass (Shimizu 2007). Direct smear was examined by 10X (10 times) and 40X (40 times) microscopic magnifications. A blood-sample was obtained by finger-prick after disinfection with alcohol, drying of the skin and removal of the first drop of blood. Giemsa stained of thick and thin smears were prepared to determine the presence or absence of malaria parasite (Shimizu 2007). Hemoglobin was used as screening test for anemia (ITCA WIC Training Program 2012).

To assure the data quality the questionnaire was translated to Somali language by a translator and retranslated in to English by another person who was blind to the original questionnaire. After an intensive two days training of data collectors, pre-testing of the questionnaire was undertaken. The final version of the questionnaire was used for the data collection. The principal investigator designed proper data collection materials and closely supervised the overall activity. All completed questionnaires were examined for completeness and consistency every day. Data was cleaned and coded before entering into Epi Info 3.5.1. and then exported to a SPSS version 16 and analyzed. Errors identified during the cleaning up of the data were corrected.

The associations between variables were examined through bivariate analysis; by computing odds ratio (OR) at 95% confidence level as well as multivariate logistic regression at 95% CI. A P value ≤ 0.05 was considered as statistically significant. Permission to undertake the study was obtained from the Ethical Review Committee of College of Health Sciences, Mekele University. Written informed consent was obtained from all study participants. All pregnant women who were found to be anemic were referred to health facility for free treatment.

Results

The age of the study participants was ranging from 15 to 45 years, with mean age of 24.9 (+5.5) years. Three hundred eighty nine (94.6%) of the study participants were married, 84.9% were Muslims and 284 (69.1%) were the Somali ethnic group. Nearly half of the study participants were 186 (45.3%) illiterate. More than three fourth (78.6%) were house wives and less than 10% were employed. The median monthly income of respondents was 900 birr with interquartile range (IQR) of 1500 birr (Table 1).

Table1: Back ground characteristics of study participants attaining ANC service in Karamara Hospital (n=411)

Variables	Number	Percent
Age(years)		
15-24	192	46.7
25-34	186	45.3
>35	33	8
Marital status		
Married	389	94.6
Non-married *	22	5.4
Religion		
Muslim	349	84.7
Orthodox	48	11.7
Protestant	10	2.4
Catholic	4	1
Ethnicity		
Somali	284	69.1
Oromo	65	15.8
Amhara	34	8.3
Gurage	14	3.4
Tigray	10	2.4
Silte	4	1
Educational status of respondent		
No education		
Elementary(1-8)	186	45.3
high school(9-12)	165	40.1
Collage and above	32	7.8
	28	6.8
Occupational status		
House wife	323	78.6
Daily laborer	30	7.3
Government or private employee	27	6.6
Merchant	24	5.8
Student	7	1.7
Monthly income (Birr)		
<500	124	30.2
501-1000	112	27.3
>1000	175	42.6

*single, divorced or widowed,

Prevalence of Anemia: The hemoglobin value of study participants was ranging from 3.43g/dl to 14.27g/dl with the median and IQR of 10.60 and 3.83, respectively. Prevalence of anemia among pregnant women who come for first routine ANC visit

in the current study after adjusted for altitude and trimester was 55.7%. Among the women, 44.2% have mild, 26.6% moderate 27.9% severe and 1.3% very severe Anemia. Table 2 shows differences in status of anemia among study participants.

Table 2: Prevalence of anemia in pregnant women attending ANC service in Karamara Hospital (n=411)

Methods used to classify	Status	
	Anemic	Non anemic
WHO classification	129(31.4%)	282 (68.6%)
Hemoglobin Adjusted for altitude	143 (34.8%)	268(65.2%)
Hemoglobin Adjusted for trimester	195(47.4%)	215(52.6%)
Hemoglobin Adjusted for altitude and trimester	233(55.8%)	178(44.2%)

About three quarter of the participants (74.7%) have habit of drinking tea immediately after meal. Dietary diversity scores revealed that the most consumed food groups by study participants were Vitamin A rich fruits and vegetables (41%), other fruits and vegetables (19.7%) and meat (24.7%) among non-anemic group of pregnant women as compared to anemic group in 24 hours preceding the survey. Among the 411 study participants, 243 (59.1%) pregnant women, consumed heam-iron rich foods

prior to 24 hours of the survey and 168 (40.9%) didn't consume. Among those 168 pregnant women who didn't consume heam-iron rich foods, 36.3% were non-anemic and 63.7% were anemic. The food consumption frequency study showed that, milk (76.4%), vegetables (69.7%), fish (14.6%), pulses (55.1%), meat (71.9%) and egg (26.4%) were the most consumed food groups seven days prior to the survey by the non-anemic group of pregnant women as compared to anemic groups (Table 3).

Table 3: Food groups consumed during 24 hours and 7 days prior to survey (n=411)

		Anemia status			
Time	Food groups	Anemic (N=178)		Non Anemic (N=233)	
		Yes N (%)	No N (%)	Yes N (%)	No N (%)
Previous 24 hours	Starch staples	223(95.7)	10(4.3)	164(92.1)	14(7.9)
	Milk and milk products	182(78.1)	21.9	137(77)	41 (23)
	Green vegetables	160(68.7)	73(31.3)	115(64.6)	63(35.4)
	Vitamin A rich fruits and vegetables	85 (36.5)	148 (63.5)	73(41)	105(58)
	Other fruits and vegetables	39(19.7)	194(83.3)	35(19.7)	143(80.3)
	Meat and fish	132(56.7)	101(43.3)	89(50)	89(50)
	Legumes ,nuts and seed	63(27)	170(73)	45(25.3)	133(74.7)
	Organ meat	31(13.3)	202(86.7)	44(24.7)	134(75.3)
	Eggs	37(15.9)	196(84.1)	28(15.7)	150(84.3)
Before seven days	Cereals	225(96.6)	8(3.4)	168(94.4)	10(5.6)
	Milk and milk products?	166(71.2)	67(28.8)	136(76.4)	42(23.6)
	Green vegetables	162(69.5)	71(30.5)	124(69.7)	54(30.3)
	Meat and fish	28(12)	205(88)	26(14.6)	152(85.4)
		115(49.4)	118(50.6)	98(55.1)	80(44.9)
	Pulse and legumes	73(31.3)	160(68.7)	52(29.2)	126(70.8)
	Fruits				
	Meat	153(65.7)	80(34.3)	129(72.5)	49(27.5)
	Eggs	58(24.9)	175(75.1)	47(26.4)	131(73.6)
	Oils and fats	109(46.8)	124(53.2)	72(40.4)	106(59.6)

The presence of anemia was assessed based on different pregnancy and nutritional variables. Maternal age, trimester, drinking tea immediately after meal and consumption of iron rich foods in the previous 24 hours were significantly associated with anemia during pregnancy. Pregnant women aged higher than or equal to 35 years were 3.27 times more likely to be exposed to anemia as compared to pregnant women in the age of 15 to 24 years (AOR 3.27 [1.21, 8.83]). Pregnant women who were in third stage of trimester (gestational age ≥ 28 weeks) were

2.59 times more likely to be exposed to anemia as compared to pregnant women in their first trimester (gestational age ≤ 12 weeks) (AOR=2.59 [1.46, 4.58]). Consumption of iron rich foods in the previous 24 hours can help to prevent anemia (38%) in pregnant women than those who didn't consume (AOR=0.62 [95% CI=0.62[0.41, 0.95]). Pregnant women who drink tea immediately after meal were 1.71 times more likely to be anemic than those women who didn't drink tea (AOR=1.71 [95% CI= [1.07, 2.73]) (Table.4).

Table 4. Factors affecting ANC service attendance in Karamara Hospital (n=411)

Variables	Anemia status		COR [95% CI]	AOR [95% CI]
	Anemic N (%)	Non-anemic N (%)		
Age (years)				
15-24	96(41.2)	96(53.9)	1.00	1.00
25-34	110(47.2)	76(42.7)	1.45 [0.96,2.17]	1.42[0.89,2.25]
≥35	27(11.6)	6(3.4)	4.50[1.78,11.39]**	3.27[1.21,8.83]*
Trimester (weeks)				
First(<12)	38(16.3)	49(27.5)	1.00	1.00
Second (13-27)	94(40.3)	78(43.8)	1.55[0.92,2.61]	1.78[1.04,3.06]
Third(≥28)	101(43.3)	51(28.7)	2.55 [1.49,4.39]**	2.59[1.46,4.58]**
History of abortion				
No	174(74.7)	153(86.0)	1.00	1.00
Yes	59(25.3)	25(14.0)	2.08[1.24,3.48]*	1.72[0.96,3.10]
Drink tea/coffee				
No	48(20.6)	58(31.5)	1.00	1.00
Yes	185(79.4)	112(68.5)	1.77 [1.13,2.77]*	1.71[1.07,2.73]*
Consumption of iron rich foods(24h)				
No	107(45.9)	61(34.3)	1.00	1.00
Yes	126(54.1)	117(65.7)	0.61 [0.41,0.92]*	0.62[0.41,0.95]*
Gravidity				
Primigravida	80(34.3)	79(44.4)	1.00	1.00
Multigravida	153	99(55.6)	1.53 [1.02,2.78]*	0.93[0.56,1.53]

*P<0.05, **P<0.01, COR (Crude odds ratio), AOR (Adjusted odds ratio), CI (Confidence interval)

Discussion

In this study, the prevalence of anemia among pregnant women who seek ANC service was 55.8%. It is consistent with studies done among pregnant women in Malaysia (Rosmawati *et al.* 2012) and Gligel Gibe dam area (Getachew *et al.* 2012) with prevalence rates of 57.4% and 53.9 %, respectively, but higher than pregnant women in Sri Lanka (Chathurani *et al.* 2012), Cape-Verde (Okeke 2011), Tanzania (Msuya *et al.* 2011) and Nigeria (Jeremiah 2016) with prevalence of 34.4%, 38.8%, 47.4% and 23.2%, respectively. The finding of the current study is also higher than those reported in different parts of Ethiopia with prevalence of 21.6 % in Azezo town, North Gondar Zone of Amhara Region, 36.6% in Shalla and 46.8% in Ethiopian Somali Region (Alem *et al.* 2013; (Nigusie *et al.* 2013; CSA 2012).

The highest variation in anemia prevalence in this study might be attributed to the use of different cutoff points. The previous studies used WHO cutoff points to define anemia, which is 11g/dl. In the current study, the values are adjusted for gestational age and altitude of the study area. But the prevalence of anemia in the

current study is lower as compared to study findings from other parts of Ethiopia, Uganda with the prevalence of 63.1% (Mbule *et al.* 2013) and Kenya with 70% (Ouma *et al.* 2007). The variation may be due to study population and study area. They included rural community and malaria endemic is whereas the present study was done in malaria free urban population. The finding indicated that pregnant mothers who are in third trimester, drink tea immediately after meal and whose age category is ≥35 years were more likely to be anemic than their counterparts.

Consumption of heme-iron rich foods in the previous 24hrs helps to prevent anemia, and increased maternal age (age ≥35 years) is found to be risk factor for anemia.

Similar results were reported from studies in Azezo (North Gondar of Amhara Region, Ethiopia) and Malaysia ; Rosmawati *et al.* 2012). Higher fertility rate and less pregnancy spacing may have exposed them to be anemic (Shaw and Friedman 2011; Okwu and Ukoha 2008).

Prevalence of anemia significantly increased as gestational ages increased. This might be due to increasing demand of micronutrients and depletion of iron in the pregnant women during the third trimester. Pregnant women who consumed organic iron rich foods in the previous 24 hours (AOR=0.62[95% CI= [0.41, 0.95]) prevent anemia better than non-consumers. This might be due to consumption of iron from animal sources, which are known to be bioavailable iron sources. The current study further showed that pregnant women who drink tea immediately after meal are 1.71 times more likely to be exposed to anemia than those women who didn't drink tea immediately after meal (AOR=1.71 [95% CI= [1.07,2.73]). This might be due to presence of higher level of tannin in tea, which is known to reduce absorption of bivalent minerals, especially iron from plant food sources.

Conclusion

The prevalence of anemia among antenatal care (ANC) attending women in Karamara Hospital was 55.8 %, showing its public health significant in the area higher than the WHO criteria(>40%).

Third trimester, maternal age (≥ 35 years), drinking tea immediately after meal and consumption of heme iron rich foods are factors that are associated with anemia in pregnant women.

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Conflict of interest

There are no personal, financial and/or non-financial competing interests among the authors of this paper.

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