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Research Article

Prevalence of Anemia and Contributing Factors among Pregnant Women Attending Public Health Facilities of Hossana Town, South Ethiopia

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ABSTRACT

Background: Anemia during pregnancy is an important contributor to maternal mortality, morbidity and poor fetal outcomes. It remains as one of the utmost unresolved public health problems in developing countries including Ethiopia. Therefore, this study intended to assess the prevalence and predictors of anemia among pregnant women in the public health facilities of Hossana town, South Ethiopia.

Methods: A facility-based cross-sectional study was conducted among 284 antenatal care attending pregnant mothers from April 1-30, 2019. The systematic random sampling method was used to select the study subjects. Data were collected through face-to-face interview and chart-review. Data were entered into the epi-data (version 3.1) and analyzed by using SPSS software (version 24). Both, bivariable and multivariable binary logistic regression was computed. Variables with P-value<0.05 were considered statistically significant at 95% Confidence Interval (CI).

Results: The overall prevalence of anemia was observed to be 26.4%. Being not informed about anemia (AOR=2.2, CI (4.1, 5.6)), heavy menstrual bleeding before the current pregnancy (AOR=3.6, CI (5.2, 13.4)), not taking animal origin food within a week (AOR=6.4, CI (4.1, 15.2)) and meal frequency of less than two times per day (AOR=2.9, CI (3.1, 22.2)) were significantly associated factors of anemia.

Conclusion: In the study setting, anemia is observed to be a moderate public health problem. Therefore, improving awareness about anemia, increasing intake of meals and strengthening nutritional counselling on consumption of iron rich foodstuffs, particularly animal sources of diet is very important to reduce the prevalence of anemia.

Keywords: Anemia; Pregnant women; Contributing factors; Hossana

Abbreviations: ANC: Antenatal Care; AOR: Adjusted Odds Ratio; CI: Confidence Interval; COR: Crude Odds Ratio; g/dL: Gram per Decilitre; Hgb: Hemoglobin; WHO: World Health Organization; SPSS: Statistical Package for Social Sciences.

INTRODUCTION

Anemia denotes a reduction in the oxygen-carrying capacity of the blood as a result of fewer circulating erythrocytes than standard or a diminution in the concentration of Hemoglobin (Hgb). Anemia during pregnancy is defined as a hemoglobin concentration less than 11 gram per decilitre (g/dl) andcategorized as mild (10.0 g/dl-10.9 g/dl), moderate (7.0 g/ dl-9.9 g/dl) and severe <7 g/ dl.

The World Health Organization (WHO) acknowledged that, the Hgb value less than 11.0 g/dl at 1st and 3rd trimesters and less than 10.5 g/dl in the 2nd trimester [1].

Women and under-five children are frequently affected by anemia; it can also touch all individual at any stage of life cycle. Worldwide, 56 million pregnant women were anemic and 20% of maternal deaths were caused by anemia. It was 35%-75% in

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developing countries and 18% in developed countries. The fetal consequences of anemia are premature births, low birth weight, fetal cognitive impairment and death [2]. In Ethiopia, several studies were conducted on the prevalence of anemia among pregnant women, the prevalence ranges from 24%-61.6%.

The federal ministry of health develops a national nutrition program strategy to improve the micronutrient deficiency among pregnant women by increasing the system to give comprehensive and routine nutritional assessment, intervention as well as routine iron and folic acid supplementation and deworming during pregnancy. Despite the efforts made by the government and other stakeholders, the issue of anemia still remains unresolved in Ethiopia. Therefore, investigating the specific etiology and prevalence of anemia in a given setting and population group is extremely vital to avert or treat anemia. Yet, there is a paucity of data in the study area. It is fact that the availability of information on the extent and associated factors has a main role in the management and control of anemia during pregnancy contributing to reductions in maternal morbidity and mortality. As a result, this study aimed to assess the prevalence and predictors of anemia among pregnant women in the public health facilities of Hossana town, south Ethiopia [3].

MATERIALS AND METHODS

Study area and period

A facility-based cross-sectional study was conducted at the public health facilities of Hossana town from April 1-30, 2019. The source population were all pregnant women attending Antenatal Care (ANC) unit in public health facilities of Hossana town during the study period and our study population were selected pregnant women attending ANC unit at public health facilities of Hossana town, southern Ethiopia and study participants were randomly selected pregnant women attending ANC at public health facilities of Hossana town during the study and who met the inclusion criteria; the total of 284 pregnant women were recruited in this study. All pregnant women attending ANC unit in public health facilities of Hossana town were included in the study. But, women who couldn't communicate during the study period were excluded from the study [4].

Sample size determination and sampling procedure

The sample of 294 participants was obtained using a single population proportion formula. The following assumptions were used; the prevalence of anemia, 62% (which was taken from the previous study conducted in the Bodeti health center) and with a 95% confidence interval, a 5% margin of error, and 5% non-response rate. The desired numbers of study participants were allocated proportionally for each health facility. The attendance which contains the list of pregnant women that mention the last year three months' period was as the sampling frame. The systematic random sampling procedure was used to select the study participants [5].

Data collection tool and procedure

Data were collected through face-to-face interviewer administered structured questionnaire. Data on hemoglobin level and stool examination were collected by reviewing charts of women.

The questionnaire was adapted from related published research by considering the purpose of the study and local situation. The questionnaire contained socio-demographic factors, pregnancy and medical characteristics and dietary intake information. All the laboratory investigations were done by laboratory technicians as part of their routine activity [6]. Four diploma and two bachelor's degree midwives were recruited for data collection and supervision.

To confirm the quality of data, the tool was translated first to the amharic local language and then translated back to English by experts to check its consistency. The tool was pre-tested on 5% of the sample size in a similar setting and the required adjustments were made based on the nature of gaps identified in the tool. Furthermore, data collectors and supervisors were trained for a day by the investigators on the content of the questionnaire and the ways to collect the data. Moreover, the supervisors and the investigators closely followed the day-to-day data collection process during the pre-test and the actual data collection. Moreover, the filled questionnaire was collected and signed by the supervisor once it was checked for any omitted items and completeness [7].

Measurement

Anemia was defined as the hgb level of below 11 g/dl during the first and second trimester pregnancy and 10.5 g/dl in the second trimester as per WHO criteria. Women who had Hgb value between 10 g/dL-10.9 g/dL, 7 g/dL-9.9 g/dL, and <7 g/dL were categorized as having mild, moderate and severe anemia, respectively [8].

Data processing and analysis

Data were entered into epi-data (version 3.1) and analyzed using SPSS software (version 20). The outcome variable, anemia was dichotomized into (1=anemic and 0=not anemic). Descriptive statistics was used to summarize the data. Binary logistic regression analysis was done to see the association between the dependent and explanatory variables. Variables which have p-value ≤ 0.25 in bivariate analysis were entered into multivariable logistic regression model to identify the independent effect of each explanatory variable on the outcome variable. In conclusion, variables which have a p-value of <0.05 was assumed to be statistically significant. The model fitness was checked by Hosmer-Lemeshow statistic with a value of 0.76 which proves that it was a good fit [9].

RESULTS

Socio-demographic characteristics

All the study participants (294 women) were completed the interview, making the response rate of 100%. The mean age of the mothers was 27.2 ± 4.9. Nearly all, (97.5%) of them were married and 68.7% were Hadiya in ethnics. One-third of the respondents, (35.5%) were attended a primary level education and around half of them (53.9%) were housewives [10]. With regard to the size of the households, more than two-third of the respondents (71.1%) has three to five family members (Table 1).

Table 1: Socio-demographic and economic characteristics of the study participants, south Ethiopia, 2019 (n=284).

Variables	Categories	Frequency	Percent
Age of women	18-22	94	33.1
	23-34	152	53.5
	≥ 35	38	13,4
Marital status	Married	277	97.5
	Other	7	2.5
Ethnicity	Hadiya	196	68.7
	Kambata	44	15.5
	Silti	19	6.7
	Amhara	13	4.6
	Gurage	12	4.2
Religion	Orthodox	32	11.2
	Protestant	218	76.8
	Catholic	6	2.1
	Muslim	28	9.9
Education status	Can't read and write	42	14.8
	Able to read and write	88	31
	Primary level	101	35.5
	Secondary and above	53	18.7
Occupation of women	House wives	153	53.9
	Merchant	61	21.5
	Government employee	51	18
	Students	19	6.6
Size of household	≤ 3	44	15.5
	3-5	202	71.1
	≥ 6	38	13.4
Family monthly income in Ethiopian birr	<2000	99	34.9
	2000-4500	133	46.8
	>4500	52	18.3

Pregnancy and health related characteristics

More than two-third of respondents, 201 (70.8%) were multigravida, 158 (55.6%) delivered at the health facility and 94 (46.8%) gave birth in the interval of more than three years. Almost half of the respondents, 136 (47.9%) had one or two ANC visits, 137 (48.2%) of them were found within the gestational period of the third trimester and 197 (69.4%) had an iron supplement. Additionally, about 3.8% and 1.9% of the respondents have encountered still birth and abortion respectively. Moreover, only 2.8% of the respondents had chronic illness during their previous pregnancy [11]. About, 13.7% and 6.3% of the respondents were reported a history of intestinal parasites and malaria in the last one year respectively (Table 2).

Table 2: Pregnancy and health related character of studied women in Hossana town, south Ethiopia, 2019 (n=284).

Variables	Category	Frequency	Percent
Age at first delivery	≤ 18	29	10.2
	19-23	134	47.2
	≥ 24	121	42.6
Birth interval	<2 Years	27	13.4
	2-3 Years	80	39.8
	>3 Years	94	46.8
Gravida	Primigravida	83	29.2
	Multigravida	201	70.8
Place of previous delivery	Home	126	44.4
	Health institution	158	55.6
Gestational age in weeks	≤ 12	51	18.7
	13-24	94	33.4
	≥ 25	137	48.2
Number of ANC visit	One-two times	136	47.9
	Three times	99	34.9
	Four times	49	17.2
Utilized contraceptive method	Yes	231	81.3
	No	53	18.7
Iron supplementation on current pregnancy	Yes	197	69.4
	No	87	30.6
History of chronic illness	Yes	8	2.8
on previous pregnancy	No	193	97.2
Heavy menstrual bleeding	Yes	29	10.2
	No	255	89.8
Malaria attack in last one year	Yes	18	6.3

	No	266	93.7
Heard about anemia	Yes	118	41.5
	No	166	58.5
Had anemia	Yes	118	41.5
	No	166	58.5
Took medication for parasite	Yes	17	43.6
	No	22	56.4

Prevalence of anemia and description of dietary intake

The overall prevalence of anemia was found to be 26.4%. In terms of its severity; 45 (60%), 28 (37.3%) and 2 (2.7%) of the respondents had a mild, moderate and severe anemia, respectively. The mean hemoglobin level was 12.4 g/dL ± 3.21 g/dL.

Concerning to meal frequency, two-third of the respondents (68.2%) were consumed three times within a day, 40.2% of them took vegetables 2-3 times per week. Less than half of the respondents, (41.9%) took animal origin foodstuff once per a week and one-third of them (33.1%) drank tea immediately following a meal (Table 3).

Table 3: Nutritional patterns of pregnant women in public health facilities in Hossana town, south Ethiopia, 2019 (n=284).

Variables	Category	Frequency	Percent
Meal frequency per day	≤ 2 Times	78	27.6
	3 Times	193	68.2
	>3 Times	12	4.2
Frequency of taking vegetables	Daily	7	2.5
	2-3/Weeks	113	40.2
	4-6/Weeks	70	24.9
	Once/Week	66	23.5
	Once/Month	25	8.9
Frequency of taking fruits	Daily	27	9.5
	2-3/Week	93	32.7
	4-6/Week	63	22.2
	Once/Week	54	19
	Once/Month	46	16.2
	Never	1	0.4
Frequency of taking cereals	Daily	252	88.8
	2-3/Week	14	4.9
	4-6/Week	16	5.6

	Never	2	0.7
Frequency of taking animal origin food	Daily	20	7
	2-3/Week	19	6.7
	4-6/Week	24	8.5
	Once/Week	119	41.9
	Once/Month	57	20.1
	Never	45	15.8
Drank coffee after meal	Everyday	208	73.2
	Occasionally	72	25.4
	Never	4	1.4
Drank tea after meal	Everyday	94	33.1
	Occasionally	122	43
	Never	68	23.9
Anemia	Yes	75	26.4
	No	209	73.6
Severity of anemia	Mild anemia	45	60
	Moderate anemia	28	37.3
	Severe anemia	2	2.7

Factors associated with anemia

The results of the bivariate logistic regression analysis revealed that, family monthly income, gestational age, educational status, birth interval, heavy menstrual bleeding before the current pregnancy, not having information about anemia, history of intestinal parasites, malaria attack in last one year, not taking animal origin food, meal frequency of ≤ 2 times per day and drinking tea immediately after the meal were the identified significantly associated factors of anemia. However, the multivariable logistic regression analysis revealed that; not being informed about anemia, having heavy menstrual bleeding, not taking animal origin food within a week and meal frequency of ≤ 2 times per day were remained statistically significantly associated factors of anemia [12].

Being not informed about anemia was 2.2 times at a greater risk of experiencing anemia than those who were informed about anemia (AOR=2.2, CI (4.15.6)). Similarly, having heavy menstrual bleeding among pregnant women were 3.6 times more likely to be anemic than their counter parts (AOR=3.6, CI (5.21, 13.42)).

Additionally, pregnant women who had a meal frequency of ≤ 2 per day were 2.9 times at higher risk of experiencing anemia than those whose had meal frequency of >3 times per day (AOR=2.9, CI (3.1, 22.2)). Moreover, pregnant women who didn't eat animal origin food within a week were 6.4 times more likely to be anemic as compared to their counterparts (AOR=6.4, CI (4.1, 15.2)) (Table 4).

Table 4: Contributing factors of anemia among pregnant women attending ANC in public health facilities of Hossana town, south Ethiopia, 2019 (n=284).

Characteristics	Category	COR (95 % CI)	P	AOR (95% CI)	P
Educational level	Can't read and write	8.6 (3.3, 27.9)	0.003	7.4 (4.4, 22)	0.052

	Able to read and write	4.2 (1.2, 12.8)	0.033	1.2 (3.1, 8.6)	0.069
	Primary level	2.8 (2.1, 13.4)	0.044	10.5 (2.2, 47)	0.074
	Secondary and above	1		1	
Monthly income of family	<2000	2.7 (4.3, 9.7)	0.002	1.6 (0.2, 6.9)	0.511
	2000-4500	3.3 (2.1, 5.9)	0.83	1.2 (0.5, 3.6)	0.611
	>4500	1		1	
Birth interval in years	<2	3.1 (3.8, 12.7)	0.022	2.4 (0.82, 6.8)	0.362
	2-3	2.8 (1.4, 5.3)	0.311	1.1 (0.98, 2.07)	0.424
	>3	1		1	
Gestational age in weeks	≤ 12	1		1	
	13-24	2.2 (2.6, 9.3)	0.047	0.07 (0.64, 4.8)	0.784
	≥ 25	1.6 (2.3, 7.6)	0.019	1.4 (0.88, 9.1)	0.094
Had heavy menstrual bleeding	Yes	4.8 (4.1, 12.8)	0.002	3.6 (5.21, 13.4)	0.006
	No	1		1	
Heard about anemia	Yes	1		1	
	No	4.3 (3.9, 8.2)	0.002	2.2 (4.1, 15.6)	0.016
Had intestinal parasites	Yes	1.6 (2.4, 8.2)	0.117	1.1 (0.63, 4.2)	0.451
	No	1		1	
Malaria attack in last one year	Yes	2.5 (3.2, 22.1)	0.011	0.4 (0.08, 8.2)	0.122
	No	1		1	
Taking animal origin food within a week	Yes	1		1	
	No	8.9 (5.2, 18.1)	<0.001	6.4 (4.1, 15.2)	<0.001
Meal frequency	2 times	3.3 (5.3, 22.8)	0.002	2.9 (3.1, 22.2)	0.011
	3 times	2.1 (4.5, 14.6)	0.011	1.8 (4.4, 13.6)	0.014
	≥ 4 times	1		1	
Drink tea immediately after meal	Yes	1.3 (3.2, 11.1)	0.021	0.6 (0.04, 9.2)	0.233
	No	1		1	

DISCUSSION

This study was aimed to assess the prevalence and contributing factors of anemia among pregnant women attending public health facilities of Hossana town. The WHO criteria were used to classify anemia. In the current study, the prevalence of anemia was observed to be 26.4%.

This figure was nearly similar to the studies done in Mizan Tepi, Tikur Anbesa specialized hospital and India in which the reported prevalence was, 23.5%, 24.4% and 24.8% respectively. In contrary, this rate was lower as compared to the findings of the Gilgel Gibe dam, Ethiopia and Kenya in which the reported prevalence were 53.9% and 57%.

This discrepancy might be due to differences in socioeconomic and awareness towards anemia. In contrast, this finding was higher as compared to the studies conducted in Debre Berhan, Ethiopia and Iran in which the reported prevalence was 9.7% and 13.1%. The inconsistency between the current study and the above-mentioned studies might be due to differences in socio-economic, geographic and eating habit.

Heavy menstrual bleeding (using greater than seven sanitary pads per menstrual period) before the current pregnancy was recognized as one independent associated factor for the existence of anemia. Pregnant women who had heavy menstrual bleeding were 3.6 times more likely to be anemic as compared to their counterparts. This study was consistent with studies conducted at Tikur Anbessa specialized hospital, Ethiopia and Kenya. The possible justification could be heavy menstrual bleeding reduces the mothers' body stores of iron. This exposed her to additional need of iron.

Being not informed about anemia had also a positive significant association with anemia. Women who did not have information about anemia were 2.2 times more likely to be anemic as compared to their counterparts. This is consistent with studies conducted in Mizan Tepi and Indonesia. The reason might be due to the fact that, women who have information about anemia had a more chance to be aware of its prevention by taking the routinely ordered iron supplementation. Secondly, informed women have a greater likelihood to eat additional food properly.

The present study also identified that, meal frequency was significantly associated with anemia. Pregnant women who had meal frequency two times per day were 2.9 times at higher risk of developing anemia than those whose meal frequency was four times per day. This finding is in line with a study done in Mekele and the reason could be the physiological changes occurred during pregnancy, upsurge the requirement for Iron and other nutrients, which can be realized with increased number of meal frequency [13]. Moreover, not eating an animal origin food within a week was also significantly associated with anemia. Pregnant women who didn't eat an animal origin food within a week were 6.4 times more likely to be anemic as compared to their counterparts. This finding is consistent to the study done in Mekelle and Turkey. This is could be the fact that, consumption of animal origin food is an essential source for improving iron intensity of the women.

CONCLUSION

In the study setting, anemia is found to be a moderate public health problem. Not being informed about anemia, heavy menstrual bleeding, not ingestion of animal origin food within a week and meal frequency were factors significantly associated with anemia. Therefore, improving of awareness about anemia, increasing intake of meals and strengthening nutritional counselling on ingestion of iron rich foodstuffs particularly, animal source of foods is very important to reduce the prevalence of anemia.

LIMITATION OF THE STUDY

Recall and/or social desirability bias might be hosted on dietary information. Moreover, since the study was cross-sectional it may not show the cause and effect relationship of the anemia.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical clearance was obtained from the research review committee of Hossana health science college. Additionally, permission letter was attained from health bureau of Hossana town and respective administrative officials of each health facility. Informed written consent was sought from each study participant. The participants were told about the objective, procedures, possible risks, and benefits of the study. Moreover, the participants were ensured that rejection to consent or withdrawal from the study would not alter or put at risk their access to care.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIAL

The datasets used and /or analysed during the current study are available from the corresponding author on reasonable request.

COMPETING INTERESTS

The authors declare that they have no conflict of interests.

FUNDING

The study received a fund from Hossana college of health science. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

AUTHORS' CONTRIBUTIONS

RD: conceived and designed the study, have analyzed the data, HM and AE: has analyzed the data, review and edit the manuscript; EE and RA: participated in data collection, analysis and reviewed the paper. All the authors read and approved the final version of the manuscript.

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