Associated factors of Anemia among pregnant women attending Banadir hospital in Somalia

Mohamed M. Omar[1], Tarig H. Merghani[2*], Mariam O. Qurashi[3] and Sahla M. Ahmed[3]

[1]Faculty of Medical Postgraduate Studies, University of Gezira, Wad Medani, **Sudan**
[2]Department of Physiology, RAK College of Medical Sciences, RAK Medical and Health Sciences University, **UAE**
[3]Department of Physiology, Faculty of Medicine University of Gezira, Wad Medani, **Sudan**

The prevalence of anemia in pregnancy is approaching half of all pregnant women, worldwide. Because of the high burden of the disease and its complications that affect both the mother and her fetus, the determinant factors are receiving increased attention. The aim of this study was to analyze the relation of different demographic, social, and economic factors that could be associated with anemia in pregnancy. The study was carried out among 130 pregnant women, who presented with anemia to Banadir Hospital in Somalia. Information about age, residence, education, occupation, medical history, social attributes, and nutritional history were collected using a structured, interviewer-based questionnaire. The statistical Package for the Social Sciences, version 20 (IBM Corp., Armonk, NY, USA) was used for data analysis. Based on hemoglobin concentration, anemia was classified as mild in 35.4%, moderate in 43.8%, and severe in 20.8% of the participants. Factors that showed statistically significant association with anemia included low educational level, residence in rural areas, non-employment, low family income, large family size, twin pregnancy, excessive tea intake, and previous abortions. Although poverty is the underlying cause of most anemia-related factors, nutritional education and promotion of antenatal care could be helpful in the prevention of anemia in pregnancy.

Keywords: Anemia; Pregnancy; Hemoglobin; Education

INTRODUCTION

Anemia is a global public health problem that imposes major consequences on human health as well as social and economic effects (Jufar and Zewde, 2014). It affects 41.8% of pregnant women worldwide, especially in Africa, where the prevalence reaches 57.1% (Gedefaw et al. 2015). Anemia in pregnancy is associated with fetal low birth weight, prematurity, intrauterine growth retardation, intrauterine death of the fetus and birth asphyxia as well as maternal premature rupture of membranes, premature birth, oligohydramnios, and increased susceptibility to develop infections (Kassa et al. 2017; Rahman et al. 2016; Ortiz-Montalvo et al. 2019; Prakash, 2015). In addition, anemia reduces energy and capacity for work thus affecting mothers' ability to secure food for their families and reducing their income (Ndegwa, 2019).

Anemia in pregnancy is a preventable disease but still represents a major health problem in Somalia. Although iron and folate supplementations are regularly distributed to pregnant women as part of the Somali national control strategy of micronutrient deficiency (2014 – 2016), the burden of anemia is still high. There could be determinant factors that predispose to anemia during pregnancy and could be associated with high fetomaternal morbidity and mortality. Many such factors have been identified and reported in regional and Western countries; however, in Somalia, there is a lack of information due to insufficient studies. Therefore, the investigation of the possible causes and associated factors of anemia in pregnancy will help the Somali health authorities to take appropriate actions, based on evidence, to prevent this problem.

The aim of this study is to investigate the relation of different demographic, social, and economic factors with anemia in pregnancy.

MATERIALS AND METHODS

Methods
Study design

A cross-sectional hospital-based study was carried out on anemic pregnant women attending Banadir hospital in Mogadishu, Somalia. The study was conducted during the period from January 2021 to June 2021.

Study area

Mogadishu is the capital city of Somalia with estimated population of 1.6 million. It is located in Banadir region. The Banadir Hospital is a teaching hospital established in 1977. It consists of pediatric and maternity sections with bed capacity of 700.

Study population

Anemia in pregnancy is diagnosed when hemoglobin concentration is less than 11.0 g/dL. It is considered severe when hemoglobin concentration is <7 g/dL, moderate when it is between 7 and 9.9 g/dL, and mild when it is 10–10.9 g/ dL. The participants were pregnant women whose hemoglobin level was < 11.0 g/dL. They were admitted to the hospital during the study period. The study included 130 participants representing all hospitably admitted pregnant women who fulfilled the inclusion criteria during the study period (pregnant women with HB < 11 g/dL). Non-pregnant women and pregnant women whose HB ≥ 11 g/dL were excluded.

Data collection tools

A structured, interviewer-based questionnaire was used to collect data from pregnant women. The questionnaire requested demographic information of each participant, current and past medical history, obstetrical history, history of abortions, nutritional and dietary habits, frequency of antenatal care visits, and iron/ folic acid supplementations.

Ethical considerations

The study was approved and ethically cleared by the Research Ethics Committee of the Faculty of Medicine, University of Gezira (2020-21). Official permission to conduct the study was obtained from the Hospital Director.

All the participants gave their informed consent before participation. The identity, data, and confidentiality of the participants were protected and handled in accordance with the ethical principles of medical research by the World Medical Association (WMA, 2013).

Data analysis

The Statistical Package for Social Science (SPSS) program version 20.0 (IBM Corp., Armonk, NY, USA) was utilized for data analysis. The chi-square test was used in analysis of categorical variables and the student's t-test for continuous variables. The data was presented in figures and tables as frequency and percentage or mean ± standard deviation. Statistical significance was accepted for $p < 0.05$.

RESULTS

Socio-demographic characteristics of the participants in relation to anemia

Out of 130 pregnant women enrolled in the study, 21% had severe anemia, 44% had moderate anemia and 35% had mild anemia. Statistical analysis showed an insignificant association between anemia and the age of participants (Table 1).

Table 1: Socio demographic characteristics of the participants in relation to anemia n=130

		Anemia				P-value
		Mild	Moderate	Severe	Total	
Age of the respondents (Y)	15-20	11 (44%)	8 (32%)	6 (24%)	25 (19%)	0.532
	21-25	10 (26%)	21 (55%)	7 (18%)	38 (29%)	
	26-35	21 (38%)	24 (44%)	10 (18%)	55 (42%)	
	>35	4 (33%)	4 (33%)	4 (33%)	12 (09%)	
	Total	46 (35%)	57 (44%)	27 (21%)	130 (100%)	
Social status	Married	38(36.9%)	47 (45.6%)	18 (17.5)	103 (79.2%)	0.458
	Divorced	7 (30.4%)	8 (34.8%)	8 (34.8%)	23 (17.7%)	
	Widowed	1 (25.0%)	2 (50.0%)	1 (25.0%)	4 (3.1%)	
Residence	Urban	42 (40.4%)	46 (44.2%)	16 (15.4%)	104 (80.0%)	0.040
	Rural	4 (15.4%)	11 (42.3%)	11 (42.3%)	26 (20.0%)	
Educational attainment	Illiterate	1 (6.7%)	9 (60.0%)	5 (33.3%)	15 (11.5%)	0.007
	Non-formal	23 (39.0%)	24 (40.7%)	12 (20.3%)	59 (45.4%)	
	Primary	7 (25.0%)	16 (57.1%)	5 (17.9%)	28 (21.5%)	
	Secondary	8 (38.1%)	8 (38.1%)	5 (23.8%)	21 (16.2%)	
	University	7 (100.0%)	0 (0.0%)	0 (0.0%)	7 (5.4%)	
Occupation	Unemployed	37 (32.2%)	51 (44.3%)	27 (23.5%)	115 (88%)	0.039
	Employed	9 (60%)	6 (40%)	0 (0.0%)	15 (12%)	
Monthly income ($)	< 50	2 (10.0%)	6 (30.0%)	12 (60.0%)	20 (15.4%)	< 0.001
	50-199	31 (36.0%)	42 (48.8%)	13 (15.1%)	86 (66.2%)	
	200-500	13 (54.2%)	9 (37.5%)	2 (8.3%)	24 (18.5%)	
Family size (n)	2-3	12 (57.1%)	4 (19.0%)	5 (23.8%)	21 (16.2%)	0.014
	4-6	25 (34.7%)	33 (45.8%)	14 (19.4%)	72 (55.4%)	
	> 7	9 (24.3%)	20 (54.1%)	8 (31.6%)	37 (28.4%)	

The percentage of severe anemia was significantly higher among women living in rural areas compared to urban areas (p= 0.04), illiterate mothers compared to educated ones (p= 0.007), unemployed compared to the employed group (p= 0.039), and low income compared to higher-income rate (p< 0.001). The analysis also showed that anemia tends to be mild in families of three or fewer members and moderate in families with more members (p= 0.014). The social status of the mother, whether married, divorced, or widowed, showed an insignificant association (table 1).

Obstetrics, gynecological and antenatal history of the participants in relation to anemia

Anemia in pregnancy is significantly associated with the history of abortion, and twin pregnancy (p< 0.001). Insignificant associations were found with a previous history of excessive bleeding, gravidity, frequency of antenatal visits, and time of initiation of iron supplements during pregnancy (table 2).

Nutritional history and eating habits of the participants in relation to anemia

The reported alterations in appetite and eating habits during pregnancy have insignificant relation to the development of anemia (table 3). Frequency of tea consumption showed a significant relation to anemia; however, coffee, fruits/ vegetables and meat intake have insignificant association (table 3).

Table 2: Obstetric, gynecological and antenatal history of the participants in relation to anemia n=130

		Anemia				P-value
		Mild	**Moderate**	**Severe**	**Total**	
History of abortion	Yes	10 (20.4%)	24 (49%)	15 (30.6%)	49 (37.7%)	< 0.001
	No	36 (44.4%)	33 (40.7%)	12 (14.8%)	81 (62.3%)	
History of excessive bleeding	None	23 (44.2%)	20 (38.5%)	9 (17.3%)	52 (40.0%)	0.805
	Menstruation	7 (29.2%)	12 (50.0%)	5 (20.8%)	24 (18.5%)	
	Antepartum	8 (26.7%)	14 (46.7%)	8 (26.7%)	30 (23.1%)	
	Postpartum	4 (26.7%)	8 (53.3%)	3 (20.0%)	15 (11.5%)	
	Other causes	3 (33.3%)	3 (33.3%)	3 (33.3%)	09 (6.92%)	
Gravidity	Primigravida	14 (51.9%)	8 (29.6%)	5 (18.5%)	27 (20.8%)	0.171
	2 - 3 times	20 (37.7%)	23 (43.4%)	10 (18.9%)	53 (40.8%)	
	> 3 times	12 (24.0%)	26 (52.0%)	12 (24.0%)	50 (38.5%)	
History of twin pregnancy	Yes	0 (0%)	3 (25%)	9 (75%)	12 (9.2%)	< 0.001
	No	46 (38.9%)	54 (45.8%)	18 (15.3%)	118 (90.8%)	
Antenatal visits (n)	0-1	23 (29.1%)	38 (47.5%)	19 (23.8%)	80 (61.5%)	0.349
	2-4	22 (45.8%)	18 (37.5%)	8 (16.7%)	48 (36.9%)	
	> 4	1 (50.0%)	1 (50.0%)	0 (0.0%)	02 (1.5%)	
Initiation of iron supplements	Never	21 (29.6%)	324 (5.1%)	18 (25.4%)	71 (54.6%)	0.065
	1st trimester	16 (55.2%)	12 (41.4%)	1 (3.4%)	29 (22.3%)	
	2nd trimester	5 (23.8%)	9 (42.9%)	7 (33.3%)	21 (16.2%)	
	3rd trimester	4 (44.4%)	4 (44.4%)	1 (11.1%)	09 (6.9%)	

Table 3: Nutritional history and eating habits of the participants in relation to anemia n=130

		Anemia				P-value
		Mild	**Moderate**	**Severe**	**Total**	
Pregnancy induced alterations in appetite and eating habits	No change	11 (50.0%)	8 (36.4%)	3 (13.6%)	22 (16.9%)	0.178
	Increased appetite	0 (0.0%)	0 (0.0%)	1 (100.0%)	1 (0.8%)	
	Reduced appetite	35 (32.7%)	49 (45.8%)	23 (21.5%)	107 (82.3%)	
Intake of fruits/ vegetable salad per week	< once	36 (34.0%)	47 (44.3%)	23 (21.7%)	106 (81.5%)	0.419
	1 - 2 times	9 (52.9%)	6 (35.3%)	2 (11.8%)	17 (13.1%)	
	> 2 times	1 (14.3%)	4 (57.1%)	2 (28.6%)	7 (5.4%)	
Intake of meat per week	< once	43 (34.7%)	55 (44.4%)	26 (21.0%)	124 (95.4)	0.424
	1 - 2 times	2 (100.0%)	0 (0.0%)	0 (0.0%)	2 (1.5%)	
	> 2 times	1 (25.0%)	2 (50.0%)	1 (25.0%)	4 (3.1%)	
Tea intake per day	< once	23 (45.1%)	21 (41.2%)	7 (13.7%)	51 (39.2%)	0.001
	2 - 3 times	21 (32.8%)	32 (50.0%)	11 (17.2%)	64 (49.2%)	
	> 3 times	2 (13.3%)	4 (26.7%)	9 (60.0%)	15 (11.5%)	
Coffee intake per day	< once	45 (35.4%)	55 (43.3%)	27 (21.3%)	127 (97.7%)	0.605
	> once	1 (33.3%)	2 (66.7%)	0 (0%)	3 (2.3%)	

DISCUSSION

Anemia in pregnancy is one of the most widespread public health problems, especially in developing countries. It has adverse health, welfare, social and economic consequences. The finding that 35% had mild anemia, 44% had moderate anemia and 21% had severe anemia are similar to the results of a regional study conducted in Uganda in which the prevalence of mild, moderate, and severe anemia were 28.1%, 51.7% and 20.2%, respectively (Mahamoud et al. 2020). Another study found that the majority of anemic pregnant women (67.3 %) had the mild type (Asrie, 2017). The high percentage of moderate and severe anemia in our study is an alarming finding as most of the patients live in urban areas and have access to health care facilities. The expected number of anemic patients in the rural areas who have limited access to hospitals could be very high. It is worth noting that the overall prevalence of gestational anemia in Somalia is about 48.7%, which could be linked to high maternal mortality and poor pregnancy outcomes.

In this study, mild anemia was most prevalent in the younger age groups, whereas severe anemia was highest in the older age groups. Although this finding is statistically insignificant, it can be explained by the fact that the older mothers might have more children to feed, which would affect their own nutrition, especially in families with limited resources and income. Our finding is consistent with the study done by Yadav and Das, who noted that the majority of primigravida women develop mild and moderate anemia (Yadav and Lal-Das, 2015). The significant association between anemia and a large family size further confirms this. We found that the percentage of moderate and severe anemia are higher in families of more than seven members compared to families of three members or less, who are more likely to develop mild anemia. History of twin pregnancy is likewise associated with the grade of anemia. Similarly, Abay and colleagues noted that the likelihood of developing severe anemia among mothers from families of large sizes was higher when compared to those from small family sizes (Abay et al. 2017).

The association between the family income of participants and their level of anemia was statistically significant, which agrees with a study conducted by Derso and his colleagues who found that the likelihood of anemia was higher among pregnant women whose income was equivalent to US dollar 52.22 or less (Derso et al. 2017). In addition, and most likely because of the difference in income, the study found a higher percentage of severe anemia in unemployed women, and in those living in the rural areas.

A recent study showed that widowed or separated women were more likely to have anemia (Hakizimana et al. 2019). However, this study showed an insignificant association between anemia in pregnancy and the social status of women, whether still married, divorced or widowed. In many developing countries, including Somalia, men are the principal source of income of the family. Divorced, widowed and separated women lack this support, and therefore, are likely to suffer from malnutrition and low access to health services.

A highly significant relation was found between the educational attainment of the participants and their hemoglobin level. Severe anemia was more prevalent in the illiterate group and absent in the highly educated group. The most likely explanation is the better income and therefore, better nutrition of the educated mothers (Stephen et al. 2018). In support to that, severe anemia was higher in the unemployed group. None of the employed participants in our study had severe anemia.

The majority reported a low frequency of antenatal visits, and therefore, iron supplements were either never prescribed or started lately in about two-thirds of the participants. This could explain the insignificant association between gestational anemia and iron supplementation in this study. The compliance of those who received the tablets cannot be confirmed. However, regular intake of iron and folic acid supplements during pregnancy remains one of the best ways to prevent anemia (Yakoob and Bhutta, 2011).

An important finding is the association of anemia with tea intake. A significant proportion of the pregnant women in this study reported high frequency of tea consumption. These women are likely to develop iron deficiency anemia because chelators in tea, like tannin, reduce iron absorption (Disler et al. 1975). Conversely, no significant relation was found with frequency of coffee, fruits, vegetables, or meat intake.

A few limitations in this study need to be considered for the interpretation of the results. The sample size is relatively small, especially for mothers from rural areas that have limited healthcare facilities. Other limitations were the recall and reporting bias, which is common in all questionnaire-based studies.

CONCLUSION

Based on the findings of this study, poverty, illiteracy, lack of health awareness and nutritional culture are the major causes of anemia in pregnancy. Preventive programs are highly needed and recommended to provide education, financial support, and employment opportunities for women, especially in rural areas.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

AUTHOR CONTRIBUTIONS

MMO designed and performleed the data collection and wrote the manuscript. THM supervised all stages of the study. THM, MOG, and SMA performed the data analysis and reviewed the manuscript. All authors read and approved the final version.

REFERENCES

Abay A, Yalew HW, Tariku A, Gebeye E, 2017. Determinants of prenatal anemia in Ethiopia. Archives of public health = Archives belges de sante publique, 75, 51. https://doi.org/10.1186/s13690-017-0215-7.

Asrie F, 2017. Prevalence of anemia and its associated factors among pregnant women receiving antenatal care at Aymiba Health Center, northwest Ethiopia. J Blood Med. 8:35-40. doi:10.2147/JBM.S134932.

Derso T, Abera Z, Tariku A, 2017. Magnitude and associated factors of anemia among pregnant women in Dera District: A cross-sectional study in northwest Ethiopia. BMC Research Notes 10, 359. doi: 10.1186/s13104-017-2690-x.

Disler PB, Lynch SR, Torrance JD, et al, 1975. The mechanism of the inhibition of iron absorption by tea. The South African Journal of Medical Sciences 40(4):109-116. PMID: 1862.

Gedefaw L, Ayele A, Asres Y, Mossie A, 2015. Anemia and Associated Factors Among Pregnant Women Attending Antenatal Care Clinic in Wolayita Sodo Town, Southern Ethiopia. Ethiop J Health Sci. 25(2):155-162. doi:10.4314/ejhs.v25i2.8

Hakizimana D, Nisingizwe MP, Logan J, Wong R, 2019. Identifying risk factors of anemia among women of reproductive age in Rwanda - a cross-sectional study using secondary data from the Rwanda demographic and health survey 2014/2015. BMC Public Health 19(1):1662. doi:10.1186/s12889-019-8019-z.

Jufar AH, Zewde T, 2014. Prevalence of Anemia among Pregnant Women Attending Antenatal Care at Tikur Anbessa Specialized Hospital, Addis Ababa Ethiopia. J Hematol Thromb Dis 2: 125 doi: 10.4172/2329-8790.1000125.

Kassa GM, Muche AA, Berhe AK, Fekadu GA, 2017. Prevalence and determinants of anemia among pregnant women in Ethiopia; a systematic review and meta-analysis. BMC Hematol. 17:17. doi:10.1186/s12878-017-0090-z.

Mahamoud NK, Mwambi B, Oyet C, et al, 2020. Prevalence of Anemia and Its Associated Socio-Demographic Factors Among Pregnant Women Attending an Antenatal Care Clinic at Kisugu Health Center IV, Makindye Division, Kampala, Uganda. J Blood Med. 11:13-18. doi:10.2147/JBM.S231262.

Ndegwa SK, 2019. Anemia & Its Associated Factors Among Pregnant Women Attending Antenatal Clinic At Mbagathi County Hospital, Nairobi County, Kenya. African Journal of Health Sciences 32(1):59–73.

Ortiz-Montalvo YJ, Romani KJO, Trujillo BSC, Revilla SCN, Balta GLR, 2019. Sociodemographic and prenatal factors associated with anemia in Peruvian pregnant women. Enfermeria Global 18(4):273–281. doi: 10.6018/eglobal.18.4.358801.

Prakash S, Yadav K, Bhardwaj B, Chaudhary S, 2015. Incidence of Anemia and its Socio-demographic determinants among pregnant women attending for antenatal care: A cross sectional study. International Journal of Medical and Health Research 1(3):12-17.

Rahman MM, Abe SK, Rahman MS, Kanda M, Narita S, Bilano V, Ota E, Gilmour S, Shibuya K, 2016. Maternal anemia and risk of adverse birth and health outcomes in low- and middle-income countries: systematic review and meta-analysis. Am J Clin Nutr. 103(2):495-504. doi:10.3945/ajcn.115.107896.

Stephen, G. Mgongo , Hashim TH, et al. Anaemia in Pregnancy: Prevalence, Risk Factors, and Adverse Perinatal Outcomes in Northern Tanzania'. Anemia 2018. ID 1846280. doi: 10.1155/2018/1846280.

World Medical Association, 2013. WMA Declaration of Helsinki: Ethical principles for medical research involving human subjects. JAMA 310:2191-2194.

Yadav U, Lal-Das B, 2015. A study on occurrence of anemia in primigravida women attending antenatal ward of BPKIHS. Health Renaissance 13(3):37-40. doi: 10.3126/hren.v13i3.17925.

Yakoob MY, Bhutta ZA, 2011. Effect of routine iron supplementation with or without folic acid on anemia during pregnancy. BMC Public Health 11(S21). doi: 10.1186/1471-2458-11-S3-S21.