Assessment of the Prevalence of Anemia and Its Associated Factors among Pregnant Women in Bahir Dar City Administration, North-West Ethiopia

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Abstract

Background: Anemia in pregnancy is a public health problem affecting maternal and child health globally and particularly in many developing countries like Ethiopia.

Objective: This study aims to assess the prevalence of anemia and associated factors among pregnant women at Bahir Dar city administration, North-West Ethiopia.

Methods: A cross-sectional study was conducted in public health facilities of Bahir Dar city from May to July 2014 on 480 pregnant women. Mothers who came for ANC during the study period and who met the inclusion criteria were interviewed. Hemoglobin level determination was assessed following the standard procedures. Socio-demographic, obstetrics, medical history and nutrition related data was collected using a pretested structured questionnaire. Data were collected by trained health workers and coded and cleaned. The data were entered and analyzed by using SPSS version 16.0 software. Bivariate and multivariate regression analysis were done to assess the association between outcome and independent variables. Significance level of 0.05 was considered.

Result: The overall prevalence of anemia in this study population was 18.3%. Fifty one anemic cases (10.6%) showed mild type of anemia followed by moderate anemia 33 (6.9%) and the remaining 4 (0.8%) were having severe anemia. Gravidity (AOR=2.1, 95% CI: 1.1-4.1), trimester of pregnancy (AOR=2.9, 95% CI: 1.1-7.7), history of abortion (AOR=4.9, CI: 2.4-10.2) and history of ante partum hemorrhage (AOR=2.6, 95% CI: 1.1-6.6) had statistically significant association with anemia in pregnant women.

Conclusion: In the present study, the prevalence of anemia was relatively low. Gravidity, trimester of pregnancy, history of abortion and antepartum hemorrhage are the main contributing factors for anemia.

Keywords: Pregnancy; ANC; Anemia; Ethiopia

Abbreviations: ANC: Antenatal Care Follow up; APH: Ante Partum Hemorrhage; AOR: Adjusted Odd Ratio; CI: Confidence Interval; EDHS: Ethiopian Demographic and Health Survey; WHO: World Health Organization

Background

Anemia is a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs, which vary by age, sex, altitude, smoking and pregnancy status. It occurs at all stages of the life cycle particularly over half of preschool and pregnant women in developing countries. The majority of women in the developing countries start pregnancy with depleted body stores of nutrients [1]. The increased iron requirement is due to expansion of maternal red blood cell mass during pregnancy which leads to high proportion of anemic women [2].

Basically anemia can be caused by poor health and nutrition status. Nutritional deficiencies like iron, foliate, Vitamin B12 and Vitamin A can cause anemia. Infectious diseases in particular malaria, helminthes infections and chronic disease such as HIV/AIDS are important factors contributing to the high prevalence of anemia [3]. Anemia is estimated to contribute to more than 115,000 maternal deaths and 591,000 prenatal deaths globally per year [4].

Globally, WHO estimated that one third of the world’s population have anemia and the majority (50%) of cases reside in developing countries like Sub-Saharan Africa and South East Asia. About more than half the world’s population (57.5%) of pregnant women resides in countries where Anemia is a severe public health problem [5].

According to 2011 EDHS report 22% of pregnant women were anemic at national level and it was 16.6% in Amhara National Regional State. The highest proportion of pregnant women are anemic (22%) than women who are breastfeeding (19%) and women who are neither pregnant nor breastfeeding [6]. Studies done in Gilgel Gibe and Gondar also showed prevalence of 53.9% and 21.6% respectively [7,8].

However, there is no sufficient scientific evidence available on the stated problem in the study area. This study is, therefore, aimed at assessing prevalence of anemia and associated factors among pregnant women attending ANC in Bahirdar city administration, North-West, Ethiopia.

Methods

Study design and area

A Facility based cross-sectional study design was conducted in Bahir Dar city administration from May to July, 2014. The study was
conducted in Bahir Dar city administration, Northwest part of Ethiopia which is located 565 km far from the capital Addis Ababa. It is a capital of Amhara National Regional State with a total population of 267,350 of whom 113,535 are women. The city administration has nine sub cities with total public health centers of 10 and 2 hospitals. Among the residents 180,174 (81.16%) are urban inhabitants and the rest of population are living at rural kebele’s around Bahir Dar city. The major economic sectors of the city are horticulture, agro-industrial processing, urban agriculture and manufacturing and diverse service industries.

Source populations
All pregnant women who attended ANC in Bahir Dar city administration public health centers.

Study populations
Pregnant women who attended ANC service in the selected Bahir Dar city administration public health centers during the study period.

Inclusion criteria
Pregnant women who attended antenatal care visit in the selected Health centers during the study period and provide informed written consent were included.

Exclusion criteria
Pregnant women who were seriously ill and had communication barriers were excluded from the study.

Sample size determination
Sample size was determined using single population proportion formula by taking 5% degree of precision and 95% CI with the following assumptions:

The prevalence of anemia among pregnant women was taken as 36.6% [9]. Using the formula \( n = \frac{Z^2 \times p \times (1-p)}{d^2} \) for computing the sample size for cross sectional study and non-response rate of 10%, 389 pregnant women included in the study. Since the total independent variable is 24 and the required sample size should be a minimum of 480. So to make CI precise, the sample size was adjusted from 389 to 480.

Sampling procedures
Four Health Centers were considered which carried out Hemoglobin determination for pregnant mothers routinely. Each respondent from the respective health centers were selected by proportional allocation method. From each health centers consecutive subjects were included until the desired sample size was achieved.

Dependent variable
Occurrence of anemia

Independent variables
- **Social-demographic factors**: Age, marital status, residency, education status, pregnant occupation and family size.
- **Obstetrics and medical history**: Parity, gestational period and birth interval, history of abortion, history of APH, history of malaria attack, HIV status and pregnancy induced hypertension and DM.
- **Nutritional related factors**: Consumption of iron rich food, frequency of coffee and tea intake and iron folic acid supplementation and regular de-worming.

Data collection
Data were collected through face-to-face interview using structured, pre-tested questionnaire. Trained nurses collected the data after explaining the purpose of their visit by reading the information sheet. The questionnaire was adopted from Demographic Health Survey (DHS, 2005) and prepared in English, which was translated into Amharic language.

Pretest was done in 5% of the sample in Felege Hiwot Hospital (Bahir Dar). Findings and experiences from the pre-test were utilized in modifying the data collection tool. Supervision was done during data collection. The collected data were checked for completeness and clarity by supervisors and principal investigators on daily basis.

Blood sample collection process
Blood sample was collected via finger-prick with disposable lancet and hemoglobin concentration was measured using a portable Hemo-Cue photometer system. Standardized checklist was used to gather information on Hemoglobin count and HIV status.

Data analysis
The data was coded and entered using SPSS version 16.0 statistical software. Data were cleaned for inconsistencies and missing values and analyzed using SPSS version 16.0 statistical software. Frequencies and proportions were computed for description of the study population. Significance was determined using crude and adjusted odds ratios with 95% confidence intervals.

Bivariate and multivariate logistic regression analyses were done to assess the association between dependent and independent variables. In the bivariate analysis, statistically significant variables at significance level of 0.02 were included for the multivariate analysis and significance level of 0.05 were considered for the multivariate analysis.

Operation definitions
The following definitions were used for the analysis and interpretation.

1. Anemia in pregnancy: Hemoglobin level below 11 g/dl during pregnancy.
2. Mild anemia: Hemoglobin level from 10-10.9 g/dl.
3. Moderate anemia: Hemoglobin level from 7-9.9 g/dl.
4. Severe anemia: Hemoglobin level from <7 g/dl [10,11].

Ethical issue
Institutional ethical clearance was obtained from the research and publication office of Bahir Dar University. Permission to conduct this study was obtained from Bahir Dar city administration health department. Individual written informed consents were obtained from each study participant before starting the study, participants were requested to agree after they had understood the study aims and before answering the questions. Confidentiality was assured, where anonymous questionnaires were used.

Results
**Socio-demographic characteristics**
A total of 480 mothers who attended ANC were interviewed making a response rate of 100%. The mean age of the attendants was 26.7 years old ± 4.9 years. More than half of the study groups (56.5%)
were 25-34 years old. About 30.4% were unable to read and write. Half of the pregnant women (49.4%) were house wife and 89 (18.5%) were government employee. Majority of the study participants (83.1%) were urban residents. About three fourth of the attendants (78.1%) had 2-4 family size (Table 1).

Obstetric and medical history

Out of the total respondents, 120 (25%) of the pregnant women were in the first trimester (gestational age less than 13 weeks) and 51 (10.6%) had history of abortion. Pertaining to gravidity, 83.3% were Primigravid. Regarding HIV status, 29 (6%) were HIV positive and 151 (31.5%) had previous history of Malaria attack at least once. Moreover, only 19 (4%) had any medical illness at the time of the study (Table 2).

Prevalence of anemia

The prevalence of anemia in this study population using a cut off level 11 g/dl was 88 (18.3%). Fifty one anemic cases (10.6%) showed mild type of anemia followed by moderate 33 (6.9%) and 4 (0.8%) severe anemia (Figure 1).

Factors associated with the occurrence of anemia among ANC attendant pregnant women

Association of independent variables with occurrence of anemia was assessed using logistic regression. After controlling other variables, the multivariate analysis showed that multi gravida women were 2.1 more likely to develop anemia as compared to primi gravida women (AOR=2.1, 95%CI: 1.1-4.1). Similarly, third trimester pregnant women were 2.9 more likely to develop anemia as compared to first trimester women (AOR=2.9, 95% CI: 1.1-7.7). Previously aborted women had 5 times higher chance of developing anemia as compared to those who have no anemia (AOR=4.9, 95% CI: 2.4-10.2). Women who had history of ante partum hemorrhage were 2.6 more likely to develop anemia as compared to who had no same history (AOR=2.6, 95% CI: 1.1-6.6) (Table 4).

Discussion

Nutrition related factors

Related to nutrition, 341 (71%) of the attendees consumed meat within 24 h during the study period and 469 (97.7%) of pregnant women ate Teff. More than half (55.4%) were took tea once or less per a day and three fourth of the study subjects took both tea and coffee always during/after meal. 265 (55.2%) of the attendants took Iron Foliate supplementation. 180 (37.3%) of the antenatal care attendants have received de-worming drug (Table 3).
This study included all pregnant women and used both questionnaire and lab based approaches to determine anemia status. The overall prevalence of anemia was found to be low compared to other similar studies [8,9,12-18]. This could be explained by the urban nature of the study area where women have better nutritional status and better health information.

This low prevalence of anemia in the current study might be due to differences in study area. It was also lower when compared with the national prevalence of anemia reported in EDHS 2011 and higher than prevalence of anemia in Amhara national regional state [6]. The lower prevalence of anemia in this study relative to the national might be explained by the method that is survey include large population and time period difference. The reason for the higher prevalence of anemia in this study from the regional figure could be the population difference that is the regional study subjects were all women of child bearing age (15-49 years) while this study only includes pregnant women.

In this study, majority of the study subjects showed mild type anemia which is similar with the study done in Gondar (Ethiopia), Sudan, Gilgel Gibe (Ethiopia) and in India [7,8,14,15]. Unlike to other studies conducted in different study areas, this

<table>
<thead>
<tr>
<th>Variable</th>
<th>Anemia</th>
<th>COR (95% CI)</th>
<th>AOR (95% CI)</th>
<th>P-value</th>
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<tr>
<td>Gravidity</td>
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<td>1</td>
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<td>56</td>
<td>2.3 (1.3, 3.8)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>First</td>
<td>16</td>
<td>104</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Second</td>
<td>33</td>
<td>147</td>
<td>1.5 (0.8, 2.8)</td>
<td>1.9 (0.8, 4.7)</td>
</tr>
<tr>
<td>Third</td>
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<td>141</td>
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<td>1</td>
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<td>5.1 (2.9, 9.4)</td>
<td>4.9 (2.4, 10.2)</td>
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<td>History of Ante Partum Hemorrhage</td>
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<td></td>
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<tr>
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<td>17</td>
<td>3.8 (1.8, 8.2)</td>
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<td>Regular deworming</td>
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<tr>
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<td>1</td>
</tr>
<tr>
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<td>147</td>
<td>1 (0.6, 1.61)</td>
<td>0.7 (0.4, 1.3)</td>
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<td>Iron/folic acid supplementation</td>
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<td></td>
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<tr>
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<td>1</td>
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<tr>
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<td>Coffee intake</td>
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<td>once or less per day</td>
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<td>Tea intake</td>
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<td>1</td>
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<tr>
<td>once or less per day</td>
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<td>222</td>
<td>0.61 (0.34, 1.09)</td>
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</tr>
<tr>
<td>Not at all</td>
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<td>102</td>
<td>0.67 (0.34, 1.29)</td>
<td>0.6 (0.3, 1.2)</td>
</tr>
</tbody>
</table>

Table 4: Bivariate and multivariate logistic regression analysis among pregnant women in Bahir Dar city administration, North West Ethiopia, 2014.
study failed to observe any relationship between occurrence of anemia and any socio-demographic factors [14,19-22]. In this study, insignificant association between anemia and parity was observed and this is in line with studies that were conducted in Sudan and Niger delta of Nigeria but in contrary finding in Saudi Arabia low parity had low risk of anemia [19,21,23]. Among the determinants, gravidity, level of trimester, history of abortion and history of antepartum hemorrhage were factors significantly associated with anemia.

This study showed that third trimester women were more likely to develop anemia when compared to first trimester women which is collaborates with findings of other studies and also this study showed that multi gravida women were more likely to develop anemia than prime gravida women which is consistent with other studies [9,15,18,19,23-28]. This might be explained due to increase demand, depleted iron stores and maternal RBC expansion in different levels of gravidity and trimesters.

In this study pregnant women who had history of abortion were more likely to develop anemia as compared to non-aborted mothers which is the same to other study conducted in Brazil [29]. History of Antepartum Hemorrhage is significantly associated with anemia which might be due to depletion of iron that leads to anemia [30-32].

Limitation of the Study

Even though this study tried to address some important factors, other factors, such as other comprehensive nutritional and parasitic infection assessment were not addressed. As limitation, the study was cross-sectional which cannot measure the cause and effect relationship. The study may not also represent the general community since it is conducted at urban setting.

Conclusions

The prevalence of anemia in the study areas is relatively low. Among the predictors; trimester of pregnancy, history of abortion, gravidity and history of ante partum hemorrhage were found to have a statistically significant association with occurrence of anemia during pregnancy. Focused antenatal care should be strengthened for all pregnant women to detect and combat anemia in early stages of pregnancy. In addition, future researches should be done at community level with large sample size.

Author’s Contributions

DG: Initiated the research, carried out the data analysis, interpreted the results and drafted the manuscript. AB, BB, TT and ZM: Involved in designing the study, drafting the statistical analysis and write up of the manuscript. All authors read and approved the final manuscript.

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