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Original article

Prevalence of Anaemia among Pregnant Women Attending Benghazi Medical Centre

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Abstract
Anemia in pregnancy is a public health problem with poor outcomes for both mother and child. It is the most common cause of maternal mortality. Severe anemia is associated with preterm birth, low birth weight, and a fetus small for gestational age. Though anemia is an easily treatable and largely preventable disease if detected, it continues to be significantly prevalent among pregnant women. This study was conducted to assess the prevalence of anemia among pregnant women receiving care at the obstetric unit within Benghazi Medical Center. A cross-sectional study was conducted on 100 pregnant women randomly selected attending the Benghazi Medical Center -Benghazi, Libya. The prevalence of anemia was 71%. The higher prevalence of anemia was in the third trimester of pregnancy (91%). Anemia was more prevalent in pregnant women within the age of 29-39(51%) and with a university-level education (40%)**.** Daily meat consumption was reported by 41% of the pregnant women. The majority of participants consumed green vegetables daily (75%), although fresh fruit consumption was infrequent for many (46%). Approximately 53% reported consuming 2-3 meals per day. Most pregnant women did not drink tea immediately after meals (63%). Approximately 81% of the participants reported taking iron, folic acid, and vitamin supplements. There is no statistical association between anemia and any characteristic of a pregnant woman. Our study concludes that the prevalence of anemia in pregnant women was 71%. Strengthen community health education about anemia in pregnancy. Health education should include the consequences of anemia in pregnancy, proper nutrition, maintaining regular antenatal visits, and the importance of early diagnosis of anemia.
Keywords. Anaemia, Pregnant Women, Benghazi Medical Centre.

Introduction

Anemia is a medical condition in which individuals have a quantitative deficiency of hemoglobin (HB), the oxygen-carrying component of red blood cells (RBCs). It is noted that Hb levels are approximately: Less than 13.5 g/dL in adult males, 12 g/dL in adult females. Normal levels can vary depending on the laboratory reference range [1]. Iron deficiency is the most common micronutrient deficiency in the world. [2] Mild iron deficiency anaemia is common in women of reproductive age [1]. Anemia may manifest with fatigue, shortness of breath, pallor, weakness, palpitations, hair loss, headaches, vertigo, leg cramps, cold intolerance, dizziness, irritability, fatigue, poor concentration [1,3], pica, restless legs syndrome, and reduced physical performance. These symptoms are often dismissed as normal during pregnancy, as they can also be attributed to the physiologic changes in pregnancy. Pagophagia, a specific form of pica entailing the eating of ice, has a 95% specificity for iron deficiency in women [3].

Anaemia is one of the most prevalent complications during pregnancy. It is commonly considered a risk factor for poor pregnancy outcomes and can result in complications that threaten the life of both mother and fetus [4]. Normally, during pregnancy, erythroid hyperplasia of the marrow occurs, and red blood cell (RBC) mass increases. However, a disproportionate increase in plasma volume results in hem dilution (hydraemic of pregnancy): haematocrit (Hct) decreases from between 38% and 45% in healthy women who are not pregnant to about 34% during late single pregnancy and to 30% during late multifetal pregnancy. The following haemoglobin (Hb) and Hct levels are classified as anaemic; First trimester: Hb < 11 g/dL; Hct < 33%, 2nd trimester: Hb < 10.5 g/dL; Hct < 32%, 3rd trimester: Hb < 11 g/dL; Hct < 33 %2% [4] Anaemia in pregnancy can be further divided as mild, moderate and severe anaemia for haemoglobin level; Mild 10.0–10.9 g/dL, Moderate 7–9.9 g/dL and Severe <7 g/dL [5].

Anaemia of pregnancy is most commonly caused by iron deficiency [2, 6]. IDA complicates approximately 30–60% of pregnancies globally [7,8]. Iron deficiency affects more than 40% of first- trimester pregnancies in the US using standard cut-offs of percent transferrin saturation and/or serum ferritin (<50 µg/L) [6]. The incidence of iron deficiency without anaemia has not been well described, but appears to increase throughout gestation, with 30–50% of pregnant individuals affected by low serum ferritin by the end of pregnancy [9]. Iron deficiency anemia in pregnant individuals is known to increase maternal morbidity and mortality [10]. In pregnancy, untreated isolated iron deficiency is associated with an increased risk of iron deficiency anemia, placental hypertrophy, and maternal hypothyroidism [11]. Maternal consequences of iron deficiency anaemia include abnormal thyroid function, preterm labour, preterm birth placental abruption, preeclampsia, eclampsia, and caesarean delivery [10, 11]. In addition, maternal iron deficiency anemia is associated with an increased risk of postpartum depression, decreased quality of life, severe, severe postpartum hemorrhage, maternal shock, increased admission to the maternal intensive care unit, and

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hysterectomy [12]. Antenatal and postnatal maternal sepsis, need for blood transfusion, poor wound healing, cardiac failure, and even maternal death [10, 11, 13]. Maternal iron deficiency is associated with an increased risk for adverse consequences to their offspring including low birth weight, small size for gestational age, and higher rates of foetal distress [14].

The contextual factors contributing to anemia among pregnant women are different. Interaction of multiple factors like women's socio-demographic, economic, nutritional, and health- related factors cause anemia in pregnant women. [15].

Despite the high prevalence, health inequalities, and negative impact on both mother and fetus iron deficiency remains underdiagnosed, understudied, and undertreated [2]. It's common for women to become anemic during pregnancy because of diminished intake and increased demand and requirements and altered metabolism; therefore is a common public health problem with poor outcomes for both mother and child. The management and control of anemia during pregnancy are significantly influenced by the availability of local information on the severity and associated risk factors. Our study aims to determine the prevalence of anemia among Libyan pregnant women to determine its trend and its aggravated risk factors among Libyan pregnant women receiving care at the obstetric unit at Benghazi Medical Center.

Methods

Study design and setting

A cross-sectional study was conducted between July 1, 2023, and August 30, 2023, at Benghazi Medical Center (BMC). A total of 100 pregnant women were selected through a convenience sampling technique from all pregnant women attending the obstetric unit during the study period, regardless of age, parity, or trimester.

Data collection

Data was collected through face-to-face interviews using a structured questionnaire developed by the researchers and from laboratory investigations. The questionnaire was designed based on relevant literature to align with the research objectives. It consisted of three main sections: Section One contains socio-demographic information, gathered data on age, occupation, family size, and educational level. Section two comprises data related to obstetric and gynecological history, such as parity, gravidity, menstrual cycle characteristics, birth intervals, and any existing medical conditions. The last section focused on participants' dietary habits, specifically their consumption of iron-rich foods and foods that might inhibit iron absorption. Participants were asked to specify the frequency of their food consumption (daily, weekly, monthly, rarely, or never) and the number of meals they consumed per day. Additionally, they were queried about supplement intake, specifically iron and folic acid, and whether they took them (yes or no).

Laboratory Investigations

A laboratory investigation of complete blood counts (CBC) was performed to estimate the hemoglobin level

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics, including frequency, percentage, mean, and standard deviation (SD), were employed to summarize the data. Inferential statistics, such as the Chi-squared test (x2) were utilized to examine the association between anemia and various demographic characteristics. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study received formal approval from the Faculty of Medicine Committee for Medical Research Ethics. Written consent was obtained from the authorities of Benghazi Medical Center, and informed consent was acquired from all participating women after providing a straightforward explanation of the research objectives. Verbal consent was obtained from all pregnant women after informing them that their participation was entirely voluntary, and they had the right to refuse the interview.

Results

In this study, a total of 100 pregnant women were analyzed, demonstrating a wide age range from 18 to 44 years, with a mean age of 31±6.4 years. The most prevalent age group among the participants fell within the range of 29-39 years. The women had completed university-level education about 40%, with a significant portion being housewives (78%), followed by teachers (15%). These women typically resided in medium-sized families consisting of 4-5 individuals (42%) and reported a family income between 1500 and 2000 (57%) (Table 1).

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Table 1. Socio-demographic characteristics of pregnant women, n=100

Women characteristics	No.	%
Age		
18-28	40	40.0
29-39	51	51.0
49-49	9	9.0
Education		
Primary	15	15.0
Secondary	32	32.0
College	13	13.0
University	40	40.0
Occupation		
House wife	78	78.0
Teacher	15	15.0
Accounting	2	2.0
Nurse	3	3.0
Doctor	2	2.0
Family income		
250-500	11	11.0
570-700	5	5.0
750-1000	27	27.0
1500-2000	57	57.0
Family size		
2 – 3	32	32.0
4 – 5	42	42.0
6 – 7	17	17.0
>7	9	9.0

Our findings indicated that 31% of the pregnant women had blood group A Positive, closely followed by O Positive at 25% (Fig. 1).

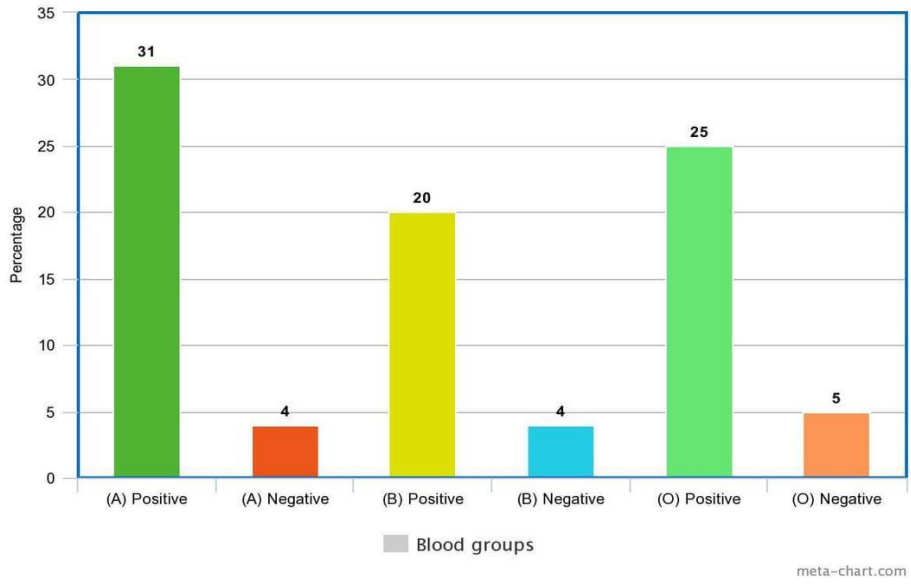

Figure 1. The distribution of blood group antigen among the participants

In terms of obstetrical history, 50% of the participants were multigravida, with 54% having two children. A majority of the participants (62%) had not experienced any abortions, and a substantial portion (94%) reported having regular menstrual cycles. Additionally, 82% of the pregnant women did not experience any bleeding during the current pregnancy, with 67% having given birth within the previous 1-2.5 years. Most of the participants were in the third trimester of pregnancy (Table 2).

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Table 2. Distribution of pregnant women according to obstetric history.

Obstetric History	No	%
Gravidity		
1-3	50	50
4-6	40	40
7-9	10	10
Parity		
0	16	16.0
1—3	54	54
4—6	25	25
7—9	5	5
Miscarriage		
0	62	62
1- 3	32	32
4 - 6	5	5
>6	1	1
Period flow amount		
Normal	94	94
Irregular	1	1
Heavy	4	4
Clot bleeding	1	1
Pregnancy		
First trimester	5	5
Second trimester	4	4
Third trimester	91	91
Abnormal bleeding		
APH	14	14
PPH	4	4
No	82	82
Last delivery		
0 – 2	67	27
3 – 5	26	26
>5	7	7

A significant proportion of the participants did not experience severe vomiting (68%), while 16% had chronic medical conditions (Table 3).

Table 3. Distribution of medical conditions among pregnant women.

Women Characteristics	No	%
Hyperemesis		
Yes	32	32
No	68	68
Chronic diseases		
Yes	16	16
No	84	84

Daily meat consumption was reported by 41% of the pregnant women. The majority of participants consumed green vegetables daily (75%), although fresh fruit consumption was infrequent for many (46%). Approximately 53% reported consuming 2-3 meals per day. Most pregnant women did not drink tea immediately after meals (63%). Approximately 81% of the participants reported taking iron, folic acid, and vitamin supplements (Table 4).

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Table 4: Distribution of pregnant women according to dietary practice and supplement intake.

Women characteristics	No	%
Meat intake		
Daily	41	41
Weekly	32	32
Per month	8	8
Rarely	16	16
No	3	3
Fresh fruits		
Daily	3	3
Weekly	19	19
Per month	32	32
Rarely	46	46
Green vegetables		
Daily	75	75
Weekly	14	14
Per month	4	4
Rarely	6	6
No	1	1
Number of meals per day		
1 – 2	29	29
2 – 3	53	53
> 3	18	18
Drinking tea after meals		
Yes	30	30
No	63	63
Sometimes	7	7
Did you take folic acid vitamins iron?		
Yes	81	81
No	4	4
Sometimes	15	15

In this study, 71% of the participants were found to have anemia during the current pregnancy. Figure 2

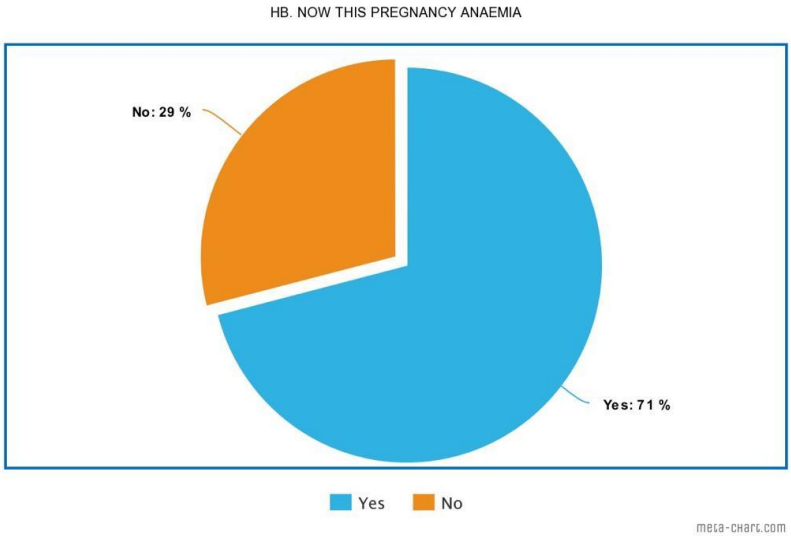

Figure 2. Prevalence of anemia

Within our total study population of 100 individuals, we observed a high prevalence of anemia, with varying degrees of severity: 29 individuals (29%) exhibited normal hemoglobin levels, 22 individuals (22%) had mild anemia, 34 individuals (34%) presented with moderate anemia, and 13 individuals (13%) displayed severe anemia. Additionally, 2 individuals (2%) were identified with life-threatening levels of anemia. These findings emphasize the diverse spectrum of anemia within our study cohort, highlighting the critical importance of assessing and managing anemia in this specific population (Figure 3).

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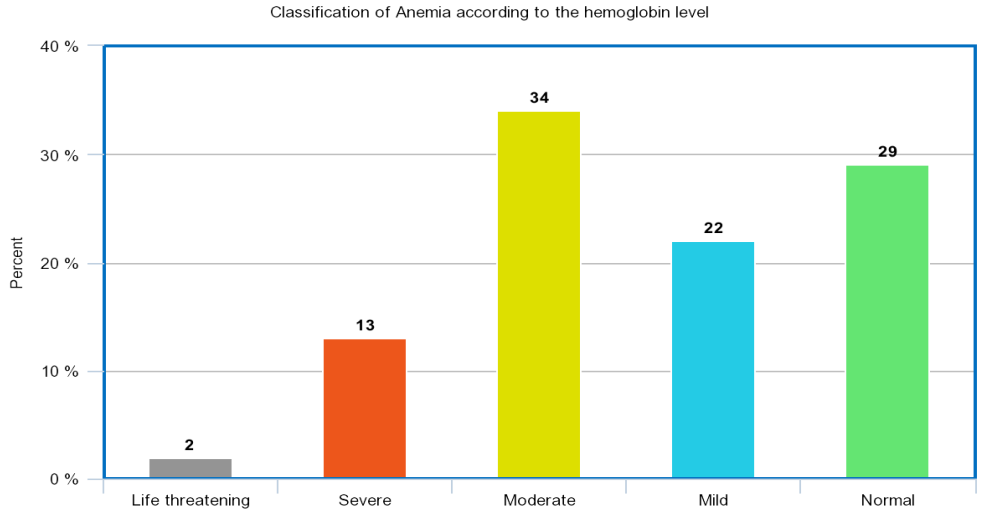

Figure 3. Classification of anemia according to the hemoglobin level during pregnancy

The study findings indicate a statistically significant difference in hemoglobin levels before and during pregnancy. Before pregnancy, the mean ± SD hemoglobin level was 10.7±1.7, whereas during pregnancy, it decreased to 9.5±1.7, resulting in a mean difference of 1.23. This substantial drop in hemoglobin levels during pregnancy is highly significant, with a p-value of 0.001. We found no significant statistical association between anemia and all Socio-demographic characteristics of participants. All obstetric risk factors, dietary factors had no significant statistical association to get anemia, P value more than 0.05.

Discussion

Anaemia in pregnant women in developing countries is significantly higher than in developed countries due to pregnancies economic, sociological, and health factors [16]. In developing countries such as Libya, this becomes even more of an issue during pregnancy. There are numerous causes of anemia, and the risk factors that are linked to it differ greatly throughout regions and populations. This data was gathered from pregnant women from Benghazi city/Libya attending at Benghazi Medical Center (BMC). Libya is classified as a developing country with a Human Development Index (HDI) of 0.784, and Libya's estimate of prevalence was higher than other studies estimate [17]. There is a consensus in the literature that anemia is a common problem in pregnant women in most developing countries. Anemia is considered a severe public health problem among pregnant women when the prevalence is 40.0% or more by the WHO [18].

The results of the current study showed that a high prevalence of anemic patients among pregnant women is 71%. The prevalence estimates of anemia in Benghazi Medical Center, slight similar to previous Libyan study, the overall prevalence among pregnant women in northwest of Libya 72% [19], however, the figure is relatively comparable to other studies conducted in other cities in Libya such as Derna was 54.6% [17] and Al- Bayda was 56.5% [18], these findings were higher than some African countries and North Africa such as South Western Uganda (7.4%) [20], Ethiopia (41%) [21], Nigerian (62.6%) [22] Kafr Al-Sheikh city/Egypt (32%) [23], Sudan (42.3%) [24], As well this finding is higher to the overall prevalence found among pregnant women than other studies in the Middle East countries, Jordan (34.7%) [25], Hail City Saudi Arabia (34.1%) [26], Iraq (38%) [27] and Bahrain (38%) [28].

The mean age group of pregnant women was 31±6.4 years. Anemia condition is seen among pregnant women within the age group between 29-39 years, followed by the age group 18-28 years. However, Anemia was more prevalent in pregnant women between the ages of 15-20 and 36-40 years in a previous study conducted in Derna [17]. The age of the mother is not significantly associated with anemia, which is similar to other studies carried out in the west Algeria, which indicated no relation found between age and anemia p value=0.440[16]. However, it was significant in the Derna city study [17].

In this study, the mean ± SD haemoglobin concentration among the study participants was 9.5±1.7, which is comparable to 11.21 ± 1.18 g/dL, which is low [15].

Depending on the severity of anemia, the study revealed that the pregnant women presented with moderate anemia, in contrast with a previous study done in Derna city [17], other global studies [15, 26,30,31], the highest prevalence of anemia was mild type. While similar to the study done in Yemen, moderate anemia was the most common anemia [32]. The higher prevalence of anemia was in the third trimester of pregnancy in consistent with other studies [17, 30], and different from another study that reported anemia prevalence was higher in the second trimester [31].

Factors such as low education, high parity, poor socio-economic poor nutritional status, and certain diseases have been found as important determinants of anaemia [34]. This study revealed that no significant statistical association between anemia and educational level which was by Jordan and Nigeria studies [22, 25] while unlike the Derna study [17], and no significant statistical association between anemia and obstetric

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risk factors like number of gravidity and parity similar to Derna city study [17]. The anaemia was significantly associated with parity in other studies, multiparous women are more prone to get anaemia [26, 31, and 35].

Iron from red meat raises hemoglobin levels, particularly during pregnancy when there is a greater need for iron [35], however in the current study reported that consumption of red meat had no statistical association to get anemia, P value more than 0.05, unlike other studies the low consumption of red meat associated with anemia among the participants pregnant [15,17,26,35]. The consumption of leafy green vegetables can reduce the risk of anaemia by increasing haemoglobin concentration. [36]. This study also revealed a significant finding regarding green vegetables, it was not significantly associated with getting anemia. This finding is consistent with a previous study conducted in Ethiopia [36]. Unlike previous studies conducted in Dessie, northern Ethiopia, which reported low consumption of green vegetables to be significantly associated with an increased risk of anaemia [36,37].

The study has limitations. Most of the participants were in the third trimester of pregnancy because the hospital only receives delivery cases and does not follow up on pregnancies.

Conclusion

Our study concludes that the prevalence of anemia in pregnant women was 71%. The percentage of anemia was higher than in previous studies conducted in Libya and the world. There is no relationship between anemia and age with any demographic characteristic of a pregnant woman in terms of patient history. Strengthen community health education about anemia in pregnancy, Health education should include the consequences of anemia in pregnancy, proper nutrition, maintaining regular antenatal visits, and the importance of early diagnosis of anemia. Further reaches on anemia in pregnancy is needed.

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Conflict of interest

The authors declare no conflict of interest

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