Prevalence of Anemia among Libyan Pregnant Women and its Relation to Low Birth Weight

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***Abstract:** Anemia is the most common disorders affecting a large number of pregnant women worldwide. Anemia contributes to maternal mortality and morbidity and to low birth weight. To determine the prevalence of anemia and it's relation to birth weight. This method is a retrospective study, carried out by reviewing files of four hundred Libyan pregnant women admitted for delivery at the Central Hospital of Tarhuna, from January 2005 to December 2010. The prevalence of anemia among studied population in this study was 47%; out of them 14.2% had mild anemia and 31.8% had moderate anemia and only1% had severe anemia. However, it's relation with birth weight was statistically insignificant with a p value of 0.16. Thus, **i**n this study, the prevalence of anemia is moderate in its severity, with a very small proportion had severe anemia. Anemia was more distributed in multiparous women and in rural dwellers than that of urban. The relation of anemia with birth weight was insignificant.*

Keywords: Prevalence, anemia, pregnancy, birth weight, Libya

1. INTRODUCTION

Anemia is the commonest medical disorder in pregnancy. It is defined according to Center of Disease Control and Prevention of North America as a hemoglobin concentration less than 10.5 g/dl and according to World Health Organization (WHO) as a less than 11 g/dl. It is classified as mild, moderate and severe according to hemoglobin level [1 - 4]. Worldwide, the prevalence of anemia is 50% in pregnant women and in Libya is 28% which put it among countries with anemic prevalence of moderate public health significance according to WHO classification [5, 6]. Normal pregnancy involves many changes in maternal physiology, including alteration in hematologic parameters. These changes may confuse assessment, diagnosis, and treatment of many hematological disorders [1. 4. 7 - 9].
Iron in is provided from different sources including, red blood cells break down, diet in the forms, heme and non-heme iron, which are absorbed in the duodenum and upper jejunum. In pregnancy and iron deficiency states, iron absorption increases, and is found in all cells of the body and tissue fluid [3, 4, 10, 11]. The recommended dose of iron rises from 18 mg/day in non-pregnant women to 27 mg/day in pregnancy [1. 3, 12 - 14]. Risk factors for anemia include, ethnicity and geographical areas, socioeconomic status, dietary habits, preexisting iron status, prenatal iron supplementation and obstetric history including multiparty, multiple pregnancy and interval between each pregnancy, early pregnancy complications, chronic bleeding, parasitic infestation like hook worm, giardiasis, and malaria. Types of anemia include, iron deficiency anemia, megaloplastic anemia, and hemolytic anemia, in addition to the hereditary types, including thalassemia, sickle cell anemia and hemoglobinopathies [15, 16]. In addition to history and examination, laboratory tests are essential, they include, complete blood count, reticulocyte count, total iron binding capacity, and serum transferrin all are slightly increased, serum ferritin is the diagnostic test, if it's level fall below 15 µg/l and bone marrow sample is used only when the underlying causes of anemia are not identifiable by simple investigation [1. 2. 13. 16. 17].
Management of iron deficiency anemia during pregnancy includes, screening for all pregnant women at booking visit and 28, and 34 weeks of gestational age, prevention by dietary advice and daily supplementation with 60 mg of elemental iron from the time of booking which is recommended by the WHO and treatment is by iron, either orally or parenteral. The route of administration depends on patient, severity of anemia, gestational age and compliance of the pregnant women. The dose is 100 - 200 mg of elemental iron, however, oral route is preferred [6, 9, 14, 18, 19]. Blood transfusion is indicated in case of obstetric hemorrhage as it is a causes of maternal mortality, however, it is not without risks [18, 20]. Anemia carries both maternal and infant morbidity and mortality. According to the WHO data, anemia is associated with 40% of maternal deaths all over the world [5, 6, 9, 21]. Severe anemia, early in pregnancy is associated with increased risk of intrauterine growth restriction, low birth weight, small for gestational age, preterm births, intrauterine fetal death, stillbirth, neonatal death and developmental delays [9, 21]. Low birth weight below 2500 grams is associated with many complications such as hypothermia, hypoglycemia, hypocalcaemia, birth asphyxia, meconium aspiration,

respiratory distress syndrome, jaundice, cerebral hemorrhage, pulmonary hemorrhage, polycythemia and sudden infant death syndrome. In addition to long term complications, including mental retardation, cerebral palsy, seizure disorders, hypertension and learning and behavior problems [2, 3, 15, 21, 22]. To the best of our knowledge, no previous studied investigated the prevalence of anemia in pregnant women in Libya, thus, this study was aimed to estimate the prevalence of anemia and it's relation to birth weight among the pregnant women.

2. MATERIALS AND METHODS

This is a retrospective, case series study reviewing files of four hundred pregnant women who had delivered at Tarhuna General Hospital during the period from January 2005 to December 2010. Tarhuna is one of the largest city in Libya.

Exclusion criteria: Patients who had history of preterm delivery, diabetes, preeclampsia, anti-phospholipid antibody syndrome, congenital anomalies and multiple pregnancy were excluded from this study.

A specially designed case sheet was used, it included age, address, parity, gestational age, hemoglobin level, birth weight, sex of baby and centile for gestational age. Hemoglobin concentration of less than 10.5 g/dl, was used in this study, which is the value set by the Center of Disease Control and Prevention of North America. The address written on files was used to classify our study population to rural and urban citizens. Depending on the prevalence of anemia among pregnant women Health Nutrition and Population statistics (2005) in Libya, prevalence of anemia was 34.50%.

The formula shown below was used to determine the sample size.

$n = \frac{z^2 pq}{d^2}$, thus sample size, n = 400.

Statistical Analysis: Using the program of statistical package for social sciences (SPSS), frequencies and percentages were calculated and Chi-square test performed to investigate the significance in the association of anemia and its severity to birth weight. The associations was considered significant if the observed level (p value < 0.05).

3. RESULTS

Table 1 shows that the age of women in the study ranged between 17 and 43 years. The mean age was 29.6, the age distribution of the women was as following, women bellow 20 years was 11 women (2.8%) and that for women above 40 years was only four women (1%). Most of the women were scattered between 26 and 30 years, which represent about 40.85% of included women.

Table 1: Ages of the mothers among studied population

Age interval	Frequency	Percent
15-20	11	2.8
21-25	81	20.2
26-30	163	40.8
31-35	90	22.5
36-40	51	12.8
>40	4	1.0
Total	400	100

Table 2 shows the relation between age of mothers and severity of anemia. Out of 400 Libyan women included in this study, 212 (53%) were not anemic, 57 (14.25%) were mildly anemic, 127 (31.75%) moderately anemic which represent the majority of cases, among which 57 cases were 26 - 30 years of age, while only four cases (1%) were severely anemic of the total number of patients.

Table 2: Relation between age of the mothers and severity of anemia

Age interval	Severity of anemia				
	not	mild	moderate	severe	total
15 - 20	6	2	2	1	11
21 - 25	49	13	19	0	81
26 - 30	78	25	57	3	163
31 - 35	50	9	31	0	90
36 - 40	26	7	18	0	51
> 40	3	1	0	0	4
Total	212	57	127	4	400

Table 3 shows that out of 400 pregnant women included in this study 382 women (95.5%) were living in rural areas and only 18 (4.5%) were living in urban areas.

Table 3: Place of residence among studied population

Place of residence	Frequency	Percentage
Rural	382	95.5%
Urban	18	4.5%
Total	400	100.0%

Table 4 shows that 99 women in this study were primigravids which represent (24.8%) and 301 (75.2%) were multiparous.

Table 4: Parity distribution among studied population

Parity	Frequency	Percentage
Primi gravid	99	24.8%

Multi gravid	301	75.2%
Total	400	100.0%

Table 5 shows that out of 400 women included in this study, 99 women (24.75%) were primigravids whom 13 cases were mildly anemic, 27 cases were moderately anemicand only one case was severely anemic. While 301 (75.25%) were multiparous among whom 44 cases were mildly anemic, three cases were severely anemic and 100 cases were moderately anemic and they represent the majority of cases.

Table 5: Relation between parity and severity of anemia

Parity	Frequency and percentage according to severity of anemia				
	not anemic	mild	moderate	severe	Total
Primi-gravids	58 (58.58%)	13 (13.13%)	27 (27.27%)	1 (1.01%)	99 (24.75%)
Multi gravid	154 (51.16%)	44 (14.61%)	100 (33.22%)	3 (0.99%)	301 (75.25%)
Total	212	57	172	4	

Table 6 shows that only five cases (1.25%) were post-term and the rest of cases 395 (98.75%) were within normal ranges of gestational age with a mean gestational age of 39.7 weeks.

Table 6: Gestational age distributions among studied population

Gestational age	Frequency	Percentage
37	12	03.0%
38	53	13.2%
39	107	26.8%
40	148	37.0%
41	51	12.8%
42	24	06.0%
43	4	1.00%
44	1	0.2%
Total	400	100%

Table 7 shows that 223 women (55.75%) included in this study were between gestational age 40 - 42 weeks among whom 24 were mildly anemic, 71 were moderately anemic and three were severely anemic which represent the majority of the cases. While the minority of cases 5 (1.25%) were distributed between gestational age 43 - 45 weeks among whom two cases were mildly anemic. The rest of cases 172 (43%) were distributed between gestational age 37 - 39 weeks, among whom 31 were mildly anemic, 56 were moderately anemic and one case was severely anemic.

Table 7: Relation between severity of anemia and gestational age

Gestational age interval	Frequency according to Severity of anemia				
	Not anemic	Mild	Moderate	Severe	Total
37-39	84	31	56	1	172
40-42	125	24	71	3	223
43-45	3	2	0	0	5
Total	212	57	127	4	400

Table 8 shows that the most common prevalent type of anemia among pregnant women is iron deficiency anemia, as 188 cases (47%) were anemic and 212 pregnant women (53%) were not anemic.

Table 8: Prevalence of anemia among studied population

Anemia	Frequency	Percentage
Yes	188	47%
No	212	53%
Total	400	100%

Table 9 shows the distribution of patients according to the severity of anemia, where most of the women in this study (31.8%) had moderate anemia, 57 women (14.2%) had mild anemic and only four cases (1%) were severely anemic.

Table 9: Severity of anemia among studied population

Severity of anemia	Frequency	Percentage
not anemic	212	53%
mild	57	14.2%
moderate	127	31.8%
severe	4	1%
Total	400	100%

Table 10 shows that the distribution of the neonates according to gender where gender 220 were females (55%) and 180 were males (45%).

Table 10: Distributions of sex of the babies

Gender	Frequency	Percentage
Male	180	45%
Female	220	55%
Total	400	100%

Table 11 shows that 2500 to 4000 grams are the normal ranges of babies birth weight, below of which are low birth weight and above of it are average or big sized babies. In this study, the majority of babies 359 (89.8%) were of normal

ranges of birth body weight 21 (5.2%) babies were of low birth weight and 20 (5%) babies were of big sized birth weight.

Table 11: Birth body weight distributions

Birth weight	Frequency	Percentage
Low birth weight	21	5.2%
Normal birth weight	359	89.8%
Big size baby	20	5%
Total	400	100%

In Table 12, the majority of the babies in this study (88.3%) were in the normal range of weight. Whereas, 9.5% were below the 3rd centile and the minority of babies (2.2%) was above 97th centile.

Table 12: Weight for gestational age distributions

Centile for gestational age	Percentage	Frequency
Below 3%ile	9.5%	38
Between 3%ile and 5%ile	3.2%	13
At 5%ile	0.2%	1
Between 5%ile and 10%ile	7.8%	31
Between 10%ile and 50%ile	42.8%	171
At 50%ile	0.2%	1
Between 50%ile and 90%ile	33.2%	133
Between 90%ile and 95%ile	0.5%	2
Between 95%ile and 97%ile	0.2%	1
Above 97%ile	2.2%	9
Total	100%	400

Table 13 shows that among 188 neonates, only five babies (2.66%) were of low birth weight, nine babies (4.79%) were big size weight and the majority of delivered babies 174 (92.55%) were of normal birth weight. The relation was statistically insignificant with p value of 0.16.

Table 13: Relation of anemia to birth weight

	Birth weight			
Severity of anemia	Low birth weight	Normal birth weight	Big size babies	Total
Anemic	5	174	9	188
Not anemic	16	185	11	212
Total	21	359	20	400
$p = 0.16$				

Table 14 shows that regardless the severity of anemia, the normal birth weight represented the majority of weight for delivered babies. It was 9.1% for mildly anemic mothers, 93.7% for moderately anemic women and 75% for severely anemic women. Low and large birth weight were more in moderate anemia than other groups. The relation between severity of anemia and birth weight were statistically insignificant with p = 0.16.

Table 14: Relation of severity of anemia to birth weight

	Birth weight			
Severity of anemia	Low birth weight	Normal birth weight	Big size	Total
Not anemic	16	185	11	212
Mild	2	52	3	57
Moderate	3	119	5	127
Severe	0	3	1	4
Total	21	359	20	400
P value = 0.13				

4. DISCUSSION

Iron deficiency anemia is a major public health nutritional problem affecting all ages. Across the globe, 1.62 billion people are anemic (24.8%), with the highest prevalence among preschool age children (47.4%) and pregnant women (41.8%), due to physiological changes during pregnancy, iron requirements increases, thus exacerbating the prevalence of anemia [23]. The early diagnosis of anemia during pregnancy is important to prevent it's complications especially maternal and perinatal mortality and morbidity. The aim of the current study was to assess the maternal and neonatal outcome of anemic women. According to WHO, the estimated prevalence of anemia in pregnant women for the African region is about 55.8% while in this study it was 47%, and it is comparable to the prevalence in other regions, as in Ajman (50%), Macca city (39%), Fayoum city (67.4%), Nigeria (54.5%), Jordan (56.7%), however, lower prevalence was found in Ethiopia (27.9%) [6, 24 - 29]. Out of 188 anemic pregnant women included in this study, 14.2% were of mild severity, 1% were severe cases and 31.8% were of moderate severity which represented the majority in this study. With the exception of the study from Egypt, in which the prevalence of moderate anemia was 34%, the other studies showed that the prevalence was in favor of mild severity of anemia, it was 45 % in Ajman, and 55% and 61% for mild anemia in Ethiopia and Nigeria respectively [24. 26 - 28].

In this study the prevalence of anemia was decreased with the increase in the age of pregnant women, similar results were observed in other studies, except for the study from

Egypt which showed increasing prevalence of anemia below the age of 20 years and above 30 years, it was 52% in this study, 39% in Saudi Arabia, 59% in Ajman and it was 30.7% in Nigeria [24 - 26, 28]. Most of pregnant women included in this study were multiparous, among whom anemia was more prevalent and it was 75.3%. The same findings were found in studies from Jordan (64%), Saudi Arabia (84%), Nigeria (55.8%) and Ethiopia (86%). In contrary, anemia was more in prime porous (58%) in Egypt and 79.3% for Ajman [24 - 29]. Regarding the relation between prevalence of anemia and place of residence, most of the included pregnant women in this study lived in rural areas, with prevalence of 95%, which was comparable to results in other studies, with anemic prevalence in rural areas was 67.9% in Jordan, 63% in Egypt, and 76.4% in Ethiopia, high prevalence noted in rural area [26, 27, 29]. Regarding the relation of anemia and birth weight in this study, it was statistically insignificant, same results were noted in a study from Ajman except that the mean of birth weight was lower in case of moderate to severe anemic mothers than that of non-anemic. The same finding was obtained a from study in Russia while data collected from a study in five areas in China showed that low birth weight was more prevalent when hemoglobin concentration was below 8 g/dl. Another study from Bangalore India showed increase risk of low birth weight and preterm delivery with hemoglobin concentration bellow 7 g/dl, which means that effect of anemia on birth weight occurs with severe anemia. The study of Kaur and others showed highly significant relation between anemia and low birth weight [23]. In conclusion, the prevalence of anemia is moderate in its severity, with a very small percentage of women who had severe anemia, anemia was more prevalent in multiparous women, and is more common in rural dwellers than that of urban. The relation of anemia and it's severity to birth weight was insignificant.

Author Contributions: I.M. and A.A. performed, collected and analyzed data. F.S. revised the final draft of the paper. All authors provided useful criticism and suggestions during paper writing.

Conflicts of Interest: The authors declare no conflict of interest.

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