

# The Prevalence of Iron Deficiency Anemia among Pregnant Women Attending Hospitals and Private Clinics in the Northwest of Libya

Abdu-Alhameed A. Ali Azzwali<sup>1\*</sup>, Azab Elsayed Azab<sup>2</sup>, Abdalrauf M.A.B.Alfourti<sup>3</sup>

<sup>1</sup>Department of Biochemistry, Faculty of Medicine, Sabratha University, Libya

<sup>2</sup>Department of Physiology, Faculty of Medicine, Sabratha University, Libya

<sup>3</sup>Department of Medical Laboratory, Faculty of Medical Technology, Zawia University, Libya

\*Corresponding Author

**Abstract: Background:** Normal pregnancy involves many changes in maternal physiology, including alteration the in the hematologic parameters. Anemia in pregnancy is the commonest medical disorder in pregnancy and constitutes a major public health issue throughout the world, particularly in developing countries where it is an important contributor to maternal morbidity and mortality. **Objectives:** The present study aimed to determine the prevalence of anemia among pregnant women who attended hospitals and private clinics in the North West of Libya and the age groups most affected by anemia. **Materials and Methods:** A prospective observational study was conducted in five primary health centers in the northwest of Libya between May 2022 and November 2022. A sample size of 100 pregnant women was included in this study. A multistage sampling technique was adopted to select the pregnant woman. The pregnant woman was examined by the OBG consultant, and the data about age, residence, chronic diseases, education, period of pregnancy, and tea or coffee drinking were collected in a pretested and semi-structured questionnaire. The hemoglobin level and MCV of the pregnant women were measured. All data obtained were calculated and analyzed by using Microsoft Office Excel 2010. **Results:** The highest percentage of pregnant women was from Zawia city (44%) while the lowest percentage was from Ajelat city (9%). 67% of pregnant women had a decrease in levels of hemoglobin, serum iron concentration, and MCV. The highest percentage of anemic pregnant women (31%) was in the age group 17-26 years, while the least affected (12%) was in the age group 37-46 years. Women in the third trimester of pregnancy showed a lower level of mean hemoglobin concentration when compared with the other trimesters. Most anemic pregnant women suffered from mild anemia (66.6%) when compared with moderate and severe anemia. 88% of anemic patients were educated and 56% suffered from bleeding, whereas 60% always drank coffee or tea after a meal. **Conclusion:** It can be concluded that the prevalence of anemia, probably IDA, was higher among pregnant women in the northwest of Libya which is more pronounced in the age group 17-26 years, especially in the third trimester of pregnancy. So, Women at this age should manage their iron and ferritin levels, especially pregnant women, which should be making more attention and have regular medical checkups. In addition, folic acid and iron supplements should be taken regularly. Young pregnant women should gain more knowledge about pregnancy and its requirements. Also, pregnant women must be advised for monitoring the hematological parameters during different periods of pregnancy and urgent intervention to prevent the occurrence of adverse maternal and neonatal outcomes.

**Keywords:** Iron deficiency anemia, Pregnant women, Northwest of 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, 2]. Worldwide, the prevalence of anemia is 50% in pregnant women and in Libya is 28% which put it among countries with an anemic prevalence of moderate public health significance according to WHO classification [3, 4]. Normal pregnancy involves many changes in maternal physiology, including alteration in hematologic parameters. These changes may confuse the assessment, diagnosis, and treatment of many hematological disorders [5, 6].

Anaemia in pregnancy is a major public health issue throughout the world, particularly in the developing countries where it is an important contributor to maternal morbidity and mortality [7]. It is also associated with increased risk of miscarriage [8], prematurity, stillbirth, low birth weight and consequently perinatal mortality [9].

Anemia is alternately defined as a reduced absolute number of circulating RBCs or a condition in which the number of RBCs (and subsequently their oxygen-carrying capacity) is insufficient to meet physiologic needs [10]. The critical role of Hb to carry oxygen to the tissues explains the most common clinical symptoms of anemia, which include fatigue, shortness of breath, bounding pulses or palpitations, and conjunctival and palmar pallor.[11]

During pregnancy, the total blood volume increases by about 1.5 liter [12]. The plasma volume increases more compared to red cell mass which leading to hemodilution and reduced hemoglobin concentration. This is termed physiological anemia of pregnancy [13]. The World Health Organization (WHO) has suggested that anemia is present in pregnancy when Hb level is <11g/dl. It also

classified anemia in pregnancy as mild (10.0-10.9 g/dl), moderate (7.0-9.9 g/dl), and severe (lower than 7.0 g/dl) based on the level of hemoglobin concentration.

Anemia is a public health problem in both developed and developing countries. It affects 1.62 billion people globally, which corresponds to 24.8% of the world population. Global prevalence of anemia in pregnant women is 41.8% and the highest proportions of pregnant women affected are in Africa (57.1%) [14]. In addition to history and examination, laboratory tests are essential, which 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 [15-19].

## 2. Objective

The present study aimed to determine the prevalence of anemia among pregnant women who attended hospitals and private clinics in the North West of Libya and the age groups most affected by anemia.

## 3- Methods and Materials:

A prospective observational study was conducted in five primary health centers (PHCs) of west Libya during May 2022 -November 2022. A sample size of 100 pregnant women was estimated based on the prevalence of anemia of 59% among pregnant.

A multistage sampling technique was adopted to select the pregnant woman. Randomly selected five PHCs. The pregnant woman was examined by the OBG consultant, and the data were collected. Pretested and a semi-structured questionnaire were used to collect the data. The hemoglobin (HB) and MCV level of the pregnant women was measured. The HB measurements of the pregnant woman were measured using fluorescence flow cytometry analyzer (SYSMEX XP 300). In addition to that, a questionnaire asked for information from patients about age, residence, chronic diseases, education, period of pregnancy, and tea or coffee drinking to assess the risk factors. Types of anemia were classified as: Mild anemia 9.0-10.9g/dl Severe anemia 76.0–96.0 fl; Hb > 10.9 g/dl.

## 3 -Statistical analysis

All data obtained were calculated and analyzed by using Microsoft Office Excel 2010.

## 4- Results:

### 4.1 Distribution of the sample according to the address:

The data in table (1) and figure (1) show the distribution of pregnant women according to address ,the highest percentage of sample members is in Zawia city (44%) while the lowest percentage of sample members is in Ajelat city (9%) .

**Table (1) Distribution of pregnant women according to the address**

City	Frequency	Percent (%)
Zawia	44	44 %
Sabrath	28	28 %
Ajelat	9	9 %
Tripoli	19	19%

### 4.2 Prevalence of anemia among pregnant women :

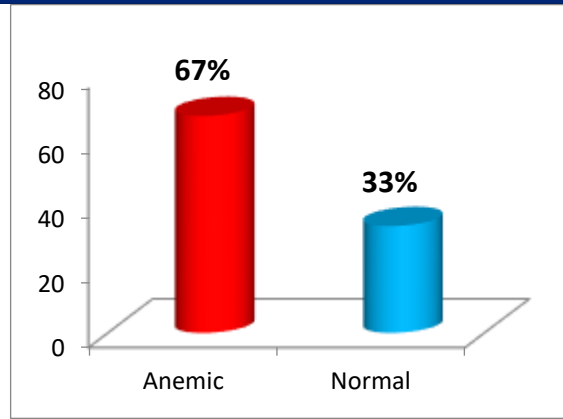
Out of 100 pregnant women, 67 showed a low level of Hb, MCV, and iron concentration. As a result, the prevalence of anemia was very high (Table.2& Figure.2).

**Table (2) Prevalence of anemia among pregnant women**

Number of cases	Normal	Anemic
100	33	67



**Figure (1):** The distribution of pregnant women according to address



**Figure (2):** The Prevalence of anemia among pregnant women

**4.3 Distribution of the sample according to age group:**

Data obtained in the table (3) and figure (3) show the highest percentage of sample members is in the age group (17-26) with a percentage of (43%), while the lowest percentage of sample members is in the age group (37-46) with a percentage of (19%).

**Table (3) Distribution of the sample according to age group**

Age group	Frequency	Percent
17-26	43	43 %
27-36	38	38 %
37-46	19	19 %

**4.4 Distribution of age groups according to the incidence of anemia:**

Table (4) and figure (4) show the highest percentage was for the age group most affected by anemia, which is 17-26 years, and the percentage reached 31%, while the least affected age group was from 37-46 years, and amounted to 12%.

**Table (4) Distribution of age groups according to the incidence of anemia**

Class	Anemia			
	Anemia	%	No	%
17-26	31	31%	12	12%
27-36	24	24%	14	14%
37-46	12	12%	7	7%
<b>Total</b>	67	67%	33	33%

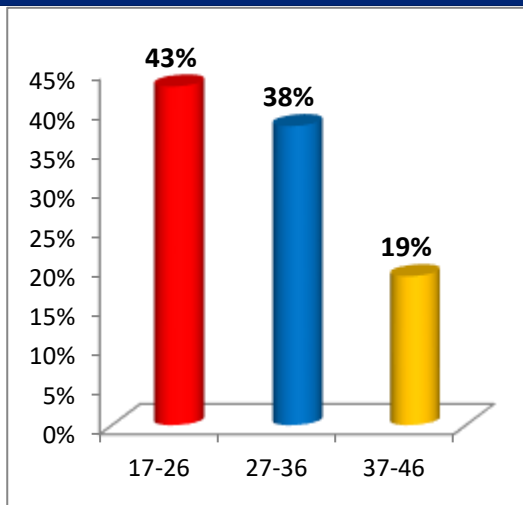


Figure (3) Distribution of the sample according to age group

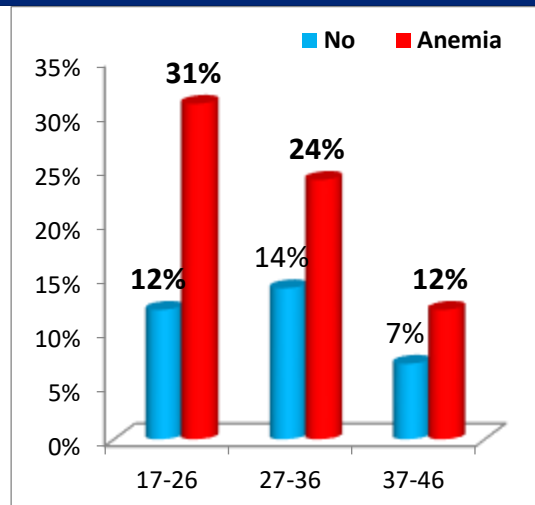


Figure (4) Distribution of age groups according to the incidence of anemia

#### 4.5 Distribution of the sample according to age groups wise mean of MCV

The highest age group was 27-36 years, with a percentage of 46%, while the lowest percentage was for the 17-26 years, with a percentage of 31% (Table .5& Figure.5)

Table (5) Age groups wise mean of MCV

Age groups	Frequency	Percentage%
17-26	31	31%
27-36	46	46%
37-46	23	23%

#### 4.6 Distribution of the sample Anemia according to gestational age:

Clearly that the third trimester (6-9 months) showed a lower level of mean hemoglobin concentration when compared with the other months (Table .6& Figure.6).

Table (6) Anemia according to gestational age

Month	Average Hb g/dl	Percentage%
1-3	10.7	23%
3-6	10.1	34%
6-9	9.2	43%

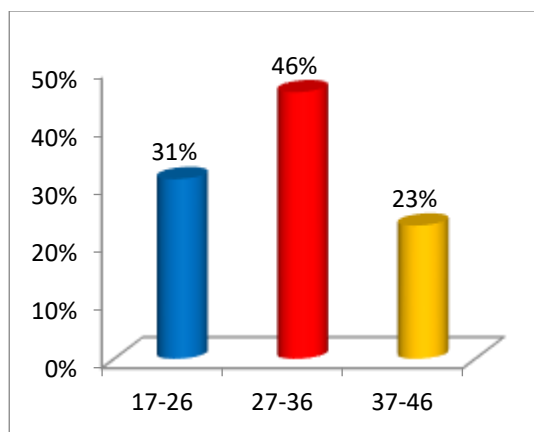


Figure (5) The diagram showing Age groups wise mean of MCV

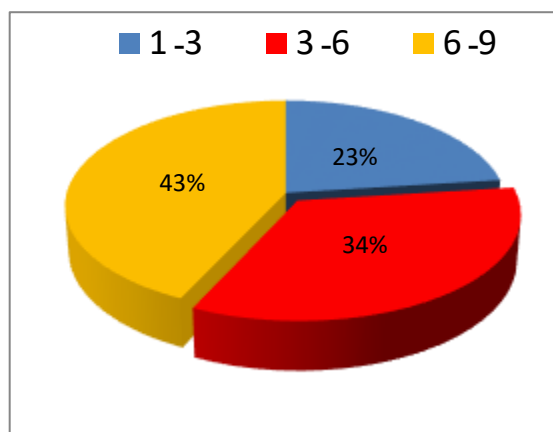


Figure (6) The diagram showing Anemia according to gestational age

#### 4.7 Classification of Anemia according to the severity:

Most anemic patients were suffering from mild anemia (66.6) when compared with moderate and severe anemia (Table .7& Figure.7)

**Table (7) Classification of Anemia according to the severity**

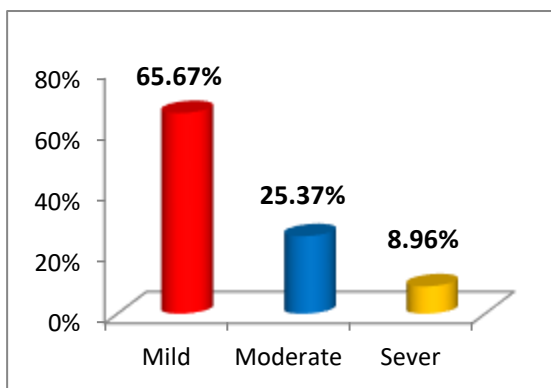
Type of Anemia	Number of normal cases	Percentage%
Mild	44	65.67%
Moderate	17	25.37%
Sever	6	8.96%

**4.8 Distribution of the sample according to Socio-demographic characteristics of the study population**

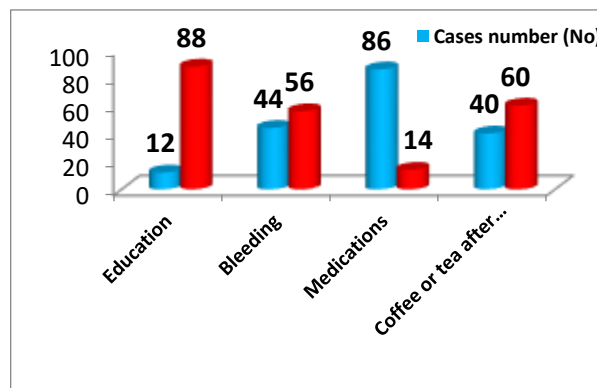
In this study, most anemic patients were educated (88%) and 56% suffered from bleeding, whereas 60% always drank coffee or tea after a meal. Iron absorption could be decreased when drinking coffee immediately after a meal, as many studies have demonstrated (Table .8& Figure.8).

**Table (8) Socio-demographic characteristics of the study population**

Socio-demographic characteristics	Cases number (Yes)	Cases number (No)
Education	88	12
Bleeding	56	44
Medications	14	86
coffee or tea after a meal	60	40



**Figure (7)** The diagram showing Classification of Anemia according to the severity



**Figure (8)** The diagram showing Socio-demographic characteristics of the study population

**5- Discussion:**

Anemia, especially in pregnant women, is a significant problem in developing countries not only to the mother but to the baby's health as well. In this study, the mean Hb concentration was 9.2 g/dL in anemic patients. The results showed a high prevalence of anemic patients among pregnant women 67% out of 100 pregnant women. As a result of, physiological changes during pregnancy, iron requirements increases, thus exacerbating the prevalence of anemia [20]. The early diagnosis of anemia during pregnancy is important to prevent its complications especially maternal and perinatal mortality and morbidity. 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 67%, and it is similar 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%) [21, 22]. Out of 67 anemic pregnant women included in this study, 65% were of mild severity, 8% were severe cases and 25% 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 [21, 22]. 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 43% in this study, 39% in Saudi Arabia, 59% in Ajman and it was 30.7% in Nigeria [20, 22, 23].

These high number anemic patients could reflect that 90% of them did not take iron supplements or folic acid, whereas 60% of pregnant women always drank coffee or tea after a meal. Iron absorption could be decreased when drinking coffee immediately

after a meal, as many studies have demonstrated. Anemia levels were higher in this study than in Elzahaf and Omar's study [24] in the northeast of Libya (67% vs. 54.6%). Anemia was found more prevalent in the age group between 17 to 26 years old when compared with the other groups, as shown by their Hb and MCV levels. Moreover, the prevalence of anemia was high during the third trimester of pregnancy, as the concentration of Hb was 9.2% g/dl.

From the result in this study, the prevalence of anemia was very high; however, 65.67% of participants had mild anemia with Hb levels below ranged from (9-10.9g/dl), 25.37% had moderate Anemia (Hb levels of 7.0-8.9 g/dl). Conversely, another study in Libya mentioned that severities of anemia among the anemic fraction (47%) of the studied population; were distributed as follows: 14.2% had mild anemia, 31.8% had moderate anemia, only 1% had severe anemia [25]. In the northwest of Libya also, the prevalence of mild, moderate, and severe anemia was observed as 44.5%, 7.6%, and 2.5% , respectively [24]. Iron deficiency anemia is due to high iron demand. In developing countries, 52% of pregnant women are affected [26]. In Egypt, IDA prevalence was 51.3% (1267 of 2470); IDA affects about one in every two pregnant women in rural districts [27]. According to this study, Out of 100 pregnant women, 56% had bleeding.

The study showed the prevalence of different types of anemia in pregnant women in a number of cities in western Libya that were as a sample. There are many reasons related to these cities that were understudied, which include early marriage, the young couple is not fully aware of the importance of nutritional components during pregnancy and delivery. In addition, the people in these cities may not have awareness of healthy culture corresponding to pregnancy issues. Furthermore, pollution by toxic gases emitted from an oil and gas refinery leads to early and recurrent abortion, which in turn is considered a major cause of anemia in women in general and particularly in pregnant women. Moreover, the pregnant girl in an early period of life will not complete the full term, because her body is not yet fully developed, and may be subjected to repeated abortion as a result of an incomplete hormonal relationship with the correct organizational model. In addition to recurrent pregnancy without sufficient intake of iron and vitamins complements. These may increase the chances of anemia occurrence.

## 6. Conclusion

It can be concluded that the prevalence of anemia, probably IDA, was higher among pregnant women in the northwest of Libya which is more pronounced in the age group 17-26 years, especially in the third trimester of pregnancy. So, Women at this age should manage their iron and ferritin levels, especially pregnant women, which should be making more attention and have regular medical checkups. In addition, folic acid and iron supplements should be taken regularly. Young pregnant women should gain more knowledge about pregnancy and its requirements. Also, pregnant women must be advised for monitoring the hematological parameters during different periods of pregnancy and urgent intervention to prevent the occurrence of adverse maternal and neonatal outcomes.

## Reference :

- [1] Jimenez K, Dabsch SK, Gasche C. Gastroenterology & hepatology. Management of iron deficiency anemia 2015–241 :(4)11 .250
- [2] Sharma AJ, Addo OY, Mei Z, Suchdev PS. Reexamination of hemoglobin adjustments to define anemia: altitude and smoking. Ann N Y Acad Sci. 2019; 1450 (1): 190-203.
- [3] Wemakor A, Prevalence and determinants of anemia in pregnant women receiving antenatal care at a tertiary referral hospital in Northern Ghana. Wemakor BMC Pregnancy and Childbirth.2019; (2019) 19:495.
- [4] Pavord S, Daru J, Prasannan N, Robinson S, Stanworth S, Girling J. UK guidelines on the management of iron deficiency in pregnancy. British journal of hematology. 2020; 188: 819-830 .
- [5] Foo LH, Khor GL, Tee ES, Prabakaran D. Iron status and dietary. Iron intake of adolescents from a rural community in Sabah, Malaysia. Asia Pacific J Clin Nutr. 2004; 13 (1): 48-55.
- [6] Pasricha SR, Brown SCF, Allen KJ, Gibson PR, McMahon LP, Olynyk JK, Roger SD, Savoia HF, Tampi R, Thomson AR, Wood EM, Robinson KL. Diagnosis and management of iron deficiency anemia: a clinical update. 2010; 193(9) :532-525
- [7] Brabin BJ, Hakimi M, Pelletier D. An analysis of anemia and pregnancy- related maternal mortality. J Nutr. 2001;131(2):604S–15S.
- [8] Camargo RMS, Pereira RA, Yokoo EM, Schirmer J. Factors associated with iron deficiency in pregnant women seen at a public prenatal care service. Rev Nutr. 2013;26(4):455–64.
- [9] Brabin B, Sapau J, Galme K, Paino J. Consequences of maternal anaemia on outcome of pregnancy in a malaria endemic area in Papua New Guinea. Ann Trop Med Parasitol. 1990;84(1):11–24.

- [10] Totege GS. Prevalence of anaemia among pregnant women and adolescent girls in 16 districts of India. *Food and Nutrition Bulletin*, 2006; 27(4): 311-315
- [11] SinghR, ChauhanR, NandanD, SinghH, GupataSC, BhatnagarM . Morbidity profile of women during pregnancy: A hospital record based study in Western UP. *IJCH* 2012; 24:342-346.
- [12] Haldar K, Mohandas N. Malaria, erythrocytic infection, and anemia. *Hematology Am Soc Hematol Educ Program* 2009; 1: 87-93.
- [13] Petkova-Kirova P, Hertz L, Danielczok J, Huisjes R, Makhro A, et al. Red blood cell membrane conductance in hereditary haemolytic anaemias. *Front Physiol*. 2019;10:386.
- [14] Kejo D, Petrucka P, Martin H, Mosha CET, Kimanya ME. Efficacy of different doses of multiple micronutrient powder on haemoglobin concentration in children aged 6-59 months in arusha district. *Scientifica*. 2019;8979456:1-7.
- [15] Somkute S.G. *Obstetrics and gynecology board review*. 3<sup>rd</sup> ed. Newyork, McGraw Hill Medical. 2008: 27 - 30.
- [16] Cunningham F.G., Leveno K., Bloom S., Ddashe J ,Casey B., et al. *Williams Obstetrics*. 24<sup>th</sup> ed . New York, McGraw Hill. 2014, PP: 55, 874 - 1101.
- [17] Beckman C., Lling F., Herbert W., Barzansky B , Laube D. and Smith R. *Obstetrics and gynecology*. 6<sup>th</sup> ed. Philadelphia, Wolters kluer Lippincott Williams and Wilkins. 2010: 151 -192.
- [18] Davidson's C.H. *Principles and practice of Medicine*.16<sup>th</sup> ed. London, Churchil Livingstone., 1992:711- 707
- [19] Pernoll M.L. Benson and Pernoll's handbook of obstetrics and gynecology 10th ed . New York, McGraw Hill medical publishing. 2001; 435- 437.
- [20] Kaur M. Maternal anaemia and neonatal outcome: a prospective study on urban pregnant women. *JCDR*. 2015; 9(12): QC04 - QC08.
- [21] Ahmed A., Nasir H., Shafiq Q., Naeem B. and Shaikh Y.G.R. The effect of anemia on pregnancy outcomes. *Gulf Med J*. 2015; 4(S1):76 - 82.
- [22] World Health Organization *Iron deficiency anemia: assessment, prevention and control, a guide for programme managers*. Geneva, Switzerland. 2001
- [23] Elashiry A., Elghazali S. and Habib I. Prevalence and determinants of anemia in third trimester pregnancy in Fayoum governorate-Egypt. *Acta Medica Mediterranea*. 2014; 19; 30: 1045 - 1051.
- [24]Elzahaf R and Omar M. Prevalence of anemia among pregnant women in Derna city, *International Journal of Community Medicine and Public Health*. *Int J Community Med Public Health*. 2016; 3 (7): 1915-1920.
- [25]Mazughi I FM, Arebi A MY and Sheri F M. Prevalence of anemia among Libyan pregnant women and its relation to low birth weight.2018; *International Journal of academic health and medical research (IJAHMR)*.2018
- [26]Abu-ouf, NM, Jan MM. The impact of maternal iron deficiency and iron deficiency anemia on a child's health. *Saudi med J*. 2015; 36(2): 146-149.
- [27] Rezk M, Marwan H, Dawood R, Masood A & Abo-Elnasr M. Prevalence and risk factors of iron-deficiency anemia among pregnant women in rural districts of Menoufia governorate, Egypt. *Journal of Obstetrics and gynecology*. 2015; 35(7): 663-666.