eISSN:2413-6096 http://www.ljmr.com.ly/

Original Article

Prevalence of vitamin B12deficiency in pregnant women

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ABSTRACT

Background: vitamin B12 deficiency is associated with an increased risk for several adverse pregnancy outcomes for both mother and fetus.

Objective: this study was conducted to evaluate the prevalence of vitamin B12 deficiency in pregnant women.

Materials and methods: In this cross-sectional study, a total of 66 pregnant women were investigated at Alkhumus Clinic from January to October 2020. After a detailed obstetrical and medical history, and clinical assessment, participants were subdivided into three groups. Group I: first trimester, Group II: second trimester, and Group III: third trimester. These groups were assessed for vitamin B12 and complete blood counts (CBC).

Results: Vitamin B12 deficiency was observed in 25.8% of the total participants. The mean of B 12 in the first, second and third trimesters was pg/mL341, 298.58 pg/mL, and 201.21 pg/mL, respectively. The mean hemoglobin was 10.96±1.66 g/dl, the haematocrit 34.24±4.89%, red blood cells 4.06±0.64 million/mm^3, mean corpuscular volume (MCV) 85.05±7.50 fl and vitamin B12 (222.8±53.53) pg/mL. Hemoglobin levels were low in the third trimester (8.14±1.92) g/dl compared to the first trimester (12.10±1.6 g/dl) and the second trimester (12.6±1.64 g/dl).

conclusion: This study concluded that the prevalence of vitamin B12 deficiency is high in pregnant women. The deficiency was highest in the third trimester of pregnancy when compared with the first and second trimesters. However, there is no effect of age or parity on vitamin B12 levels.

Keywords: vitamin B12, deficiency, pregnancy, women.

CitationIrqayahaNaser Mohammed.,Prevalence of vitamin B12deficiency in pregnant womenLibyan Population,2022;16(2):https://doi.org/10.54361/ljmr.1620

Received: 20/08/22**accepted**: 30/08/22; **published**: 31/12/22

Introduction

Vitamin B-12, also known as cobalamin, is a micronutrient essential for cellular growth, differentiation, and development [1]. Vitamin B-12 and folic acid are necessary for the synthesis of DNA, RNA, lipids, and protein in the cellular cytoplasm [2,3]. Vitamin B12 deficiency (serum vitamin B12 below 200 pg/mL) is a major public health problem globally [4]. The major cause of vitamin B12 deficiency is the low dietary intake of food containing vitamin B12 (5). The deficiency of vitamin B12 causes macrocytic megaloblastic anemia and neurological disorders [6]. vitamin B12 deficiency is associated with an increased risk for several adverse pregnancy outcomes for both mother and fetus. These risks include neural tube defects, intrauterine growth retardation, low birth weight, preeclampsia, and early miscarriage [7,8]. vitamin B12 deficiency can be caused by malabsorption of food, the inadequate intake of animal-source foods is the main cause [9], is also caused by the malabsorption of food due to gastrointestinal infections, and nonspecific gastritis, including atrophy of the gastric mucosa, and gradual loss of gastric acid, particularly in the elderly [4].

The objective of this study was to determine the prevalence of vitamin B12 deficiency among pregnant women.

Subjects and methods

This cross-sectional study was carried out in the Alkhumus clinic at Alkhumus city, Libya: A total of 66 women were enrolled in the study. The women ranged in age from 18 to 45 years. They were subdivided into three groups after complete history taking and through clinical examinations and full investigations. Group I: first trimester, Group II: second trimester, and Group III: third trimester. The sample were collected from January to October 2020.

A questionnaire was used to obtain initial knowledge about the individual's age, duration of pregnancy, educational background, vitamin supplementation, and fever.

Blood samples were collected from antecubital veins. Five ml of blood was collected in clot activator tubes and Ethylene diamine tetraacetic acid (EDTA). Blood samples were allowed to clot and serum was separated from blood cells by centrifugation at 5000 rpm for 5 minutes. All of the sera have been stored at -20 C until the time for assay. EDTA tubes were used forestimation of complete blood count (CBC).

III. II.1. Statistical analysis

IV. Data analysis was performed in Excel 2010 software. The prevalence of vitamin B12 deficiency was presented as a percentage.

V. Results

VI. III.1. Distribution of pregnant women in all age groups

VII. The mean ages of the study population were 25.4 ± 3.59 and the distribution of pregnant women's ages in this study is presented in Figure 1. The percentage of pregnant

women was less than 20 years (12.12%), 21 to 25 years (36.36%), 26 to 30 years (27.27%), 31 to 35 years (%15.15), and more than 36 years (9.1%).

VIII.

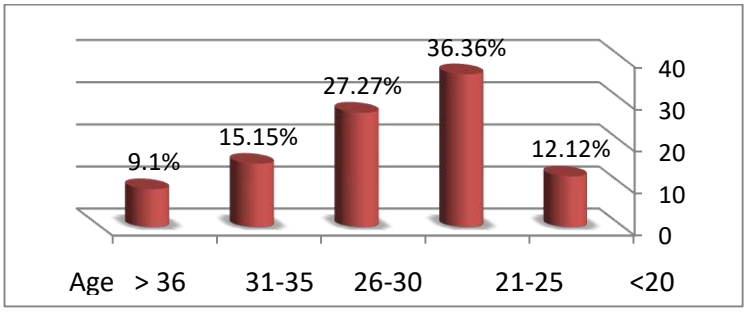

Figure1Distribution of pregnant women in all age groups

IX. III.2 Hematologic values in pregnant women

X. In table 1 the results showed some haematological values in pregnant women, the mean haemoglobin was 10.96±1.66 g/dl, haematocrit34.24±4.89%, red blood cells 4.06±0.64 million/mm³, MCV 85.05±7.50 fl, RDW 15.8±2 % and vitamin B12 222.8±53.53 pg/mL.

Table 1. Hematologic values in pregnant women

Variable	(n=66) Mean±SD (min.–max.)
Hemoglobin (g/dL)	**10.96±1.66 (7.2 – 14.3)**
Hematocrit (%)	**34.24±4.89 (23.7 -49.10)**
Red blood cells (million/mm³)	**4.06±0.64 (2.28-5.93)**
MCV (fl)	**85.05±7.50 (66-104)**
RDW (%)	**15.8±2 (13-26)**
Vitamin B12 (pg/mL)	**222.8±53.53 (111.8-392.03)**

III.3 Prevalence of Vitamin B12 deficiency

Serum vitamin B12 concentrations ranged from (111.8-392.03) pg/ml. The study's findings showed that 49 (74.2%) women had acceptable levels of vitamin B12, while 17 (25.8%) women had deficiencies, as shown in (Figure 2)

Normal

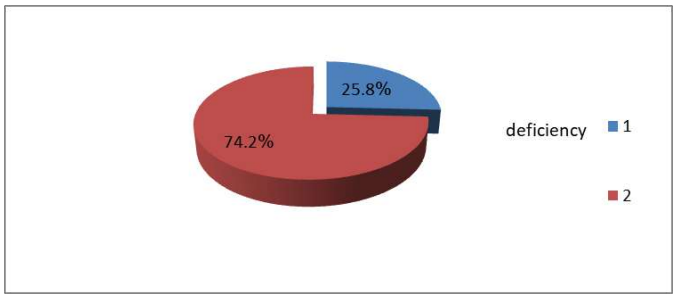

Figure 2. Prevalence of Vitamin B12 deficiency

III.4 Prevalence of vitamin b12 deficiency in pregnant women according to a period of pregnancy

The women were divided into three groups according to the period of pregnancy; the first group from the first month to the third month, with 24 volunteers; the second group from the fourth month to the sixth month, with 20 volunteers. The third group, from the seventh month to the ninth month, had 22 volunteers.

The findings revealed that the first group had a vitamin B12 deficiency rate of 20.8%, the second group had a vitamin B12 deficiency rate of 20%, and the third group had a vitamin B12 deficiency rate of 36.4%.

According to the display table, this indicates that vitamin B12 deficiency was concentrated in the last three months with a percentage of 36.4%, as shown in Table 2.

Table 2. Prevalence of vitamin b12 deficiency in pregnant women according to a period of pregnancy

Group	Pregnancy Period	Number of volunteers	deficiency of vitamin B12	Normal
I	1-3M	24	20.8 %	**79.2%**
II	4-6M	20	20%	**80%**
III	7-9M	22	36.4%	**63.6%**

III.5 Distribution of average hematologic values on the duration of pregnancy

The results showed that hemoglobin levels were low in the third trimester compared to the first and second trimesters at 8.141.92 g/dl, 12.10±1.6 g/dl, and 12.6±1.64 g/dl. The mean hematocrit ratio was low in the third trimester compared to the first and second trimesters; it was 28.72±4.615%, 39.09±3.94 %, and 42.08±4.01%. RBC was low at 3.92±0.69 million/mm3 in the third trimester compared to the first and second trimesters, 4.14±0.73 million/mm3, 4.18±0.68 million/mm3. The MCV was low (71.4 fl) in the third trimester and the RDW ratios were high in the third trimester, is highly sensitive, but not specific. It might be due to for iron-deficiency anemia and not because of vitamin B12 deficiency as shown in Table 3, . The mean level of vitamin B 12 in the first trimester reached 341 pg/ml and in the second trimester

298.58 pg/ml. In the third trimester, 201.21 pg/ml, while the mean reached 222.8, with the largest value in samples reaching 392.03 and the smallest value of 111.8, as shown in Table 1.

Table3 Distribution of average Hematologic values on the Duration of pregnancy

Variable	Duration of pregnancy		
	First trimester Mean ±SD	**Second trimester Mean ±SD**	**Third trimester Mean ±SD**
Hemoglobin (g/dL)	12.10±1.6	12.6±1.64	**8.14±1.92**
Hematocrit (%)	39.09±3.94	42.08±4.01	**28.72±4.61**
RBC (million/mm³)	4.14±0/73	4.18±0.68	**3.92±0.69**
MCV (fl)	88.05±4.63	94.48±6.67	**71.4±6.85**
RDW (%)	13.71±2	14.7±1.98	**18.3±2.3**
Vitamin B12 (pg/mL)	341	298.58	**201.21**

VI. Discussion

The deficiency of vitamin B12 is a vital health issue worldwide. although the prevalence of vitamin B12 deficiency showed great variation. Currently, a vitamin B12 deficiency is defined as a level of less than 200 pg/mL. In this study, the prevalence of vitamin B12 deficiency was found to be 25.8%. This rate is lower than the outcome of a similar study conducted in Tripoli, Libya, where the rate was 40% [10], and in Haryana State, India, where the rate was high at 74.1%. [11]. The main reason for the prevalence of vitamin B12 deficiency can be correlated to inadequate or insufficient dietary intake of the B12 vitamin. There was no significant effect of age or parity on vitamin B12 [10]. Lastly, the status of vitamin B12 deficiency at gestational age showed maximum deficiency during the third trimester (36.4%), followed by the first trimester (20.8%) and second trimester (20%). A study carried out among pregnant women in Venezuela reported a 50% prevalence of vitamin B12 deficiency in the first trimester, 59% in the second trimester, and 72.5% in the third trimester; the authors concluded that the prevalence of vitamin B12 deficiency rises as pregnancy advances [12]. Another study conducted in Canada showed a 35% prevalence of vitamin B12 deficiency during early pregnancy; as the pregnancy advanced, there was a significant rise in the prevalence of vitamin B12 deficiency to 42.9% [13].

Conclusion

This study concluded that the prevalence of vitamin B12 deficiency is high and that there is an increase in deficiency in third-trimester pregnancy. However, there is no effect of age or parity on vitamin B12 levels. Furthermore, it can be recommended to increase the intake of foods containing vitamin B12 or vitamin B12 supplements to reduce the incidence during gestation, especially in the third trimester of pregnancy.

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