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Original Research

Assessment of vitamin B 12 level among pregnant women

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ABSTRACT:

Background: Adequate vitamin B12 status during pregnancy is critical since maternal vitamin B12 deficiency is associated with increased risk for several adverse pregnancy outcomes for both mother and fetus. The present study was conducted to assess vitamin B 12 level among pregnant women.

Materials & Methods: 140 pregnant women were enrolled. In each subject, 5 ml of venous blood was collected for biochemical analysis. Hemoglobin concentration was determined by colorimetric analysis of lysed whole blood using the Hemoglobin B test kit. Total vitamin B12 was measured using the IMMULITE 2500.

Results: 20 patients were in first trimester, 70 in second and 50 in third trimester. The mean age was 24.5 years, 26.3 years and 28.2 years in first, second and third trimester respectively. The mean height was 158.4 cm, 159.4 cm and 161.2 cm in first, second and third trimester respectively. The mean hemoglobin level in first trimester was 112.4 g/L, in second trimester was 106.5 g/L and in third trimester was 105.2 g/L. The mean Vitamin B12 level in first trimester was 328.6 pmol/L, in second trimester was 198.2 pmol/L and in third trimester was 165.3 pmol/L. The mean serum folate level in first trimester was 28.4 pmol/L, in second trimester was 19.3 pmol/L and in third trimester was 15.1 pmol/L.

Conclusion: Authors found that vitamin B- 12 level was lowered in pregnant women in third trimester, hence there is need of additional oral supplement.

Key words: Oral supplement, Trimester, Vitamin B- 12.

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INTRODUCTION

Adequate vitamin B12 status during pregnancy is critical since maternal vitamin B12 deficiency is associated with increased risk for several adverse pregnancy outcomes for both mother and fetus.[1] These risks include neural tube defects, intrauterine growth retardation, preeclampsia and early miscarriage. Furthermore, fetal vitamin B12 accumulation during gestation is the major determinant of the B12 status of the newborn and of stores in infancy.[2] Even though a mother may not exhibit any hematological or neurological symptoms of B12 deficiency, an exclusively breast-fed infant born to a mother who is deficient in vitamin B12 can develop symptoms within several months following delivery. These include failure-to-thrive, megaloblastic anemia, and neurological symptoms.[3]

Vitamin B-12 insufficiency was previously perceived to be a problem that affected the elderly, due to malnutrition or intrinsic factor–mediated malabsorption and has been related to anemia, dementia, and cognitive dysfunction.[4] Both low vitamin B-12 and folate

concentrations have been associated with pregnancy complications such as neural tube defects (NTDs), spontaneous abortion, pre-eclampsia and preterm birth with the latter 2 conditions mediated in part by elevated homocysteine.[5] Folic acid supplementation is effective in reducing the risk of NTDs by .40% but because more than half of pregnancies are unplanned, mandatory folic acid fortification of wheat flour and cereal products was introduced in North America in 1997 and many other parts of the world in the early 2000s. This resulted in a halving of NTDs due to folate deficiency over 10 years. However, the number of NTDs attributable to vitamin B-12 deficiency has tripled during this time.[6] The present study was conducted to assess vitamin B 12 level among pregnant women.

MATERIALS & METHODS

The present study was conducted in the department of community medicine. It comprised of 140 pregnant women who were enrolled after explaining them the purpose of the study. Ethical clearance was obtained from ethical approval and review committee.

Parameter such as age, gravidity, parity, occupation, educational background, vitamin supplementation and fever was recorded. In each patient, 5 ml of venour blood was collected for biochemical analysis. Hemoglobin concentration was determined by colorimetric analysis of lysed whole blood using the Hemoglobin B test kit. Total vitamin B12 was measured using the IMMULITE 2500 Vitamin B12 solid phase, two-site chemiluminescent enzyme immunoassay in the IMMULITE 2500 analyzer. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of subjects

Parameters	Trimester 1	Trimester 2	Trimester 3
Number	20	70	50
Age (yrs)	24.5	26.3	28.2
Weight (Kg)	60.2	63.2	67.2
Height (cm)	158.4	159.4	161.2
Gravida (no.)	5 (1-6)	24 (1-4)	26 (1-9)

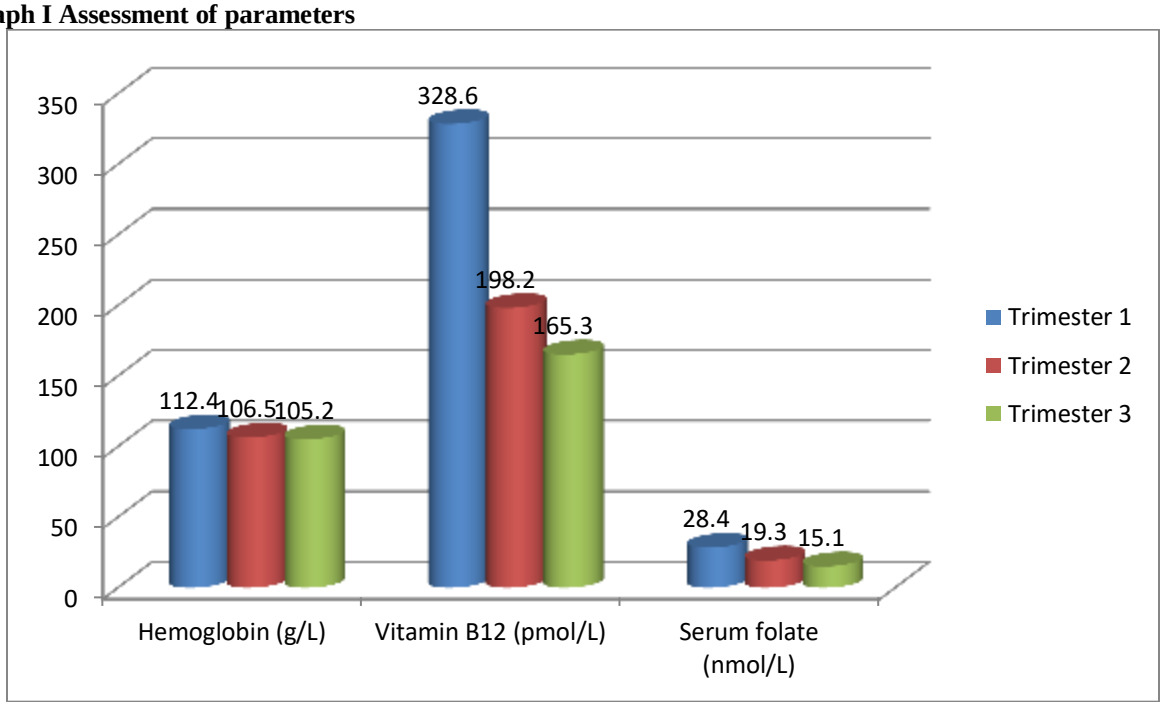
Table I shows that 20 patients were in first trimester, 70 in second and 50 in third trimester. The mean age was 24.5 years, 26.3 years and 28.2 years in first, second and third trimester respectively. The mean weight was 60.2 Kgs, 63.2 Kgs and 67.2 Kgs in first, second and third trimester respectively. The mean height was 158.4 cm, 159.4 cm and 161.2 cm in first, second and third trimester respectively. Gravida of 1-6 was seen in 5 in first trimester, 1-4 in 24 in second trimester and 1-9 in 26 third trimester subjects.

Table II Assessment of parameters

Parameters	Trimester 1	Trimester 2	Trimester 3	P value
Hemoglobin (g/L)	112.4	106.5	105.2	0.91
Vitamin B12 (pmol/L)	328.6	198.2	165.3	0.02
Serum folate (nmol/L)	28.4	19.3	15.1	0.05

Table II, graph I shows that mean hemoglobin level in first trimester was 112.4 g/L, in second trimester was 106.5 g/L and in third trimester was 105.2 g/L. The mean Vitamin B12 level in first trimester was 328.6 pmol/L, in second trimester was 198.2 pmol/L and in third trimester was 165.3 pmol/L. The mean serum folate level in first trimester was 28.4 pmol/L, in second trimester was 19.3 pmol/L and in third trimester was 15.1 pmol/L. The difference was significant ($p< 0.05$).

Graph I Assessment of parameters



DISCUSSION

Vitamin B-12, also known as cobalamin, is a micronutrient essential for cellular growth, differentiation, and development.[7] Together with folic acid, vitamin B-12 is necessary for the synthesis of DNA, RNA, lipids, and protein in the cellular cytoplasm.[8] More specifically, vitamin B-12 and folate are necessary cofactors for the conversion of homocysteine to methionine, the latter being an important methyl donor required for the synthesis of neurotransmitters and phospholipids.[9] The present study was conducted to assess vitamin B 12 level among pregnant women.

In present study we found that out of 140 pregnant women. 20 patients were in first trimester, 70 in second and 50 in third trimester. The mean age was 24.5 years, 26.3 years and 28.2 years in first, second and third trimester respectively. Sukumar et al[10] assessed prevalence of vitamin B-12 insufficiency in pregnancy and its association with BW. A total of 57 and 23 articles were included for the prevalence and BW subreviews, respectively. The pooled estimates of vitamin B-12 insufficiency were 21%, 19%, and 29% in the first, second, and third trimesters, respectively, with high rates for the Indian subcontinent and the Eastern Mediterranean. The large heterogeneity between studies was partially addressed by creating a standardized score for each study which internally corrected for geographic region, trimester, and assay type. Twelve of the 13 longitudinal studies included showed a decrease in mean or median vitamin B-12 across trimesters. Pooled analysis showed non-significantly lower maternal vitamin B-12 concentrations in LBW than in normal-BW infants and higher odds of LBW with lower vitamin B-12 values.

We found that the mean weight was 60.2 Kgs, 63.2 Kgs and 67.2 Kgs in first, second and third trimester respectively. The mean height was 158.4 cm, 159.4 cm and 161.2 cm in first, second and third trimester respectively. Gravida of 1-6 was seen in 5 in first trimester, 1-4 in 24 in second trimester and 1-9 in 26 third trimester subjects. VanderJagt et al[11] determined the vitamin B12 status of 143 pregnant women in Nigeria representing all trimesters who presented to an antenatal clinic in Jos, Nigeria, using holotranscobalamin II levels (holoTCII), which is a measure of the vitamin B12 that is available for uptake into tissues. The holoTCII concentration ranged from 13 to 128 pmol/L. Using a cutoff of 40 pmol/L, 36% of the women were classified as vitamin B12-deficient. HoloTCII concentrations correlated negatively with plasma homocysteine levels ($r = -0.24$, $P = 0.003$) and positively with red blood cell folate concentrations ($r = 0.28$, $P < 0.001$). These data underscore the importance of supplementing pregnant women in Nigeria with vitamin B12 in order to ensure adequate vitamin B12 status and decrease the risk for neural tube defects.

We found that mean hemoglobin level in first trimester was 112.4 g/L, in second trimester was 106.5 g/L and in third trimester was 105.2 g/L. The mean Vitamin B12 level in first trimester was 328.6 pmol/L, in second trimester was 198.2 pmol/L and in third trimester was 165.3 pmol/L. The mean serum folate level in first trimester was 28.4 pmol/L, in second trimester was 19.3

pmol/L and in third trimester was 15.1 pmol/L. Vitamin B12 accumulation in utero is the major determinant of vitamin B12 status in the newborn and throughout infancy. Vitamin B12 is actively transported across the placenta, and strong correlations between maternal and newborn vitamin B12 status have been documented. Giugliani and associates[12] estimated that an infant born to a vitamin B12-replete mother will have vitamin B12 stores in the 25 to 30 μg range. Based on an average breast milk concentration of 0.42 μg/L in B12-replete mothers, an infant consuming 780 mL breast milk would obtain approximately 0.3 μg/day of vitamin B12 from milk. This amount is close to the recommended adequate intake (AI) of 0.4 μg/day for infants up to 6 months of age.

CONCLUSION

Authors found that vitamin B- 12 level was lowered in pregnant women in third trimester, hence there is need of additional oral supplement.

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