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The relationship between pregnancy and serum vitamin B9 and B12.

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ABSTRACT

Folate (vitamin B9) is a necessary ingredient for DNA replication. Also used as a substrate in a variety of enzymatic processes involved in amino acid synthesis and vitamin metabolism. Vitamin B12, commonly known as cobalamin, is a water-soluble vitamin. It comes in cyano-, methyl-, deoxyadenosyl-, and hydroxy-cobalamin forms. From December to June 2019, 50 pregnant women were registered in Al-Karkh Materuity Hospital. After obtaining informed consent, fasting blood (n=25) was taken by a single puncture from patients (either demonstrated vitamin B9 or B12 deficiency) and healthy volunteers (n=25). The weight of the baby at birth, the type of delivery, and the length of the pregnancy were all documented. After gaining oral agreement from the participants, fasting blood (2ml) was taken from the vein in plain vacutainers. Commercially available tests were used to determine the levels of vitamin B9 (folate) and vitamin B12 in the blood (Sigma, USA). GraphPad Instat was used to calculate the statistical significance of the unpaired t-test (3.0, Trial Version). Women with low vitamin B9 levels had a significantly lower fetal weight (p0.0001) than healthy controls. Similarly, as compared to healthy controls, B12 deficient women had lower infant birth weights. Vitamin B9 levels in healthy controls were 174.3821385.17 pmol/l, while they were 119.878525.81 pmol/l in B9 deficient subjects. The vitamin B12 concentration in the B12 deficient group was substantially lower (211.64931.71pg/ml) than in the healthy control group (401.47258.94 pg/ml). We may conclude from this research that vitamins B9 and B12 are critical for the growth and development of the fetus. The supplementing should begin before the pregnancy is planned. Folate (Vitamin B9) and vitamin B12 are linked to pregnancy difficulties in a negative way.

1. INTRODUCTION

Vitamin B complexes have an important plays an important part in a one-carbon cycle, which is required for a healthy pregnancy and, in particular, fetal growth [1]. Folate (vitamin B9) is a necessary component of DNA replication. Furthermore, as a substrate in a variety of enzymatic processes involved in amino acid synthesis and vitamin metabolism [2]. Pregnancy is made easier with the help of vitamin B9. Neural tube defects, such as brain and spinal cord defects, must be avoided. It's commonly administered throughout

pregnancy and when a woman begins trying to conceive [3].

Cobalamin is another name for vitamin B12. Cobalamin comes in a variety of forms, including cyano-, methyl-, deoxyadenosyl-, and hydroxyadenosyl-. In serum vitamin B12 is bound to proteins, and known as transcobalamins (TC) [4]. Vitamin B12 is necessary for methylation process, which is required for DNA and cell metabolism. Vitamin B12 is water soluble vitamin, which plays a important role in neuronal health and haematopoiesis. It also plays role in antioxidant properties. Vitamin B12 is bound to protein, which is cleaved by gastric mucosa. It is secreted in bile and reabsorbed by enterohepatic circulation and excreted via faeces [4].

The process of red blood cells formation is known as erythropoiesis and it occurs in the hematopoietic tissue of the bone marrow. It required several nutrients. But, folate, cobalamin (vitamin B12), and iron are most essentials for this process [5]. It is well known that the dietary supplementation with folic acid during the time of conception greatly reduces the risk of NTD in the offspring [6- 8]. Very few reports are available from the Iraq about the correlation of vitamins and pregnancy [9]. Since, vitamins are playing very important role in the fetus development. Hence, there is an urgent need to study the serum vitamin B9 and B12 levels and correlate this with pregnancy outcome. The goal of this study is to investigate the link between serum B12 levels and other factors, blood hemoglobin, In Iraqi women, serum glucose levels and pregnancy outcomes were studied.

2. Material and methods

2.1 Study design

From December 2019 to June 2019, 50 pregnant women were registered at Al-Karkh Materuity Hospital. The participants in this study were pregnant women in their 24th to 25th week of pregnancy. The procedure was carried out in the Al-Karkh Materuity Hospital. After obtaining informed consent, fasting blood (n=25) was obtained from patients (either indicated vitamin B9 or B12 deficiency) and healthy volunteers (n=25). The weight of the kid at birth, the type of delivery, and the length of the pregnancy were all documented.

2.2 Blood collection and serum separation

After receiving oral agreement from the subjects, fasting blood was taken (2ml) from the vein in plain vacutainers. After 30 minutes at room temperature, the samples were analyzed. After that, for 15 minutes, centrifuge at 3000rpm. For further investigation, the serum was isolated and stored at -20°C.

2.3 Biomarkers Determined

Commercially available tests were used to determine the amount of vitamin B9 (folate) and vitamin B12 in the blood (Sigma, USA).

2.4 Statistical analysis

The data was represented as Mean Standard Error (SE). GraphPad Instat was used to calculate the statistical significance of the unpaired t-test (3.0, Trial Version).

3. Results

3.1 Serum B9 and B12 levels of participants

Women with low vitamin B9 levels had a significantly lower fetal weight (p0.0001) than healthy controls. Similarly, as compared to healthy controls, B12 deficient women had lower infant birth weights. Vitamin B9

concentrations were determined to be 174.3821385.17 pmol/l in healthy controls and 119.878525.81 pmol/l in B9 deficient subjects. Figure 1 shows the serum B9 levels in both groups.

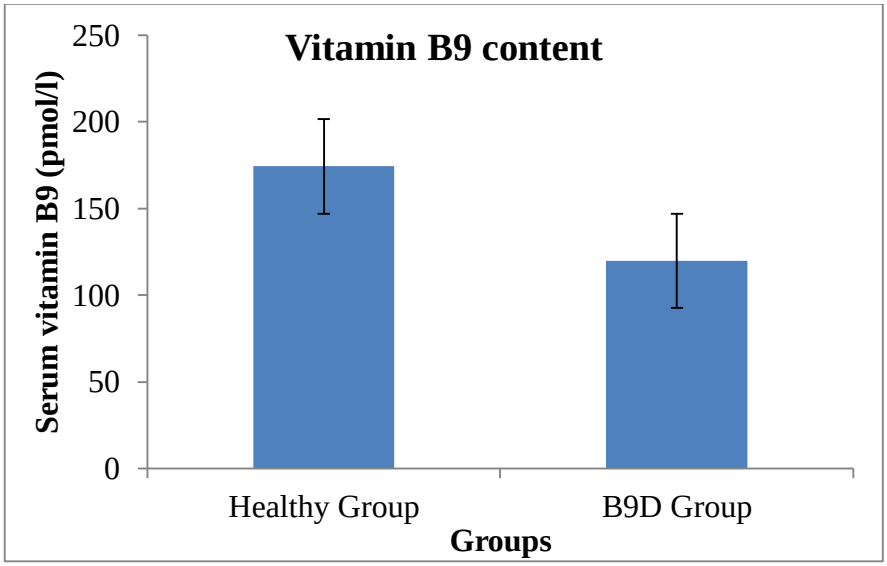

Figure 1: Serum vitamin B9 levels of enrolled women

The mean standard deviation error is used to represent the results. In comparison to healthy controls, the high glucose women group demonstrated p0.05 (unpaired two-tailed test).

Figure 2 depicts the vitamin B12 content of enrolled women. In the B12 deficient group, the vitamin B12 content was substantially lower (211.64931.71pg/ml) than in the healthy control group (401.47258.94 pg/ml). Premature birth has been documented in women with B12 deficiency. External B12 supplementation is given to these ladies. As a result, none of the delivered children had any birth defects. According to the findings, fetal birth weight is inversely connected with vitamin B12 insufficiency.

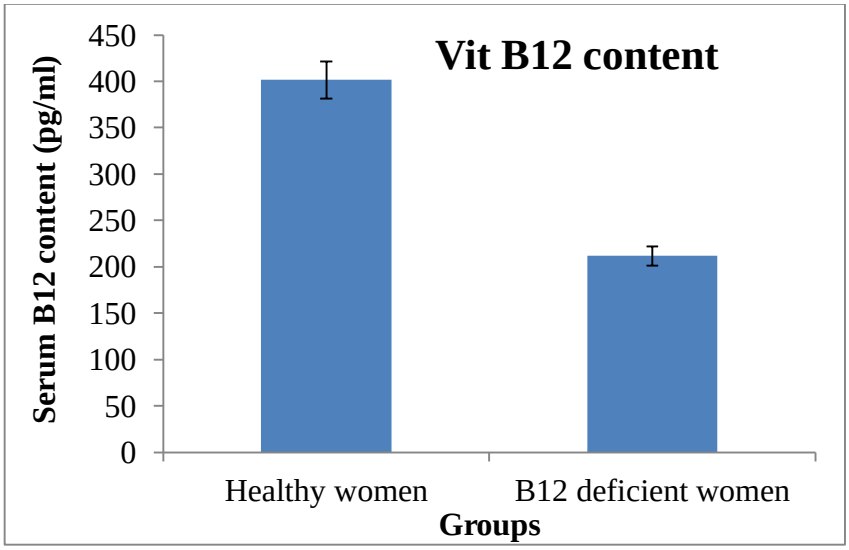

Figure 2: vitamin B12 content of enrolled patients

The mean standard error is used to represent the results. p0.001 was found in the high glucose women group when compared to the healthy control group (unpaired two-tailed test).

4. Discussion

So far in vitro studies have demonstrated that supplementation of physiologically balanced concentration of cyanocobalamine decreases superoxide levels in human aortic endothelial cells [10]. In vitro and *in vivo* studies has revealed that deficiency of folate causes expression of chromosomal fragile sites. There is excessive deposition of uracil in DNA, chromosome breakage, and DNA hypomethlation [11]. In human intervention studies it has been demonstrated that DNA hypomethlation, chromosome damage and uracil incorporation is minimized when folate concentration is higher. In human intervention it has been observed that plasma concentration of vitamin B12 above 300pmol/L may minimize micronucleus formation [11].

In a randomized placebo controlled clinical trial, it was observed that in preganant womens with gestation age less than 14 weeks increased the B12 status of both mother and child [12]. Many studies have revealed that women in poor and resource-constrained nations have low vitamin B-12 levels. Low plasma vitamin B-12 levels and low B12 levels in breast milk are both linked to newborn urinary MMA in 113 Guatemalan women. Lacto-vegetarian women's serum vitamin B-12 concentration was discovered to be lower than nonvegetarian women's in Mumbai, India. Another Mumbai study found that mean plasma vitamin B-12 levels in pregnant nonanemic women were 50.2 pmol/L compared to 131.3 pmol/L in nonanemic women (P 0.001). It's worth noting that vitamin B-12 levels were generally low in all of the study groups [12].

Neural tube abnormalities, other deformities, and even pregnancy problems are all reduced when folate is consumed [13]. A vitamin B12 deficiency was found in some of the women in this investigation. Many studies demonstrate that folate has a favorable effect on homocysteine to methionine conversion enzyme that requires vitamin B12 and the synthesis of that amino acid. During pregnancy, a little shortage in vitamin B12 is prevalent. Due to increasing fetal demand throughout gestation [14], approximately 38% of women had low B12 levels during delivery. If anemia is misdiagnosed as physiologic hemodilution or iron insufficiency, B12 deficiency can go unnoticed, resulting in Severe anemia and peripheral neuropathy, cognitive impairment, and a wide range of neuropsychiatric symptoms are all indications of peripheral neuropathy are all signs of this disease. Hemolytic anemia and thrombocytopenia with low platelet count (HELLP) syndrome is a microangiopathic hemolytic anemia and thrombocytopenia syndrome with low platelet count., increased liver enzymes, and thrombotic thrombocytopenic [15- 17] are all symptoms that might occur. Folate (Vitamin B9) and vitamin B12 are both linked to pregnancy difficulties in a negative way.

5. Conclusions

We may conclude from this research that vitamins B9 and B12 are critical for the growth and development of the fetus. The supplementing should begin before the pregnancy is planned. Folate (Vitamin B9) and vitamin B12 are linked to pregnancy difficulties in a negative way.

Ethical clearance: Following their inquiry, The Al-Karkh Materuity hospital was used to collect blood. Before enrolling the participants in the trial, oral agreement was obtained.

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