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Effect of maternal B12 on the child weight

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ABSTRACT— The health of the embryo is mainly depending upon the oxygen resource and nutrients from the mother. The present research aims to evaluate the effect of maternal B12 levels on the child weight. The pregnant women (n=20) were enrolled in the study at Kerbala maternity teaching hospital during October to March (23rd to 25th gestational week). The test was performed at Kerbala maternity teaching hospital. The blood was collected from the vitamin B12 group (B12 group) and healthy participants. Vitamin B12 deficient women showed significant (p=0.0317) decreased in the fetus weight. This decrease in the fetus birth weight and due to other complications, about 82.71% women underwent the caesarean section delivery. While, only 21.73% normal delivery occurs with vitamin B12 supplementation and healthy women, respectively. The presence of vitamin B12 deficiency leads to the premature delivery. The fetus birth weight was negatively associated with the presence of vitamin B12 scarcity. The vitamin B12 content was significantly lower (274.13±14.52 pg/ml) in the B12 deficient group as compared to healthy control (495.8±24.81 pg/ml). From the above study, we can conclude that vitamin B12 scarcity was associated with anemia in the mother, which in turn affected fetal weight. Vitamin B12 levels should be supervised before planning a pregnancy.

KEYWORDS: Pregnancy, Nutrients, Vitamin B12, Birth weight

1. INTRODUCTION

The mother's health during pregnancy was very critical and important for the health of the generations. The intra-uterine environment is greatly responsible for genetic control of fetal growth [1], [2]. Oxygen supply and nutrients from the mother are important factors that make an embryo healthy [3]. This provision depends on the mother's body size, nutritional status, body composition and metabolism. The self-reported parameters are established throughout the life of the mother of the child, in infancy and in infancy [3].

Several nutrients such as vitamins, minarals, carbohydrates, etc. are necessary during pregnancy [4]. Among the various categories of nutrients, vitamin B12 (more commonly known as cyanocobalamin) is a complex chemical compound. The vitamin B12 structure consist of one corrin ring and two pyrrole rings [5]. It is used by the body as methylcobalamin or 5-deoxyadenosyl cobalamin for DNA methylation and the hemoglobin production, which carries oxygen to red blood cells [5]. Similarly, hemoglobin is another important factor in pregnancy. It is a Fe-iron protein found in erythrocytes, and is responsible for O2 transport in vertebrates [6]. The main nutrients responsible for hemoglobin production are iron, folic acid, and vitamin B12. Succinyl co-A formulated as a mediator from B12 metabolism leading to the production of hemoglobin in red blood cells [7]. Folate deficiency without vitamin B12 causes megaloblastic anemia [8].

The diet consists of a various vitamin B12, methylcobalamin and the activity of 5-deoxyadenosylcobalamin, involved in methionine biosynthesis and methylmolonyl-CoA mutase, involved in amino acids and odd-

chain fatty acid metabolism in mammal cells [9], [10]. Humans have a complex process of absorbing vitamin B12 in the gut [11].

The recommended dietary supplement for vitamin B12 in adults is 2.4 μg/day in some countries [12]. [13] reported that daily 6 μg intake was found to be sufficient to maintain sufficient serum concentration. The deficiency is often caused by poor vitamin B12 intake, vegans or ovo-lacto vegetarians who eat junk food. The causes may also be related to inadequate production of Intrinsic factor, atrophic gastritis, and impaired intake of vitamin B12 due to disease, decay or disruption of pathogens, drug interactions and genetic abnormalities [14].

Decreased hemoglobin levels may be the result of one or more malnutrition. The main nutrients responsible for hemoglobin production are iron, folic acid, and vitamin B12. This deficiency is characterized by a decrease in hemoglobin levels due to a lack of essential nutrients, such as zinc, B vitamins, and iron. With this background, we evaluate the effect of maternal B12 levels on the child weight.

2. Material and Methods

2.1 Study design

The present research aims to evaluate the effect of maternal B12 levels on the child weight. The pregnant women (n=20) with 23rd to 25th gestational week were enrolled in the study at Kerbala maternity teaching hospital during October to March. The test was performed at Kerbala maternity teaching hospital. The blood was collected from the vitamin B12 group (B12 group) and healthy participants. Informed consent was taken. The parameters like type of delivery, child birth weight, and duration of pregnancy was recorded. The content of serum vitamin B12 and blood hemoglobin is measured by commercially available kits (Sigma, USA).

2.2 Statistical analysis

Results were presented as Mean ± Standard Error (SE). The data were analyzed to statistical analysis using GraphPad Instat (3.0, Trial Version).

3. Results

Vitamin B12 deficient women showed significant (p=0.0317) decreased in the fetus weight (Figure 1). This decrease in the fetus birth weight and due to other complications, about 82.71% women underwent the C-section delivery. While, only 21.73% normal delivery occurs.

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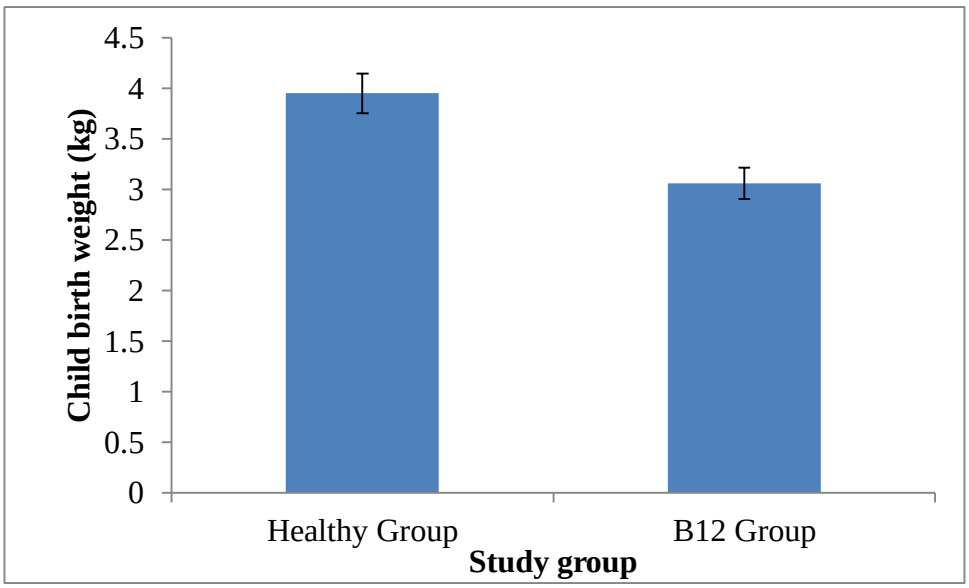

Figure 1. The fetus birth weight of B12 group and healthy women

Results are represented as mean ± standard error. B12 group showed $p<0.05$ as compared to healthy control.

The child delivery were found to be about 35.31 and 37.93 weeks in women with vitamin B12 supplementation and healthy women, respectively. The fetus birth weight was found to be negatively associated with the presence of vitamin B12 scarcity (Figure 2). The vitamin B12 content was significantly lower (274.13±14.52 pg/ml) in the B12 deficient group as compared to healthy control (495.8±24.81 pg/ml).

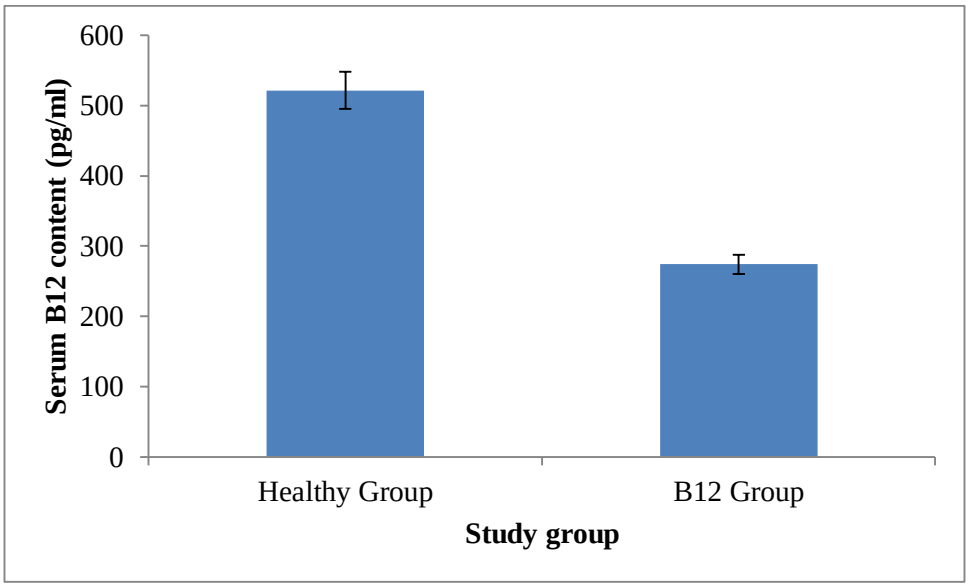

Figure 2: The vitamin B12 content of B12 group and healthy women

Results are represented as mean ± standard error. B12 group showed $p<0.05$ as compared to healthy control.

The blood hemoglobin levels of B12 deficient and healthy control group were 11.07±0.94 g/dl and 14.38±0.58 g/dl, respectively. In the deficient group, hemoglobin was low as compared to healthy group (Figure 3).

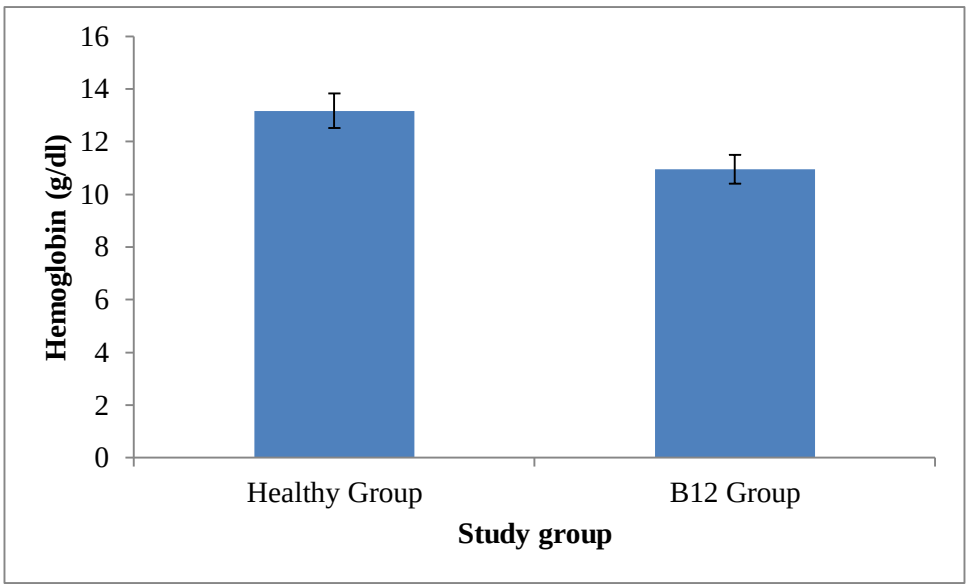

Figure 3: Blood hemoglobin levels of B12D group and healthy women

Results are represented as mean ± standard error. B12D group showed $p<0.05$ as compared to healthy control.

The normal Vitamin B12 values were compared with the earlier reports [15]. A positive correlation was observed between serum vitamin B12 levels and blood hemoglobin content. This, in turn, can be positively correlated with the birth weight.

4. Discussion

As defined by WHO, Fe deficiency is the most common disease of healthy eating and the leading cause of anemia in the world [16]. Any abnormality in the intra-uterine area can be detrimental to the baby's development. Failure to provide adequate amounts of nutrients to meet the baby's need, for example, due to maternal malnutrition, placental malnutrition or increased nutritional needs, leads to malnutrition [17], [18].

Severe anemia is the last stage of auto-immune gastritis and results in loss of the combination of intrinsic factor (IF). It is this deficiency of IF that causes vitamin B12 deficiency and if left untreated, megaloblastic anemia and neurological problems develop [19- 21]. The process of anemia begins with during pregnancy is well understood. Hemoglobin levels decrease due to hemodilution during the first and second trimester of normal pregnancy [22].

Vitamin B12 (B12) deficiency - pregnancy deficiency is very common, and has been found to be associated with premature birth (gestation length <37 weeks) and low birth weight (birth weight <2,500 g) [23]. Numerous reports have been published regarding the relationship between vitamin B12 and low birth weight [23- 27]. In the present study, we found that low birth weight is associated with a deficiency of vitamin B12. Our research is consistent with these reports. It has also been reported that high B12 is linked to higher birth weight in low- and middle-income countries, but not in high-income countries [23]. Maternal obesity may be one of the reasons for B12 deficiency in a few people [28], [29].

Very few reports are available regarding the link between vitamin B12 and low hemoglobin levels i.e. anemia [30], [31]. Studies in Korean children have reported that iron deficiency and vitamin B12 deficiency are directly related to growth retardation and anemia [30].

5. Conclusions

From the above study, we can conclude that vitamin B12 deficiency was associated with anemia in the mother, which in turn affected fetal weight. Vitamin B12 levels should be monitored before planning a pregnancy.

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