The Effect of Vitamin D3, Vitamin B6, Selenium and Some Electrolytes on the Women with Nausea and Vomiting of Pregnancy in Thi-Qar Government -Iraq

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Abstract

Objective: Nausea and vomiting (NVP) are among the most common symptoms during pregnancy. NVP causes emotional and psychological distress and can have a profound impact on a woman's quality of life (QoL).

Material and Method: Vitamin D3 and Vitamin B6,se and electrolytes (Mg^{+2},K^{+}) levels were determined in first and second trimesters in 120 women suffering from nausea and vomiting of pregnancy,30 pregnant women free of symptoms, age identical between the ages of (17-45) years.

Results: Vitamin D3 Vitamin B6, K^{+}, Se and Mg^{+2} in the blood showed a significant decrease in all patients as compared to control group ($P \leq 0.05$).

Conclusion: In patients with NVP and NP we find a significant reduction in level of Vit.D3, and decrease in level of serum Vit. B6,K^{+}, Se and Mg^{+2}. In first trimester found a decrease in levels of Vit.D3, Vit.B6 and K^{+} more from second trimester,while in first trimester found an increase in levels Se, Mg^{+2} more from second trimester.

Keywords: *Pregnancy, Nausea and vomiting (NVP), First and Second trimesters, Vitamin D3, Vitamin B6, Selenium, Potassium, Magnesium.*

Introduction

Nausea and vomiting are among the most common symptoms during pregnancy, affecting 50–90% of all pregnant women(1).This condition usually begins at weeks 4–8 after menstruation and is more severe in the 9th week. It starts to decrease in the following weeks and most cases, improves until the 14th week; however, it continues during the whole pregnancy in 2% of the cases(2). The most severe form of NVP, Hyperemesis gravidarum (HG), is characterized by severe and persistent nausea and vomiting leading to weight loss, ketonuria, nutritional deficiencies, dehydration, and electrolyte imbalance, often so severe as merits hospitalization(3). Vitamins and minerals are collectively referred to as micronutrients and have an important influence on the health of pregnant women and growing fetus(4) Vitamin D is a fat-soluble vitamin. It is also synthesized within skin cells on sunlight contac(5). Vitamin D is a well-known immunomodulatory and anti inflammatory agent in the body(6). Low serum 25-hydroxyvitamin D3 [25(OH)D] levels have been related to adverse obstetric outcomes such as preterm birth, low birth weight, hypertension, and gestational diabetes mellitus (GDM)(7). Vitamin B6,a water soluble vitamin. VitaminB6 functions as a coenzyme in many reactions that are involved in amino acid, carbohydrates, and lipid metabolism(8). Vitamin B6 deficiency has

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been proposed as a cause for NVP too[9]. Vitamin B6 supplementation may be important for achieving adequate intake during pregnancy[10]. Selenium plays an important role in the maintenance of human health[12]. It a vital intracellular antioxidant that prevents oxidative cellular damage[12]. The demand for selenium during pregnancy is increased to support optimal fetal growth, resulting in decreased maternal blood and tissue concentrations of selenium [13]. Electrolytes are present in the human body, and the balance of the electrolytes in bodies is essential for the normal function of the cells and organs[14]. Magnesium (Mg^{+2}**)** is the fourth most abundant cation in the body and the second most abundant intracellular ion[15]. Pregnancy represents a physiological situation with increased magnesium requirement[16]. An adequate magnesium intake also seems to be important for further healthy development in pregnancy[17]. Potassium (K^{+}) is a very important mineral to the human body for Building proteins, Break down and use carbohydrates, Building muscle, maintain normal body growth, control the electrical activity of the heart and control the acid-base balance[15].

Material and Method

This study conducted at the Bent Al-Huda hospital in Thi-Qar Governorate/Iraq, biochemistry laboratory, the hormones and immunology laboratory, the specialized clinics. It included (150) subjects, the control group consisting of (30) women Symptom -free (SF) and patients (120) .A bout (5mL) of blood samples of NVP patients and controls. Analyzed Vitamin D3,Vitamin B6, electrolet and Se. Vitamn D3 in serum was analyzed by ELISA instrument, kits supplied by Calbiotech,USA . Serum vitamin B6 was analyzed by (ELISA) instrument, kits supplied by Elabscience, USA . Serum Mg^{+2} and $K^{+}$was analyzed by enzymatic colorimetric method by UV/VIS spectrophotometer, kits supplied by (S.A.E), Egypt. Concentrations of selenium element in serum samples were measured by flame atomic absorption device, at the college of sciences/university of Thi-Qar. **Excluded cases**: non-pregnant women, smokers, pregnant women with diabetes, preeclampsia, heart disease, patients with chronic diseases. **Statistical Analysis:** All statistical analysis was performed using SPSS, Windows version 24.0 software and Microsoft Excel 2010. the results were expressed as mean ± standard deviations (mean ± SD),and Least Significant Difference (LSD).One way analysis of variance (ANOVA) was used to compare parameters in different studied groups. P-values ($P \leq 0.05$) were considered statistically significant.

Results

In this study, we identified the effect of NVP and NV on pregnancy womans in first and second trimesters in Vitamins (D3 and B6),Electrolytes (Mg^{+2} and K^{+}) and trace elements (Se). The levels of biochemical markers in pregnancy (Vit.D3,Vit B6,Se, Mg^{+2},K^{+}) showed a significant decrease in NVP and NP patients compared to the control group. We also identified the effect of pregnancy period (first trimester) (1st),(second trimester) (2nd) on those parameters biochemical, and the results indicate a significant decrease in the concentration of vitamin D3 (Vit.D3) in (1st) compared to (2nd)compared to the control groups .As shown a significant decrease in the concentration of(Vit.B6 and K^{+}) in (1st) compared to (2nd). The results showed a significant increase in the levels of (Se and Mg^{+2}) in (1st) compared to (2nd),. We also identified the correlation between (V.D3) and with those parameters biochemical and the results showed positive correlation.

Table (1): Serum vitamin D3 and vitamin B6 Test for patients with NVP,NP and the controls.

Groups		No.	Vit.D3 (ng/ml) Mean ± SD	Vit.B6 (ng/ml) Mean ± SD
NVP	1st	30	2.02 ± 0.15^{e}	30.38 ± 2.04^{c}
NVP	2nd	30	2.52 ± 0.21^{d}	34.11 ± 2.01^{b}
NP	1st	30	3.20 ± 0.43^{c}	34.33 ± 1.59^{b}
NP	2nd	30	3.60 ± 0.30^{b}	34.9 ± 1.34^{b}
Control	30		8.52 ± 1.12^{a}	50.27 ± 2.17^{a}
Lsd	0.14			0.80

Table (2): Serum Se, Mg^{+2} and K^{+} Tests for patients with NVP,NP and the controls.

Group		No	Se (mg/l) Mean ±SD	Mg^{+2} (mg/dl) Mean ±SD	K^{+1} (mmol/L) (Mean±SD)
NVP	1st	30	7.13±0.43[b]	2.22±0.11[b]	3.44±0.81[c]
NVP	2nd	30	3.86±0.37[e]	2.11±0.61[b]	4.08±0.57[b]
NP	1st	30	6.68±0.63[c]	2.24±0.04[b]	4.24±0.62[b]
NP	2nd	30	5.37±0.54[d]	2.13±0.46[b]	4.26±0.49[b]
Control		30	7.60±0.52[a]	2.40±0.12[a]	5.25±1.02[a]
Lsd			0.22	0.15	0.31

* Each value represents mean ± SD values with non-identical superscript (a, b, or c…etc.), which were considered significant differences ($P \leq 0.05$).

-No: Number of subjects., NVP: Nausea and vomiting in pregnancy, NP: Nausea in pregnancy, SD: Standard deviation.,LSD: Least Significant Difference.

Discussion

Our study is the first to include a clinical study of vitamins and elements and their effect and classification of nausea and vomiting during pregnancy during the first and second trimesters of pregnant women with NP and NVP and asymptomatic pregnant women. Morning sickness is a frequent symptom in pregnancy, the pregnant woman has nausea or vomiting at various levels due to gestational hormone increase (HCG), leading to dehydration, weight loss, malnutrition, and micro-nutrient deficiency as well. Vitamin D is a well-known immunomodulatory and anti-inflammatory agent in the body[18]. Pregnant women with morning sickness had a double increase in vitamin D deficiency risk versus pregnant women without morning sickness at $P<0.05$[19]. Table (1), show a significant decrease in the concentration of serum Vit.D3 in all patient with NVP,NP in comparison with control groups, There was no significant difference in the prevalence of 25(OH) D deficiency(25(OH)D,50nmol/l)among pregnant women in the three different trimesters[20] nutrients from vitamins and supplements in addition to foods, however, revealed that the intake of many micronutrients increased substantially from the 1st to 2nd trimester[21]. Vitamin D deficiency is a widespread global problem, which even can observe in the countries which get enough sunlight[21]. Considering the factors affecting vitamin D production such as clothing type, skin color, and the time of day being exposed to the sun[22]. Table (1), show a significant decrease in the concentration of serum Vit.B6 in all patient with NVP, NP in comparison with control groups. Vitamin B6 deficiency is associated with more severe NVP symptoms[23].During pregnancy, pyridoxine contributes to the embryonic development of the central nervous system influencing brain development and cognitive function; therefore, maternal vitamin B6 deficiency may have negative long-term neuro developmental consequences on the fetus [24]. The first-line treatment for nausea and vomiting is vitamin B6 which has been evaluated in many controlled trials fo the treatment of morning sickness. it is found a vitamin that B6 reduces nausea and vomiting in early pregnancy[25]. However, safety and efficacy studies have determined doses up to 200 mg per day may be useful in managing NVP[23]. Table (2), show a significant decrease in the concentration of serum Se in all patient with NVP,NP in comparison with control groups. In a previous study,the antioxidant activity was significantly lower in Women with NVP compared to healthy pregnant women. Some theories may explain the decreased levels of antioxidants in NVP in the study. The decreased dietary intake of most nutrients rich in antioxidants is observed in women with NVP[26].Selenium is believed to be one of the most important antioxidant nutrients in the human body, and selenoproteins have a protective effect against oxidative stress and inflammation[27].Various studies have demonstrated that during pregnancy, the whole blood and plasma selenium concentrations, and the activity of glutathione peroxidase in red cells and plasma decline in a linear fashion from the first trimester to parturition[28]. The demand for selenium during pregnancy is increased to support optimal fetal growth, resulting in decreased maternal blood and tissue concentrations of selenium[13].Table (2),show a significant decrease in the concentration of serum Mg^{+2} in all patient with NVP,NP in comparison with control groups. In a previous study serum Mg^{2+} concentration during pregnancy was significantly lowered to a value

considered to be deficiency starting appears at the first trimester and continues to decline during the rest of pregnancy have a significant negative correlation with pregnancy duration[29]. The reduction of serum Mg^{2+} level during pregnancy is mainly attributed to fetal growth demand or because of nutritional status during pregnancy. Many explanations behind this reduction, it is most likely due to the fetus and placenta absorb huge amounts of nutrients particularly magnesium from the mother[30]. Early signs of deficiency can include loss of appetite, nausea, vomiting, fatigue, and weakness[31]. Table (2), show a significant decrease in the concentration of serum K^+ in all patient with NVP,NP in comparison with control groups . The concentration of (K^+) in the serum is a balance among intake, excretion, and distribution between the extra-and intracellular spaces[32]. A patient with Hyperemesis gravidarum (HG) frequently vomits gastric juice and, thus, the loss of hydrogen ions, sodium, chloride, and water in gastric contents leads to chloride-sensitive metabolic alkalosis, dehydration, and extracellular fluid (ECF) volume reduction[33] causing elevated activity of the renin-angiotensin-aldosterone system (RAAS)[33]. This activated RAAS, in turn, increases the urinary excretion of potassium, compounding the hypokalaemia[34].

Conclusion

Vitamin D is has a key role in the etiopathogenesis of nausea and vomiting pregnancy because vitamin D deficiency might lead to problems in immune regulation.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq.

Conflict of Interest: None

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