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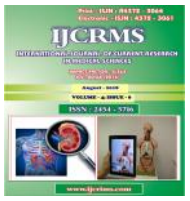

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The Effect of low Serum Vitamin D Levels on the Prevalence of Preeclampsia in Pregnant Women

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Abstract

As the most common metabolic disorder during pregnancy, diabetes causes chronic resistance to insulin through secreting extra volumes of insulin. Diabetes is a chronic disease which develops when pancreas does not produce insulin or the body does not use insulin effectively, a problem which is often due to cardiovascular complications. The main types of diabetes include type 1, type 2, and gestational diabetes. Due to physiological and hormone changes (lactobenic-progesterone-estrogen and cortisol) during pregnancy, the mother's body becomes susceptible to diabetes mellitus , which is a type of diabetes intolerant to varying severity of carbohydrates developing primarily during pregnancy.Results of the Literature review were exported to Endnote. Prior to the formal screening process, a calibration exercise was undertaken to pilot and refine the screening. Formal screening process of titles and abstracts were conducted by two researchers according to the eligibility criteria, and consensus method was used for solving controversies among the two researchers. The full text was obtained for all titles that met the inclusion criteria.According to the results of the present study, vitamin D metabolism is related to glucose levels, but low levels of vitamin D may interfere with glucose tolerance and diabetes or they might be related to the duration of the disease, an important goal that cannot be closed with certainty with cross-sectional studies.

Keywords: Serum, Prevalence , Pregnant Women, Preeclampsia ,Vitamin D

Introduction

As the most common metabolic disorder during pregnancy, diabetes causes chronic resistance to insulin through secreting extra volumes of insulin (1).Diabetes is a chronic disease which develops when pancreas does not produce insulin or the body does not use insulin effectively, a problem which is often due to cardiovascular complications. The main types of diabetes include type 1, type 2, and gestational diabetes (2). Due to physiological and hormone changes (lactobenic-progesterone-estrogen and cortisol) (3) during pregnancy, the mother's body becomes susceptible to diabetes mellitus (5-4), which is a type of diabetes intolerant to varying severity of carbohydrates developing primarily during pregnancy (7-6). The prevalence rate is between 1.4-14% of all pregnancies in different countries (8) and 13.-13% in Iran.

Method

Search strategy

Searches were conducted by two independent researchers in international (PubMed, Web of science, Scopus and Google scholar) and national (SID, Magiran) databases for related studies from the inception of the databases to September 2017 (without time limitation) in English and Persian languages. To ensure literature saturation, the reference lists of included studies or relevant reviews identified through the search were scanned. The specific search strategies were created by a Health Sciences Librarian with expertise in systematic review search using the MESH terms and free terms according to the PRESS standard . After the MEDLINE strategy was finalized, it was adapted to search in other databases. Accordingly, PROSPERO was searched for ongoing or recently related completed systematic reviews. The key words used in the search strategy were “Serum, Prevalence, Pregnant Women, Preeclampsia ,Vitamin D” and Iran which were combined with Boolean operators including AND, OR, and NOT.

Study selection

Results of the Literature review were exported to Endnote. Prior to the formal screening process, a calibration exercise was undertaken to pilot and refine the screening. Formal screening process of titles and abstracts were conducted by two researchers according to the eligibility criteria, and consensus method was used for solving controversies among the two researchers. The full text was obtained for all titles that met the inclusion criteria. Additional information was retrieved from the study authors in order to resolve queries regarding the eligibility criteria. The reasons for the exclusion criteria were recorded. Neither of the review authors was blinded to the journal titles, the study authors or institutions.

Discussion

Patients with gestational diabetes mellitus are divided into two groups of symptomatic and asymptomatic. Symptoms of gestational diabetes include overeating, fatigue, edema, high blood pressure, obesity, itching, sweating, and sugar level downfall attacks (9). However, up to 70% of patients asymptomatic (10). The risk factors for gestational diabetes include being aged higher than 30 years old, the history of diabetes in family members, more than three times of pregnancy (11),having the history of deliveries with babies more than or equal to 4 kg, high blood pressure and embryonic anomalies, (12) increased triglycerides (13), and high body mass index. The higher the number of factors listed, the greater the risk of developing the disease. The effects of gestational diabetes mellitus are divided into maternal and fetal ones. Maternal complications include diabetic ketoacidosis, weight gain, early delivery and spontaneous abortions (14), increased risk of urinary tract and genital, cesarean, and preeclampsia (15); fetal complications include weighing higher than or equal to 4 kg, premature birth defects, congenital anomalies, respiratory distress, the probability of developing diabetes in newborns, and congenital disorders (16). In addition, there might be late eternal complications such as developing type 2 diabetes in 5 years postpartum in 18-50% of cases (17), and the probability of hypertension, dyslipidemia, and long-term cardiovascular disease (18). Controlling gestational diabetes by lifestyle modification, including anaerobic exercise, getting enough fruits and vegetables, using a low-fat diet, controlling blood sugar during pregnancy, and limiting calories that should be accompanied with weight loss are efficient recommendations (19). If the mother cannot tolerate or fail to respond appropriately, insulin therapy is recommended(20). In addition, some studies have shown that vitamin D can contribute to insulin secretion and dysfunction (21). The prevalence of vitamin D deficiency is reported to be 18 to 48% in pregnant women (22).This vitamin is a fat-soluble vitamins (23) produced by non-enzymatic conversion of the skin during exposure to ultraviolet rays of the sun. It should also be noted that a limited amount of

vitamin D is supplied by food sources. Vitamin D is stored in the adipose and liver tissues, and then converted to the active form (1 and 25 dihydroxyvitamin D) in the kidney. Recent studies have shown that vitamin D can play a crucial role in treating diabetes, as its receptors have been diagnosed in many tissues, including the pancreas (24); this vitamin, also, increases the expression of insulin receptors and insulin sensitivity in other tissues (25). Based on the WHO definition, levels> 10 ng / ml are considered as deficiencies and> 20 ng / ml as inadequate vitamin D (37). Risk factors for vitamin D deficiency include pregnancy, lactation, early childhood, dark skin and aging (26). In a study conducted by Dr. Hossein Nejad et al in 2006, there turned out to be an inverse relationship between insulin resistance and gestational diabetes with serum vitamin D levels (27). In another study, maternal vitamin D deficiency in early pregnancy turned out to have an important relationship with the increased incidence of gestational diabetes (28).

Dr. Saeed Behradad Manshesh et al conducted a double blind randomized clinical trial on 60 patients, divided in two groups, with type 2 diabetes in 2011 (the subjects were matched in terms of age, sex, body mass index, and diabetes control). Patients in the case group received oral vitamin D at weekly dose of 50,000 units for 12 weeks. At the beginning of the study, no significant relationship was observed between the serum levels of hemoglobin glycosylated and 25 hydroxyvitamin D in patients. At the end of the study, vitamin D supplementation had a significant effect on the concentration of fasting blood sugar serum, glucose 2 hours after food, glycosylated hemoglobin and lipid profile (29).

The third National Nutrition and Public Health Survey (2004) shows that although there is no association between the concentration of 25 hydroxyvitamin D and the evaluation of the beta cell hemostasis model, serum 25 hydroxyvitamin D levels have an inverse relationship with diabetes risk and insulin resistance (30).

In 2006, Dr. Piticcoet al conducted a study on 70 newborns with a mean age of 14 years with type 1 diabetes; according to the results of their study, supplemental calcitriol turned out to have a modest effect on the remaining performance of beta cells, while reducing the concentration of hemoglobin glycosylated after 1 year was not statistically significant(31).

In a cross-sectional study conducted by Champe et al on non-diabetic patients in 2009, there turned out to be an inverse relationship between serum vitamin D levels and fasting glucose and glucose after food (32).

According to the results of the present study, vitamin D metabolism is related to glucose levels, but low levels of vitamin D may interfere with glucose tolerance and diabetes or they might be related to the duration of the disease, an important goal that cannot be closed with certainty with cross-sectional studies. (33)

On the other hand, studies on patients with impaired glucose tolerance or gestational diabetes who are at the early stages of diabetes are more helpful in evaluating the relationship between vitamin D deficiency and insulin levels; additionally, there are quite limited number of epidemiological studies on the status of vitamin D and diabetic patients during early onset of impaired glucose tolerance. (34)

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