Tripolitana Medical Journal; 2018, Vol. 7, No. 2, pp. 77 - 79

tmj

Short Communication

ISSN 2077-5628

Effect of Vitamin D Level on Glycemic Control in Diabetic Pregnant Women at Endocrine Clinic, Department of Gynecology and Obstetrics/ Tripoli Medical Center, Libya, 2016

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Received 3 August 2018/Accepted 20 September 2018

ABSTRACT

Vitamin D deficiency in pregnancy was related to the incidence of gestational diabetes (GDM) and serum 25(OH) D was significantly lower in women with GDM than in those with normal glucose tolerance.

The study aimed to study the effect of vitamin D level on glycemic control in diabetic pregnant women.

This study was a longitudinal study. It was conducted at Obstetrics and Gynecology Department at Tripoli Medical Center (TMC) during the year 2016 from March to August. Sixty diabetic pregnant women were included. Blood level for vitamin D and HbA1c were measured before and after vitamin D supplementation. SPSS software version 16, used to analyze the data; mean, standard deviation, percentages and paired T test were used. *P* value < 0.05 considered significant. The mean age of the cases was 33.7 ± 6.3 years. Most of the patients 57 (95%) suffered from Vitamin D deficiency and 3 (5%) patients have insufficient level. HbA1c level among 96.6% of patients was > 7%. Mean of vitamin D prior supplementation was 9.3±6.45 ng/ml, increasing to 27.7±9.12 post treatment and the mean of Hb A1C pre supplementation was 7.8±1.27 decreasing after treatment to 5.8±0.68.

There was a significant increase in vitamin D level after treatment (27.7±9.2) and significant decrease in HbA1c after supplementation (5.83±0.68).

Identification of CAN is crucial because it can lead to severe morbidity and mortality and increase risk of sudden cardiac death.

Key words- *Gestational diabetes; Vitamin D; Deficiency; Glycated hemoglobin.*

INTRODUCTION

The diagnosis of gestational diabetes mellitus at any time during pregnancy should be considered if one or more of the following criteria are met: Fasting plasma glucose = 5.1-6.9 mmol/l (92 -125 mg/dl) or 1-h post 75g oral glucose load >=10.0 mmol/l (180 mg/dl) or 2-h post 75g oral glucose load 8.5 –11.0 mmol/l (153-199 mg/dl)[1], and glycated hemoglobin (HbA1C) (≥ 6.5 DCCT %).[2]

There is no consensus on optimal serum levels of 25-hydroxyvitamin D (25(OH)D), vitamin D deficiency is defined by a serum 25(OH)D level less than 25 nmol/l (10 ng/ml). Serum 25(OH) D levels between 25 and 50 nmol/l (10-20 ng/ml) are considered as vitamin D insufficiency.[3] Vitamin D deficiency in pregnancy was related to the incidence of GDM and serum 25(OH)D was significantly lower in women with GDM than in those with normal glucose tolerance,[4] also associated with pre-eclampsia, and small infants[5], bacterial vaginosis, and an increased risk for caesarean section delivery.[6,7]

Vitamin D deficiency and insufficiency have been associated with impaired glucose metabolism and the metabolic syndrome.[3,8] Furthermore, several studies found inverse correlation between 25(OH)D and fasting plasma glucose (FPG), 1 hr. after load plasma glucose in oral glucose tolerance test (OGTT) and glycated hemoglobin.[4,9,10]

The influence of vitamin D status on glycated hemoglobin (HbA1c), a marker of longer-term glucose control, has not been established in women with GDM, hence the study conducted to the effect of vitamin D level on glycemic control in diabetic pregnant women.

MATERIALS AND METHODS

This study was longitudinal type. It was conducted at diabetic clinic; in Obstetric Department in Tripoli Medical Center (TMC) during the year 2016 from March to August. Sixty diabetic pregnant women who came for follow up at Obstetrics and Gynecology Department in TMC during period of study were included. Blood samples for vitamin D level and HbA1c were taken from them in first visit to the clinic then those diabetic pregnant women who have vitamin D deficiency received vitamin D treatment in form of vitamin D IM injection 200.000 IU monthly for 3 months then blood samples were taken from

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them to see the changes in vitamin D and HbA1c levels. The levels of vitamin D were defined as: Deficient if <10ng /ml, insufficient between 11-20 ng / ml and normal >20ng / ml.[3] HbA1c levels were defined: Ideal control if between 6-7%, Accepted control if between 7-8 %, 8-9% needs improving and re-evaluation of treatment and Poor control if ≥ 9%.[11]

Data was analyzed using SPSS program version 16. Descriptive statistics including means, standard deviation, frequencies, and percentages were obtained for all variables as appropriate. Paired *t* test was conducted to compare difference in means of vitamin D and HbA1c level pre and post vitamin D supplementation. *P* value < 0.05 considered significant.

Verbal informed consent was obtained from all participants during their follow up at clinic and data confidentiality was maintained throughout the study and any resulting publication anonymously.

RESULTS

The study revealed that, the age of the cases was ranged between 20 and 44 years with mean age 33.7 ± 6.3 years, one third of the patients were in age group 35-39 years (Table1).

Table 1: Distribution of cases according to the age, TMC, 2016.

Age	No.	%
20-24	5	8.3
25-29	9	15
30-34	14	23.3
35-39	20	33.3
40-44	12	20
Total	60	100

All the cases in present study suffered from vitamin D deficiency, most of them(95%) were had vitamin level below 10 ng/ ml, and 5% were had insufficient level of vitamin. The study showed that only 3.3% of the participants were had HbA1c level less than 7% (Table 2).

Table 2: Distribution of cases according to the levels of vitamin D and HbA1c pre vitamin D supplementation.

	No.	%
Vitamin D levels		
Deficiency	57	95
Insufficiency	3	5
HbA1c level		
Controlled	2	3.3
Accepted	44	73.3
Uncontrolled	14	23.3

There was a significant difference in vitamin D level pre (9.3±6.45) and post supplementation (27.7±9.13), t (59) = -13.74, *P* <0.001. Also the results revealed that, a significant difference in HbA1c level pre-treatment (7.8±1.28) and post supplementation (5.8±0.68), t (59) = 13.88, *P*<0.001 (Table 3).

Table 3: Mean of vitamin and HbA1c levels pre and post treatment in TMC, 2016.

	Mean ± SD before supplementation	Mean ± SD post supplementation	Mean difference	*P* value
Vitamin D	9.3 ± 6.45	27.7 ± 9.13	-1.84	**<0.001**
HbA1c	7.8 ± 1.28	5.8 ± 0.68	1.96	**<0.001**

DISCUSSION

Studies reported a prevalence of inadequate vitamin D levels in 41% of the women with GDM, and they consequently proposed routine vitamin D testing of all pregnant women when screening for GDM or earlier, and treatment of women who are found to be deficient[12], compared with current study all diabetic pregnant women who were included have vitamin D deficiency. The highest percentage of women between 30 and 39 years with mean age 33.7 ± 6.3 years year supported by study in India which revealed that GDM patients with vitamin D deficiency were in the age group of greater than 30 years (44.7%).[13] The majority of the patients in the current study suffered from Vitamin D deficiency rather than insufficiency. Same study in India reported similar result, Vitamin D deficiency present in 31 (96.9%) GDM patients on the other hand insufficiency in 1(3.1%) patient.[13] The study of Lithy A et al showed different result in which the majority of the women with GDM suffered from Vitamin D insufficiency rather than deficiency where the mean 25 OHD levels was (18.9 ng/ml) 47.25 nmol/L ± 10.18.[12] In current study there is a significant difference in vitamin D level pre (9.3±6.45) and post supplementation (27.7±9.13), *P*<0.001, which is similar with Asemi Z et al study which showed vitamin D supplementation resulted in increased serum vitamin D concentrations compared with placebo (+18.5 ± 20.4 compared with +0.5 ± 6.1 ng/mL; *P* < 0.001). Furthermore, intake of vitamin D supplements led to a significant decrease in concentrations of fasting plasma glucose (-17.1 ± 14.8 compared with -0.9 ± 16.6 mg/dL; *P* < 0.001).[14] The study of Lithy A et al showed a negative linear correlation between fasting blood glucose levels and vitamin D3. The same study reported that there was inverse association between vitamin D and HbA1c in women with GDM, showing a potential interaction between vitamin D and blood glucose control in pregnancy.[12] Heather H Burris et al study reported that there was a significant inverse relation of serum vitamin D and the incidence of GDM, in which Vitamin D insufficiency is associated with an increased risk of GDM.[15] Some studies reported that only severely deficient maternal serum vitamin D levels are significantly associated with an elevated relative risk of gestational diabetes mellitus as Maghbooli et al found in a study of 741 women in Iran that among the 29% of participants with vitamin D level < 15 nmol/L (6 ng/ml), the prevalence of GDM was significantly higher compared to women with 25(OH)D levels ≥ 35 nmol/L(14 ng/ml).[16]

CONCLUSION

There was a significant increase in vitamin D level after treatment and significant decrease in HbA1c after vitamin D supplementation. Further study recommended to ascertain the appropriate dose of vitamin D among gestational diabetic women.

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