RESEARCH ARTICLE

ASSESSMENT OF THE EFFECT OF VITAMIN D SUPPLEMENTATION ON IMPROVING GLYCAEMIC CONTROL IN DIABETIC VITAMIN D-DEFICIENT PREGNANT WOMEN

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ABSTRACT

The study is conducted to assess the effect of vitamin D supplementation in diabetic vitamin D-Deficient pregnant women on the improvement of blood sugar levels. One hundred sixty pregnant women in age ranged 18-40 years were randomized into Group I & Group II. Group I am consisting of 80 patients were supplemented with 60,000 I.U of vitamin D3 and Group II were offered routine antenatal care as per institutional protocol. Mean age was 28.1 years and 28.4 years, weight was 73.5 Kgs and 74.1 kgs, height was 156.2 cms and 157.4 cms, BMI (Kg/m²) was 30.1 and 29.5, primigravida was seen in 35 and 42, multigravida in 45 and 38, overt DM in 12 and 10, H/O GDM in previous pregnancy was seen in 16 and 8 and family history of DM was seen in 36 and 24 in Group I and Group II respectively. 35 patients in Group I and 26 in Group II were on insulin which increased to 40 in Group I and 30 in Group II on post- intervention. 32 patients in Group I and 25 in Group II required metformin which increased to 36 in Group I and 28 in Group II. The difference was comparable ($P > 0.05$) between both Groups. Vitamin D supplementation had no effect on decreasing insulin resistance or improving the blood sugar levels in diabetic pregnant women suffering from deficiency of vitamin D.

KEYWORDS

Pregnancy, glycaemic control, carbohydrate intolerance

1. INTRODUCTION

Diabetes mellitus is a metabolic disorder characterised by intolerance to carbohydrate leading to high blood glucose level. Gestational diabetes mellitus (GDM) is the type of diabetes identified during pregnancy (Hu et al., 2019). Polyuria, polydipsia and polyphagia are different clinical symptoms among patient of diabetes mellitus. Vitamin D has major role in life. Sunlight is the main source of vitamin D. The impact of vitamin D in modulating numerous inflammatory pathways is being studied which may affect the metabolic control in diabetes (Bener et al., 2013). The demand of vitamin D is highest during trimesters of pregnancy. Inadequate vitamin D level in pregnant ladies can lead to risk of gestational diabetes mellitus (GDM). There are contradictory studies regarding correlation of gestational diabetes mellitus with vitamin D (Parildar et al., 2013; ACOG Committee on Obstetric Practice, 2011). Worldwide, the patients of vitamin D deficiency is increasing day by day. It is the matter of great concern. Approximately, 1 billion subjects are vitamin D deficient universally (Singla et al., 2012). In a study, there have been vitamin D deficient people in all age-Group (Asemi et al., 2014). The number of vitamin D deficiency people is no less in countries like Australia where ozone layer is partially absent leading to high ultraviolet exposure. The number is as high as 31% in people over 25 years of age (Lau et al., 2011). Vitamin D deficiency affect both skeletal as well as non-skeletal conditions such as diabetes. Dark skinned pregnant ladies are more prone to develop

vitamin D deficiency. This may be facilitated via effects of vitamin D on beta cell of islets of Langerhans of pancreas or insulin resistance (Dawodu et al., 2013; Mishra et al., 2018). The study is conducted to assess the effect of vitamin D supplementation in diabetic vitamin D-Deficient pregnant women on the improvement of blood sugar levels.

2. MATERIALS AND METHODS

In our randomized controlled trial, we enrolled one hundred sixty pregnant women in age ranged 18-40 years. Approval from institute review board was obtained. A valid written consent was taken from all enrolled participants after explaining them about benefits of the study. All participants were divided into two Groups. Group I (80) subjects were having GDM who were prescribed 60,000 units of vitamin D3 for 1 month. Group II (80) subjects were provided routine antenatal care and delivery was induced. In all, parameters such as glycaemic level, medicines, mode of delivery in subjects and neonatal outcomes were calculated. Results of the study was subjected to statistical analysis using SPSS version 20.0. P value was set significant below 0.05.

3. RESULTS

Mean age was 28.1 years and 28.4 years, weight was 73.5 Kgs and 74.1 kgs, height was 156.2 cms and 157.4 cms, BMI (Kg/m²) was 30.1 and 29.5,

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primigravida was seen in 35 and 42, multigravida in 45 and 38, overt DM in 12 and 10, H/O GDM in previous pregnancy was seen in 16 and 8 and family history of DM was seen in 36 and 24 in Group I and Group II respectively. The difference among both Groups found to be non-significant ($P > 0.05$) (Table I, Graph I).

Table 1: Baseline characteristics

Parameters	Group I	Group II	P value
Age (years)	28.1	28.4	>0.05
Weight (Kgs)	73.5	74.1	>0.05
Height (cms)	156.2	157.4	>0.05
BMI (Kg/m ²)	30.1	29.5	>0.05
Primigravida	35	42	>0.05
Multigravida	45	38	
Overt DM	12	10	>0.05
H/O GDM in previous pregnancy	16	8	<0.05
Family history of DM	36	24	<0.05

Table 2: Insulin and metformin requirement in both Groups

Drug	Duration	Group I	Group II	P value
Insulin	Baseline	35	26	>0.05
	Post-intervention	40	30	>0.05
Metformin	Baseline	32	25	>0.05
	Post-intervention	36	28	>0.05

Table 2 shows that 35 patients in Group I and 26 in Group II were on insulin which increased to 40 in Group I and 30 in Group II on post-intervention. 32 patients in Group I and 25 in Group II required metformin which increased to 36 in Group I and 28 in Group II. The difference among both Groups found to be non-significant ($P > 0.05$) (Table 1, Graph I).

Table 3: Neonatal outcome in both Groups

Duration	Group I	Group II	P value
NICU admission	13%	21%	>0.05
Neonatal seizures	6%	2.5%	>0.05
Low birth weight	8%	14%	>0.05

NICU admission was seen among 13% in Group I and 21% in Group II. Neonatal seizures in 6% in Group I and 2.5% in Group II and low birth weight in 8% in Group I and 14% in Group II. The difference among both Groups found to be non-significant ($P > 0.05$) (Table 3).

4. DISCUSSION

We assessed the effect of vitamin D supplementation on improving glycaemic control in diabetic vitamin D-Deficient pregnant women (Rodrigues et al., 2019; Parlea et al., 2012). Diabetes are of two types. Type 1 diabetes also known as insulin dependent or juvenile diabetes is due to destruction of β -cells of islets of Langerhans of pancreas. There is complete deficiency of insulin resulting in high blood glucose level. Type 2 diabetes is adult onset or non-insulin dependent is because of progressive insulin secretory defect. Another commonly encountered diabetes is

gestational diabetes mellitus (GDM) which is usually diagnosed in the 2nd or 3rd trimester of pregnancy (Norman et al., 1980; Zeitz et al., 2003).

Vitamin D was regarded as a vitamin but now days is classified as a hormone and involved in a plethora of physiological processes (Poel et al., 2012). Vitamin D deficiency is evident not only in bone diseases but in other diseases as well as infectious diseases, cardiac diseases, autoimmune disorders, cancers and metabolic diseases such as adult-onset diabetes mellitus. It is seen in patients that vitamin D deficiency has positive correlation with risks of t2DM. Approximately 11%-12% pregnant females are suffering from GDM. Increased blood glucose level in pregnancy is linked with enhanced infant and maternal mortality and morbidity and glucose control in GDM decreases the risks linked with it (Baker et al., 2012).

Our study showed that mean age was 28.1 years and 28.4 years, weight was 73.5 Kgs and 74.1 kgs, height was 156.2 cms and 157.4 cms, BMI (Kg/m²) was 30.1 and 29.5, primigravida was seen in 35 and 42, multigravida in 45 and 38, overt DM in 12 and 10, H/O GDM in previous pregnancy was seen in 16 and 8 and family history of DM was seen in 36 and 24 in Group I and Group II respectively. A group researcher in their study on 56.1% females and 43.9% males in cases and 43.9% males and 54.8% females in control Group assessed vitamin D level (Salih et al., 2021). The result of the study showed that there was significant difference among both Groups ($P < 0.05$). Females exhibited low vitamin D level as compared to males. Similarly, people of urban were tended to had higher vitamin D deficiency as compared to those living in rural area. BMI and dyslipidemia had a significant effect on vitamin D levels in cases. Subjects with good glycemic control had higher serum 25(OH)-D level as compared to those with poor glycemic control and in patients with a diabetes duration $<$ than 5 years. Their study revealed no positive correlation between smoking and age.

Our study revealed that 35 patients in Group I and 26 in Group II were on insulin which increased to 40 in Group I and 30 in Group II on post-intervention. 32 patients in Group I and 25 in Group II required metformin which increased to 36 in Group I and 28 in Group II. Some researchers also in their study determined effect of vitamin D administration on glucose level in pregnancy (Yap et al., 2014). Results showed that females with plasma 25-hydroxyvitamin D levels < 0.001 , and deficiency was more common in LD offspring. It was observed that baseline 25OHD continued an independent predictor.

We observed that NICU admission was seen among 13% in Group I and 21% in Group II. Neonatal seizures in 6% in Group I and 2.5% in Group II and low birth weight in 8% in Group I and 14% in Group II. Swetha et al evaluated role of vitamin D supplementation on 100 diabetic pregnant women (Swetha et al., 2019). All were classified into Group A and Group B. Group A females were supplemented with 60,000 units of vitamin D3 whereas Group B were given routine antenatal care. It was seen that there was a significant increase in the mean insulin and metformin requirements in both Groups. Vitamin D supplementation had no effect in improving the glycaemic control in diabetic pregnant women.

5. CONCLUSION

It was seen in our study that vitamin D supplementation had no effect on decreasing insulin resistance or improving the glycaemic control in diabetic pregnant women with vitamin D deficiency.

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