

OP-D-09

THE EFFECT OF DIFFERENT DOSES OF VITAMIN D SUPPLEMENTATION ON INSULIN RESISTANCE IN PATIENTS WITH GESTATIONAL DIABETES AND VITAMIN D DEFICIENCY

<https://doi.org/10.15605/jafes.038.AFES.12>

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INTRODUCTION

Gestational diabetes mellitus (GDM) has serious implications on pregnancy outcomes. Vitamin D deficiency has been increasingly recognized as one potential contributor to GDM risk in recent years. It is postulated to have a role in maintaining glucose homeostasis and insulin sensitivity. Vitamin D deficiency is more common in women with GDM. This study was conducted to determine the effects of different doses of vitamin D supplementation on insulin resistance in patients with gestational diabetes and vitamin D deficiency.

METHODOLOGY

In a randomized, hospital-based intervention study, 83 pregnant women with GDM during 24–28 weeks gestation were screened for vitamin D deficiency [25-hydroxyvitamin D (25(OH)D) <30 ng/mL]. Of these, 60 GDM patients with vitamin D deficiency were randomly assigned to receive either vitamin D 2,000 IU daily [medium dose, group A (n = 30)] or 4,000 IU daily [high dose, group B (n=30)] for 8 weeks. The serum 25(OH)D, fasting plasma glucose (FPG), plasma insulin (FPI) and homeostatic model assessment-insulin resistance (HOMA-IR) were measured before and after treatment. Paired t-test and McNemar's Chi-square test were used.

RESULTS

After 8 weeks of intervention, the mean \pm standard deviation of serum 25(OH)D levels is increased from 18.9 ± 5.36 to 29.2 ± 7.09 ng/mL in group A and group B it also increased from 15.85 ± 4.50 to 31.44 ± 10.03 ng/mL ($p < 0.001$). The mean change of concentration of serum 25(OH)D at week 8 in group B was significantly higher than that of group A (15.59 ± 8.58 vs 10.30 ± 5.48 ng/mL, respectively) ($p = 0.009$).

Although metabolic parameters FPG, FPI and HOMA-IR were reduced in week 8, only FPG was significantly reduced in both groups, (4.62 ± 0.82 to 4.24 ± 0.51 mmol/L, $p = 0.007$) in group A and (4.77 ± 0.97 to 4.45 ± 0.72 mmol/L, $p = 0.037$) in group B. However, the mean change of FPG was not significantly different between the two groups A and B (-0.38 ± 0.72 vs -0.32 ± 0.75 mmol/L, $p = 0.750$) after the study period.

A significant change in FPI (-1.34 ± 5.76 vs -0.30 ± 5.98 mU/L, $p = 0.507$) and HOMA-IR (-0.51 ± 1.74 vs -0.34 ± 1.67 , $p = 0.695$) were not observed between the two groups A and B after 8 weeks.

From the view of having increased HOMA-IR (>3.8) status in all participants, there was a reduction in the number of patients having increased HOMA-IR, from 14 (25%) out of 57 to 5 (9%) out of 57 after 8 weeks. This change in the number of participants getting improvement in HOMA- IR was statistically significant ($p = 0.026$).

CONCLUSION

About 81% of the women with GDM had vitamin D deficiency. Although Vitamin D supplementation of 4,000 IU/d resulted in a significant increase in the concentration of serum 25(OH)D level compared to vitamin D 2,000 IU/d, the high dose vitamin D (4,000 IU/d) was not superior to medium dose vitamin D (2,000 IU/d) in reduction of insulin resistance (HOMA-IR) in GDM patients. However, vitamin D supplementation may have beneficial effect on changes of HOMA-IR to a certain extent.

KEYWORDS

gestational diabetes mellitus, vitamin D deficiency, homeostatic model assessment-insulin resistance (HOMA-IR)