ORIGINAL RESEARCH PAPER

Gynaecology

KEY WORDS: GDM, Type 2 DM, 25 - Hydroxy vitamin D

ASSESSMENT OF MATERNAL VITAMIN D STATUS WITH GESTATIONAL DIABETES MELLITUS

Dr. S. Vijaya. MD, DGO , Professor of Obstetrics and Gynaecology,Institute of Social Obstetrics and Government Kasthurba Gandhi Hospital for women and children, Triplicane, Chennai - 600005.

Dr. M. Mahalakshmi* MS(OG),Assistant Professor, Institute of Social Obstetrics and Government Kasthurba Gandhi Hospital for women and children, Triplicane, Chennai - 600005.*Corresponding Author

DR. K.Dhivya MS (OG), Senior Resident, Institute of Obstetrics and Gynaecology for Women and Children,Egmore, Chennai – 600008.

ABSTRACT

Introduction: This is an observational cross sectional study conducted in the Institute of Social obstetrics and Government Kasthurba Gandhi Hospital for women and children. The objective is to assess the relation between the level of 25 hydroxy cholecalciferol with Gestational diabetes mellitus. Materials and methods: The study involved 100 AN women attending the antenatal clinic , aged between 20 - 40 years with either type 2 DM or established diagnosis of GDM in the 2nd and 3rd trimester and after excluding metabolic disease of bone, liver dysfunction, chronic hypertension, cushing syndrome and use of steroids. They were grouped into cases and controls after doing OGCT and 25 hydroxy vitamin D were assayed in both groups. Results: The mean vitamin D level in the GDM group was 13.0ng/dl as compared to controls with mean value of 22.2ng/dl. GDM women with associated hypertensive disorder had profound vitamin D deficiency.

INTRODUCTION

In recent times, there has been extensive studies about the multisystem effects of vitamin D. Vitamin D decreases cell proliferation and stimulates cell maturation and apoptosis. vitamin D has a recognized spectrum of non classical actions such as promoting insulin action and secretion, immune modulation and lung development, thus has the potential to influence many factors in developing fetus. A strong association exists between glucose intolerance and hypovitaminosis D due to the presence of specific receptors for 1, 25 dihydroxy vitamin D3 as well as vitamin D dependent calcium binding protein in pancreatic beta cells.

Gestational diabetes mellitus is defined as impaired glucose tolerance with onset or first recognition during pregnancy. The frequency of GDM may reach upto 18% depending on the population and diagnostic criteria used. World- wide , 1 in 10 pregnancies are associated with diabetes, 90% of which are GDM. Even in normal pregnancy, there is marked reduction in maternal insulin sensitivity in the second and third trimester. The reduced beta cell reserve or their maladaptation to higher insulin demands lead to the development of GDM. Women with GDM and their offsprings are at increased risk of developing type 2 diabetes later in life.

Vitamin D improves insulin sensitivity of target cells and also improves beta cell function. It also prevents immune mediated beta cell damage. So, vitamin D has been studied as a potential therapeutic or preventive candidate for DM. The major circulating form of vitamin D is 25- hydroxy vitamin D3 , the best available marker for overall vitamin D status. Endocrine society 2011 defines normal level as 30 – 100ng/ml, insufficiency as 21-29ng/ml and deficiency as < 20ng/ml .

Some studies have reported a prevalence of insufficient levels of vitamin D levels in 41% of women with GDM, and consequently proposed the testing of all women for vitamin D while screening for GDM.

MATERIALS AND METHODS

It is an observational cross sectional study done between May, 2016 to December, 2017. The study involved 100 pregnant women between 20 -40 years of age attending the outpatient AN clinic, ISO-KGH. They were divided into two equal groups, one with established diagnosis of GDM, other with normal glucose level as screened by OGCT.

Pregnant women between 20-40 years of age with established diagnosis of GDM in 2nd or 3rd trimester or with type 2 DM were included in the study. Those with metabolic disease of bone, abnormal liver function tests, chronic hypertension, cushing syndrome and history of steroid use were excluded from the study.

All enrolled women were subjected to a single step 75gms glucose orally irrespective of the fasting status and post 2hour blood glucose level measured. A value of more than or equal to 140mgs% was diagnosed as GDM (DIPSI CRITERIA BY SESHIAH et al).

All participants were subjected to full history taking including gestational age ,history of previous GDM, family history of diabetes and history of maternal and neonatal complications, present glycaemic status, clinical examination including BP, calculation of BMI.(Obesity – BMI>30kg/sq.m and morbid obesity - BMI >40kg/sq.m).

25 – hydroxyl vitamin D was assessed in both groups using chemiluminiscence ELISA assay. Their outcomes were studied in terms of the mode of delivery and birth weight of neonates.

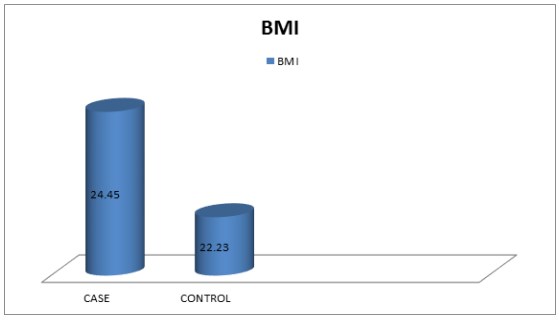
Data were collected and included in a data based system. Parametric data were expressed as mean and standard deviation. It was analysed using t- test and non- parametric data were expressed as percentages and analysed using chi square test. Receiver operator characteristics analysis was used to identify the optimal threshold values of 25 – hydroxyl vitamin D.

RESULTS AND ANALYSIS

Various risk factors for GDM were analysed.

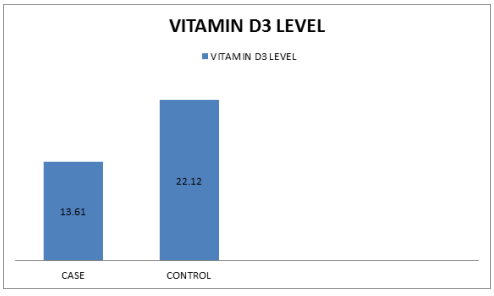
AGE - The mean age of presentation was between 28-30 years and above. There is statistically significant association between GDM and control group with respect to age.Pearson Chi – square = 14.720. P = 0.005. This is supported by Hollander et al who postulated that advanced maternal age was a significant risk factor for development of GDM.

BMI – The mean BMI for GDM women was 24.45kg/sq.m, whereas for non GDM women was 22.230kg/sq.m. In our study, there was an inverse relationship between 25- hydroxyl vitamin D and BMI. There exists a statistical significance (P value = 0.008) between GDM and non GDM patients with respect to BMI mean level. Torloni et al showed that the risk of GDM is positively associated with pre pregnancy BMI.



PARITY – There was no significant relationship between parity and GDM which is in accordance with studies by Dunlop et al.

VITAMIN D LEVEL AND GDM – The mean vitamin D level in the GDM group was 13.0ng/dl as compared to controls with mean value of 22.2ng/dl. In our study, majority of women suffered with vitamin D insufficiency rather than deficiency.



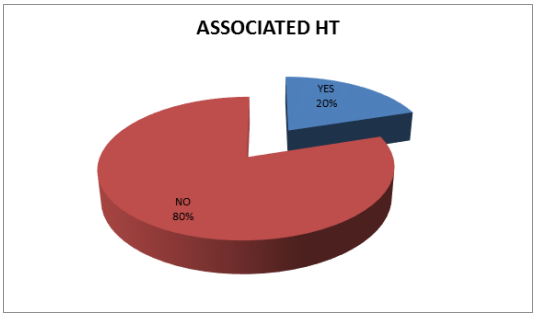
There exists a statistical significance between (P value < 0.05) GDM and control group with respect to vitamin D 3 levels.

The relation between vitamin D level and insulin resistance was shown by Ian Wallace et al. Studies by Sherna et al had concluded that vitamin D may play a role in the pathogenesis of type 2 DM. Study by El Lithy et al showed a cut off point for prediction of GDM as 22ng/dl. Our study also supports this fact, the mean cut off value being 18ng/dl. The sensitivity was 70% and specificity was 28%.

CORRELATION BETWEEN OGCT VALUES AND VITAMIN D LEVEL – Our study showed a negative correlation between OGCT values and vitamin D level. The ROC curve showed a sensitivity of 80%. The cut off OGCT value was 103mg/dl.

Maghbooli et al showed maternal serum vitamin D level in women between 24 – 28 weeks were lower in GDM group compared with controls. Study by Ling Loy et al in Singapore in Asian women, comparing glucose values with vitamin D showed that higher fasting glucose levels were associated with vitamin D deficiency.

ASSOCIATION OF HYPERTENSIVE DISORDER AND GDM WITH VITAMIN D DEFICIENCY – GDM women with associated hypertensive disorder were about 20%. This group was found to have profound vitamin D deficiency. Mean value of vitamin D was 11.0ng/dl.

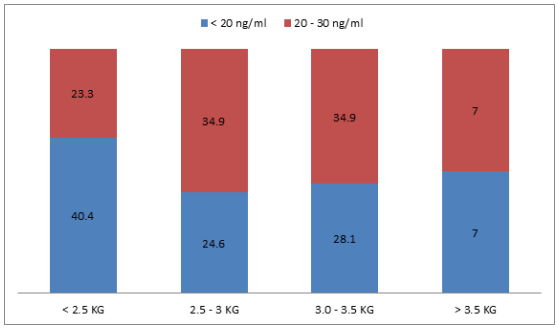


VITAMIN D AS A PREDICTOR FOR GDM – Our study supported the hypothesis that hypovitaminosis D is associated with higher glucose levels, but it is not significant in predicting GDM.

VITAMIN D DEFICIENCY AND MATERNAL OUTCOME – In our study, caesarean section rate was 40% in the vitamin D deficient group, though statistically not significant. The probable hypothesis is that vitamin D indirectly affects calcium levels , which plays an important role in the initiation of labour. Studies by Merewood et al showed that mothers with vitamin D levels < 37.5ng/dl have higher caesarean section rates than those with normal values.

MATERNAL VITAMIN D LEVEL AND FETAL OUTCOME – In our study, the incidence of low birth weight < 2.5 kg in the vitamin D deficient group was 40.4%, and was statistically significant. This is in accordance with study by Deepika et al, who studied the effect of maternal serum calcium level on birth weight.

PERINATAL OUTCOME (BIRTH WEIGHT vs VITAMIN D LEVEL)



The incidence of low birth weight < 2.5 kg in the vitamin D deficient group is 40.4%, and is statistically significant.

CONCLUSION

Based on the results , we conclude that there is a statistically significant negative correlation between the glycemic status and serum vitamin D levels in the study group.

Moreover , the study also showed the influence of variables like age and BMI on vitamin D levels and consequently GDM.

This study emphasizes that vitamin D deficiency may play a role in the development of GDM.

Further, large randomized, controlled, prospective studies are required to study the role of vitamin D as a predictor and the effect of replacement of vitamin D in the prevention of GDM.

REFERENCES

1. Muscogiuri, G., Sorice, G.P., PRIOLETTA, A. et al. 25- Hydroxyvitamin D concentration correlates with insulin sensitivity and BMI in obesity. 2010.
2. Biscoch – Ferrari. Baseline serum 25 Hydroxyvitamin D independent and inversely associated with 5 year incident of Type 2 DM. 2011.
3. Aghajafari F, Nagulesapillai T, Ronksley PE, Tough SC, O'Beirne M, Rabi DM. Association between maternal serum vitamin D level and pregnancy and neonatal outcomes: systematic review and meta analysis of observational studies. BMJ, 2013.
4. El Lithy et al. the relationship maternal serum vitamin D levels and glycemic control in gestational diabetes assessed by HbA1C levels: an observational cross sectional study. BMC Pregnancy and child birth, 2014.
5. Lacroix M, Battista MC, Doyon M, Houde G, Menard J, Ardilouze JL, et al. lower vitamin D levels at first trimester are associated with higher risk of developing GDM. Acta Diabetol. 2014.
6. Anna Pleskacova, Vendula Bartakova, Lukas pacal, Katarina kuricova, Josef Tomandl and Katerina Kankova. Vitamin D status in women with Gestational Diabetes Mellitus during pregnancy and postpartum. Biomed Research International Volume,2015.
7. Heather H. Burris, MD,MPH and Carlos A. Camargo, Jr., MD, DrPH. Vitamin D and Gestational Diabetes Mellitus. 2015.
8. Meng xi zhang et al. vitamin D deficiency increases the risk of GDM – a meta analysis of observational studies. BMJ, October, 2015.
9. Hyun Koo Yoon. Gestational Diabetes Mellitus, Fetal growth and Vitamin D. Journal Of Bone Metabolism, Aug 2017.