ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

A Study On The Relationship Of Vitamin D Serum Level With Intrauterine Growth Retardation In Pregnant Women.

R Umamaheswari*.

Consultant, Department Of Obstetrics & Gynecology, SRM Global Hospital , Chennai, Tamil Nadu, India.

ABSTRACT

Intrauterine growth restriction (IUGR) is a prevalent disease in pregnancy in which placental insufficiency leads to 5 to 10 times higher mortality and lifelong morbidities. IUGR is a multifaceted problem that increases the risk of hypoxemia, acidemia, preterm deaths, and maternal distress, and disposes the infant of several metabolic disorders, polycythemia, lung problems, and intraventricular hemorrhage, cognitive dysfunction, cerebral palsy, which occur in both term and preterm infants. Maternal hypocalcemia may lead to the development of preeclampsia and neonatal hypocalcemia, which in turn is determined by maternal vitamin D levels. The purpose of this study was to investigate the relationship between vitamin D serum levels with IUGR in pregnant women. Well-constructed proforma in English language containing various aspects of information about patients which include demographic details, Serum levels of vitamin D were tested in the blood samples obtained from the participants. vitamin D level was determined using the enzyme-linked immunosorbent assay (ELISA). Moreover, average serum levels of vitamin D were about 14.74 ng/L and 25.34 ng/L in the case and control groups, respectively. In those with vitamin D deficiency, the chance of IUGR was higher compared to those who had sufficient levels of vitamin D (6.27 times). Therefore, women who had vitamin D deficiency, had almost 6 times more chance of IUGR incidence compared to the women with adequate levels of vitamin D . The influence of taking vitamin D supplements during pregnancy in women with vitamin D deficiency for reducing the adverse effects of IUGR is recommended in future clinical trials.

Keywords: Vitamin D, Intrauterine growth retardation, Pregnancy.

https://doi.org/10.33887/rjpbcs/2023.14.4.44

Corresponding author

ISSN: 0975-8585

INTRODUCTION

IUGR is a multifaceted problem that increases the risk of hypoxemia, acidemia, preterm deaths, and maternal distress, and disposes the infant of several metabolic disorders, polycythemia, lung problems, and intraventricular hemorrhage, cognitive dysfunction, cerebral palsy, which occur in both term and preterm infants. Some of the effective factors for the occurrence of IUGR include the history of chronic maternal diseases (blood pressure, renal diseases, diabetes, Anemia, etc), higher body mass index (BMI), maternal weight gain during pregnancy, maternal age during pregnancy, occupation, different types of fetal infections and chromosomal abnormalities, birth rank, delivery interval, neonatal sex, age of the uterus, placental abruption, and placenta previa [1]. Vitamin D deficiency is highly prevalent among pregnant women. One study in Iran has shown that the vitamin D deficiency level is 69.3% in pregnant women which is higher than that in other women. Not only vitamin D deficiency during pregnancy causes maternal and fetal side effects, but it also increases the risk of preeclampsia, gestational diabetes, preterm birth, and birth of a child younger than small for gestational age (SGA), inadequate fetal immune system, wheezing and eczema, and risk of respiratory infections in the infants Despite the discovery of vitamin D a hundred years ago, it has recently emerged as one of the most controversial Nutrients and prohormones of 21st century. It is found to play a major role in calcium metabolism and bone health [2].

Normal vitamin D level is also very much needed for the prevention of type 2 diabetes, Gestational diabetes mellitus, preeclampsia, cancer, preterm birth, and low birth weight. Vitamin D has recently been found to promote insulin action, immunomodulation, and lung function. Thus it is found to play a very important role in the development of the fetus [3]. Maternal hypocalcemia may lead to the development of preeclampsia and neonatal hypocalcemia, which in turn is determined by maternal vitamin D levels. Barker's hypothesis suggests that under-nutrition and other insults or adverse stimuli in utero and during infancy can permanently change the body's structure, physiology, and metabolism [4].

The lasting or lifelong effects of undernutrition will depend on the period in the development at which it occurs. In early gestation, it will reduce the body's size permanently, whereas in late gestation it is found to have effects on body form without necessarily reducing body size. There are several studies to depict the association between vitamin Dlevels during pregnancy and its outcome [5].

METHODS

This Prospective longitudinal observational study was MIG-20, Vallal orhi street, NH-1 Maraimalai Nagar, Chennai, Tamil Nadu 603209, India.100 samples (50 controls & 50 cases) were included for the study. Over 6-8 months in year 2022 The subjects were divided into subgroups based on interviews concerning vitamin D supplementation by the patient, Information from the completed questionnaire. Sonographic confirmation of IUGR was the inclusion criteria. The exclusion criteria included: Anemia, APH, Placenta previa, Pre-eclampsia, Hepatic or renal failure, Diabetes mellitus, Multiple gestations, Parathyroid and adrenal diseases, Rheumatoid disorder, Mal-absorption, Bone disorder, and any drugs affecting absorption of vitamin D3 and calcium The patient did not have to know what dose of vitamin D they took; they only needed to provide the name of the vitamin formulation taken at that time, and the frequency and regularity of taking the supplement. Well-constructed proforma in English language containing various aspects of information about patients which include demographic details, Serum levels of vitamin D were tested in the blood samples obtained from the participants. vitamin D level was determined using the enzyme-linked immunosorbent assay (ELISA). An inactive metabolite of vitamin D3, 25(OH)D was determined. It is a standard procedure for determining vitamin D3 resources in a body. Both studied subgroups received the general standard management. They did not receive LMWH, L-arginine, or other therapy-supporting experimental methods. No clinical intervention was used during the study.

Inclusion Criteria: All low-risk pregnancy, Vertex, and nonvertex presentation. Age < 35 yrs.

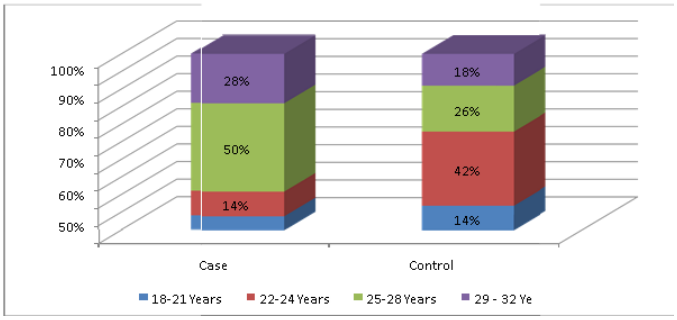
Exclusion Criteria: Overt diabetes. Abnormal placental presentation Other complications (PIH, anemia, preeclampsia, multiple gestations) Other medical complications (chronic kidney disease) GDM on insulin and OHA 50 Gestational age < 37 weeks. Not willing to study.

Statistical analysis: Statistical analysis was performed by SPSS software, version 18.0. Data were

ISSN: 0975-8585

analyzed using descriptive statistical chi-square test and Fisher exact test, independent t-test, and odds ratio. The significance level was determined at less than 0.05.

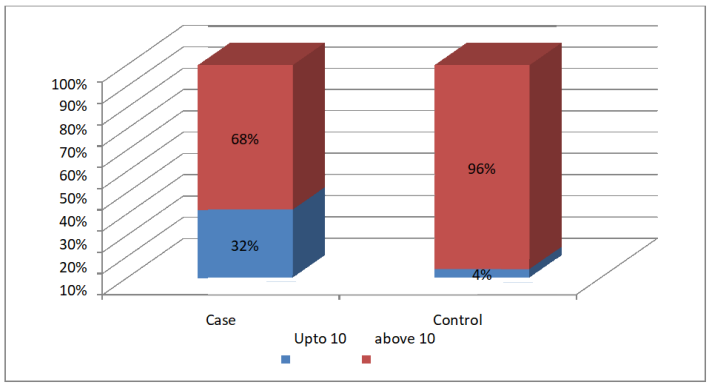
Graph 1: Analysis Between Age Group And Vitamin Deficiency.



ars

Graph 1: There is a statistical significance in association Between increasing age and vitamin D deficiency. With Increasing age there is an increased incidence of vitamin D deficiency.

Graph 2: Haemoglobin Level And Vitamin D



Graph 2: There is statistical significance in the association Between hemoglobin level and vitamin d deficiency. Individuals with hemoglobin above 10gm were found.

Table 1: The Mean Vitamin D Level In Cases And Control Group Before Treatment

Independent Samples Test

Group		N	Mean	Std. Deviation on	Std. Error Mean	t value	p-value
	Case	50	11.41	3.420	.4837	10.474	p<0.001
VitD levels			46	46	3	**	
	Control	50	20.20	4.849	.6857	***	
			48	26	9		

Table 1: Mean level of vitamin D in control is found to behigher than in cases.

Table 2: Comparison Of Serum Vitamin D In The Two Groups.

Parameter		controls	Cases	P value	Statistical Significance
Before Supplementation	Vitamin D (in nmol/L)	25.87 ± 11.36	27.10 ± 10.12	0.45	Not significant
After Supplementation	Vitamin D (in nmol/L)	62.92 ± 12.16	47.10 ± 8.15	<0.0001	Significant

ISSN: 0975-8585

DISCUSSION

The mean age group in which vitamin D deficiency was seen was above 25 years.39 cases occurred above 25 years of age. out of which 25 cases (64.1%) occurred between 25 to 28 years and 14 cases (35.9%) occurred between 29 to 32 years. In our study, increasing maternal age showed a significant decrease in serum vitamin D levels (p-value =0.005) [6]. In our study there were 51% primi and 49% multi as a whole and among cases, primi was 52% and multi was 48%. Among control, primi and muti were each 50%. thus, there was no significant correlation between parity and vitamin D deficiency. This result is found to be following Hoftiezer L, the et al study which showed no association between parity and vitamin D deficiency. Circulating levels of vitamin D were found to be low in obese individualscompared to lean individuals [7]. There are several mechanisms behind it such aslower vitamin D intake or reduced intestinal absorption, decreased UVB exposureor cutaneous synthesis, and deposition of vitamin D in excess adipose tissue [8]. Hong-Bi Sal suggested that vitamin D is deposited in adipose tissue andsubsequently less available to the circulation in obese individuals. In my study mean HB in cases among vitamin D deficiency individuals wasfound to be 10.3 compared to 10.84 among the control group. It also showed that 96% of women in the control group were found to have HB above 10.88% of women in the case group were found to have a dark complexion compared to44% in the control group. P-value <0.001%. [9]. People with dark skin color produce less vitamin D because of decreased exposure to the UVB rays due to increased melanin content. A study reported that vitamin D deficiency at birth was not associated with placental inflammation or neonatal infection among infants with very low birth weight [10]. In the present study, the mean level of vitamin D in the case group was significantly lower than that in the control group. Vitamin D level was also significantly different between both case and control groups [11]. In our study, IUGR incidence was significantly different between the case and control groups, to such a level that women with vitamin D deficiency had an IUGR incidence of approximately six times greater than that of women with a sufficient level of vitamin D. Vitamin D deficiency during pregnancy causes potentially harmful implications in the mother and the fetus. Several studies have referred to the relationship between vitamin D deficiency and the incidence of IUGR. Studies have also indicated that the decreased expression of vitamin D receptors results in functional impairment and limitation in the beneficial effects of vitamin D in regulating the fetus-placental growth [12]. In the study by Mahon P et al, maternal vitamin D deficiency was observed in all pathological pregnancies with a decrease in the staining levels of placental VDR in IUGR. As Zhang et al have shown, severe vitamin D deficiency may play an important role in placental inflammation, which in turn may lead to a higher risk of IUGR and other neonatal side effects [13]. The influence of taking vitamin D supplements during pregnancy in women with vitamin D deficiency for reducing the adverse effects of IUGR is recommended in future clinical trials. In this study, the correlation between vitamin D deficiency and IUGR was approved; hence, the use of vitamin D supplements before and during pregnancy could be the clinical application of this research [14,15].

CONCLUSIONS

The results of the current study indicated that vitamin D serum levels could be effective on the incidence of IUGR. Moreover, it was shown that the incidence of IUGR in the infants whose mothers had sufficient levels of vitamin D during pregnancy was lower than that in other infants. Therefore, it could be predicted the occurrence of IUGR by measuring the vitamin D serum levels in the early pregnancy and preventing its occurrence by using possible methods.

REFERENCES

[1] Bodnar LM, Catov JM, Roberts JM, Simhan HN. Prepregnancy obesity predicts poor vitamin D status in mothers and their neonates. J Nutr 2007; 137:2437–42.
[2] Bodnar LM, Catov JM, Zmuda JM, et al. Maternal serum 25-hydroxyvitamin D concentrations are associated with small-for-gestational-age births in white women. J Nutr 2010;140(5):999-1006.
[3] Burris HH, Rifas – Shiman SL, Kleinman K, Litonjua AA, Huh SY, Rich-Edwards JW, et al. Vitamin D deficiency in pregnancy and gestationaldiabetes mellitus. Am J Obstet Gynecol. 2012.
[4] Clemens TL, Henderson SL, Adams JS, Holick MF. Increased skin pigment reduces the capacity of the skin to synthesize vitamin D3. Lancet 1982; i:74–6.
[5] Dawodu A, Akinbi H. Vitamin D nutrition in pregnancy: current opinion. Int J Women's Health 2013;5:333-343.

[6] Draznin B, Lewis D, Houlder N, et al. Mechanism of insulinresistance induced by sustained levels of systolic free calcium in rat adipocytes. Endocrinology 1989;125,2341-2349.
[7] Hoftiezer L, Hukkelhoven CW, Hogeveen M, et al. Defining small-for-gestational-age: prescriptive versus descriptive birth weight standards. EurJ Pediatr 2016.
[8] Hollis BW. Vitamin D requirement during pregnancy and lactation. J Bone Miner Res 2007;22Suppl 2:V39–44.
[9] Hong-Bi S, Yin X, Xiaowu Y, et al. High prevalence of vitamin D deficiency in pregnant women and its relationship with adverse pregnancy outcomes in Guizhou, China. J Int Med Res 2018;46(11):4500-4505.
[10] Jones JN, Gercel-Taylor C, Taylor DD. Altered cord serum lipid levels are associated with small for gestational age infants. Obstet Gynecol 1999;93(4):527-531.
[11] Kiely ME, Zhang JY, Kinsella M, et al. Vitamin D status is associated with uteroplacental dysfunction indicated by pre-eclampsia and small-for-gestational-age birth in a large prospective pregnancy cohort in Ireland withlow vitamin D status. Am J Clin Nutr 2016;104:354–61.
[12] Larqué E, Morales E, Leis R, Blanco-Carnero JE. Maternal and fetal health implications of vitamin D status during pregnancy. Ann Nutr Metab 2018;72(3):179-192.
[13] Mahon P, Harvey N, Crozier S, Inskip H, Robinson S, Arden N, et al.Low maternal vitamin D status and fetal bone development: cohort study. J Bone Miner Res 2010;25:14–9.
[14] Miku K, Vinkhuyzen A, Blanken LM, et al. Maternal vitamin D concentrations during pregnancy, fetal growth patterns, and risks of adversebirth outcomes. Am J Clin Nutr 2016;103:1514–22.
[15] Mirbolouk F, Pakseresht S, Asgharnia M, Farjadmand BM, Kazemnezhad E. Study of vitamin D status in pregnant women in North of Iran. Int J Women's Health Reprod Sci 2016;4(4):176-180.