International Journal of Medical Science in Clinical Research and Review
Online ISSN: 2581-8945
Available Online at http://www.ijmscrr.in Volume 6|Issue 06 (November-December)|2023 Page: 1005-1008
Original Research Paper

Vitamin D Deficiency and Pregnancy Outcome: A longitudinal Interventional Study

Authors:
1Dr. Minal Kadam, 2Dr. Savita Kadam, 3Dr. Lakshmi Rachkonda, 4Dr. Shubhangi Mande
[1]*Associate Professor, Dept. of OBGY MGM MCH, Aurangabad.* [2]*Professor, Dept of Anatomy MGM MCH, Aurangabad.*
[3]*Professor and Head, Dept of OBGY, MGM MCH, Aurangabad.*
[4]*Professor, Dept of OBGY, MGM MCH, Aurangabad.*
Corresponding Author:
Dr. Minal Kadam
Associate Professor, Dept. of OBGY MGM MCH, Aurangabad.

Article Received: 24-September-2023, Revised: 14-October-2023, Accepted: 04-November-2023

ABSTRACT:
Introduction: Vitamin D is a fat-soluble vitamin responsible for increasing the absorption of calcium, magnesium, phosphate, and multiple other biological effects. Deficiency of vitamin D is a common global problem, especially in females. It is naturally produced by the body on exposure to sunlight. Deficiency of vitamin D in pregnancy predisposes to pre-eclampsia, GDM, preterm birth to the mother, hypocalcemic tetany, low birth weight, and congenital rickets in the fetus. In general, 10 mg (400 units) of vitamin D are recommended for all pregnant women per day. **Materials and methods:** The study was conducted in the OBGY department of MGM Medical College, Aurangabad, Maharashtra, between August 2022 to August 2023. A complete procedure was explained to all the second-trimester pregnant women willing to participate in this study, and informed written consent was obtained from them. Their detailed history was taken and subjected to an estimation of 25 hydroxyvitamin D and serum calcium. **Results:** A high prevalence of vitamin D deficiency is found (81%). In teenage pregnancy, the occurrence of vitamin D deficiency is higher. In our study, vitamin D deficiency was more prevalent in rural areas thanurban areas. It was more in the Muslim population. A sedentary life is prone to vitamin D deficiency. The incidence of GDM, preeclampsia, and low birth weight was significantly lower in tested and treated patients. Empirical vitamin D supplementation should be given to each pregnant patient.

Keywords: GDM, Preeclampsia, prevalence, teenage pregnancy, low birth weight.

INTRODUCTION:

The fetus is dependent on the mother for acquiring vitamin D. Maternal vitamin D has the potential to influence many factors in the developing fetus, which is important for fetal bone development3. Maternal vitamin D deficiency increases the risk of preeclampsia, impaired glucose tolerance, neonatal low birth weight, neonatal hypocalcaemic seizures, and impaired skeletal, lung, and immune development. Vitamin D deficiency at or before 22 weeks of gestation is an independent predictor of preeclampsia and low vitamin D in neonates. Patients with a 25hydroxy vitamin D level <15 ng/ml have a 5-fold increased risk of preeclampsia. Lack of vitamin D has been linked to diabetes and increased rates of cesarean section births. Vitamin D is a fat-soluble vitamin responsible for increasing intestinal absorption of calcium, magnesium, and phosphate. It is present in five forms It has a classical action on calcium and bone metabolism. In adults, the largest source of vitamin D is solar radiation. Half-hour sunlight delivers about 50,000 IU of vitamin D to white-colored skin. Dietary intake of vitamin D is very low, as it is very low in food. Vitamin D deficiency is a very common global nutritional deficiency, with a higher prevalence in women. Deficiency of vitamin D in pregnancy is very common. In neonates, deficiency of vitamin D causes hypocalcaemic tetany, whereas in childhood, vitamin D deficiency manifests as rickets, which develop many months after delivery. Although India is a tropical country with abundant sunshine, vitamin D deficiency is very common. About 78.18% of Asian women are associated with vitamin D deficiency. Malnutrition, repeated pregnancies, adolescent pregnancies, traditional dietary practices, socioeconomic factors, and job-related irregular and junk food habits (D1-D5), but D3 i.e. cholecalciferol, is widely studied. predispose women to micronutrient deficiency. It is the most untreated nutritional deficiency.

AIMS AND OBJECTIVES:

- To detect vitamin D deficiency in pregnant women in the second trimester.
- To supplement oral vitamin D for deficient patients.
- To follow up with the patient until delivery and study the pregnancy outcome with non-tested patients.
- To study the proportion of vitamin D deficiency and its effects on pregnancy outcome.

Inclusion Criteria:

- Antenatal patients in their second trimester and planning to deliver at MGM Medical College Aurangabad.

Exclusion Criteria:

- Patients diagnosed with chronic kidney disease.
- Patient diagnosed with chronic liver disease.
- Place: Department of OBGY MGH MCH.

Duration of Study: August 2022 to August 2023

MATERIALS AND METHODS:

The complete procedure was explained to the patients, and informed written consent was obtained. A detailed history was taken from the study population about their present complaints, personal history, past history, family history, dietary history, and treatment history. A detailed general and systemic examination was performed. The selected patients underwent an anthropometric assessment, including height and weight, and a demographic profile, including age, geographical area, and religion. Every patient was given a questionnaire that covered various aspects like type of diet, type of lifestyle, exposure to sunlight, duration of exercise, vitamin supplementation, and use of sunscreen. The serum calcium and 25-hydroxyvitamin D levels of all selected patients were estimated. All the data obtained was noted on predesigned and pretested proforma.

The 25-hydroxyvitamin D was done by the VITOS 56.

OBSERVATION AND RESULTS:

Total number of pregnant patients tested: 101

Deficient: 82, Non deficient: 19

Loss to follow up: 16

Table No. 1: Grading of vitamin D level

Level of vitamin D	Total
Normal (30-60ng/dl)	19 (18.8%)
Insufficient (21-29 ng/dl)	34 (33.7%)
Deficient (11-20 ng/dl)	38(37.6%)
Severe deficiency (<10 ng/dl)	10 (9.9%)
Total	101(100%)

The mean level of vitamin D deficiency is 20.4ng/dl.

Table No. 2: Prevalence of vitamin D deficiency

Vitamin D deficiency	N=101
Absent	19(19%)
Present	82(81%)

The prevalence of vitamin D deficiency in our study is 81%

Table No. 3: Relation of vitamin D deficiency with age

Age	Deficient N(%)	Non deficient N(%)	Total
< 20	20 (87%)	3 (13%)	23 (100%)
21 to 35	62 (79%)	16 (21%)	78 (100%)
Total	82	19	101

In teenage pregnancy, occurrence of vitamin D deficiency was found to be higher.

Table No. 4: Relation of vitamin D deficiency with geographical area of residence

Geographical area	Deficient	Non-deficient	Total
Urban	15 (79%)	4 (21%)	19 (100%)
Rural	67 (82%)	15 (18%)	82 (100%)
Total	82	19	101

Vitamin D deficiency is more common in rural areas than in urban areas.

Table No.5: Relation of vitamin D deficiency with religion

Religion	Deficient	Non-deficient	Total
Muslim	32 (100%)	0 (0%)	32 (100%)
Non-Muslim	50 (72%)	19 (28%)	69 (100%)
Total	82	19	101

Vitamin D deficiency was significantly higher in Muslims.

Table No.6: Relation of vitamin D deficiency with type of diet

Type of diet	Deficient	Non-deficient	Total
Vegetarian	8 (80%)	2 (20%)	10 (100%)
Mixed	74 (81%)	17 (18%)	91 (100%)
Total	82	19	101

The type of diet has no effect on vitamin D deficiency

Table No.7: Relation of vitamin D deficiency with life style

Type of life style	Deficient	Non deficient	Total
Sedentary	69 (97%)	3 (3%)	71 (100%)
Outdoor	13 (43%)	17 (57%)	30 (100%)
Total	82	19	101

A sedentary lifestyle is associated with vitamin D deficiency.

Table No. 8: Relation of Vitamin D and GDM

Tested and treated	1 (0.17%)	84 (98.83%)	85 (100%)
Not tested and treated	352 (6.83%)	4943 (95.94%)	5152 (100%)
	210	5027	5237

The tested and treated group reduce the incidence of GDM.

Table No. 9: Relation of vitamin deficiency with pre-eclampsia

	Pre eclampsia	No pre eclampsia	Total
Tested and treated	1 (o.17%)	84 (98.83%)	85 (100%)
Not tested and treated	352 (6.83%)	4800 (93.16%)	5152 (100%)
	353	4884	5237

There is a significant association between vitamin D deficiency and pre-eclampsia.

Table No. 10: Relation of vitamin D deficiency with term low birth weight

	Term low birth weight	No term low Birth weight	Total
Tested and treated	8 (9.41%)	77 (90.59%)	85 (100%)
Non tested and treated	920 (17.95%)	4232 (82.14%)	5152 (100%)
	928	4309	5237

The incidence of low birth weight is lower in tested and treated groups.

DISCUSSION:

The prevalence of vitamin D deficiency in our study was 81%. This is almost similar to the study done by Ghadeer K et al. (2016)[6] which shows 86.4% of patients have vitamin D deficiency.

In our study, the occurrence of vitamin D deficiency is more common in teenage pregnancy, which is the same as the study done by Ocal et al (2019)[7]. Preeti Kamboj (2018)[8] concluded in her study that vitamin D deficiency is more prevalent in rural areas than urban areas, and our study also concluded the same.

In our study, vitamin D deficiency is significant in the Muslim population. These findings are similar to those of the study done by Sangita NangiaAjmani (2015)[9]. Burqua practice in the Muslim community is more likely to cause vitamin D deficiency.

In our study, diet has no effect on vitamin D deficiency. In a study by Megan et al[10] concluded that the contribution of dietary vitamin D is low as compared to endogenous production from sunlight.

Elizabeth.A.H. et al. (2015)[11] did not find any association between life style and vitamin D deficiency, whereas our study shows sedentary life is associated with vitamin D deficiency.

Our study shows no significant association between vitamin D deficiency and GDM, which is the same as Makgoba et al.[12]. But the study done by JayaramamMuthukrishna et al. showed that low levels of vitamin D are associated with GDM. Baker AM et al (2010)[13] found that vitamin D deficiency is significantly associated with the risk of preeclampsia which is similar to our study. Our study found that the incidence of LBW is lower in the tested and treated groups, which is similar to the study done by Sachan A. et al.[14]

CONCLUSION:

- Despite living in a country with high sun exposure, pregnant women reported a high prevalence of vitamin D deficiency, i.e., 81%.
- Wearing burqa and a sedentary lifestyle are major contributors to the deficiency of vitamin D.
- The prevalence of pre-eclampsia and low birth weight significantly decreased with the treatment.
- Considering the very high prevalence of vitamin D deficiency and the high cost of testing, we may give thought to the empirical supplementation of vitamin D in each pregnant woman.

Financial Support and Sponsorship: Nil

Conflicts of Interest: Nil

Acknowledgements: We wish to thank department of OBGY, MGM Medical College and hospital, Aurangabad, for their cooperation in conducting this study. We also thankful to all the patients participated in this study.

REFERENCES:

1.Yu CK,Sykes L, Sethi M Teoh TG,Robinson S. Vitamin D deficiency and supplementation during pregnancy. Clin Endocrinol (Oxf)2009;70:685-90.

2. Wang Y, Li H , Zheng M, Wu Y, Zeng T, Fu J, et al. Maternal Vitamin D deficiency increases the risk of adverse neonatal outcomes in the Chinese population: A prospective cohort study. PLoS One 2018;13 :e0195700.

3.Mulligan ML, Felton SK, Riek AE, Bernal-Mizrachi C. Implantations of vitamin D deficiency in pregnancy and lactation. Am J Obstet Gynecol. 2010;202:429. el-9.

4. Mahon P, Harvey N, Crozier S, InskipH,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.

5.Bodhnar LM, Catov JM, Simhan HN, Holick MF, Powers RW, Roberts JM. Maternal vitamin D deficiency increases the risk of pre eclampsia. J Clin Endocrinol Metab. 2007;92:3517-22.

6. Megan L.Mulligan, Shaili K Felton, Amy E.Riek and Carlos Bernal-Mizrachi.Implication of vitamin D deficiency in pregnancy and lactation. Am J Obstet Gynecol.2010 May ; 202 (5): 429.e9.

7. Tzu-Hui Loa, Ting –Yu Wua, Pei-Chen Lib, Dah-Ching Dingb. Effect of vitamin D supplementation during pregnancy on maternal and perinatal outcomes. Medical Journal 2019; 31(4): 201-206.

8. Anupama Dave, Monica Verma, Neelam Jain, Atisha Dave. A study of vitamin D levels and associated deficiency in pregnancy and its effect on maternal and fetal outcome. Int J Reprod Contracept Obstet Gynecol. 2017 Jan;6(1):84-88.

9. AndrazDovnik and Faris Mujezinovi'c. The association of vitamin levels with common pregnancy complications.Nutrients 2018, 10,867.

10. Dave A,Verma M, Jain N, Dave A. A study of vitamin D levels and associated deficiency in pregnancy and its effect on maternal and fetal outcome. Int J Reprod ContraceptObstetGynecol2017;6:84-8.

11. Bodnar LM, Simhan HN, Powers RW, Frank MP, Cooperstein E, Roberts JM. High prevalence of vitamin D insufficiency in black and white pregnant women residing inth northern United States and their neonates. J Nutr. 2007;137(2):447-52.

12. Kolusari A, Kurdoglu M, Yildizhan R, Adali E, Edime T, CebiA,et al. Catalase activity ,serum trace element and heavy metal concentrations, vitamin A, D and E levels in pre eclampsia. J Int Med Res.2008;36:1335-41.

13.Baker AM,Haeri S, Camargo CA Jr,EspinolaJA,StuebeAM.Anested case control study of midgestationvitaminD deficiency and risk of severe pre eclampsia.J Clin Endocrinol Metab.2007;95:5105-9.

14. Ssachan A, Gupta R,a Das V, Agarwal A, Awasthi PK, Bhatia V. High prevalence of vitamin D deficiency among pregnant women and their newborns in northern India. Am J Clin Nutr2005;81:1060-4.