Original Article

Vitamin D Deficiency Prevalence in Pregnant Women Presenting in A Tertiary Care Hospital for Antenatal Checkup in Northern Region of Bangladesh

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Abstract

Background: *Studying the prevalence of vitamin D deficiency in pregnant women and its relationships to parity, BMI, and employment status was the study's goal.*

Materials and Methods: *An observational study was carried out in the Department of Gynecology and Obstetrics at Khwaja Yunus Ali Medical College Hospital (KYAMCH), Enayetpur, Sirajganj, Bangladesh, between December 2023 and July 2024. The study involved 188 pregnant women who gave informed consent. On their initial visit, blood was drawn, and in the hospital lab, an automated immunoassay analyzer was used to measure the patient's 25 (OH) D3 level. Results were then tabulated and analyzed.*

Results: *Of the 188 pregnant women, only 14 (or 7.50%) had levels of vitamin D between 30 and 100 ng/ml, that is a sufficient level of vitamin D3. Within this group, the mean (SD) level of vitamin D was 41.1±10.8. Of the study individuals, 48 (25.6%) had vitamin D insufficiency (20-29 ng/ml) with a mean (SD) value of 22.6±2.3, and 126 (68.87%) had vitamin D deficiency with serum level <20 ng/ml and a mean (SD) value of 13.8±3.9. The combined amount of vitamin D insufficiency (less than 30 ng/ml) and deficiency made up 92.50%, with a mean (SD) of 16.2±5.6. Out of the group of people lacking in vitamin D, 26 (16.25%) had a mean of 8.1±1.3 and a vitamin D level less than 10 ng/ml.*

Conclusion: *Vitamin D inadequacy and insufficiency are highly prevalent among pregnant women attending OPD at KYAMCH, a tertiary care hospital in Northern region of Bangladesh. Correcting vitamin D insufficiency during pregnancy is important because it plays a critical role in the health outcomes for both the mother and the fetus.*

Key words: *Vitamin D Deficiency, Pregnant Wome, Northern Region of Bangladesh*

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Introduction

Fat-soluble vitamin D plays a critical biological role in maintaining calcium homeostasis in the human body. Enhancing insulin action and secretion, immune system modulation, hematopoietic system regulation, cognitive processes, and lung development are all significantly aided by vitamin D.[1-3] Since vitamin D can be transferred from pregnant women to their fetus, it may have an impact on the development of the unborn child.[1] Vitamin D is especially important during pregnancy and nursing. 24, 25(OH)2 vitamin D3 can be synthesized by the placenta, which also plays a role in the ossification of fetal bone. Pre-eclampsia, intrauterine growth restriction, gestational diabetes mellitus, bacterial vaginitis, and chorioamnionitis are all more common in women who are vitamin D deficient.[4–9]

There has been evidence linking low birth weight, respiratory infections, neonatal sepsis, and neonatal seizures to babies whose mothers are vitamin D deficient.[10–12] According to recent studies, vitamin D supplements given to newborns may not be able to completely restore some of the issues related to vitamin D insufficiency in infants. Melanin in pigmented skin absorbs UVB rays from sunshine, which reduces the creation of vitamin D3.[13-16] So, dark skinned people as in South Asian countries and Africa are more prone to develop vitamin D deficiency.

Natural sources of vitamin D include fish, eggs, meat, fish liver oil, and fortified foods. Globally, vitamin D insufficiency remain an unrecognized condition affecting all age groups and sex.[13, 15-18] This study set out to find out how common vitamin D

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deficiency was among expectant mothers attending OPD of KYAMCH, a tertiary care hospital in the northern part of Bangladesh.

Materials and Methods

This study was conducted in the Department of Obstetrics and Gynaecology at KYAMCH, Enayetpur, Sirajganj, from December 2023 and July 2024 after receiving approval from the Ethical Committee. After receiving informed consent, 188 pregnant women were included in this observational study.

A questionnaire was used to collect data on the following topics: age, occupation, diet, parity, co-morbidity, gestational age, and vitamin supplement usage. In the OPD, weight and height were recorded, and BMI was computed. On their very first visit, blood was drawn, and the hospital lab was used to measure the 25(OH)D3 level.

Inclusion criteria

Patients who attended for antenatal checkup and in the first trimester prior to beginning calcium supplements were included.

Exclusion criteria

Pregnant women, who had a history of co-morbid conditions, were using medications that could alter metabolism of calcium or vitamin D, or both were excluded.

Vitamin D3 values

A serum vitamin D level of 30 ng/ml is deemed acceptable, 20–29.9 ng/ml is regarded insufficient, and <20 ng/ml is considered deficient.

Statistical analysis

Data were entered and statistically analyzed in a Microsoft Excel sheet. A p-value of less than 0.05 was deemed significant.

Results

The study population's mean (±SD) age was 28 (±3.8). Hundred and five of the total 188 participants were under thirty, and 83 were over thirty. Regarding the total number of pregnancies, 73 were with second or third pregnancies (multigravida), and 115 were with the first pregnancy (primigravida). There were 72 participants with a normal BMI (18–24.9), 71 overweight people (BMI-25–29.9), 34 obese persons (BMI≥30), and 11 underweight participants (BMI<18). Fifty five women were employed in the following categories: bank officer (4), medical professional (15), engineer (3), NGO worker (24) and teacher (9). Of the 133 non-working women, 108 were housewives and 25 were students. 176 participants were from Muslim community. (Table 1).

Table I: Characteristics of the study population.

Characteristics	Categories	Frequency	%
Age group (years)	18-29 years	105	55.8
	30– 40 years	75	39.8
	>40 years	8	4.2
Parity	Primigravida	115	61.17
	Multigravida	73	38.8
BMI (kg/m2)	<18	11	5.8
	18-24.9	72	38.29
	25-29.9	71	37.76
	>30	34	18

Only 14 (07.50%) of the 188 pregnant women had adequate vitamin D levels, which ranged from 30 to 100 ng/ml. The group's mean (SD) vitamin D level was 41.1±10.8. Of the individuals, 48 (25.6%) had vitamin D insufficiency (20-29 ng/ml) with a mean (SD) of 22.6±2.3, and 126 (68.875%) had vitamin D deficiency with a mean (SD) value of 13.8±3.9. Together, vitamin D insufficiency and deficiency (less than 30 ng/ml) accounted for 92.50% of the total (174 in number), with a mean (SD) of 16.2±5.6. Of the individuals in the vitamin D deficient group, 26 (16.25%) had a mean vitamin D level of 8.1±1.3, which was less than 10 ng/ml (Table II). The older age groups have a higher prevalence of the deficit.

Table II: Vitamin D levels in the study population.

Serum Vitamin D level in ng/ml		Frequency	%	Mean Vitamin D level
Vitamin D sufficient	≥ 30	14	07.50	41.1±10.8
Vitamin D Insufficient	20 - 29	48	25.625	22.6±23
Vitamin D deficient	<20	126	68.875	13.8±3.9

Discussion

Vitamin D deficiency is a serious public health problem that can be avoided. Even while vitamin D deficiency is common in Bangladesh—a tropical nation with year-round sunshine, with the majority of studies suggesting that the prevalence is closer to 80–90%.[19]

Research conducted on pregnant patients in Tamil Nadu and Mysore, South India, revealed 61.5% and 66.5% of cases, respectively were vitamin D deficient.[19-21] In Bangladesh, vitamin D insufficiency is very common even with favorable weather circumstances.[19] Increases in skin melanin pigment, wearing more clothes that cover the body, eating too little vitamin D through diet, overcooking food, and inadequate vitamin D fortification of food are some of the possible causes of this.[22]

Furthermore, our findings agree with previous studies. 68.9% and 25.6% of individuals, respectively, were deficient and insufficient in vitamin D. The increased prevalence in this study may be the consequence of urban inhabitants avoiding outside activities and spending more time indoors as a result of air pollution, which also limits exposure to sunshine.[22] It is strongly recommended that women of reproductive age get two to three sessions of around 10-15 minutes of sun exposure per week in order to absorb a sufficient amount of vitamin D.

A recent study among Hawaiians found that even 11.1 hours of total body exposure to sunlight per week was not enough to stop the development of "low vitamin D status.

According to a study by Chandel et al, most people with vitamin D deficiency were under 30 years old.[23] Conversely, our research revealed that the prevalence of vitamin D insufficiency and deficiency was higher in age groups under 30. In our study, the deficiency affected 55.85% of women under 30 and 44% of women over 30. The higher frequency in the age group below 30 in our study could be explained by changes in lifestyle, such as fewer outside activities due to people's increased duties at home and sun aversion.

Primigravida had a higher prevalence of vitamin D insufficiency (60%) than multigravida (39.8%). This stands in contrast to earlier research, the majority of which found a higher frequency in multigravida . However, a recent study by Tuan et al. found that multigravidas had a reduced deficiency risk than primigravida.[24, 25] The low incidence of multigravida in our study may be explained by their increased awareness from previous pregnancies and concomitant increased attentiveness throughout the current pregnancy. According to a study by Bodnar et al., pregnant women with a pre-pregnancy BMI of ≥ 30 had chances to have vitamin D deficiency.[26] According to our study, 76% of obese people (BMI ≥30) had this condition.

A strong correlation was found between the level of vitamin D and employment status.

Vitamin D deficiency was found in 45% of working women compared to the non-working pregnant group.

Despite their education and middle-to-high socioeconomic status, the vitamin D deficiency may result from their ignorance of the importance of vitamin D in the diet and sunshine exposure during pregnancy.[27]

Higher educational level in mother have been linked to reduced rates of severe vitamin D deficiency and greater rates of adequate vitamin D levels, per the study. According to the "modified Kuppuswamy scale," it has also been discovered that as socioeconomic status rises, the prevalence of severe vitamin D deficiency decreases.

The typical Bangladeshi diet is deficient in vitamin D, making it difficult to prevent vitamin D deficiency, specially in pregnancy. Thus, vitamin D supplements are necessary for pregnant women who are deficient in the vitamin for the benefit of both mothers and unborn children.

Conclusion

Vitamin D defeciency and insufficiency are highly prevalent among pregnant women visiting the outpatient department (OPD) at Khayja Yunus Ali Medical College Hospital (KYAMCH), Enayetpur, Sirajganj, Bangladesh.

Correcting vitamin D insufficiency during pregnancy is important because it plays a critical role in the health outcomes for both the mother and the fetus. We came to the conclusion that protocols needed to be updated and include instructions to assess each pregnant patient's vitamin D level and to begin supplementation at the appropriate time to minimize any negative effects. It's also important to raise awareness among patients and medical professionals about vitamin D.

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References

1. Royal College of Obstetricians and Gynaecologists. Vitamin D in Pregnancy. Scientific Impact Paper No 43. London: RCOG; 2014.

2. Hall AC, Juckett MB. The role of vitamin D in hematologic disease and stem cell transplantation. Nutrients. 2013;5(6):2206-21.

3. Laughlin GA, Kritz-Silverstein D, Bergstrom J, Reas ET, Jassal SK, Barrett-Connor E et al. Vitamin D insufficiency and cognitive function trajectories in older adults: the rancho bernardo study. J Alzheimer's Dis. 2017;58(3):871-3.

4. Robinson CJ, Alanis MC, Wagner CL, Hollis BW, Johnson DD. Plasma 25-hydroxyvitamin D levels in early-onset severe preeclampsia. Am J Obstet Gynecol. 2010;203(4):366-e1.

5. Shand AW, Nassar N, Von Dadelszen P, Innis SM, Green TJ. Maternal vitamin D status in pregnancy and adverse pregnancy outcomes in a group at high risk for pre-eclampsia. BJOG. 2010;117(13):1593-8.

6. Fiscaletti M, Stewart P, Munns CF. The importance of vitamin D in maternal and child health: a global perspective. Public Health Rev. 2017;38(1):1-7.

7. Lau SL, Gunton JE, Athayde NP, Byth K, Cheung NW. Serum 25-hydroxyvitamin D and glycated haemoglobin levels in women with gestational diabetes mellitus. Med J Aust. 2011;194(7):334-7.

8. Bodnar LM, Krohn MA, Simhan HN. Maternal vitamin D deficiency is associated with bacterial vaginosis in the first trimester of pregnancy. J Nutr. 2009;139(6):1157-61.

9. Persad MD, Staszewski C, Khan F, Perseleni T, Herrera K, Garre o D. Does Antepartum Vitamin D3 Supplementation Prevent Chorioamnionitis [24P]. Obstet Gynecol. 2019;133:176S-7S.

10. Kaushal M, Magon N. Vitamin D in pregnancy: A metabolic outlook. Indian J Endocrinol Metab. 2013;17(1):76.

11. Lapillonne A. Vitamin D deficiency during pregnancy may impair maternal and fetal outcomes. Med Hypothe. 2010;74(1):71-5.

12. Kerley CP, Elnazir B, Faul J, Cormican L. Vitamin D as an adjunctive therapy in asthma. Part 1: A review of potential mechanisms. Pulm Pharmacol Ther. 2015;32:60-74.

13. Holick MF, Chen TC. Vitamin D deficiency: a worldwide problem with health consequences. Am J Clin Nut. 2008;87(4):1080S-6S.

14. Lips P. Vitamin D physiology. Prog Biophys Mol Biol. 2006;92(1):4-8.

15. Ross AC, Manson JE, Abrams SA, Aloia JF, Brannon PM, Clinton SK, et al. The 2011 report on dietary reference intakes for calcium and vitamin D from the Institute of Medicine: what clinicians need to know. J Clin Endocrinol Metab. 2011;96(1):53-8.

16. Grant WB, Holick MF. Benefits and requirements of vitamin D for optimal health: a review. Altern Med Rev. 2005;10(2):94-111.

17. Dawson-Hughes B, Heaney RP, Holick MF, Lips P, Meunier PJ, Vieth R. Estimates of optimal vitamin D status. Osteoporos Int. 2005;16(7):713-6.

18. Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA, Heaney RP, et al. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab. 2011;96(7):1911- 30.

19. Islam AM, Hasan MN, Rahman KM, Asaduzzaman M, Rahim MA, Zaman S, et al. Vitamin D status in Bangladeshi subjects: a laboratory based study. BIRDEM Medical Journal. 2019 Sep 11;9(3):202–6.

20. Aparna P, Muthathal S, Nongkynrih B, Gupta SK. Vitamin D deficiency in India. J Family Med Prim Care. 2018;7(2):324.

21. Durairaj K, Muthulakshmi M, Venkataraman P, Murali R, Rukumani J. Vitamin D Deficiency among Pregnant Women Attending Tertiary Care Centre in Tamilnadu. J Chem Pharm Res. 2018;10(5):126-31.

22. Hoseinzadeh E, Taha P, Wei C, Godini H, Ashraf GM, Taghavi M, et al. The impact of air pollutants, UV exposure and geographic location on vitamin D deficiency. Food Chem Toxicol. 2018;113:241-54.

23. Chandel AB, Mittal R, Sharma A, Mittal S, Samyal P. Prevalence of vitamin D deficiency in antenatal women. Int J Reprod Contracept Obstet Gynecol. 2019;8(6):2302-6.

24. Binkley N, Novotny R, Krueger D, Kawahara T, Daida YG, Lensmeyer G, et al. Low vitamin D status despite abundant sun exposure. J Clin Endocrinol Metab. 2007;92(6):2130-5.

25. Tuan VM, Xuan LT, Nhat PQ. Vitamin D deficiency rate in first-trimester pregnant women at Ho Chi Minh City. Gynecol Reprod Health. 2019;3(1):1-5.

26. 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 in the northern United States and their neonates. J Nutr. 2007;137(2):447-52.

27. Sharma S, Kumar A, Prasad S, Sharma S. Current scenario of vitamin D status during pregnancy in north Indian population. J Obstet Gynecol India. 2016;66(2):93-100.