

Correlation of Maternal-Neonatal Pairs with Vitamin D Status and Low Birth Weight Outcome: Observational Analysis

Girija C Bellad¹, Vasant Kabbur², Sunita Kittali³

¹Associate Professor, Department of Obstetrics & Gynaecology, Radha Devi Jageshwari Memorial Medical College and Hospital, Muzaffarpur, Bihar, India

²Associate Professor, Department of Obstetrics & Gynaecology, Belagavi Institute of Medical Science's, Belagavi, Karnataka, India

³Assistant Professor, Department of Obstetrics & Gynaecology, Belagavi Institute of Medical Science's, Belagavi, Karnataka, India

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Corresponding author: Dr Girija C Bellad

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Abstract

Background and Aim: There is insufficient data linking hypovitaminosis D with the potential danger to maternal-neonatal pairings, despite mounting evidence that vitamin D shortage and insufficiency are linked to poor pregnancy and newborn outcomes. The purpose of this study was to examine the relationship between maternal and neonatal vitamin D status and see if maternal vitamin D deficiency may increase the risk of low birth weight.

Material and Methods: The current study comprised 200 women and was an observational study. The patients that were enrolled were split into two groups: a case group and a control group. Mothers of newborns weighing more than 2500 g will be used as a control group. Mothers of newborns less 2500 g at birth will be counted as cases. Within two hours of birth, 5 ml of the mother's blood will be drawn, labelled, and submitted to the lab to be tested for serum 25 (OH) vitamin D levels using the 25 hydroxy vitamin d enzyme immunoassay method.

Results: The means maternal serum vitamin D level in the included women was found to be 34.79 nmol/L. The Vitamin D deficiency in the included mothers were found in the 45% of the total included population, Vitamin D insufficiency was found in 29% and the normal range of vitamin D level was found in 26% of the included women population. The present study's data collection revealed that the mean maternal serum vitamin D levels in the group of newborns with low birth weight were considerably lower than those in the group of newborns with normal birth weight.

Conclusion: Low birth weight babies and maternal vitamin D insufficiency are significantly correlated.

Keywords: Low Birth Weight, Neonates, Pregnancy, Vitamin D.

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Introduction

Despite being discovered a century ago, vitamin D has only recently gained notoriety as one of the prohormones and nutrients of the twenty-first century. It is discovered to have a

significant impact on bone health and calcium metabolism. The body produces vitamin D, a fat-soluble vitamin, when sunlight interacts with 7-dehydrocholesterol and breaks one of

its chemical connections, transforming it into the active form. There are two types of vitamin D: vitamin D2 (ergocalciferol) in plants and vitamin D3 (cholecalciferol) in people and other animals. Through interacting with calcium and parathyroid hormone homeostasis, vitamin D plays a significant role in bone mineralization [1-3].

Low birth weight (LBW) is the term used to describe term or preterm newborns with birth weights under 2500 grammes. These newborns could have intrauterine growth restriction or be undersized for gestational age. These neonates have a mortality rate that is 40 times higher than neonates of normal weight [4,5].

Preeclampsia, hypertension, gestational diabetes mellitus (GDM), spontaneous abortion, intrauterine growth restriction (IUGR), small size for gestational age (SGA), low birth weight (LBW), and premature birth are just a few of the adverse outcomes that Vitamin D deficiency and insufficiency are linked to by a wealth of epidemiological evidence [6,7]. According to a paper, maternal vitamin D insufficiency is a significant biomarker that can alter placental characteristics associated to glucocorticoids. Lack of vitamin D in the mother causes foetal and placental exposure to glucocorticoids, which finally results in foetal growth restriction. Other observational studies, however, did not find a link between low vitamin D levels and poor pregnancy outcomes [8].

There is insufficient data linking hypovitaminosis D with the potential danger to maternal-neonatal pairings, despite mounting evidence that vitamin D shortage and insufficiency are linked to poor pregnancy and newborn outcomes. The purpose of this study was to examine the relationship between maternal and neonatal vitamin D status and see if maternal vitamin D deficiency may increase the risk of low birth weight.

Material and Methods

The current study involved 200 women and was an observational study. The department of gynaecology at the medical college and its affiliated hospital conducted the study. Prior to the study's launch, the ethical committee was made aware of it and an ethical clearance certificate was obtained.

The patients that were enrolled were split into two groups: a case group and a control group. Mothers of newborns weighing more than 2500 g will be used as a control group. Mothers of newborns less 2500 g at birth will be counted as cases. Within two hours of birth, 5 ml of the mother's blood will be drawn, labelled, and sent to a lab to measure the serum 25 (OH) vitamin D level using the 25 hydroxy vitamin d enzyme immunoassay method. All moms were divided into one of four groups based on their mothers' 25(OH) Vitamin D levels:

1. Deficient <25 ng/dl
2. Insufficient: 25 to 50 ng/dl
3. Normal >50 ng/dl
4. Toxic level >250ng/dl

The inclusion & exclusion criteria followed in the study were as follows:

Inclusion Criteria

1. All cases of singleton gestation
2. Term neonates with birth weight (>2500gm) and their mothers
3. Term neonates with birth weight (<2500 gm) and their mothers
4. Mode of delivery: either vaginally or by caesarean section

Exclusion Criteria

mothers who have one of the following conditions: twin pregnancies, eclampsia, postpartum haemorrhage, or pre-eclampsia. Chronic and systemic illness, haematological disorders, drug misuse, The study did not include newborns with infections or congenital malformations.

Statistical Analysis

Microsoft Excel 2007 was utilized to compile and input the collected data, which was then exported to the data editor page of SPSS version 15 for analysis (SPSS Inc., Chicago, Illinois, USA). The level of significance and confidence level for each test were set at 5% and 95%, respectively.

Results

A total of 200 women were included in the study. The mothers included in the study were in accordance with the inclusion and exclusion criteria. The mean age of the included women was found to be 27.50 years and the mean

gestational age was found to be 39.80 weeks. (Table 1) The means maternal serum vitamin D level in the included women was found to be 34.79 nmol/L. Mothers who were included in the study were found to have vitamin D deficiencies in 45% of the population overall, insufficiencies in 29%, and levels within the normal range in 26% of the population of women. The data gathered for this study revealed that, with a p-value of 0.002, the mean maternal serum vitamin D levels in the group of newborns with low birth weight were substantially lower than those in the group of newborns with normal birth weight.

Table 1: Mean age of the study Population

Variable	Mean \pm SD
Age	27.50 \pm 4.32
Gestational Age	39.80 \pm 5.48

Discussion

Through its interaction with parathyroid hormone and Ca²⁺ homeostasis, vitamin D influences embryonic growth. In Iran, very few research have been done to determine the vitamin D status of mothers. In a recent study, vitamin D deficiency was found in almost half of our mothers. Another study conducted in our nation revealed that vitamin D deficiency is common, especially among rural women (61.1%) as compared to urban ones (46.2%) [9-11]. A significant association between pre-pregnancy BMI and BMI at delivery was found in the current study. Babies born with low birth weight and an increase in BMI (obesity) were linked.

Vitamin D₃ levels in the blood were shown to be lower in fat people than in lean people. It is caused by a number of mechanisms, including decreased vitamin D intake, decreased intestinal absorption, decreased UVB exposure, decreased cutaneous production, and vitamin D accumulation in excess adipose tissue [12,13]. We found a significant link between low birth weight and maternal vitamin D insufficiency. Our findings agreed with those of Bodnar *et al* [14]. They discovered a connection between neonatal LBW and

vitamin D deficiency in white moms, but not in black mothers.

According to some articles, vitamin D pills and fortification are safe. Preterm risks were reduced in mothers who took vitamin D supplements (400–4000 IU/day) during 12–16 weeks. It appears that mothers with inadequate vitamin D status have a twofold increased risk of having SGA children compared to mothers with adequate vitamin D status. The mean level of vitamin D₃ in the group of infants under 2.5 kg was 14.5 ng/dl, which was lower than the mean level in the group of infants above 2.5 kg, which was 23.54 ng/dl. As a result, my research found a strong link between low levels of vitamin D in mothers and low birth weight newborns. Also, it revealed a negative correlation between maternal Obesity and vitamin D₃ levels.

Conclusion

Based on the findings of the current study, it was determined that low levels of vitamin D in the mother and low birth weight babies are significantly correlated.

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