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Research Article

THE RELATIONSHIP BETWEEN MATERNAL VITAMIN D DEFICIENCY AND LOW BIRTH WEIGHT NEONATES IN INDIA

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ABSTRACT

To explore the role of Antenatal Vitamin D intake in prevention of Low Birth weight babies. The present study was conducted at Bhaarath Medical College and Hospital, Chennai, and resent study involving 100 delivered women divided into two equal groups -One with women with babies with weight less than 2500 gm and another group with women with babies with weight more than 2500 gm. Maternal serum 25 (OH) vitamin D assay was done by immunoassay method. Data was collected and included in a data based system and analysed by statistician. Increasing maternal age showed a significant decrease in serum vitamin D levels. Increasing BMI was associated with vitamin D deficiency and low birth weight babies. In the study maternal vitamin D deficiency was found to be a single best predictor for low birth weight baby. Based on the results from the study, it can be said that there is a significant correlation between maternal vitamin D deficiency and low birth weight baby. The study also showed the influence of other variable like age, parity, complexion, pre pregnancy BMI, BMI at time of delivery, previous h/o low birth weight baby, diet and haemoglobin. Thus vitamin D deficiency was found to be associated with increasing age, increasing parity, dark complexion, increasing BMI and vegetarian diet. Dietary improvement and prescribing vitamin D supplements can positively effect on low birth weight. Maternal Vitamin D deficiency may increase the risk of low birth weight neonate and modifying maternal nutrition behavior and their vit D level could be beneficial on pregnancy outcome.

Keywords: - Antenatal Vitamin D, Low Birth Weight, Maternal Vitamin D Deficiency, Pregnancy Outcome, BMI and Birth Weight

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INTRODUCTION

Low birth weight (LBW) refers to term or preterm neonates with birth weight < 2500 gr. These neonates may be small for gestational age or have intrauterine growth restriction. Mortality rate in such neonates is 40 times more than those with normal weight (1). Some investigations highlighted the effect of micronutrients on birth weight (2). Vitamin D (vit D) has a key role in fetal growth by its interaction with parathyroid hormone and Ca2+ homeostasis. Studies confirmed that insufficient prenatal and postnatal levels of vit D have great effects on poor bone mineralization which have significant association with small for gestational age (SGA) births (3). SGA births are reported more frequent in pregnancies occurring in the winter with vit D deficiency (4). High Prevalence of vit D deficiency (about a billion) has been seen among people all over the world (2). Despite abundant and strong sunlight in Iran in most days of the year, vitamin D deficiency is a common problem among Iranian adult women due to their clothing style and lack of seasonal food. In this study, which was the first investigation in these medical centers

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(AliAsghar and Akbarabadi), we were intended to compare the maternal vitamin D status between LBW and normal birth weight neonates. There are several studies depicting that maternal vitamin D deficiency is associated with low birth weight babies. In this study we are intended to compare the maternal vitamin D status between LBW and normal birth weight neonates.

Our study aim is to find out the correlation between maternal vitamin D levels and low birth weight babies. To study the relationship between serum maternal vitamin D levels and low birth weight babies. To explore the role of antenatal vitamin D intake in prevention of low birth weight babies.

Materials and Methods:

It was an observational study involving 100 delivered women divided into two equal groups. One with women with babies with weight less than 2500 gm and another group with women with babies with weight more than 2500 gm. The present was conducted at Bhaarath Medical College and Hospital, Chennai.

Sample Collection:

In order to determine maternal vitamin D level, immediately two hours after delivery 5ml of mot hers blood will be collected, labelled and sent to laboratory to assay serum 25 (OH) vitamin D level by 25 hydroxy vitamin D enzyme immunoassay method. Depending on mother's 25(OH) vitamin D level. All mothers were categorised in Deficient 50 ng/dl Toxic level >250 ng/dl

Inclusion criteria:

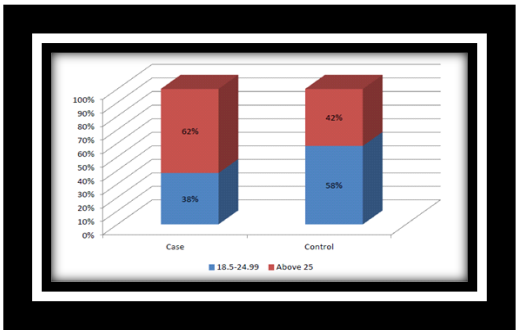
All cases of singleton gestation, Term neonates with birth weight (>2500 gm) and their mothers, Term neonates with birth weight (<2500 gm), Mode of delivery either vaginally or by caesarean section.

Exclusion criteria:

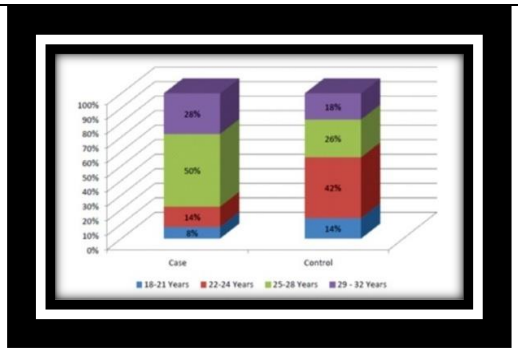
Mothers with Pre eclampsia, Eclampsia, Post partum haemorrhage, Insulin dependent diabetes, Twins pregnancy, Systemic and chronic disease, Haemotology disorder, Drug abuse, Neonates with congenital malformation and infection.

Data was collected and included in a data based system and analysed by statistician. Parametric data was expressed as mean I and standard deviation. It was analysed statistically using t-test and non parametric data was expressed as percentages and analysed using chi square receiver operator characteristics analysis were used to identify the optimal threshold values of 25(OH) vitamin D and correlation with low birth weight babies.

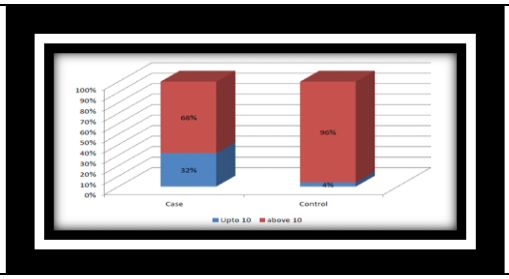
Graph.1: The mean age group in which vitamin D deficiency and increasing maternal age showed a significant decrease in serum vitamin D levels (p value =0.005)



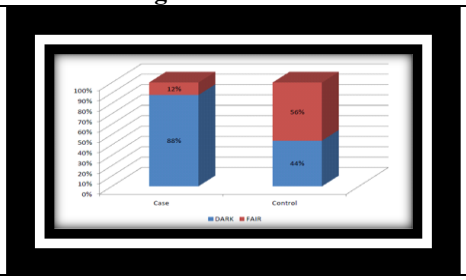
Graph.2: A significant correlation between pre pregnancy BMI and BMI at time of delivery.



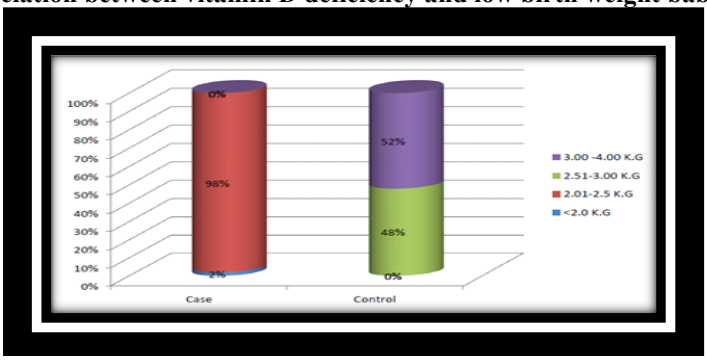
Graph.3: A significant correlation between HB and vitamin D deficiency and thereby low birth weight babies.



Graph.4: A significant association between dark complexion individuals with vitamin D deficiency and thereby low birthweight babies.



Graph.5: A significant association between vitamin D deficiency and low birth weight babies.



DISCUSSION:

Vitamin D affects fetal growth by its interaction with Ca2+ homeostasis and parathyroid hormone. Few studies have been conducted to detect vitamin D status in mothers in Iran. In recent study, nearly half of our mothers had vitamin D deficiency. In another study which has performed in our country, vitanin D deficiency was found to have widespread incidence, especially in rural women (61.1%) in compare to the urban ones (46.2%) (5-6). Vitamin D deficiency is also reported to be very common in Pakistani mothers and infants (7). Hypovitaminosis D and osteomalacia in south Asian pregnant women have been widely reported, too (8)

Analysis of low levels of vitamin D3 as predictors for low birth weight babies (>2.5kg) was done. In this study age, parity, pre pregnancy BMI, BMI at time of delivery, HB, complexion and mode of delivery were assessed. 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)

In this study there was 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. In this study there was a significant correlation between pre pregnancy BMI and BMI at time of delivery. Increasing BMI (obesity) was associated with vitamin D deficiency and low birth weight babies. Circulating levels of vitamin D3 was found to be low in obese individuals compared to lean individuals. There are several mechanism behind it such as lower vitamin D intake or reduced intestinal absorption, decreased uvb exposure or cutaneous synthesis, deposition of vitamin D in excess adipose tissue (9-16).

In this study mean HB in cases among vitamin D deficiency individuals was found to be 10.3 compared to 10.84 among control group. It also showed that 96% of women in control group was found to have HB above 10.Thus there was a significant correlation between HB and vitamin D deficiency and thereby low birth weight babies.

In this study there was significant association between dark complexion individuals with vitamin D deficiency and thereby low birth weight babies.88% of women in case group was found to have dark complexion compared to 44% in control group. P value <0.001% People with dark skin color produce less vitamin D because of decreased exposure to the UVB rays due to increased melanin content (11-13).

Results suggest a significant relationship between neonatal low birth weight and maternal vitamin D deficiency. Accordingly, nutrition improvement and prescribing vitamin D supplements can positively be effective in the way of curbing low birth weight. Moreover, Exposure to sunlight and letting rays strike skin is essential for maintaining a healthy vitamin D status for girls and women (16-18).

In this study vitamin D deficient individuals were found to deliver by lscs. 62% of women with vitamin D deficiency individuals underwent LSCS and among control group 78% of women were found to have normal vaginal delivery. There was a significant correlation between vitamin D deficiency and delivery by LSCS. P value <0.001% The relationship of vitamin D3 with labour and delivery outcomes can thus be related to both muscle performance and uterine contractions. Thus there is found to be higher chance for delivery by LSCS for women with vitamin D deficiency. According to RCOG June 2014, Vitamin D deficiency has been associated with a fourfold increased risk of primary LSCS.

In this study there was a significant association between vitamin D deficiency and low birth weight babies. Among vitamin D deficiency group 98% of women were found to have babies with weight between 2.01 to 2.5kg and 2% of women were found to have babies with weight less than 2kg.Among control group 48% of women were found to have babies with weight between 2.51kg to 3 kg and 52% of women were found to have

babies with weight above 3 kg. P value was found to be value <0.001 and found to be significant.

In this study vitamin D deficiency was found to be associated with vegetarian diet. Among cases 22% was associated with vegetarian diet compared to only 8% among control group. Low level of sreum vitamin D among pregnant mothers is found among those who consume vegetarian food alone and mix non vegetarian taking small amount of non vegetarian diet.

CONCLUSION:

Based on the results from the study, it can be said that there is a significant correlation between maternal vitamin D deficiency and low birth weight baby. The study also showed the influence of other variable like age, parity, complexion, pre pregnancy BMI, BMI at time of delivery, previous h/o low birth weight baby, diet and haemoglobin. Thus vitamin D deficiency was found to be associated with increasing age, increasing parity, dark complexion, increasing BMI and vegetarian diet. Dietary improvement and prescribing vitamin D supplements can positively effect on low birth weight. As high prevalence of vitamin D deficiency has been seen among women especially in developing countries, this study shows that neonatal low birth weight (LBW) could be related to maternal vitamin D deficiency. Using sunlight during the day to improve vitamin D level among women and girls. Modifying maternal nutrition behavior and vitamin D level could be beneficial on prevention of low birth weight, however more research in this field seems contribute to an improvement in maternal and neonatal health. Larger studies with increased sample size and also long term effect of vitamin D supplementation are prudent.

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