

Original Article

Study on Perinatal Outcome in Relation to Maternal Vitamin D Deficiency

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Objective : To assess the incidence of vitamin D deficiency in primigravida and to correlate perinatal outcome after substitution of Vitamin D among those deficient women.

Methodology : This observational and prospective study was conducted at VIMS, Kolkata for a period of one year. A total of 100 primigravida women whose vitamin D was less than 20ng/ml (deficient mother as per our study) were randomly selected based on inclusion criteria. These 100 women were subgrouped into two groups.

Group A : 50 women who were deficient of vitamin D on booking (less than 20 ng/ml).

Group B : 50 women who were deficient of vitamin D (<20ng/ml) and received vitamin D 2000IU/day during the course of pregnancy.

Serum vitamin D level was estimated by Chemiluminescence Immuno Assay (CLIA) method.

Results : Incidence of vitamin D deficiency in our study population was 87.7%. Deficient vitamin D and its associations with risk factors eg, Gestational Diabetes Mellitus (GDM), Hypothyroidism, Intrahepatic Cholestasis In Pregnancy (ICP), Pregnancy Induced Hypertension (PIH) were more or less same in both groups. Incidence of preterm delivery in non treated group (8%) was found to be higher than treated group (4%). But this difference was not statistically significant. Similar finding was noted in case of low birth weight babies between the two groups though it was 1.19 times higher among the mothers with no treatment. Caesarean section rate was higher in non treated group ($p>0.05$).

Conclusion : In this study no statistically significant association of adverse maternal and perinatal outcome was noted between mothers who were deficient and non deficient of vitamin D is found in many literature.

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Key words : Vitamin D deficiency, Perinatal outcome.

Recent evidences suggest that women belonging to high-risk groups like vegetarians, having limited sun exposure and ethnic minorities, especially those with darker skin are Vitamin D deficient¹⁻³. In India and its surrounding countries contrary to our old belief a huge population were found to have Vitamin D deficiency despite having a less dark skin and adequate exposure to sun rays. This is because sunrays falling on the skin of upper and lower extremities between 11am and 3 pm is mostly responsible for stimulating Vitamin D synthesis and people of these subcontinent usually stay in house during this time.

Editor's Comment :

- Adverse maternal and perinatal outcome have been reported with vitamin D deficiency in many literature.
- Assesment of micro and macronutrient deficiency is of utmost importance during pregnancy

Newborn mostly depends on mother for their Vitamin D. If mothers are already Vitamin D deficient then the newborns will also be vitamin D deficient⁴.

As per 2010 Institute of Medicine (IOM) Report, 12ng/ml (30nmol/L) of 25(OH)D is the limit below which "persons are at risk for bone deficiency". However, as per the 2011 ACOG Practice Bulletin "Vitamin D: Screening and Supplementation" defines a value less than 20ng/ml (50nmol/L) as Vitamin D deficient.

Mothers who are vitamin D deficient are found to suffer more from GDM, preeclampsia, small baby and operative interventions. Considering cut off as 20ng/ml, higher incidence of Vitamin D deficiency among pregnant mothers has been reported in studies throughout the world. Same has been reported in India, Pakistan, Japan, China, UK as well as in Sweden⁵.

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Most of the literature shows that 1000-2000 IU of Vitamin D per day in pregnancy is safe. Although there is no adequate data of higher safer dose but consensus is mostly upto 4000 IU per day during pregnancy and lactation⁶.

Physiologically Vitamin D is called calciferol ie, D2 and D3. Plant source of vitamin D is known as Vitamin D2 where as human source (Vitamin D3, cholecalciferol) is produced below the skin following UV light radiation from sun⁷. Vitamin D3 is three times more stronger in efficacy than Vitamin D2 and more protein bound in plasma⁸. Vitamin D is short lived and thus needs adequate dosing to maintain its effective concentration in blood.

In this study we had measured Vitamin D level in pregnant mothers and correlated that with adverse perinatal outcome.

MATERIALS AND METHODS

This is an observational and prospective study among 100 uncomplicated primigravidas in Obstet & Gynaecol department at VIMS, Kolkata. After obtaining necessary approval from institutional ethical committee and based on inclusion criteria they were enrolled after obtaining consent provided they are all Vitamin D deficient (below 20 ng/ml) at first visit as measured by CLIA method.

A total of 100 women were enrolled and divided into two groups.

Group A : (50 patients) – who were deficient of vitamin D and did not receive any treatment.

Group B : (50 patients) –who were found to be Vitamin D deficient and substituted with 2000 IU of Vitamin D per day during their antenatal periods.

These 100 pregnant women were followed up till delivery and their neonates till discharge from hospital. Finally these two groups were compared on pregnancy outcome, method of delivery and neonatal outcome.

Inclusion Criteria :

- (1) Primigravida with vitamin D level less than 20ng/ml at first visit
- (2) Booked in the OPD within 16 wks of POG
- (3) No history of antenatal or medical/surgical complication

Exclusion Criteria :

- (1) History of treatment with vitamin D before
- (2) Vitamin D is contraindicated or Hypersensitivity to Vitamin D

RESULTS AND DISCUSSIONS

Statistical Analysis was performed with help of Epi Info (TM) 3.5.3 which is a trademark of CDC (Centers for Disease Control and Prevention).

Using this software, basic cross-tabulation and frequency distributions were prepared. χ^2 test was applied to see the association between different study variables under study. Z-test was applied to assess the significant difference between two proportions. t-test was also used in this study to compare the means. Odds ratio (OR) with 95% Confidence Interval (CI) was calculated to measure the different risk factors. $p \leq 0.05$ was considered statistically significant (Fig 1).

Incidence of Vitamin D deficiency in our study population was 87.7%. The incidence of Vitamin D deficiency is quite high in our study and corroborates with the incidence stated in different earlier studies⁹⁻¹¹.

No significant difference was noted applying the t-test to compare the mean age of the patients,

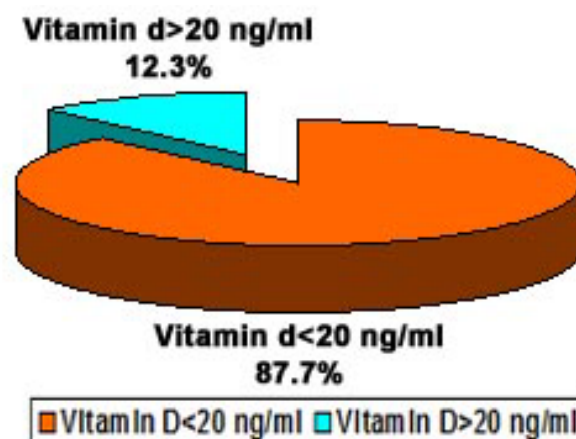


Fig 1 — Incidence of Vitamin D deficiency in study population

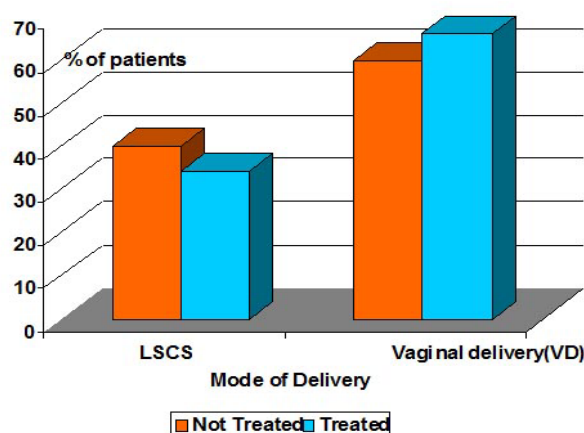


Fig 2 — Mode of delivery of the patients of two groups

gestational age at their first visit and mean vitamin D level between these two groups ($t_{98}=0.04$; $p=0.54$). Thus two groups were matched (Fig 2).

No significant association was noted when mode of delivery was considered between two groups using Chi square test ($p=0.53$). Proportion of LSCS was higher in Group-A (40%) than that of group-B (34%) but it was not significant ($p>0.05$). Similar study by Anne-Louise P *et al*¹² found that there were four times increased incidence of caesarean section in non treated expectant mothers. Fernandez-Alonso AM *et al*¹³ in their study found no increase risk of caesarean section in pregnant women with 25-OHD insufficiency, whereas Scholl TO *et al*¹⁴ in their study showed an higher risk of c-section among vitamin D deficient group of women (Fig 3).

Statistically significant association was not noted when risk factors were compared between the two groups using Chi-square test ($p=0.39$). All the associated risk factors were more or less evenly distributed over the two groups.

Prevalence of pre-term delivery was higher in group-A (8%) than that of group-B (4%) but it was not significant ($p>0.05$). Gille O *et al*¹⁵ in their study reported that after supplementaion of Vitamin D there was a reduction of preterm labour and small for date babies.

When weight of the babies at birth and neonatal outcome were compared between the two groups using Chi-square (χ^2) test showed no significant association ($p=0.37$).

CONCLUSION AND LIMITATION

In our study, in contrary to many literature we have not found any statistical difference between the two groups when maternal and perinatal outcomes were compared.

This could be due to small sample size in our study. We were also unable to estimate other factors which can affect vitamin D level. In our population we have also noticed variation in the maternal built and nutrition which can affect birth weight of babies. In future we need to perform a better study keeping in mind different important confounding factors like maternal weight, lifestyle, nutritional status, duration and time of sun exposure etc. Quantification of Vitamin D in serum

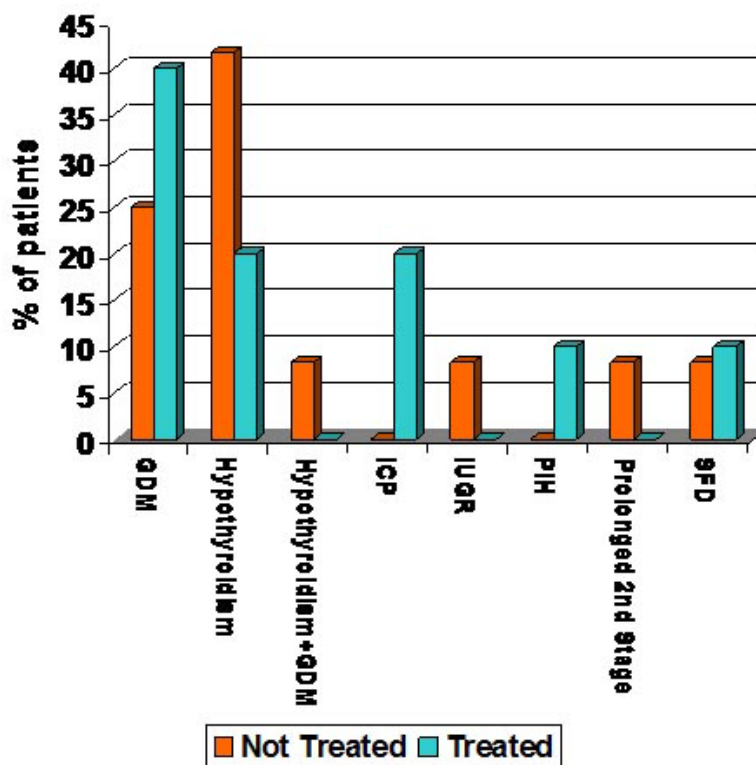


Fig 3 — Associated risk factors among the patients of two groups

also needs to be standardized among different centers to avoid any discrepancy in serum Vitamin D level.

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