Journal of Cardiovascular Disease Research

ISSN:0975-3583,0976-2833 VOL12,ISSUE01,2021

A Prospective Study to Determine the Neonatal Plasma Cholecalciferol Levels

Dr. Vijay Kumar Gupta[1] (Senior Resident), Dr. Amit Patidar[2](Senior Resident), Dr. Yusuf Ahmed[3] (PG Resident 3rd Year) &Dr. Neeta Singh[4] (PGMO)

[1]Dept. of Paediatrics, ShrimantRajmataVijayarajeScindia Medical College and Hospital, Shivpuri, M.P.
[2]Dept. of Paediatrics, AtalBihari Vajpayee Government Medical College (ABVGMC), Vidisha, M.P.
[3]Dept. of Paediatrics, G.S.V.M. Medical College,Kanpur
[4]Dept. of Paediatrics, PGMO, District Hospital, Shivpuri, Madhya Pradesh

First Author: Dr. Vijay Kumar Gupta
Corresponding Author: Dr. Neeta Singh

Abstract:

Background&Method: The study is conducted with an aim to determine the neonatal plasma cholecalciferol levels at N.I.C.U of C.R. Gardi Hospital and associated hospitals of R. D. Gardi Medical College, Ujjain.

Result: Maximum newborns in study group 41 (58.57%) were born by Spontaneous vaginal delivery. The mean 25-OH cholecalciferol levels among term is 18.53ng/ml (±4.6) and in preterm is 15.7ng/ml (±2.7) and this data is statistically significant (p-Overall mean 25-OH cholecalciferol is 17.12ng/ml.

Conclusion:67.14 % newborns were deficient in 25-OH cholecalciferol, 22.86% newborns had insufficient levels, while 10.00% of newborns had sufficient levels of 25-OH cholecalciferol. The mean 25-OH cholecalciferol levels among term was 18.53ng/ml (±4.8) while in preterm is 15.7ng/ml(±2.9) and this data is statistically highly significant(p-0.04).

Keywords:neonatal, plasma, &cholecalciferol levels.

Study Designed:prospective, observational study.

1. INTRODUCTION

In fact, it has been estimated that by optimizing vitamin D status in Canadians, mortality could be reduced by 37,000 annually (a 16.1% reduction) and reduce the annual economic burden by $14.4 billion (6.9%).[1]

Cholecalciferol role in preventing adverse health outcomes may begin as early as the first trimester of intra-uterine development; low maternal cholecalciferol intake during pregnancy has been linked with increased risk of asthma and diabetes later in the offspring's life .[2,3,4,5,6] However, few studies have assessed the relationship of newborn vitamin D levels with pregnancy outcome and neonatal health.

ISSN:0975-3583,0976-2833 VOL12,ISSUE01,2021

The prevalence of newborn cholecalciferol deficiency ranges from 11 - 93%, depending on the definition of deficiency used and the population studied. Because cholecalciferol start crossing the placenta from 4weeks of gestation , the vitamin D level of the newborn is entirely dependent on the maternal vitamin D level .[7] Therefore, a high prevalence of cholecalciferol deficiency or insufficiency in pregnant women correlates with a correspondingly high prevalence of vitamin D deficiency or insufficiency in newborns.
Considerable evidence have linked early cholecalciferol deficiency with increased risk for fetal growth restriction, infection[8] and poor neurodevelopment in later life.
Recent studies have implicated cholecalciferol insufficiency as an important risk factor for neonates and children acquiring infections such as tuberculosis, acute lower respiratory tract infections, pneumonia and influenza.
It has been found that newborns low level of cholecalciferol is closely related neonatal sepsis.
Present study aimes to estimate the prevalence of low neonatal levels of cholecalciferol, identify maternal risk factors for low neonatal cholecalciferol levels, and correlate the relationship between low neonatal levels of cholecalciferol and adverse neonatal outcomes, if any.

2. MATERIAL & METHOD

The study is conducted at N.I.C.U of C.R. Gardi Hospital and associated hospitals of R. D. Gardi Medical College, Ujjain conducted from January 2019 to June 2019. The C.R. Gardi Hospital is in the campus of R.D. Gardi Medical College, Ujjain approximately five kilometers from Ujjain city and is a teaching hospital attached to R.D. Gardi Medical College at Surasa, Ujjain. Approximately 200-300 deliveries are conducted each month at the Obstetrics unit of C.R. Gardi hospital.

Inclusion criteria:

- The cases included all babies >34 weeks of gestational age having post natal age of 0-28 days with clinical signs and laboratory findings of neonatal sepsis admitted to NICU at Department of Pediatrics CRGH Hospital , Surasa Ujjain.

Exclusion criteria:

- Neonates less than 34 weeks gestation.
- Presence of major congenital anomalies.
- Severe birth asphyxia.
- Infants who have received vitamin D supplementation after birth.
- Infants who have already received Antibiotics.
- If parents were not available to give informed consent or refused to give consent.

Data Collection

All the neonates who fulfill the inclusion criteria were taken in the study after taking written consent from the patient.
A pretested written Proforma was used to record the detailed history, clinical findings and investigations. A detailed antenatal history including maternal age, religion, socio-economic

ISSN:0975-3583,0976-2833 VOL12,ISSUE01,2021

status, last menstrual period, risk factors and drug intake was obtained from the mother/legal guardians of the baby and from mother's medical records.

3. RESULTS

TABLE 1: Distribution of newborns according to Gender

CATEGORY	**CASES**
Males	34 (48.57%)
Females	36 (51.53%)
TOTAL	70 (100%)

TABLE 2: Distribution of newborns according to Gestational Age

Gestational Age	**Cases(n=70)**
Term SGA	16 (22.86%)
Term AGA	35 (50.00%)
Preterm SGA	10 (14.29%)
Preterm AGA	9 (12.86%)

TABLE 3: Distribution of newborns according to mode of delivery

Mode of delivery	**Cases(n=70)**
Vaginal	41 (58.57%)
C- section	29 (41.43%)
Total	70

This table show that maximum newborns in study group 41 (58.57%) were born by Spontaneous vaginal delivery.

TABLE- 4: Distribution of newborns according to Mean 25-OH cholecalciferol levels among preterm and term newborns

	Term(n=51)	**Preterm(n=19)**	**P value**
Mean 25-OH cholecalciferol	18.53ng/ml(±4.8)	15.7ng/ml(±2.7)	0.04

ISSN:0975-3583,0976-2833 VOL12,ISSUE01,2021

The mean 25-OH cholecalciferol levels among term is 18.53ng/ml (±4.6) and in preterm is 15.7ng/ml (±2.7) and this data is statistically significant(p-Overall mean 25-OH cholecalciferol is 17.12ng/ml.

4. DISCUSSION

Cholecalciferol stimulates the expression of potent antimicrobial peptides, such as cathelicidin and β defensin 2, which exist in neutrophils, monocytes, natural killer (NK) cells and epithelial cells lining.

The mechanism of action of the active form of 1,25(OH)2D is similar to that of other steroid hormones and is mediated by its binding to Vitamin D receptors(VDR).(9) VDR is a member of the superfamily of nuclear hormone receptors including receptors for steroid and thyroid hormones and retinoic acid.(10)

VDR acts as a heterodimer generally with the retinoid X receptor for regulation of vitamin D target genes. These heterodimeric complexes interact with specific DNA sequences [vitamin D response elements (VDREs)], generally within the promoter of target genes, resulting in either activation or repression of transcription(11). The biological effects of 1,25(OH)2D are diverse. It inhibits PTH secretion and adaptive immunity, while promoting insulin secretion and innate immunity. It also inhibits cell proliferation and stimulates their differentiation.

It is estimated that exposure to sunlight for usually not more than 5-15 min/day between 10 AM and 3 PM, in the spring, summer, and fall at latitudes above and below 35° (and all year near the equator) to exposed parts of the body involving “arms, legs and face “provides the body with its required 1000 IU of cholecalciferol. Melanin absorbs ultraviolet B (UVB) rays from sunlight and diminishes cholecalciferol production to 90%. Dietary cholecalciferol is absorbed from the intestine and circulates in plasma bound to a vitamin D binding protein.

5. CONCLUSION

67.14 % newborns were deficient in 25-OH cholecalciferol, 22.86% newborns had insufficient levels, while 10.00% of newborns had sufficient levels of 25-OH cholecalciferol. The mean 25-OH cholecalciferol levels among term was 18.53ng/ml (±4.8) while in preterm is 15.7ng/ml(±2.9) and this data is statistically highly significant(p-0.04).

Recommendation

Study strongly recommends early supplementation of 25-OH cholecalciferol to all preterm and term newborns who are found deficient or insufficient levels of 25-OH cholecalciferol.

6. REFERENCES

[1] Grant, W. B., G. K. Schwalfenberg, et al. "An estimate of the economic burden and premature deaths due to vitamin D deficiency in Canada. (2010)" Molecular Nutrition and Food Research.

[2] Camargo, C. A., Jr., S. L. Rifas-Shiman, et al. "Maternal intake of vitamin D during pregnancy and risk of recurrent wheeze in children at 3 y of age." American Journal of Clinical Nutrition. (2007) 85(3): 788-795.

[3] Devereux, G., A. A. Litonjua, et al. "Maternal vitamin D intake during pregnancy and early childhood wheezing." American Journal of Clinical Nutrition. (2007). 85(3): 853-859.

ISSN:0975-3583,0976-2833 VOL12,ISSUE01,2021

[4] Erkkola, M., M. Kaila, et al. "Maternal vitamin D intake during pregnancy is inversely associated with asthma and allergic rhinitis in 5-year-old children." Clinical & Experimental Allergy. (2009). 39(6): 875-882.
[5] Miyake, Y., S. Sasaki, et al. "Dairy food, calcium and vitamin D intake in pregnancy, and wheeze and eczema in infants." European Respiratory Journal (2010). 35(6): 1228-1234.
[6] Krishnaveni, G. V., S. R. Veena, et al. "Maternal vitamin D status during pregnancy and body composition and cardiovascular risk markers in Indian children: the Mysore Parthenon Study." American Journal of Clinical Nutrition (2011). 93(3): 628-635.
[7] Hillman, L. S. and J. G. Haddad "Human perinatal vitamin D metabolism. I. 25-Hydroxyvitamin D in maternal and cord blood." Journal of Pediatrics (1974). 84(5): 742- 749.
[8] Cetinkaya M, Cekmez F, Buyukkale G, Erener-Ercan T, Demir F, Tunc T, Aydın FN, Aydemir G; Lower vitamin D levels are associated with increased risk of early-onset neonatal sepsis in term infants. J Perinatol. 2015 Jan;35(1):39.
[9] Rachez C, Freedman LP 2000 Mechanisms of gene regulation by vitamin D.
[10] Sutton AL, MacDonald PN 2003 Vitamin D: more than a bone-a- fide hormone. MolEndocrinol 17:777–797
[11] Mahon, P., Harvey, N., Crozier, S., Inskip, H., Robinson, S., Arden, N. et al. (2010) Low maternal vitamin D status and fetal bone development: cohort study. J Bone Mineral Res 25: 14–19.