Vitamin D Deficiency Among Women in Labor and Cord Blood of Newborns

25-hydroxy Vitamin D levels of 106 maternal blood samples and cord blood levels of their newborns were studied. Maternal mean (SD) vitamin D level was 16.3(10.3) ng/mL, and mean (SD) cord blood level was 12.8 (8.5) ng/mL. Seventy-five (70.7%) mothers (70.7%) and 88 (83%) newborns had hypovitaminosis-D. Seventy (93.3%) newborns of mothers with hypovitaminosis-D had low vitamin D levels. There was a strong correlation between maternal and newborn Vitamin D levels (r=0.6; *P*<0.001). There is a high prevalence of hypovitaminosis D in women in labor and their newborns.

Keywords: *Fetal blood, Neonate, Vitamin D deficiency.*

There is high prevalence of vitamin D deficiency in adolescents, especially females [1]. 25 hydroxyvitamin-D [25(OH)D] is the main circulating metabolite of vitamin D, and its concentration in serum reflects vitamin D stores. Serum concentrations of 1, $25(OH)_2D$ increase by 50%–100% over pre-pregnancy levels during the second trimester, and by 100% during third trimester, which is required for fetal skeletal growth. In a population with a high prevalence of vitamin D deficiency and poor dietary calcium intake, the problem is likely to worsen during pregnancy and may cause significant consequences in the newborn, including rickets and tetany [2,3]. This study was undertaken to determine the prevalence of hypovitaminosis D in women in labor, and in cord blood of their offspring.

This study was conducted from September 2013 to March 2014 in two branches of CloudNine Hospital in the city of Bengaluru, Southern India. Pregnant women in labor were sequentially enrolled. They were on regular maintenance dose of calcium (500 mg/day) and vitamin D (400 IU/day). Women on any drugs that affect vitamin D levels or on higher supplemental dose were excluded from the study. Those with a known history of rheumatoid arthritis, disorders of thyroid, parathyroid or adrenals, hepatic or renal failure, metabolic bone disease, type 1 diabetes mellitus, or malabsorption were excluded. Women with preterm labor or antenatal suspicion of low birth weight babies were not included in the study.

Maternal blood samples were collected during labor, and cord blood samples were collected soon after delivery. The blood samples were analyzed at Acquity Labs using Liquid Chromatography Mass Spectrometry (LCMS/MS). The reference range of 25(OH)D for both maternal and cord blood was taken as 20-80 ng/mL. A level of less than 20 ng/mL was considered as hypovitaminosis-D.

A total of 106 mothers and cord blood samples were studied. The mean (SD) maternal vitamin D level was 16.3 (10.3) ng/mL. Seventy-five mothers (70.7%) had hypovitaminosis-D. The mean (SD) cord blood vitamin D level was 12.8 (8.5) ng/mL Eighty-eight newborns (83%) had hypovitaminosis D. Among 75 mothers with hypovitaminosis D, 70 (93.3%) and blood samples had low vitamin D levels whereas 61.3% (n=18) cord blood samples from 31 mothers having normal vitamin-D levels had hyporitaminosis D. There was a significant (r=0.6; *P*<0.001) correlation between maternal and cord blood vitamin D levels.

The limitation of our study was that we did not quantify the sunlight exposure and did not record dietary calcium intake or maternal nutritional status and skin color. Cord blood calcium and PTH levels were also not done. Several reports confirm the high prevalence of hypovitaminosis-D among pregnant women in South Asia [4,5]. A strong correlation between maternal and cord blood levels has also been reported earlier [6-8].

At present, vitamin D supplementation is not a part of antenatal care programs in India. The US National Academy of Sciences mentions 400 IU/day as the reference dietary intake during pregnancy but several investigators worldwide are arguing for revised guidelines for higher vitamin D allowance during pregnancy and lactation [9,10]. Our study showed high prevalence of hypovitaminosis D in women in labor and their newborns. This may call for vitamin D supplementation to mothers or their newborns.

Contributors: PK: collection of data, analysis and the initial manuscript was prepared; AS, KK, SVG, SS: reviewed critically, helped in finalizing the manuscript and approved the final manuscript.
Funding: None; *Competing Interests*: None stated.

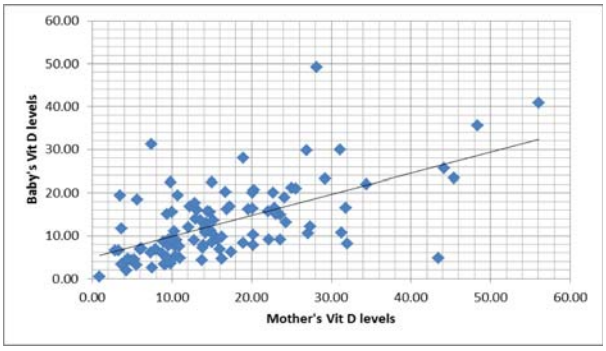

Fig. 1 *Correlation of* mothers *25-hydroxy vitamin D levels with cord blood vitamin D levels*.

***PRADEEP KUMAR, ARVIND SHENOI, R KISHORE KUMAR, SV GIRISH AND SHEKAR SUBBAIAH**
Department of Pediatrics, Cloudnine hospital, OAR Branch, Kodihalli, Murugesh Palya, Bangalore, Karanataka, India.
**drpradeepkm@gmail.com*

REFERENCES

1. Rajeswari J, Balasubramanian K, Bhatia V, Sharma VP, Agarwal AK. Aetiology and clinical profile of osteomalacia in adolescent girls in northern India. Natl Med J India. 2003;16:139-42.
2. Delvin EE, Salle BL, Glorieux FH, Adeleine P, David LS. Vitamin D supplementation during pregnancy: Effect on neonatal calcium homeostasis. J Pediatr. 1986;109:328-34.
3. Purvis RJ, Barrie WJ, MacKay GS, Wilkinson EM, Cockburn F, Belton NR. Enamel hypoplasia of the teeth associated with neonatal tetany: A manifestation of maternal vitamin D deficiency. Lancet. 1973;2:811-4.
4. Goswami R, Gupta N, Goswami D, Marwaha RK, Tandon N, Kochupillai N. Prevalence and significance of low 25hydroxyvitamin D concentrations in healthy subjects in Delhi. Am J Clin Nutr. 2000;72:472-5.
5. Datta S, Alfaham M, Davies DP, Dunstan F, Woodhead S, Evans J, *et al*. Vitamin D deficiency in pregnant women from a non-European ethnic minority population: An interventional study. Br J Obstet Gynaecol. 2002;109:905-8.
6. Nicolaidou P, Hatzistamatiou Z, Papadopoulou A, Kaleyias J, Floropoulou E, Lagona E, *et al*. Low vitamin D status in mother-newborn pairs in Greece. Calcif Tissue Int. 2006;78:337342.
7. Sachan A, Gupta R, Das V, Agarwal A, Awasthi PK, Bhatia V. High prevalence of vitamin D deficiency among pregnant women and their newborns in Northern India. Am J Clin Nutr. 2005;81:1060-64
8. Kazemi A, Sharifi F, Jafari N, Mousavinasab N. High prevalence of vitamin D deficiency among pregnant women and their newborns in an Iranian population. J Women's Health. 2009;18:835-9.
9. Hollis BW, Wagner CL. Assessment of dietary vitamin D requirements during pregnancy and lactation. Am J Clin Nutr. 2004;79:717-26.
10. Dratva J, Merten S, Ackermann-Liebrich U. Vitamin D supplementation in Swiss infants. Swiss Med Weekly. 2006;136:473-81.

Continuous Ambulatory Peritoneal Dialysis in Children – Experience from Eastern India

Twenty-three children (≤18 years) have been initiated on continuous ambulatory peritoneal dialysis at our center over the last 32 months. Ten (43%) went on to have successful transplantation proving the viability of pediatric continuous ambulatory peritoneal dialysis in our scenario. Major concern identified was a relatively high peritonitis rate of 0.85 per year of peritoneal dialysis usage.

As per Western data, pediatric End Stage Renal Disease (pESRD) has an incidence of 9.4 per million age related population (pmarp) and prevalence of 56.8 pmarp [1]. Although no such reports are available from India, with a pediatric population of over 400 million [2] the numbers are likely to be significant. In children, peritoneal dialysis is usually preferred over hemodialysis with the significant advantage of it being conducted at home [3]. Unfortunately Indian data on chronic pediatric perfitoneal dialysis is limited [4]. We retrospectively reviewed all children £18 years initiated on continuous ambulatory peritoneal dialysis (CAPD) between January 2011 and August 2014 at our centre.

Twenty-three children were identified with median age at last follow-up of 10.3 (range 5.1 -17.4) years (74% male). Underlying etiologies were : congenital anomalies of kidney and urinary tract (*n*=6), focal segmental glomerulosclerosis (*n*=4), autosomal recessive polycystic kidney disease (*n*=3), nephronopthisis (*n*=3), atypical Haemolytic Uremic Syndrome (*n*=2) and unknown etiology (*n*=5). 35% (*n*=8) needed urgent dialysis, whereas the rest were known to be suffering from chronic kidney disease for median 4.1 (range 0.4 to 10.8) years. Median age at onset of CAPD was 9.2 (range 3-16.5) years and median duration of CAPD was 15 (range 3- 48) months. Only 6 (23%) were local city residents and for the rest median distance from nearest pediatric dialysis centre was 102 (range 17 to 689) kilometre. Post initiation, four (17%) children required catheter reposition because of poor fluid drain, but of these, only one needed catheter change. Usual CAPD prescription was 3 to 4 exchanges of 4 to 6 hours duration with dwell volume of 1L/ m^2 of body surface area. Twelve (52%) children developed peritonitis as per standard definition [5]. Overall, peritonitis rate was 0.85/year of peritoneal dialysis use. E. coli was the commonest organism (82%). None had exit-site infection. Only a single episode of fungal peritonitis was reported. Culture negative peritonitis was seen in 5 (21 %) cases. Duration of CAPD significantly correlated with peritonitis (*P*=0.006). Significant improvements were seen in