Original Article

Assessment Of Umbilical Cord Calcium Levels And Its Correlation With Newborn Weight And Length

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Abstract

Introduction: The Aim of this study is to find the association between the umblical cord bloodcalcium level and term newborn weight and length.

Method: Healthy Term neonates between 37 weeks and 42 weeks with no congenital anamolieswere included in the study and umblical cord blood sample was taken and tested for calcium level and height and weight of the baby was noted.

Results: In our study, the mean Calcium level in umbilical cord blood is 10.2mg/dL. Around 15babies had hypocalcemia, but values were ranging between 8.4-8.9mg/dL and also only 11 babies had hypercalcemia values. There is increasing trend in calcium levels with rise in length and weight of the babies.

Conclusion: There is positive relation of baby length and weight with calcium levels.with p value being less than 0.05, the result shows there is increase in length and weight of babies asthere is rise in calcium level.

Keywords: Cord blood calcium, length,weight, term newborn

INTRODUCTION: Calcium is a crucial component of nutrition and is required for normal soft tissue function in muscle contraction, nerve conduction, hormone release, and other physiological functions.Because a foetus requires calcium for growth, a pregnant woman requires more calcium than a non-pregnant woman.3 The foetus total calcium accretion rate risesfrom about 50 mg/d at 20 weeks' gestation to 330 mg/d at 35 weeks' gestation. The typical accretion rate for the third trimester of pregnancy is 200 mg/d.4,5 The placenta transports calcium to the foetus, and the fetus's bone mineralization increases during pregnancy. In terms offoetal growth, infants with a very low birth weight (1500

g) have lower bone mineral content (BMC) and bone mass,which is linked to a mineral deficit, such as calcium.5 Previous research has found that rickets is more common in very LBW infants than in normal birth weight infants.1A study by Namgung and Tsang has discovered a link between baby BMC and birth weight.6 Several Ca supplementation trials for pregnant women have been undertaken in the past to assessthe effects on maternal Ca nutritional status. Purvar et al., found that Ca supplementation was related with higher birth weights; however, study by Sanchez-Ramoz et al., found that Ca supplementation in pregnant women with low Ca intake had no effect on foetal somatic growth,

skeletal growth, or size at delivery.7,8 Ca and vitamin D metabolism, such as absorption and excretion, are physiologically altered during pregnancy.Depending on the technology (kind of electrode) employed, it is alternatively characterised as an ionised calcium level of 3.0 to 4.4 mg/dL (0.75 to 1.10 mmol/L). Hypotonia, apnea, and tetany are among the neurologic symptoms. Calcium supplements can be given intravenously or orally. There are two types of hypocalcemia in newborns:

- Early onset (in the first 2 days of life)
- Late onset (> 3 days), which is unusual.

Prematurity, being small for gestational age, maternal diabetes, and perinatal asphyxia are all riskfactors for early-onset hypocalcemia.. Preterm neonates and some small-forgestational-age neonates with underdeveloped parathyroid glands, as well as infants of mothers with diabetes or hyperparathyroidism, who have higher-than-normal ionised calcium levels during pregnancy, may experience hypocalcemia due to a transient, relative hypoparathyroidism. Perinatal hypoxia can also cause a rise in serum calcitonin, which prevents calcium from being released from bone and causes hypocalcemia. The usual phosphaturic renal response to parathyroid hormone is lacking in some infants, resulting in
hypocalcemia due to increased phosphate levels. Hypocalcemia incidence is 30 percent ofnewborn with low or very low birth weight babies.

OBJECTIVE:

To assess the association between the calcium level in cord blood andneonates weight and length at birth.

METHODOLOGY:

Type of Study Design:

Analytical cross sectional study

Study duration:

JUNE 2021- MAY 2022

Study place:

Meenakshi medical college and research institute, Kanchipuram

Target population:

Newborn babies born in tertiary care hospital

Study population:

Term newborn babies in tertiary care hospital

Inclusion criteria: Healthy term neonate.

Exclusion criteria:

- Preterm/ post term babies
- Multiple pregnancy
- Birth asphyxia
- Birth trauma
- Major congenital amamolies
- Mothers with antenatal risk and illness
- History of smoking and drug intake for chronic illness in mother

Sample size:

The mean with S.D for calcium level in term neonates cord blood is 9.9+/-0.94 mg/dl.30 Hence taking above values, alpha error at 5% & power of study at 80% and using it in the formula [(Zα/2)2 S2]/d2 and 20% non-response rate, sample sizecomes as 134.

Sampling procedure:

All eligible babies born in our hospital are selected by convenience sampling.

Data analysis:

The data collected were entered in MS Excel and analyzed using SPSS 22 version. Categorical determinant variables were given as proportions. The continuous variables were given in mean with S.D.. The ANOVA test was used to compare the means. The results wereexpressed with p-value and $p<0.05$ is considered significant.

RESULTS:

TAB.1: DISTRIBTUION AS PER NEWBORN GENDER

GENDER	n	%
Female	62	46.3
Male	72	53.7

On studying the newborn data, above table 1, results shows that 72 babies were males.

TAB.2: DISTRIBUTION AS PER GESTATIONAL AGE AT DELIVERY

GESTATIONAL AGE IN WEEKS	n	%
37	38	28.3
38	37	27.6
39	35	26.11
40	21	15.6
41	3	2.2

FIG 1: DISTRIBUTION AS PER GESTATIONAL AGE

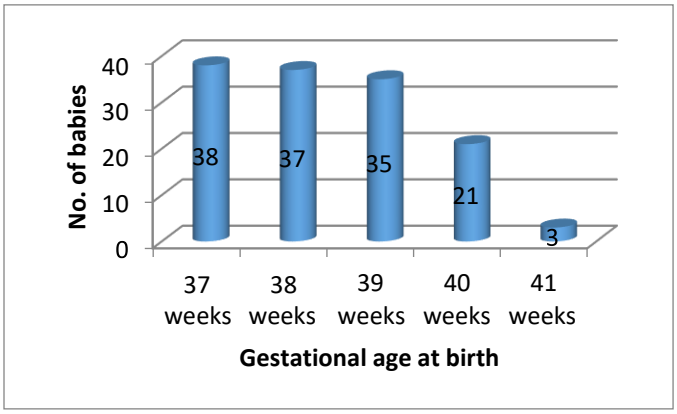

Table 2 and Figure 1shows the completed weeks of gestational age during delivery of the newborn. Around 82% of babies were delivered at gestational age 37-39 weeks. Only 3 babieswere delivered at 41 weeks of gestational age

TAB.3: DISTRIBUTION OF NEONATE WEIGHT &LENGTH

MEASURES	WEIGHT IN KG
MEAN	3.01
S.D	0.58
RANGE	2.1-4.7
MEASURES	**LENGTH IN CM**
MEAN	48.79
S.D	2.62
RANGE	42-53

TAB.4: CALCIUM LEVEL OF NEWBORNS STUDIED

MEASURES	CALCIUM LEVEL(MG/DL)
MEAN	10.2
S.D	0.74
RANGE	8.4-11.6

The table 3 depicts anthropometric measurements mean and SD.

Table 4 shows the mean calcium level in umbilical cord blood is 10.2mg/dl

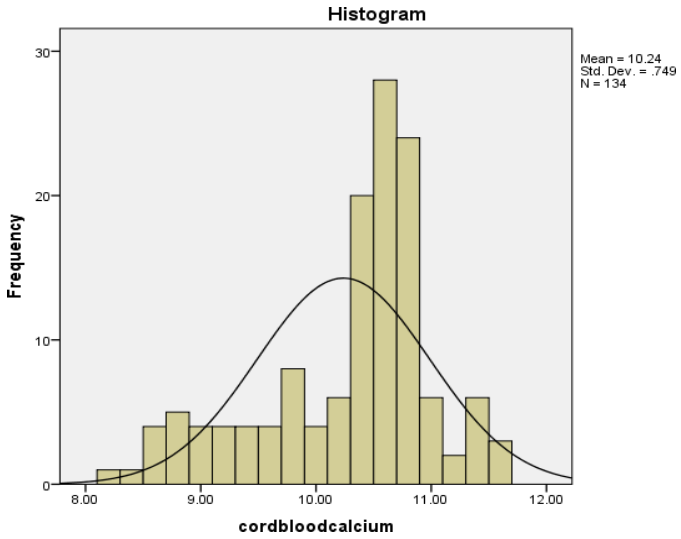

FIG.2: CALCIUM LEVEL IN CORD BLOOD

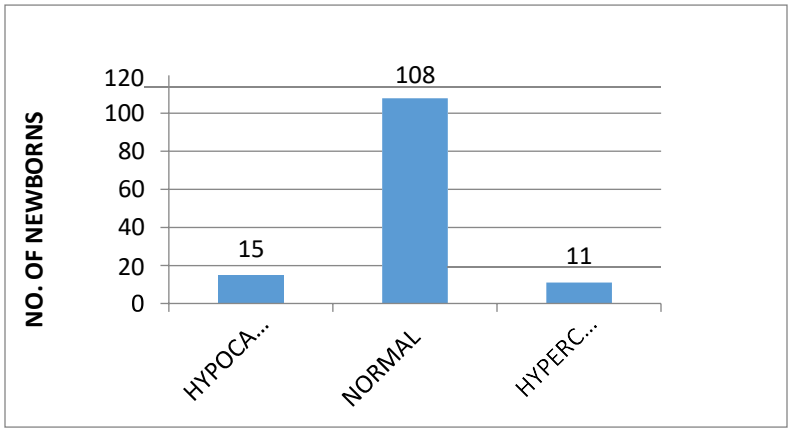

FIG.3: DISTRIBUTION OF HYPO, NORMO AND HYPER CALCEMIA

Figure 2 shows normal level of Ca distribuated among the population.

The figure.3 shows distribution as per hypo, hyper and normocalcemia. The value of less than 9 mg/dl were considered to have hypocalcemia, 9-11 mg/dl as normocalcemic and more than 11 ashypercalcemic. Around 15 babies had hypo calcemia but values were ranging between 8.4-8.9 mg/dl. And also only 11 babies had hypercalcemic values.

TAB.5: COMPARISON WEIGHT AND LENGTH WITH CORD CALCIUM LEVEL

CALCIUM LEVEL	mean	s.d	p value
CALCIUM LEVEL VS BABY WEIGHT (in kgs)			
HYPOCALCEMIA	2.25	0.06	0.001
NORMAL	2.99	0.32	
HYPERCALCEMIA	4.43	0.14	
CALCIUM LEVEL VS BABY LENGTH (in cms)			
HYPOCALCEMIA	45.5	1.18	0.001
NORMAL	49.01	2.07	
HYPERCALCEMIA	52.4	0.47	

Table 5 shows, On categorising babies based on calcium level and comparing with weight and length of babies in above table shows the mean weight and length in hypocalemic babies is 2.25kg and 45.5 cm where as shows the mean weight and length in hypercalemic babies is 4.4kgand 52.4 cm. The results were significant by ANOVA test.

DISCUSSION:

The study was conducted among 134 new born term babies in tertiary care hospital.The gender distribution in our study shows that 53.7% were male babies and 46.3% were female babies. Andthe mode of delivery were more or less equally distributed for LSCS and vaginal delivery.In our study, the mean calcium level in umbilical cord blood is 10.2mg/dl. Around 15 babies had hypo calcemia but values were ranging between 8.4-8.9 mg/dl. And also only 11 babies had hypercalcemic values. On comparing with weight and length of babies, the mean weight and length in hypocalemic babies is 2.25 kg and 45.5 cm where as shows the mean weight and lengthin hypercalemic babies is 4.4kg and 52.4 cm. The results were significant by ANOVA test.Thereis increasing trend in calcium levels with rise in length and weight of the babies.

CONCLUSION:

The current study discovered a relationship between calcium levels in cord blood and birth weight in term babies. This shows that calcium may be vital for foetal growth whichinturn influence the newborn birth size. Also this also strengthens the need of calcium supplementation during antenatal period for preventing Low birth weight and small for gestational age babies during delivery.

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Conflict of interest:no conflict of interest

Ethical approval & informed consent: this study was approved by the Instituitional Ethicscommittee.

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