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RESEARCH ARTICLE

PREVALENCE OF HYPOCALCAEMIA IN INFANTS

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ABSTRACT:

Objective: To estimate the prevalence of hypocalcaemia in children less than 12 months of age. Material and methods: A cross-sectional descriptive study was conducted over a period 2 years from Jan2012 – Dec2013 at Narayana Superspeciality Hospital, Bangalore, Karnataka, India. Infants till 1 year of age attending for Immunization clinic were enrolled for the study. Results: Out of 18250 patients seen for different causes,236 [1.29%] were subjected to serum calcium level examination. Prevalence of hypocalcaemia among children examined for serum calcium was 10.2%.Patients with serum calcium level between 4-6 mg constituted 20.8% and 6-7 mg were 79.4%. By the age group of >4 months constituted 22.1% while the age group of 3-4 months constituted 6.7 %.Home delivered babies had high prevalence of 26.9% compared to hospital delivered babies. Conclusion: Over all prevalence of hypocalcaemia in infants examined for serum calcium was high with 10.2%.By age the prevalence was high in infants more than 4 months [22.1%] and by place of delivery the prevalence was high in home delivered babies[26.9%].

KEYWORDS: Hypocalcaemia, Prevalence, Immunization clinic

INTRODUCTION

Tetany and nutritional vitamin D deficiency are rare now a days, but the latter occasionally develops in exclusively breast-fed infants and whose mothers were unaware of human milk's vitamin D deficiency and does not provide supplementary vitamin D.[1-4]

Hypocalcaemia and tetany are caused by vitamin D deficiency or abnormalities of vitamin D metabolism. The onset of vitamin D deficiency tetany usually occurs at 3-6 months of age, due to depletion of the infant's vitamin D stores require this amount of time. However, an infant born of a vitamin D–deficient mother may develop hypocalcaemia from vitamin D deficiency within the first week of life.[1] Maternal hypovitaminosis D occurs due to deficient intake of vitamin D, decreased exposure to sunlight, malabsorption, closely spaced pregnancies, prolonged lactation, dark skin and a diet poor in vitamin D.[2,5-8] Fetal calcium and vitamin D stores are derived exclusively from the mother. Depletion of maternal calcium and vitamin D stores will affect the calcium status of the fetus, resulting in hypocalcaemia and rickets in the newborn.[9]The neonate is particularly susceptible to hypocalcaemia associated with abnormal vitamin D metabolism, hypoparathyroidism, low calcium intake, or high phosphate intake. The main factors, which

regulate parathyroid hormone production are calcium, phosphate, vitamin D, and estrogens.[1,10] Serum calcium values correlate directly with gestational age, and less-mature infants have a greater chance of developing hypocalcemia.[1,11] Hypocalcaemia should be suspected as a possible cause of convulsions, it can be diagnosed only by determining serum concentrations of calcium ions. A serum calcium concentration below 7 mg/dl establishes the diagnosis; a level below 7.5 mg/dl is suggestive.1,11,12 A strong association was found between pneumonia and nutritional rickets.13-15 In recent years, the emphasis has changed from a vitamin D dosage that simply protects against rickets and osteomalacia, to one that suppresses parathyroid secretion and protects against the development of osteoporosis.13,15-17 Children with high bone density associated with vitamin D sufficiency are unlikely to develop osteoporosis later.18 To achieve these ends, adequacy of both calcium and vitamin D intakes is essential.19 Administering 1,25-dihydroxyvitamin D3 during the first day of life to prematurely born infants at risk for hypocalcaemia has either successfully prevented or reduced the severity and duration of hypocalcaemia, but it is not recommended for routine prevention.1,11,12 Irradiation with ultraviolet rays for a few minutes per day leads to adequate improvement of the vitamin D status. It is as effective as oral vitamin D3 in increasing serum 25(hydroxy) vitamin D and suppressing secondary hyperparathyroidism.20,21

The most important presentation of hypocalcaemia in infants are convulsions, respiratory distress,[4]carpopedal spasm, which are not usually seen. Laryngospasm with cyanosis and apneic episodes may occur. Irritability, muscular twitching, jitteriness, and tremors are common clinical manifestations in newborn.[1,12]

The aim of the study was to estimate the prevalence of hypocalcaemia in children less than 12 months of age examined for serum calcium to identify the possible cause of hypocalcaemia. This study also serves as a base line for future study.

MATERIAL AND METHODS

This hospital based descriptive study was carried out on the babies attending immunization clinic in the Narayana superspeciality hospital, Bangalore, Karnataka, India for a period of 2 years from Jan 2012 – Dec2013.

Inclusion Criteria

The patients who had complain related to hypocalcaemia (convulsions, carpopedal spasm, Chvostek sign, laryngospasm with cyanosis and apneic episodes, irritability, muscular twitching, jitteriness, and tremors), till the age of 12 months.

Exclusion criteria

1. Preterm infants
2. Low birth weight infants
3. Babies with previous neonatal insult
4. Sick babies
5. Congenital anomalies

Detailed history during antenatal period was taken regarding use of any anticonvulsant drugs, any major illness or any supplements (Vitamin D or calcium).Infants were thoroughly examined for any systemic disease and vital signs recorded detail anthropometry was taken. Special enquiry regarding abnormal movements, jitteriness, frank convulsions, and irritability in the past was also made. The signs suggestive or Rickets like craniotabes, wide-open anterior fontanella, frontoparietal bossing, costochondral beading. Pigeon chest, Harrison groove and wrist widening were specially looked for. Proforma was attached.

The laboratory techniques used for biochemical estimation was Modified orthocresolphtalein complexion (OCPC) method.3ml of venous blood drawn from peripheral veins after sterilizing the skin in a comfortable position without applying tourniquet, blood was immediately centrifuged and separated.

Statistical Methods: Descriptive statistical analysis has been used in the present study. Prevalence of hypocalcaemia and its correlation with various socio-demographic variables are calculated based on Z-test.

Serum calcium level 7 mg/dl or less was considered hypocalcaemia. Patients were divided according to the severity of hypocalcaemia, to those who had serum calcium level less than 6 mg/dl and those who had serum calcium level between 6 - 7 mg/dl

RESULTS

Correlation of prevalence of hypocalcaemia in all cases .

Table 1: According to socio-demographic characteristics

Socio-demographic variables	Number of infants	Number of hypocalcaemia	%	p value
Age in years				
< 1 month	10	-	-	-
1-2 months	45	-	-	-
3-4 months	104	7	6.7	0.238
> 4 months	77	17	22.1	0.006**
Gender				
Male	140	13	9.3	0.725
Female	96	11	11.5	0.674
Religion				
Hindu	121	9	7.4	0.309
Muslim	87	13	14.9	0.147
Christian	28	2	7.1	0.588
Place of delivery				
Home	52	14	26.9	0.001**

Hospital	184	10	5.4	0.031*
Type of delivery				
Vaginal	191	18	9.4	0.714
Caesarian	45	6	13.3	0.492
Socio-economic status				
Low	136	16	11.8	0.537
Middle	68	7	10.3	0.978
High	32	1	3.1	0.185
Family history of Convulsion				
Absent	219	21	9.6	0.769
Present	17	3	17.6	0.313
Occurrence of Rickets				
Absent	235	23	9.8	0.834
Present	1	1	100.0	0.761
Overall	**236**	**24**	**10.2**	-

Total patients seen during 2 year period were 18250.Among 236 (1.29%) infants (males 140 and females 96) who were suspected for hypocalcaemia and subjected to serum calcium level examination,10.2%[24/236] of the babies had hypocalcaemia with serum calcium level of 4-6mg% were present in 20.8%[5/24] of the cases and serum calcium level of 6-7 mg% were present in 79.2%[19/24] of the cases.10.2%[24/236] of the examined infants had hypocalcaemia. Among sex of the babies male babies were 54.1%[13/24] and female babies were 45.8%[11/24].Among different age groups babies > 4 months were 22.1%[17/77] with significant p value of 0.006 followed by age group from 3-4 months with 6.7%[7/104] with p value of 0.238 with the median age of 5 months youngest being 3 months 6 days old and oldest baby at 11 months 2 days. Among place of delivery, home delivered babies had hypocalcaemia in 26.9%[14/52] with significant p value of 0.001 compared to hospital delivered babies with 5.4%[10/184] with significant p value of 0.031.

DISCUSSION

In this study, presenting males with hypocalcaemia were more than females. This can be attributed to many families in Bangalore prefer males than females and bring them early for medical advice. The prevalence of hypocalcaemia among children examined for serum calcium was high 10.2%.This may be attributed to mothers with vitamin D deficiency in Bangalore due to cold weather, the mothers are completely covered by cultural use of protective clothing, minimal exposed to sunlight, many of them had closely spaced pregnancies, prolonged lactation, and took poor diet in vitamin D and calcium. However, an infant born to a vitamin D deficient

mother may develop hypocalcaemia from vitamin D deficiency within the first week of life.[1] Tetany and nutritional vitamin D deficiency are now rare, but the latter occasionally develops in a breast-fed infant whose mother was unaware of human milk's vitamin D deficiency and does not provide supplementary vitamin D.[1,11,12] Dietary calcium intake depends on the consumption of dairy products, almonds and sardines and leafy green vegetables. The primary method of prevention is to ensure maximum peak bone mass by providing optimal calcium intake during childhood and adolescence.[11]

The current study revealed that hypocalcaemia was higher in older infants than in younger ones. This may be due to mothers who have vitamin D deficiency for the reasons mentioned above, also, the children was exposed to sunlight when they become older. In this study, hypocalcaemia patients with serum calcium level between 4 - 6 mg/dl were 20.8% and patients with serum calcium level between 6 - 7 mg/dl were 79.2%. This may be correlated by severity of vitamin D deficiency of the mothers.

The current study also revealed prevalence was high in home delivered babies [26.9%] compared to hospital delivered babies. This may be due to poor health education and health awareness in parents.

In conclusion, the prevalence of hypocalcaemia in infants was high. Hypocalcaemia was more in males in comparison with females. By age more in infants>3 months of age and also more in home delivered babies. The mean cause of high percentage of hypocalcaemia in children examined for serum calcium was vitamin D deficiency.

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