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ORIGINAL ARTICLE

Frequency of Hypocalcemia in Breast Fed Infants Presenting with Afebrile Fits

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ABSTRACT

Objective: The goal of this study is to assess the prevalence of hypocalcaemia in breast-fed babies who present with afebrile fits.

Methods: After the ethical approval from the institutional review board, this cross-sectional study was carried out at Paediatric Department, Hayatabad Medical Complex Hospital, Peshawar, from August, 2019 to January, 2020. Inclusion and exclusion criteria were strictly followed in order to avoid confounding variables and bias in study. Information regarding age, gender, weight, types of fits and calcium level of child and mother were recorded in a pre-designed Performa. Collected data were then entered into the computer for further analysis using SPSS (version 20).

Results: Results showed that out of total subjects 59.7% were male and 40.3% were females. Mean age was 3.81±1.55 months while 60% were in the age group of 4-6. Mean weight and length was 2.20 ±1.24 kg and cm respectively. Weight for age (WFA) of 64.5% had less than 5th percentile. Mean serum calcium of infant and mothers are 6.98±1.83 and 8.02±1.26 respectively. 62.7% of cases were hypocalcemia while 37.3% had normal calcium level. 33.1% of subjects had generalized tonic clonic fits and 15.8% had focal fits. A significant ($p<0.05$) association was found among prevalence of hypocalcemia in male gender and in the age group of 46 months respectively. Hypocalcemia was non-significantly ($p>0.05$) associated with types of fits (generalized tonic clonic, tonic, clonic and focal).

Conclusion: The results of the current investigation indicated that both nursing babies and their mothers had a significant incidence of hypocalcemia. Breastfeeding moms are encouraged to soak up some rays themselves, and should also make sure their babies do the same. Calcium and vitamin D supplementation in nursing moms and their infants: a systematic review and meta-analysis. Hypocalcemia is quite common in pregnant women, and its causes need to be investigated more.

Keywords: hypocalcemia, breastfeeding, seizures

INTRODUCTION

Under 2.1 mmol/L (8.5 mg/dL), the total blood calcium concentration is considered to be hypocalcaemia in children (1). In the pediatric age range, around 10% of children have seizures (2). Hypocalcaemia is a significant metabolic etiology of infantile seizures in low-income settings (3). It accounts for 25.6% of febrile seizures in kids (4). A local investigation found that hypocalcaemia was the cause of 68.3% of afebrile seizures (5). Seizures are not a disease in and of itself but rather an indication of a more serious problem in the central nervous system that is being caused by some kind of systemic or biochemical imbalance (6). In children, hypocalcaemia may cause tetany, muscular cramps, convulsions, and paresthesias (7). Hypocalcaemia, through irritating the central nervous system, may lead to seizures that are difficult to treat with anticonvulsants. These types of seizures typically last just a few seconds to a few minutes, although they may occur often. Possible absence of postictal phase in the early stages. Stridor and cyanosis due to laryngospasm are very unusual but possible manifestations. Arrhythmias are much less common. The QTc interval on an electrocardiogram may be abnormally lengthy. Mild hypocalcaemia usually has no symptoms (8). Negative outcomes, such as decreased survival or an extended ICU stay, are related with hypocalcaemia (9). Because phosphate inhibits the absorption of calcium, infants who are given buffalo or cow's milk, or formula, that is rich in phosphate, tend to have low calcium levels. Indian researchers Balasubramanian et al. (10) found that using sunscreen, staying inside during the day, and residing in metropolitan areas with tall buildings were significant contributors to hypocalcaemia. Other research has linked fresh, unfortified milk, a lack of sun exposure, a lack of maternal education, and a big family size to an increased likelihood of hypocalcaemia. Due to the significant morbidity and mortality associated with hypocalcaemia, individuals who are experiencing symptoms should be treated quickly if they are diagnosed with acute hypocalcaemia. Intravenous calcium therapy is the best option for treatment. Calcium replacement therapy is the primary treatment for hypocalcaemic seizures, whereas anticonvulsant medications are usually unnecessary. Hypocalcaemic seizures may be resistant to AEDs, but both overt and latent tetany may be eliminated (11). When it comes to the incidence of hypocalcaemia in afebrile seizures in children, evidence is scarce. In order to determine whether or not empiric I/V calcium should be considered for patients with afebrile fits who did not react to an anticonvulsant treatment, this research will assist us determine the prevalence of hypocalcaemic fits. For this reason, it is reasonable to provide IV calcium to patients experiencing non-responsive afebrile convulsions in poor nations like Pakistan. Reduced risk of adverse consequences from hypocalcemic seizures is the advantage to the patient. Planning and prioritization may benefit from these findings. The goal of this study is to assess the prevalence of hypocalcaemia in breast-fed babies who present with afebrile fits.

METHODOLOGY

After the ethical approval from the institutional review board, this cross-sectional study was carried out at Paediatric Department, Hayatabad Medical Complex Hospital, Peshawar, from August, 2019 to January, 2020. According to a previous study, expected prevalence of hypocalcaemia in breast fed new-borns is 68% (13). With a margin of error of 5% and a confidence interval of 95% and using the World Health Organization's sample size calculator a sample size of 335 was calculated. Through non-probability consecutive sampling, children between ages 1 to 6 months, with gestational age of 40 weeks, with exclusive breast feeding starting within 30 minutes of birth, with first episode of fits were included in the present study. Children with fever and fits, with bottle feeding, Premature, low birth weight and failure to thrive infants, with history of birth asphyxia, with co morbidity like hepatic, renal impairment and chronic diarrhoea, with vitamin D supplement prescription, with family history of seizure disorder were excluded from the present study. Parental signed informed permission was obtained. A comprehensive clinical history was taken from the parents, and each child was then given a thorough physical examination.

Children's blood samples were submitted to the hospital laboratory for analysis of a variety of parameters, including ionized calcium, calcium, alkaline phosphatase, phosphate, albumin, random blood sugar, , urea, serum electrolyte and creatinine levels. Calcium and ionized calcium levels in the mother's serum were also studied. A pre-designed proforma was used to record all the data: names, ages, genders, and addresses. Strict exclusion criteria were used to reduce the potential for bias in the study's findings. SPSS version 20 was used to analyze the collected data. Means and standard deviations were used to characterize quantitative factors like age and weight as well as laboratory results like calcium and ionized calcium levels. Hypocalcaemia, as well as other categorical variables such as gender and fit type (generalized tonic-clonic, tonic, clonic, and focal) were characterized using frequency and percentage distributions. To examine the impact of adjustments on hypocalcaemia, patients were divided into groups based on age, fitness level, and gender. A chi-square test was performed after stratification, and a P value of 0.05 was regarded to indicate statistical significance.

RESULTS

Table 1 shows the demographic and clinical parameters of the study participants. The data analysis revealed that men accounted for 59.7% of the sample and females for 40.3%. The mean age was 3.81±1.55 months, and 60.0% were between the ages of 4-6 months. Both length and weight averaged out to be 56.70±5.23 cm and 2.20±1.24 kg. A less-than-5th-percentile weight-for-age (WFA) of 64.5% indicates obesity. Babies have a mean blood calcium level of 6.98±1.83, whereas mothers have a mean serum calcium level of 8.02 ±1.26 (Table 2).

Only 37.3% of patients had normal calcium levels, whereas 62.7% had hypocalcemia (Figure 1). Generalized tonic-clonic convulsions affected 33.1% of individuals, whereas 15.8% were localized (Table 3). The frequency of hypocalcemia was highest among males, and it peaked at 46 months of age. This correlation was statistically significant ($p<0.05$). The association between hypocalcemia and epileptic symptomatology (generalized tonic-clonic, tonic-clonic, and focal) was not statistically significant ($p>0.05$) (Table 4).

Table 1: Demographic and clinical parameters of the study participants

Variables	Mean ±SD/n (%)
Age (months)	3.81±1.55
1-3 months	134 (40)
4-6 months	201 (60)
Gender	
Male	200 (59.7)
Female	135 (40.3)
Residency	
Rural	157 (46.9)
Urban	178 (53.1)
Weight (kg)	2.20 ±1.24
Length (cm)	56.70±5.23
Nutritional Status	
Weight for age (WFA)	
<5th centile	216 (64.5)
>5th centile	119 (35.5)
Length for age (LFA)	
<5th centile	129 (38.5)
>5th centile	206 (61.5)

Table 2: Biochemical parameters of study participants and their mothers

Variables	Mean ±SD/ n (%)
Serum calcium level of child	6.98±1.83
<8 mg/dl	203 (60.6)
>8 mg/dl	132 (39.4)
Serum calcium level of mother	8.02±1.26
<8.5 mg/dl	206 (61.5)
>8.5 mg/dl	129 (38.5)
Ionized calcium level of child	3.79±0.69
<4.4 mg/dl	225 (67.2)
>4.4 mg/dl	110 (32.8)
Ionized calcium level of mother	4.09±0.83
<4.4 mg/dl	220 (65.7)
>4.4 mg/dl	115 (34.3)

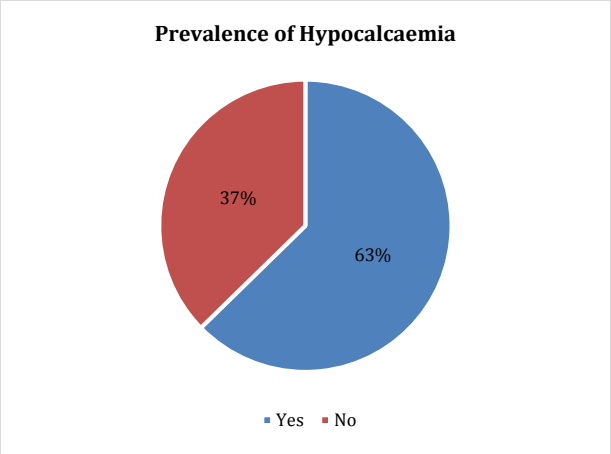

Figure 1: Prevalence of Hypocalcaemia among the study participants

Table 3: Types of Fits in the study participants

Variables		N (%)
Type of fits	Generalized tonic clonic	111(33.1)
	Tonic	80 (23.9)
	Clonic	91 (27.2)
	Focal	53 (15.8)

Table 4: Stratification of Hypocalcemia among gender, age and fit types

Stratification groups	N (%)		P value
	Yes	No	
Gender			
Male	141	59	0.00*
Female	69	66	
Age			
0-3 months	72	62	0.004*
4-6 months	138	63	
Fits			
Generalized tonic clonic	78	33	0.22
Tonic	49	31	
Clonic	53	38	
Focal	30	23	

DISCUSSION

Seizures are a typical symptom of many neurological disorders, beginning in infancy, and may cause significant hardship for the patient and their loved ones. Perhaps because of a lack of knowledge about its fatal effects, hypocalcemia is becoming more widespread (12). According to a previous research by Dibbenet al (13), 65% of kids were experiencing fever without convulsions. The results of the current research are consistent with those of a previous study by Binmahanaetal191 which found that 72% of those with hypocalcemia manifested with afebrile fits. The majority of patients with hypocalcemia in the research by Khan M.A et al. (2011) were less than 6 months old, with a mean age of 7.51±3.4 months (5). Males accounted for 59.7 percent of the participants in the current research, while females made for 40.3 percent. These results were also consistent with those of prior investigations. In a research on the prevalence of hypocalcemia in children presenting with afebrile fits in Islamabad, Rehman et al. (2019) found that boys accounted for 53.2% of the sample, while girls accounted for 47.6% (14). Sixty-four point five percent of children had a weight-for-age (WFA) below the fifth percentile, indicating malnutrition, and thirty-eight point five percent had a length-for-age (LFA) below the fifth percentile, also indicating malnutrition. Previous research conducted in Lahore found that 61% of the children with afebrile fits were malnourished (using the criteria established by Gomez) (5).

Seizures are the most notable and widespread symptom of hypocalcemia, however it may cause many others. The researchers found that generalized tonic clonic fits were the most prevalent, followed by clonic, tonic, and focal fits. One-third of the new-borns in the study showed signs of having widespread tonic

clonic fits, whereas only 15% had focused fits. Ninety-two percent of patients were classified as generalized tonic clonic fits and 9.8 percent as focal fits, according to a previous research (5). Another research done by Sharma et al corroborated these results (15). According to Bitaraf et al., (2014) generalized tonic clonic seizures make up 83.8% of hypocalcemic fits, whereas localized fits make up just 5.4% of cases (16). The current study's conclusion that there is no statistically significant (p>0.05) connection between seizure type and hypocalcemia is supported by a similar finding by Bitaraf et al, (16). The mean blood calcium level for new-borns was 6.98 1.83 mg/dl (hypocalcemic), whereas the mean serum calcium level for moms was 8.02 1.26 mg/dl (hypocalcemic).Previous studies found that 34 percent of children and 39.4 percent of moms had low blood calcium levels. Children's low blood calcium levels were reported in a previous research, with a mean of 6.32 mg/mL (range, 4.2-8.4 mg/mL) (16).

All of the babies enrolled were breastfed exclusively. Sixty-two percent were just nursing their young. Infants that were fed just breast milk had a 37% higher rate of hypocalcemia. Due to a lack of calcium and vitamin D, there is likely to be a significant incidence of hypocalcemia in the mothers and babies (17). The majority of babies with hypocalcaemia in Turkey who were breastfed only had vitamin D insufficiency, according to a research on a series of cases. India reported a case series of 13 breastfed children with hypocalcemic seizures and confirmed vitamin D insufficiency. The youngest was 2 months old, and the oldest was 6 months old, for a total of 13 newborns. All 13 exclusively breastfed newborns with hypocalcemic convulsions were found to have low serum 25(OH) D, as was the case with the children in the study by Balasubramanian et al. (4). There was a statistically significant (p=0.05) gender difference in the prevalence of hypocalcaemia between males (n=141) and females (n=69) in the current research. Gender differences in the frequency of hypocalcaemia in children were also shown to be statistically significant (p=0.05) in an earlier research (14).

CONCLUSION

The results of the current research indicate that hypocalcaemia is a significant contributing factor in afebrile seizures in breast-fed babies. Both breastfed new-borns and their moms had a significant incidence of hypocalcaemia. Several possible causes come to mind. Breastfeeding moms are encouraged to soak up some rays themselves, and should also make sure their babies do the same. Calcium and vitamin D supplementation in nursing moms and their infants: a systematic review and meta-analysis. Hypocalcaemia is quite common in pregnant women, and its causes need to be investigated more.

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