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Original Research

Assessment of incidence of hypocalcemia in infants with seizures

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ABSTRACT:

Background: Seizures are common in pediatric age group and approximately 4–10% of children experience at least one episode of seizure in the first 16 years of age. The present study was conducted to assess incidence of hypocalcemia in infants with seizures. **Materials & Methods:** 52 infants with seizures of both genders were included. Seizure manifestation was seen when serum calcium level decreases below 7 mg/dl. Blood samples were taken with full aseptic precautions and serum calcium, phosphorus, and alkaline phosphatase level estimation was performed. In infants, serum phosphorus level 3.8–6.5 mg/dl (1.25–2.10 mmol/L) was considered as normal. Any serum phosphorus level <3.8 mg/dl was considered below normal value. **Results:** Out of 52, boys were 22 and girls were 30. Hypocalcemia was seen among 24. Maximum hypocalcemia was seen in 12 upto age 3 months, 8 in 3-6 months and 4 upto 1 year. The difference was significant (P< 0.05). Seizures were due to hypocalcemic seizures in 24, febrile seizures in 15, pyogenic meningitis in 4, bronchiolitis in 3, aseptic meningitis in 2, septicemia in 1, cerebral infarct in 1 and dyselectrolytemia in 2 patients. The difference was significant (P< 0.05). **Conclusion:** Hypocalcemia is a very common cause of seizures in infants.

Key words: hypocalcemia, seizures, infants

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INTRODUCTION

Seizures are common in pediatric age group and approximately 4–10% of children experience at least one episode of seizure in the first 16 years of age. Calcium plays an important role in intracellular signaling and proper functioning of intracellular and extracellular processes including muscle contraction, nerve conduction, and hormone release.[1] During growth, bone mass increases faster than body weight, which results in increased demand of calcium. Along with calcium, phosphorus is also an essential component of bone and is necessary for skeletal mineralization.[2]

Amongst the various etiologies, hypocalcemia is an important cause of seizures in infancy. Early diagnosis can avoid expensive tests like neuro-imaging, invasive procedures like lumbar puncture and initiation of antiepileptic drugs. There is paucity of Indian data on the prevalence of hypocalcemia in seizures.[3] Hypocalcemia is seen in post-neonatal infants, which is related to poor oral intact of calcium, low level of Vitamin-D, familial causes, sepsis, multiorgan failure.[4] In the 1930s, the role of Vitamin-D, regarding calcium regulation, was detected and its synthesis with exposure to sunlight was highlighted in relation to the epidemic of rickets in that era. Calcium requirement in the first 6 months is 210 mg/day and 7–12 months is 70 mg/day.[5] Calcium deficiency is observed in infants and children receiving inadequate diet having <200 mg elementary calcium per day.[6] The present study was conducted to assess incidence of hypocalcemia in infants with seizures.

MATERIALS & METHODS

The present study comprised of 52 infants with seizures of both genders. The consent was obtained from their parents.

Data such as name, age, gender etc. was recorded. Seizure manifestation was seen when serum calcium level decreases below 7 mg/dl. Blood samples were taken with full aseptic precautions and serum calcium, phosphorus, and alkaline phosphatase level estimation was performed. Cerebrospinal fluid analysis was done in patients with suspicion of infective etiology. A total serum calcium level of 8.8–10.8 mg/dl (2.2–2.7 mmol/l) was considered as normal and decrease in

total plasma calcium concentration of <8.8 mg/dl was considered as hypocalcemia.
In infants, serum phosphorus level 3.8–6.5 mg/dl (1.25–2.10 mmol/L) was considered as normal. Any serum phosphorus level <3.8 mg/dl was considered below normal value. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 52		
Gender	Boys	Girls
Number	22	30

Table I shows that out of 52, boys were 22 and girls were 30.

Table II Seizure distribution

Patients	Upto 3 months	3-6 months	Upto 1 year	P value
Hypocalcemia	12	8	4	0.05
Others	15	10	3	0.02
Total	27	18	7	

Table II, graph I shows that hypocalcemia was seen among 24. Maximum hypocalcemia was seen in 12 upto age 3 months, 8 in 3-6 months and 4 upto 1 year. The difference was significant (P< 0.05).

Graph I Seizure distribution

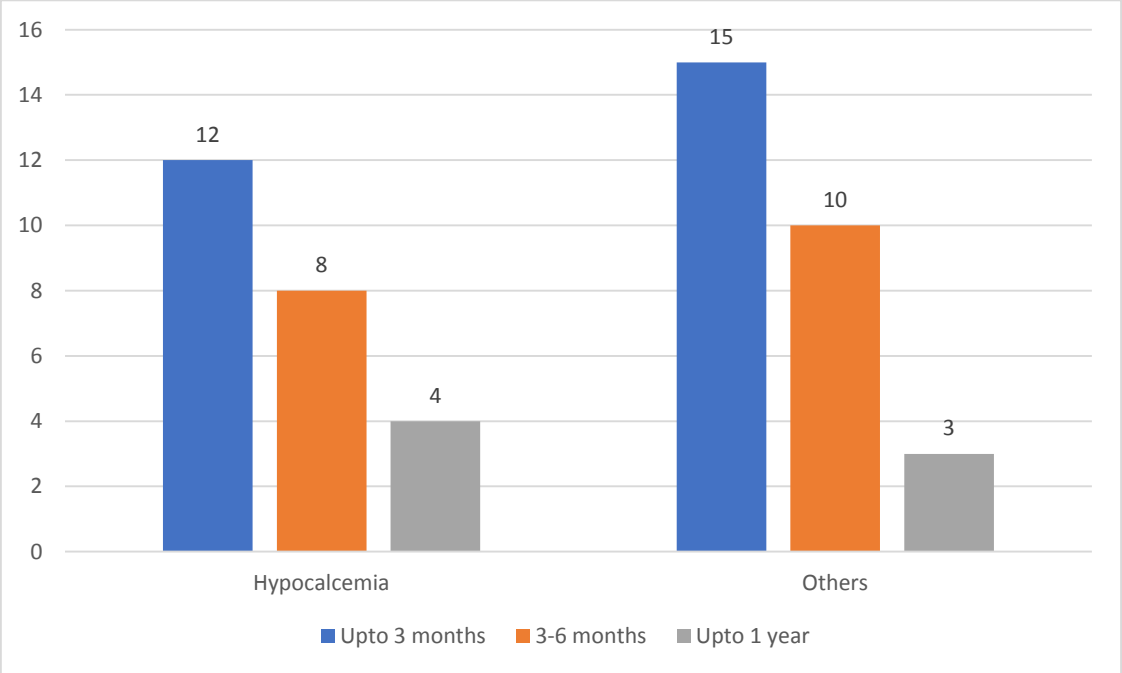
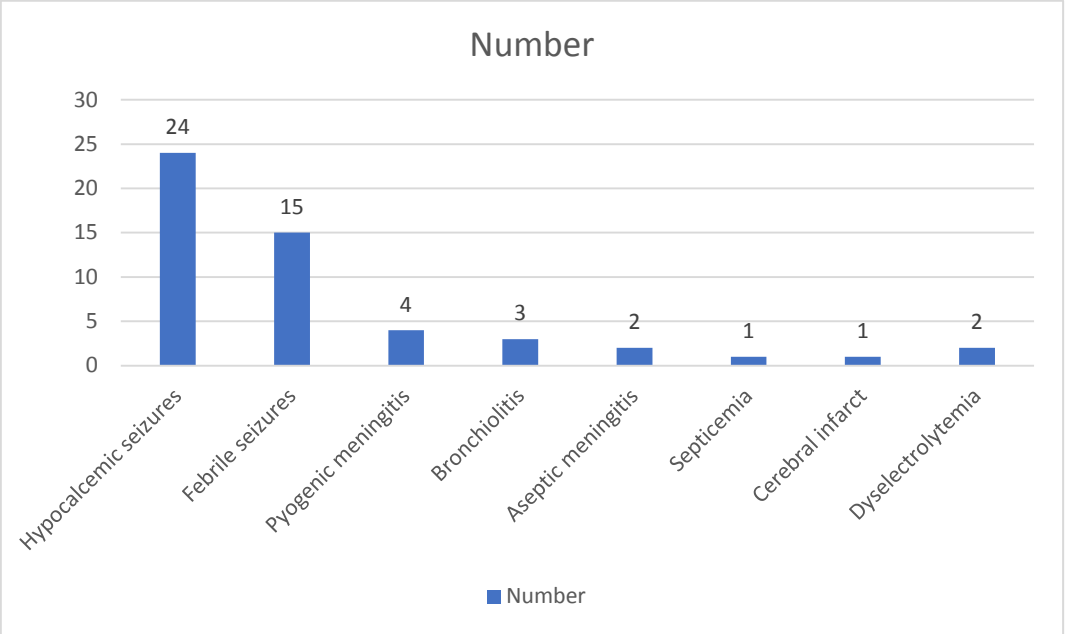


Table III Distribution of seizures

Seizures	Number	P value
Hypocalcemic seizures	24	0.01
Febrile seizures	15	
Pyogenic meningitis	4	
Bronchiolitis	3	
Aseptic meningitis	2	
Septicemia	1	
Cerebral infarct	1	
Dyselectrolytemia	2	

Table III, graph II shows that seizures were due to hypocalcemic seizures in 24, febrile seizures in 15, pyogenic meningitis in 4, bronchiolitis in 3, aseptic meningitis in 2, septicemia in 1, cerebral infarct in 1 and dyselectrolytemia in 2 patients. The difference was significant (P< 0.05).

Graph II Distribution of seizures



DISCUSSION

When serum calcium is decreased, parathyroid hormone is secreted from parathyroid gland which leads to calcium absorption and release of calcium and phosphorus from bones and excretion of phosphorus and bicarbonate in urine to maintain serum calcium level. Hence, in Vitamin-D deficiency and/or decreased calcium intake, we find low serum calcium, increased alkaline phosphatase level, and decreased phosphorus level.[7] Breast milk provides adequate calcium (28 mg/100 ml) while Vitamin-D plays crucial role in calcium absorption. Vitamin-D is synthesized in the skin by ultraviolet light from sun by its precursor 7-dehydrocholesterol. In the absence of Vitamin-D, only 10–15% of dietary calcium and 55–60% of phosphorus are absorbed. Nikunj et al[8] studied 75 infants with first seizure (both with normal and delayed development) found hypocalcemia in 34% infants. Manzoor Ali Khan et al[9] found that 51.2% of children with hypocalcemia were less than 6 months of age. Hence it is important to test for hypocalcemia in this age group. Hypocalcemic seizures can present as status epilepticus also in few children and hence hypocalcemia should be considered in all children less than two years presenting with status epilepticus. The present study was conducted to assess incidence of hypocalcemia in infants with seizures.

In present study, out of 52, boys were 22 and girls were 30. Hypocalcemia was seen among 24. Maximum hypocalcemia was seen in 12 upto age 3 months, 8 in 3-6 months and 4 upto 1 year. Kamate et al[10] in their one-year prospective study on developmentally normal children between 1-mo to 2-ywith seizures was done to study the prevalence of hypocalcemia. The contribution of hypovitaminosis-D to hypocalcemia was also studied. Of 78 infants (51 boys) enrolled, 18 (23.1%) had hypocalcemia. Fifteen (19.2%) had hypocalcemia secondary to hypovitaminosis-D and 3 (3.8%) had hypomagnesemia. In infants aged less than 6 mo who were exclusively breastfed, 15 (41.67%) had hypocalcemia in comparison to other two age groups [2 (10.53%) in 6–12 months age-group and 1 (4.35%) in 1–2 y age-group]. This association was statistically significant ($p = 0.001$).

We observed that seizures were due to hypocalcemic seizures in 24, febrile seizures in 15, pyogenic meningitis in 4, bronchiolitis in 3, aseptic meningitis in 2, septicemia in 1, cerebral infarct in 1 and dyselectrolytemia in 2 patients. Bande et al[11] studied the incidence of hypocalcemia in infants admitted with seizures. A total of 54 infants were enrolled according to the study design among which, 19 patients (35.15%) had hypocalcemic seizures while 16 of them were below 6 months of age having increased alkaline phosphatase level and low serum phosphorus level which corresponds to Vitamin-D deficiency. The second common cause was febrile seizures 25.92% (n=14) and rest were of infective etiology.

Mehrotra et al[12] in the study of 60 infants of hypocalcemic seizures (15 days–6 months of age), found low level of Vitamin D (<10 ng/ml) in 54 infants, concluding Vitamin D deficiency as a major cause of hypocalcemic seizures in infancy. Current guidelines and recommendations for evaluation and management of seizures and status epilepticus in children especially less than 2 years should mandate the testing for hypocalcemia as hypocalcemia occurs in one third to one-quarter of children, especially in those less than 6 months.

CONCLUSION

Authors found that hypocalcemia is a very common cause of seizures in infants.

REFERENCES

1. Cetinkaya F, Sennaroglu E, Comu S. Etiologies of seizures in young children admitted to an inner city hospital in a developing country. Pediatr Emerg Care. 2008;11:761–3.
2. Balasubramanian S, Shivbalan S, Kumar PS. Hypocalcemia due to vitamin D deficiency in exclusively breastfed infants. Indian Pediatr. 2006;43:247–51.
3. Taherian R, Feshangchi-Bonab M, Rezayi A, Jahandideh M. The etiologic profile of the pediatric seizure: An epidemiological study from Iran. Int Clin Neuro Sci J 2017;4:98.
4. Graves RC, Oehler K, Tingle LE. Febrile seizures: Risks, evaluation, and prognosis. Am Fam Physician 2012;85:149-53.
5. Ojha AR, Ojha UR. Clinico-etiological profile of children with seizures admitted in a tertiary center. J Kathmandu Med Coll 2016;4:55-8.
6. Holick MF. Resurrection of Vitamin D deficiency and rickets. J Clin Invest 2006;116:2062-72.
7. Schneider J Wellar M, Gresh ES. Ricket's University of California San Diego An University Hospital, San Diego (Speciality Conference), West. J Med 1976;125:203-11.
8. Nikunj NK, Mishra D, Juneja M, Talukdar B. Etiology and short-term outcome of first seizure in hospitalized infants. Indian Pediatr. 2016;53:924–6.
9. Khan MA, Iqbal SMJ, Afzal MF, Sultan MA. Frequency of hypocalcemic fits in children presenting with afebrile seizures and risk factors for hypocalcemia – a descriptive study. Ann King Edward Med University. Lahore Pakistan. 2011;17:31–5.
10. Kamate M, Sharma K, Patil V. Prevalence of hypocalcemia in seizures in infancy. The Indian Journal of Pediatrics. 2018 Apr;85(4):307-8.
11. Bande B, Agrawal A. Study of incidence of hypocalcemia in infants admitted with seizures in a tertiary care hospital. Indian J Child Health. 2018; 5(11):674-677.
12. Mehrotra P, Marwaha RK, Aneja S, Seth A, Singla BM, Ashraf G. Hypovitaminosis D and hypocalcemic seizures in infancy. Indian Pediatr. 2010;47:581–6.