

Frequency of Hypocalcemic Fits & Its Outcome: An Experience at Tertiary Care Hospital of Sindh

Muhammad Ali Abbasi,^{*} Muhammad Siddique Rajput,^{**} Nudrat Zeba,^{***}
Jawaid Hussain Lighari,^{**} Adil Ali Shaikh^{****}

ABSTRACT

Objective: To determine frequency of Hypocalcemic fits and its outcome in children presenting at Pediatric department of Liaquat University Hospital.

Methods: This cross-sectional study was conducted at Department of Pediatrics, Liaquat University Hospital Hyderabad/Jamshoro from July to December 2016. 76 Children of 1-2 years of age of either sex admitted in the Pediatric units Liaquat University Hospital via emergency department with complaint of afebrile convulsions/ fits through non-probability purposive sampling were enrolled in the study. Study was approved by the ethics review committee of the institute. Children with febrile convulsions, maternal hypoparathyroidism were excluded. Data was collected on pre-designed questionnaire. Serum calcium was sent for laboratory investigation. Data was entered and analyzed by SPSS Software.

Results: Out of children, 44 (57.89%) were male children ($p=0.034$). Majority of children belonged to 1-2 years age group. Mean \pm SD serum calcium level was 7.3 ± 0.58 mg/dl, and range was 4.60 to 8.00 mg/dl. Normal serum calcium (≥ 8.0 mg/dl) was noted in 16 (21%) of children ($p=0.0001$). Serum calcium levels as low as 4 mg/dl were observed. 60 (79%) children showed hypocalcemia.

Conclusion: Hypocalcemia is an important and major cause of fits/ seizures in children in tertiary care hospital. It is necessary to take preventive measures to overcome this problem to decrease morbidity and mortality due to Hypocalcemia

Key words: Hypocalcemia, Fits, Risk factors, Children.

Article Citation: Abbasi MA, Rajput MS, Zeba N, Lighari JH, Shaikh AA. Frequency of Hypocalcemic Fits & Its Outcome: An Experience at Pediatric Department of A Tertiary Care Hospital of Sindh. J Peoples Uni Med Health Sci. 2017;7(3):110-113.

INTRODUCTION:

Hypocalcemia manifests by various neurological signs and symptoms such as seizure, neuromuscular excitability, tetany and delirium. Hypocalcemia predisposes to spontaneous neuronal excitations. One of clinical indicator of hypocalcemia is termed as the Chvostek's sign; this test is very much sensitive and reveals hypocalcemia induced nerve fiber excitation of

the facial muscles. Hypocalcemia may manifest abdominal colic due to vagal nerve excitation. Some of the mechanisms have been proposed by which hypocalcemia causes generalized neuromuscular excitation.¹ Hypocalcemia induced brain seizures are of much clinical significance. Hypocalcemia induced seizures are observed in patients with predisposing conditions such as renal insufficiency or some endocrine disorder as the hypoparathyroidism, which are characterized by poor calcium homeostasis. Congenital hypoparathyroidism may be caused by chromosome 22q syndrome and manifests as brain seizures.^{2,3} Drugs are considered a most common cause of hypocalcemic seizures as they interfere with calcium metabolism.⁴ Typical example of such drugs is the bisphosphonates, which interfere with osteoclast functions of bone and cause hypocalcemia.^{5,6}

* District Surveillance Officer (DSC) Hyderabad.
** Assistant Professor, Community Medicine Deptt. PUMHS Nawabshah.
*** Assistant Professor, Community Medicine Deptt. Bilawal Medical College, Jamshoro.
**** Medical Officer PHDC, Jamshoro

Correspondence to:

Dr. Muhammad Ali Abbasi

District Surveillance Officer,
Hyderabad
Email: drmali_abbasi51@yahoo.com

Phenytoin is another anticonvulsant drug which is reported paradoxically to exacerbate the brain seizures when blood calcium is sub normal.⁷ Hence, the clinicians are strictly advised to check serum calcium regularly in patients taking anti convulsant drugs in routine clinical practice particularly in refractory cases. Although the problem of hypocalcemic seizures is frequent medical problem reported in medical literature^{8,9}, but the underlying cause effect mechanisms are not well understood. It is reported that the calcium is involved in the electrical signals, electrical impulse coupling, pre-synaptic release of Neurotransmitter and neuromuscular electro-chemical coupling.¹⁰⁻¹² The present study was proposed to be conducted to analyze the frequency of hypocalcemic fits/seizures and its outcome in children Department of Pediatrics of Liaquat Medical University Hospital, Hyderabad.

METHODS:

The present cross-sectional study was conducted at the Department of Pediatrics at Liaquat University Hospital Hyderabad over six month's duration from July to December 2016. 76 Children of 1-2 years of age of either sex admitted in the Pediatric units Liaquat University Hospital

via emergency department with complaint of convulsions/fits through non- probability purposive sampling. Demographic information like date of birth and sex were noted at the time of admission. The criteria for admission was generalized clonic movements of limbs or face, whether preceded by generalized rigidity or not; or clonic movements of a single limb or of facial muscles or eyes. The children were included if credible history was provided by parents or care givers to the concerned pediatrician. Study was approved by the ethics review committee of the institute. Children with febrile convulsions, maternal hypoparathyroidism were excluded. Data was collected on pre-designed questionnaire. Serum calcium was sent for laboratory investigation. Continuous and categorical variables were analyzed by student's t-test and Chi square test. A P-value less than 0.05 were taken statistically significant.

RESULTS:

44 children (57.89%) were male and 32 (42.10%) were female children. Mode of Delivery was Normal Vaginal Delivery (NVD) in (30.8%) and Health Facility (69.2%) as a place of child birth. 47 children (61.9%) have Top/Formula

Table No: I. Demographic characteristics

Table I. Demographic characteristics of study subjects (n=76)			
Variable		No.	%
Age (years)	01 -02 years	47	61.8
	02 -03 Years	13	17.2
	03 -04 Years	07	9.2
	04 -05 Years	09	11.8
Gender	Male	44	56.4
	Female	32	43.6
Mode of Delivery	NVD	59	75.6
	C- Section	17	24.4
Place of Delivery	Home	24	30.8
	Health Facility	52	69.2
Feeding/Weaning	Breast Milk	29	38.1
	Top/Formula Feed	47	61.9
Socioeconomic Status	Poor	44	57.9
	Middle Class	29	38.1
	Upper Class	03	04
Mother Nutritional Status	Poor	53	69.7
	Good	20	26.3
	Adopted	03	04

Feed. 53 children (69.73%) belong to poor social class and also majority of mothers were malnourished (69.7%).

Table II: Serum Calcium (mg/dl) in Children with Fits

Serum Calcium	No.	%
4.0 - 4.9	02	2.6
5.0 - 5.9	03	4.0
6.0 - 6.9	06	7.9
7.0 - 7.9	49	64.5
>8.0	16	21.0
Total	76	100

Mean± SD serum calcium level was 7.3±0.58 mg/dl, and range was 4.6 to 8 mg/dl. Normal serum calcium (≥8.0 mg/dl) was noted in 16 (21%) of children out of total 76 children (p=0.0001). Serum calcium level was as low as 4 mg/dl were observed in present study.

Table III: Frequency of Hypocalcemia in Children Presenting with Fits

Hypocalcemia	No.	%
Patients with Hypocalcemia	60	79
Patients without Hypocalcemia other causes	16	21
Total	76	100

60 (79%) showed hypocalcemia. Among these male were 36(60%) & female patients were 24(40%) (Table-III). On average 3 fits per child was observed in majority of children (Table-IV).

DISCUSSION:

Seizures are one of the most common clinical manifestations of pediatric patients of various etiological origins. Hypocalcemia is one of the causative factors as cause of seizures, along with various endocrine disorders which result in biochemical disturbances.¹³

Of 76 children, hypocalcemia was observed in 60 (79%) of children in present study. Normal calcium levels defined as ≥8.0 mg/dl was noted in 16 (21%) of children, this difference was statistically highly significant (p=0.0001). Calcium levels as low as 4mg/dl was the most dangerous finding of present study. On average 3 fits per child were observed in most of study population. The findings of present study show a

Table IV: Frequency of Convulsion in Children with Hypocalcemia

No. of Convulsions	No. of Patients	%
2	4	6.6
3	27	45.0
4	16	26.7
5	10	16.7
>5	03	5.0

high frequency of 79% in children suffering from seizures. Average age of children noted was between 1-2 years, comparable to other studies^{16,17}.

Of 76 children, 44 (56.4%) were male and 32 (43.6%) were female children (p=0.034), these results are comparable to^{14,15} but in contra-distinction to¹⁶. Of 79% (n=60) children of hypocalcemia, 60% (n=36) were male babies and 40% (n=24) were female babies. Mean± SD serum calcium level was 7.3±0.58 mg/dl (range 4.60 - 8.00 mg/dl).The finding of hypocalcemia of present study is comparable to other study.¹⁷ In present study, the frequency of convulsions were noted 04 patients had 02 episodes of convulsions, 27 patients had 03 episodes of convulsions, 16 patients had 04 episodes and the 03 patients had 05 or more than 05 episodes of convulsions out of 60 patients with hypocalcemia. The above findings are comparable to other study.¹⁸

Of 60 Hypocalcemic children, 18 were home born and 42 were hospital born. The finding is comparable to previous study,¹⁹ which has also reported high frequency of home delivery.

Maternal malnutrition was prevalent in present study. Nutritional status of mother was very much poor and a BMI of <17 was observed in 43 (71.7%). A previous study reported a hypocalcemic focal seizure in a one-month-old infant of a mother with a low circulating level of vitamin D and reason was maternal malnutrition.²⁰ Breast feeding in the first 02 years of life plays a very important role in controlling hypocalcemia. Out of 60 patients with hypocalcemia (61.9%) patients were on formula milk, top feed and only (38.1%) patients were on breast feed.

CONCLUSION:

Hypocalcemia is an important and major

cause of fits/ seizures in children. It is necessary to take preventive measures to overcome this problem to decrease morbidity and mortality due to Hypocalcemia.

REFERECES:

1. Han P, Trinidad BJ, Shi J. Hypocalcemia induced seizure: demystifying the calcium paradox. *ASN Neuro*. 2015;7(2):1-9.
2. Tsai PL, Lian LM, Chen WH. Hypocalcemic seizure mistaken for idiopathic epilepsy in two cases of DiGeorge syndrome (chromosome 22q11 deletion syndrome). *Acta Neurologica Taiwanica*. 2009;18:272-75.
3. Kinoshita H, Kokudo T, Ide T, Kondo Y, Mori T, Homma Y, et al. A patient with DiGeorge syndrome with spina bifida and sacral myelomeningocele, who developed both hypocalcemia-induced seizure and epilepsy. *Seizure*. 2010;19: 30-35.
4. Milman S, Epstein E J. Proton pump inhibitor-induced hypocalcemic seizure in a patient with hypoparathyroidism. *Endocrine Practice*. 2010;17:104-7.
5. Maclsaac R J, Seeman E, Jerums G. Seizures after alendronate. *J Royal Soc Med*. 2002; 95:615-6.
6. Tsourdi E, Rachner T D, Gruber M, Hamann C, Ziemssen T, Hofbauer LC. Seizures associated with zoledronic acid for osteoporosis. *J Clin Endocrinol Metabol*. 2011;96:1955-9.
7. Ali FE, Al-Bustan MA, Al-Busairi WA, Al-Mulla FA. Loss of seizure control due to anticonvulsant-induced hypocalcemia. *Annals Pharmacother*. 2004;38(6):1002-5.
8. Kidwell KS, Kopp WE, Albano EA, Brown AE. Ghosts in My Body: Seizure-like presentation of hypocalcemic tetany secondary to hypomagnesemia in a patient receiving cetuximab therapy for metastatic medulloblastoma. *J Pediatr Hematol Oncol*. 2013;36:305-7.
9. Korkmaz HA, Dizdarer C, Ecevit CO. Hypocalcemic seizure in an adolescent with Down syndrome: A manifestation of unrecognized celiac disease. *Turkish J Pediatr*. 2014;55:53-68.
10. Sudhof TC. Neurotransmitter release: The last millisecond in the life of a synaptic vesicle. *Neuron*. 2013; 80:675-90.
11. Baylor SM, Hollingworth S. Calcium indicators and calcium signalling in skeletal muscle fibres during excitation-contraction coupling. *Progress in Biophysics & Molecular Biology*. 2010;105:162-79.
12. Lazarevic V, Pothula S, Andres-Alonso M, Fejtova A. Molecular mechanisms driving homeostatic plasticity of neurotransmitter release. *Front Cell Neurosci*. 2013;7:244. doi: 10.3389/fncel.2013.00244.
13. Murray DM, Boylan GB, Ali I, Ryan CA, Murphy BP, Connolly S. Defining the gap between electrographic seizure burden, clinical expression and staff recognition of neonatal seizures. *Arch Dis Child; Fetal Neonatal*. 2008; 93:187-91.
14. Binmohana MA, Raja YA, Saif GA. Prevalence of hypocalcemia in children examined for serum calcium in blood. *Saudi Med J*. 2005;26(3):457-9.
15. Mehrotra P, Marwaha RK, Aneja S, Seth A, Singla BM. Hypovitaminosis D and hypocalcemic seizures in infancy. *Indian Pediatr*. 2010; 47: 581-6.
16. Jain V, Gupta N, Kalaivani M, Jain A, Sinha A. Vitamin D deficiency in healthy breastfed term infants at 3 months & their mothers in India: seasonal variation & determinants. *Indian J Med Res*. 2011;33:267-73.
17. Othahara S. Early-infantile epileptic encephalopathy with suppression-burst, Ohtahara syndrome; its overview referring to our 16 cases. *Brain Dev*. 2002; 24: 13-23.
18. Malik R, Mohapatra JN, Kabi BC, Halder R. 5-Hydroxy Cholecalciferol Levels in Infants with Hypocalcemic Seizures. *J Nutr Food Sci*. 2014; 4:3.
19. Scher MS, Hamid MY, Steppe DA. Ictal and interictal electrographic seizure durations in preterm and term neonates. *Epilepsia*. 2003; 34: 284-8.
20. Wolf NI, Bast T, Surtees R. Epilepsy in inborn errors of metabolism. *Epileptic Disord*. 2005; 7: 67-81.