

Serum Zinc Status of Neonates With Seizure.

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Abstract:

Background: Seizure is a common neurological disorder in neonatal age group. Primary metabolic derangement is one of the important reasons behind this convulsion during this period. Among primary metabolic derangements hypoglycemia, is most common followed by hypocalcaemia, hypomagnesaemia, low zinc status etc. As causes of many cases of convulsion remain unknown in neonates, **Objectives:** to see the zinc status in the sera of neonate with convulsion. So that if needed early intervention can be taken up and thereby prevent complications. **Method:** A total of 50 neonates (1-28 days) who had convulsion with no apparent reasons of convulsion were enrolled as cases and 50 healthy age and sex matched neonates were enrolled as controls. After a quick clinical evaluation serum zinc status was estimated from venous blood by atomic absorption method in Chemistry Division, Atomic Energy Centre. Low zinc was considered if serum value was $<0.7\text{mg/L}$. **Results:** Among a total of 50 cases 6% had low zinc value & 2% of controls also had low zinc level. The mean serum zinc level of cases and controls were 1.57 ± 0.95 and 2.37 ± 1.06 mmol/l respectively ($p<0.01$). **Conclusion:** From the study it is seen that low zinc value is an important cause of neonatal seizure due to primary metabolic abnormalities. So early recognition and treatment could save these babies from long term neurological sequelae.

Key words: Neonate, Seizure, low zinc level.

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Introduction:

Seizure is a common neurological disorder in neonates. During neonatal period manifestations of seizure are more common than at any other period of life. Neonates are at particular risk because seizure among them can be a manifestation of metabolic, toxic, infectious and structural disorder.¹ The manifestations of neonatal, seizure are extremely subtle 2,3. Repetitive lip smacking, cycling or swimming movements, blinking, nystagmus, deviation of eye and alteration of respiratory rate including apnea can be manifestations of neonatal seizure which is sometimes difficult to distinguish from neonatal movement¹.

As many as 20% newborn in intensive care unit may have seizure activity at sometime^{4,5} The overall prevalence is as low as 0.5% in term and as high as 21% in preterm babies^{6,7}.

Presence of seizure does not constitute a diagnosis but it is a symptom of an underlying central nervous system (CNS) disorder due to systemic or biochemical disturbances⁸. Biochemical disturbances occur frequently in the neonatal seizure. In their presence, it is difficult to control seizure and there is a risk of further brain damage. Early recognition and prompt treatment of biochemical disturbance is essential for optimal management and satisfactory long term outcome⁵. Different types of biochemical abnormalities can cause seizure like hypocalcaemia, hypoglycemia, hypomagnesemia, hypernatremia,

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hyponatremia, low zinc status etc ^{8,9,10}. Though several studies on the association with neonatal seizure had been carried out in our country but very few references exist with that of serum zinc. So it is important to measure serum zinc status in neonates with seizure, who had not any apparent reasons of convulsion. It is important to know as because early recognition and treatment can significantly influence the better outcome.

Method:

This case control study was carried out in neonatal care unit of Dhaka Medical College Hospital over 1 (one) year period from July 2003 to June 2004 in cooperation with the chemistry division, Atomic Energy Center, Dhaka. A total of 100 babies were studied, among them 50 neonates were enrolled as cases, they had convulsion but had no obvious cause of convulsion behind it and 50 age, sex and body weight matched neonates were enrolled as controls who were admitted to neonatal ICU for other illness not known to cause convulsion. Neonates who had history of fever, septicemia, meningitis, perinatal asphyxia, birth injuries, CNS anomalies or other obvious causes of convulsion were excluded. Informed consent was obtained from all the parents. Detailed history was taken about presenting illness. Antenatal, natal and postnatal history, socioeconomic history, family history regarding consanguinity of marriage between parents, affection of previous sibs, family history of epilepsy were taken very carefully. A thorough physical examination was done in every neonate. Convulsion was treated by per-rectal benzodiazepine (0.5 mg/kg), then with all aseptic precautions, 3 ml of venous blood was collected from each subject for the measurement of serum zinc along with other elements which may cause convulsion like serum calcium, magnesium & blood glucose in addition to routine investigations like complete blood count, C reactive protein. Blood was allowed to clot at room temperature & centrifuged for 10 minutes, separated serum was stored frozen until used for the measurement of Serum zinc by atomic absorption method in Chemistry Division, Atomic Energy Center. Low zinc is considered

if serum level is less than 0.7 mg/L. Data were analyzed in SPSS using appropriate statistical tools. A p value of < 0.05 were taken as a level of significance.

Results:

Among 50 cases, 60% were male and 40% were female, 80% were within 1ST 5 day and remaining 20% were between 6-28 days, distribution of controls were also similar (Fig-1, Fig-2). Mean age of both cases and controls were 4.37 and 4.22 days respectively. Mean weight of nearly 40% of cases and equal number of controls were between 2.8 ± 0.24 and 60% of cases and controls were 2.1 ± 0.36 . Seventy four percent babies were preterm and 26% babies were term. Sixty four percent babies had convulsion for less than 5 minutes duration and 36% had convulsion for more than 5 minute (Table-I). Of different types of convulsion focal was found in 24%, subtle in 36% and mixed in 40% cases (Fig-3). Low zinc status was present in 6% of cases. It was noted that about 2% of controls also had low zinc level, though they had no manifestation. The mean serum zinc level of cases and controls were 1.57 ± 0.95 and 2.37 ± 1.06 mmol/l respectively ($p < 0.01$).

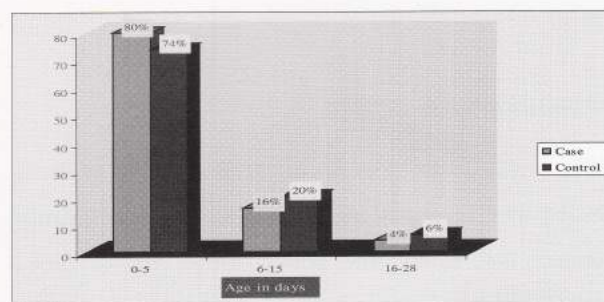


Fig-1: Age distribution of cases and controls.

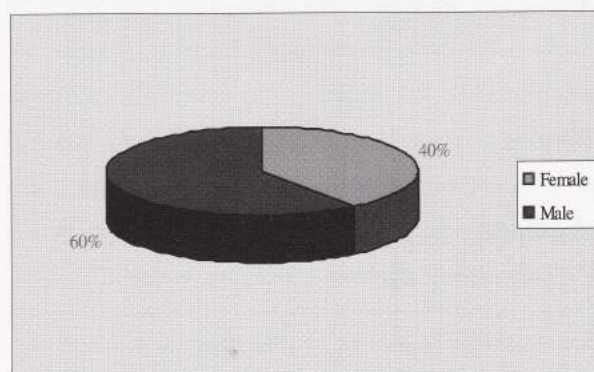


Fig-2: Sex incidence of cases and controls.

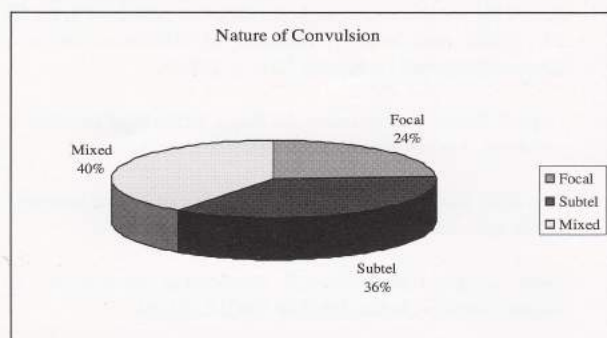


Fig- 3: Nature of convulsion

Table- I

Number and percentage of neonates by duration of convulsion

Duration (in minute)	Case (n=50)	Control (n=50)
<5	32(64%)	-
5-30	18(36%)	-

Table-II

Presentation of biochemical abnormalities in cases and controls.

Total No	No of low Zinc level in Patients	Percentage
Case (n= 50)	03	06%
Control (n=50)	01	02%

Table – III

Mean values of serum Zinc in cases and controls.

Biochemical changes	Case (n=50)	Control (n=50)	p value
Serum Zinc mol/L (mean \pm SD)	1.57 \pm 0.95	2.37 \pm 1.06	0.01

Discussion :

In this study, serum zinc status were studied in 50 convulsive neonates who had no apparent cause of seizure and were compared with age and sex matched controls.

Kumar et al ⁷ in a study showed that primary metabolic disorder accounted for 25% cause of neonatal convulsion. In a study which was carried out over 2 years period on neonatal convulsion by Cockburn et al⁹ found that 55% of neonatal convulsions were due to primary disturbances of mineral metabolism. Metabolic cause of convulsion is common in Bangladesh may be due to delayed and infrequent breast feeding, faulty feeding practices etc. This is in contrast to reports from western countries where improvement in infant feeding practices have made this category as uncommon cause of seizure ⁷.

Duration of convulsion has prognostic value. Seizures lasting more than 30 minutes bears a poor prognosis⁸. In this study 64% of the babies had convulsions of less than 5 minutes and 36% had convulsions lasting 5-30 minutes. Clinical observation without EEG may underestimate the true incidence or duration of neonatal seizure. Electrical seizure may persist without clinical signs following an introduction of anticonvulsant¹¹. Clinical recognition of seizures is impossible in babies, who have been paralyzed therapeutically. EEG monitoring was not done in this study due to lack of facility.

Among primary metabolic abnormalities in neonates, hypocalcaemia is the most common followed by hypoglycemia, hypomagnesemia & low zinc status ⁶. Sood A et al ⁵ in a study of biochemical abnormalities in neonatal seizure showed that most common cause of seizure due to primary metabolic abnormalities were hypoglycemia followed by hypocalcaemia & low zinc level.

A study was done by Mollah AH et al, in our country over 42 cases of febrile convulsion & 30 controls of fever without convulsion. The study concludes that a significantly lower zinc exists in children with febrile convulsion. However no relationship was found between zinc

status with age, sex, degree & duration of convulsion¹². Gunduz Z et al in a study of serum & CSF zinc levels in children with febrile convulsions could not observe any relationship between zinc levels of serum & CSF & the degree & duration of seizure¹³. In the present study 6% patient had low zinc value and 2% of controls also had low zinc but not associated with convulsion. Mean serum zinc was 1.57 ± 0.95 mmol/L in cases which was ($p < 0.01$) lower than the value in controls 2.37 ± 1.06 mmol/l. Kumar et al in their study found that mean serum zinc in neonatal convulsion cases was significantly lower than that of the value in controls⁷.

Conclusion:

From the study it is revealed that low zinc level can also be a cause of neonatal seizure due to primary metabolic abnormalities, where no cause of seizure is identified. So early recognition and treatment could save these babies from long term neurological problems. Further studies with large sample size covering both urban and rural population over a wide range of time may give more information about the biochemical changes in neonatal convulsions in our country.

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