

**Original article:**

## **Study of Association of Serum Calcium with Febrile Seizures among Children Admitted In Tertiary Care Hospital**

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### **Abstract:**

Background: Febrile seizure (FS) is the most common cause of convulsions in children. The objective of present work was to study the association between serum calcium and febrile seizures.

Methods: Children in the age group of 6 month to 6 years with febrile seizures satisfying inclusion criteria and equal number of age matched controls were subjected to estimation serum calcium and compared using appropriate statistical methods.

Results: Mean Serum Calcium levels in children with febrile seizures were higher than controls and this observation was statistically significant.

Conclusion: Definite association was found between serum calcium levels and the occurrence of febrile seizures, although mean serum calcium levels were in the normal range

### **Introduction**

Febrile seizures are seizures that occur between the ages of 6 months and 60 months with a temperature of 38<sup>0</sup> or higher , that are not the result of CNS infection or any metabolic imbalance, and that occur in the absence of a history of prior afebrile seizures. A simple febrile seizure is a primary generalized, usually tonic clonic attack associated with fever, lasting for a maximum of 15 min and not recurrent within a 24 hrs period. A complex febrile seizure is more prolonged (15 min), and/or is focal, and/or recurs within 24 hours.<sup>1</sup> Studies have shown different results for an association between serum electrolytes (including low serum Calcium) and febrile Seizures. The basic physiology of a seizure episode is detected in an unstable cell membrane or its surrounding supportive cells. The seizure originates from the grey matter of any cortical or subcortical area.<sup>2</sup> During an acute febrile disease, mild disturbance of water and electrolyte balance occurs frequently.<sup>3</sup> It has been suggested that changes in serum electrolyte levels, might enhance the susceptibility to seizure and its recurrence during a febrile disease in childhood.<sup>3</sup> Calcium channels are important modulators of membrane excitability, transmitter release and gene expression.<sup>4</sup>

### Methodology

This case control study was carried out among the children of age 6 months to 60 months to find out the association between serum calcium and febrile seizures.

<b>INCLUSION CRITERIA</b>	<b>EXCLUSION CRITERIA</b>
<b>Cases</b>	<b>Cases</b>
<ul style="list-style-type: none"> <li>• Children with age between 6 months to 60 months with febrile seizures</li> <li>• Children of parents who give written informed consent for participating in study will be included</li> </ul>	<ul style="list-style-type: none"> <li>• Children with seizures due to central nervous system infections, past medical history of seizures of any other etiology, CNS malformations, Developmentally challenged children, children with metabolic disorder, cardiac, kidney disease, gastroenteritis</li> </ul>
<b>Controls</b>	<b>Controls</b>
<ul style="list-style-type: none"> <li>• Children with age between 6 months to 60 months with fever without seizures</li> <li>• Parents who give written informed consent for participating in study will be included</li> </ul>	<ul style="list-style-type: none"> <li>• Children with seizures due to central nervous system infections, past medical history of seizures of any other etiology, CNS malformations, Developmentally challenged children, children with metabolic disorder, cardiac, kidney disease, gastroenteritis .</li> </ul>

### Data collection

The selected study subject detail information was collected from the guardian /parent as per the proforma (Demographic information, History, General and Physical examination), blood sample were collected and sent for the investigations including serum calcium. Normal serum calcium was taken as 8.8 to 10.8 mg/dl.<sup>5</sup> Percentages, arithmetic mean and standard deviation calculated and data statistically analyzed using SPSS (Statistical Package for Social Sciences) version v20. Interferential analysis for quantitative variables done using independent T-test whereas analysis for qualitative data was done using Chi square test. Statistical significance was set at P VALUE <0.05.

**Results**

**Table 1**

	<b>Cases (n=76)</b>	<b>Control (n=76)</b>	<b>Chi Square</b>	<b>P value</b>
<b>Decreased</b>	15(19.7%)	29(38.2%)	5.41	0.02
<b>Normal</b>	61(80.3%)	46(60.5%)		
<b>Increased</b>	0	1(1.3%)		

**Table 1** shows serum calcium was low – in 15(19.7%) cases versus 29(38.2%) controls. Normal levels – in 61(80.3%) cases versus 46(60.5%) controls. Above normal levels in no case versus one control. The result was statistically significant.

**Table 2**

<b>TABLE 2</b>					
<b>Gender</b>	<b>Levels</b>	<b>Cases (N=76)</b>	<b>Controls (N=76)</b>	<b>Chi Square</b>	<b>P value</b>
<b>Male</b>	Decreased	7 (15.9%)	16 (38.1%)	4.33	0.02
	Normal	37 (84.1%)	25 (59.5%)		
	Raised	0	1 (2.4%)		
<b>Female</b>	Decreased	8 (25.0%)	13 (38.2%)	0.79	0.19
	Normal	24 (75.0%)	21 (61.8%)		
	Raised	0	0		

Table 2 shows that among males , serum Calcium level was normal in 37 (84.1%) cases versus 25 (59.5%) controls.

Serum calcium level was low in 7 (15.9%) cases versus 16 (38.1%) controls. None of the male case versus one male child among controls had raised calcium. The result was statistically significant (P=0.02).

Among females , serum calcium was normal in 24 (75.0%) cases and 21 (61.8%) controls. Decreased in 8 (25.0%) cases and 13 (38.2%) controls. None of the females had increased serum calcium in cases as well as controls. The result was not statistically significant(P=0.19)

**TABLE 3. Association of Serum Calcium in simple and complex febrile seizures**

Serum calcium	Type of febrile seizures (%)		Chi-square value	p-value
	Simple	Complex		
Normal	40 (80.0%)	21 (80.8%)	0.006	0.94
Raised	0	0		
Decreased	10 (20%)	5 (19.2%)		

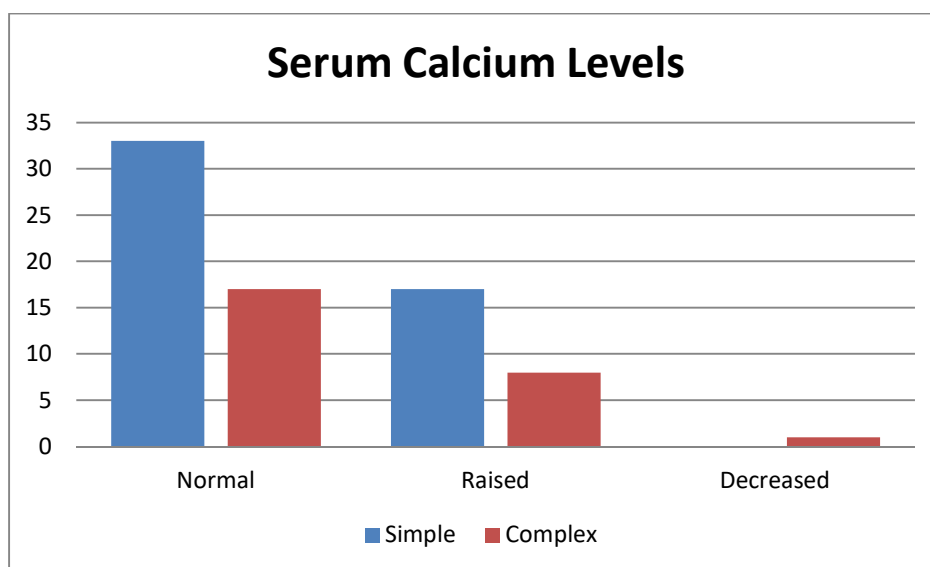


Table 3 shows that the serum Calcium levels was normal in 40 children with simple febrile seizure and 21 Children in Complex febrile seizures, and decreased in 10 children with simple febrile seizure and 5 children among complex febrile seizure and the results are not statistically significant (p=0.94)

Table 5		Mean ± SD	p-value
Serum calcium	Case	9.17 ± 0.56	0.01
	Control	8.91 ± 0.75	

Table 4 Comparison of mean values of Serum calcium between cases and controls

Table 4 shows that Mean (SD) values for serum Calcium for cases and controls were 9.17 ± 0.56 and 8.91 ± 0.75 respectively. Mean value was higher in cases and result was statistically significant(P=0.01).

## Discussion

In present study ,mean serum calcium levels of  $9.17 \pm 0.56$  in cases and  $8.91 \pm 0.75$  in control group which was statistically significant( $p = 0.01$ ). Similar findings were seen by study conducted by Naseer MR et al<sup>5</sup> where mean value of serum calcium levels in cases and controls was  $9.25 \pm 0.63$  and  $9.12 \pm 0.54$  respectively, with a P value of 0.128, the difference was not statistically significant. Sepideh Amouian et al<sup>6</sup> in their case control study found that the serum calcium levels were higher (Cases  $9.45 \pm 0.57$  and controls  $9.39 \pm 0.50$ ) but not significant. Reverse findings were seen in the study conducted by Usha Kiran also observed the serum calcium levels of 8.87 among cases and 9.27 among controls was statistically significant ( $p 0.0001$ )<sup>7</sup>.

## Conclusion

Definite association was found between serum calcium levels and the occurrence of febrile seizures, although mean serum calcium levels were in the normal range.

As studies have shown different results for an association between serum calcium and febrile seizures, further multi-centric trials involving larger sample size are needed.

## References

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