

# A study of role of serum Zn and hemoglobin in the patients of simple febrile seizures at tertiary health care centre

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## Abstract

**Background:** Seizure disorder is one of the most common neurological diseases in children and occurs at least one time in 4-10% of children in the first 16 years of life **Aims and Objectives:** to Study of Role of Serum Zn and hemoglobin in the patients of Simple febrile seizures at tertiary health care centre. **Methodology:** This was cross-sectional study carried out in the pediatric patients who were admitted to ward with febrile seizures during the one year period i.e. January 2017 to January 2018, so during the year period there 46 patients cases (n=46) and controls(n=46). All of them undergone CBC and Serum Zn level under standard protocol. The statistical analysis was done by unpaired t-test and analyzed by SPSS 19 version software. **Results:** The majority of the patients were in the age group of 2-3 were 32.61%, followed by 1-2 were 28.26%, 3-4 were 15.22%, <1 were 10.87%, 4-5 were 8.70%, >6 were 4.35%. mean was 21.6 months. The majority of the patients were Male i.e. 60.87% The mean level of Zn in cases was 43.05 ±3.43 and in controls was 83 ± 4.12 was significantly less in cases as compared to controls (P<0.0001, t = 26.5681, df = 90) The mean Hb. level in cases was 9.40 ±1.31 and in controls was 10.6 ± 1.46 was significantly less in cases as compared to controls (P<0.0001, t = 4.18, df = 90) **Conclusion:** It can be concluded from our study that the patients with febrile seizure were significantly associated with low levels of Zn and Hb. So this finding can be helpful for the diagnostic and management purpose. **Key Word:** Zn hemoglobin, Simple febrile seizures

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## INTRODUCTION

Seizure disorder is one of the most common neurological diseases in children and occurs at least one time in 4-10% of children in the first 16 years of life<sup>1</sup>. Occurrence of seizure in children is not only a terrible experience for the parents but also have many neurologic, cognitive,

psychological, and social complications for the child and adolescent. Recurrent unprovoked seizures called epilepsy and its diagnosis are done when two or more unprovoked seizures have occurred at intervals longer than 24 hours intervals<sup>1</sup>. The annual prevalence of epilepsy is 0.5-1% and its lifetime cumulative incidence is 3%<sup>1</sup>. Epilepsy begins in childhood in more than half of the cases. Approximately 50 million people in the world have epilepsy, up to one-third of whom continue to have seizures despite appropriate drug treatment<sup>2</sup>. Despite the importance of identifying refractory epilepsy, due to its comorbidities and sometimes mortalities different definitions presented in the literature. Drug resistant epilepsy may be defined as failure of adequate trials of two tolerated and appropriately chosen and used antiepileptic drugs (AEDs) schedules (whether as monotherapies or in combination) to achieve sustained seizure freedom<sup>3</sup>. Detoxification of the oxidative radicals is a major role of antioxidant enzymes such as

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glutathione peroxidase (GPx) which is a selenium-dependent enzyme and superoxide dismutase (SOD) that zinc and copper are its major constituents<sup>4</sup>. So, we have studied most important factors like Zn and Hb. With respect to Febrile seizures at tertiary health care centre.

### METHODOLOGY

This was cross-sectional study carried out in the pediatric patients who were admitted to ward with febrile seizures during the one year period i.e. January 2017 to January

2018, so during the year period there 46 patients by exclusion of the patients with secondary causes investigated by all routine investigations like , CBC, X-ray, USG, EEG and CT scan as per the indication by written and explained consent were included into study as **cases (n=46)** and age and sex matched other patients other than seizures or convulsion brought for other minor illness like URTI etc were included as **controls(n=46)**. All of them undergone CBC and Serum Zn level under standard protocol. The statistical analysis was done by unpaired t-test and analyzed by SPSS 19 version software.

### RESULT

**Table 1:** Distribution of the patients as per the age

Age	Cases (n=46)		Controls (n=46)	
	No.	Percentage (%)	No.	Percentage (%)
<1	5	10.87	6	13.04
1-2	13	28.26	12	26.09
2-3	15	32.61	14	30.43
3-4	7	15.22	8	17.39
4-5	4	8.70	4	8.70
>6	2	4.35	2	4.35
Total	46	100.00	46	100.00

The majority of the patients were in the age group of 2-3 were 32.61%, followed by 1-2 were 28.26%, 3-4 were 15.22%, <1 were 10.87%, 4-5 were 8.70%, >6 were 4.35%. Age distribution in cases and controls were comparable ( $X^2=0.23, df=5, p>0.05$ ) mean was 21.6 months.

**Table 2:** Distribution of the patients as per the sex

Sex	Cases (n=46)		Controls (n=46)	
	No.	Percentage (%)	No.	Percentage (%)
Male	28	60.87	30	65.22
Female	18	39.13	16	34.78
Total	46	100.00	46	100.00

The majority of the patients were Male i.e. 60.87% and female were 39.13% and it was comparable with the controls ( $X^2=0.19, df=1, p>0.05$ )

**Table 3:** Distribution of the patients as per the Serum level of Zn in cases and controls

Serum level of Zn ( $\mu\text{gm/dl}$ )	Cases (n=46)	Controls (n=46)	p-value (unpaired t-test)
Mean	43.05	83	$P<0.0001, t = 26.5681 \text{ df} = 90$
SD	3.43	4.12	

The mean level of Zn in cases was  $43.05 \pm 3.43$  and in controls was  $83 \pm 4.12$  was significantly less in cases as compared to controls ( $P<0.0001, t = 26.5681, \text{df} = 90$ )

**Table 4:** Distribution of the patients as per the Serum level of Hb. in cases and controls

Serum level Hb (g/dl)	Cases (n=46)	Controls (n=46)	p-value (unpaired t-test)
Mean	9.40	10.6	$P<0.0001, t = 4.18 \text{ df} = 90$
SD	1.31	1.46	

The mean Hb. level in cases was  $9.40 \pm 1.31$  and in controls was  $10.6 \pm 1.46$  was significantly less in cases as compared to controls ( $P<0.0001, t = 4.18, \text{df} = 90$ )

### DISCUSSION

Febrile seizure is a common neurologic problem occurring in children aged between 6 months to 5 years. The etiology of febrile seizure is unknown but genetic factors or electrolyte disturbances may have a role in its occurrence or recurrence. To date it is revealed that febrile seizures

can be induced by several factors. It is generally believed that an FS is an age-dependent response of the immature brain to fever. This postulation is supported by the fact that most (80 -85%) febrile seizures occur between 6 months and 3 years of age, with the peak incidence at 18 months. Although the mechanism of this increased susceptibility is

unclear, animal models suggest that there is enhanced neuronal excitability during the normal brain maturation. Gamma amino butyric acid is an important inhibitory neurotransmitter. Zinc has a regulatory effect on glutamic acid decarboxylase and the synthesis of GABA. Attempts have been made to identify predisposing risk factor like family history, metabolic disturbance (especially serum zinc, magnesium, glucose, calcium). This knowledge has a practical value and advising parents regarding recurrent convulsions. This study was conducted to determine whether children with simple febrile convulsion had low serum zinc levels compared to children with fever alone. The two groups simple febrile convulsion and fever alone were comparable with respect to age and sex.

**AGE:** The mean age of simple febrile convulsions was 21.6 months and in this study. In the present study, 48% of patient among simple febrile convulsions were in the age group of 6 months to 24 months and patients with fever alone below 2 years were 56%. No significant difference was found in relationship with in the study between groups. In the study done by Lynette *et al* reported a mean age of 18 months, In the another study done by Heydarian *et al*, reported maximum cases were in the age group less than 24 months and mean age was 21.25 months. In a study done by Sampath Kumar *et al* mean age is 29 months.

**Correlation of age distribution with other studies.**

STUDY	MEAN AGE
Samir S shah <i>et al</i> <sup>11</sup>	15.9-20 months
Lynette <i>et al</i> <sup>12</sup>	18 months
Sampathkumar <i>et al</i> <sup>13</sup>	29 months
Heydarian <sup>14</sup>	21.25 months
Present study (simple febrile convulsions)	21.6 months

**Sex distribution:** In the present study there was male preponderance. Out of 50 cases of simple febrile convulsions 60% are male, with a male to female ratio of 3:2

**Correlation of sex distribution with other study.**

Study	Sex Prepondarence	Percentage
Hartfield <i>et al</i> <sup>12</sup>	Male	57%
Leelakumari <i>et al</i> <sup>14</sup>	Male	50.65%
Samir S shah <i>et al</i> <sup>11</sup>	Male	57.3%
Present study	Male	60%

Among children with simple febrile convulsions 60% were females and 40% were males.

**Serum zinc:** The mean serum zinc levels in the present study in simple febrile convulsions were 43.05 microg/dl. Children with febrile convulsions both simple and complex have statistically significant low serum zinc levels when compared to children with fever alone without convulsions. Children with fever alone did not show decrease in serum zinc level compared to other groups which is similar to findings of other studies. Mollah MA *et al*<sup>5</sup> in 2008 published a study comparing serum and CSF

Zinc levels of febrile seizure children to their matched nonseizure febrile peers. Mean Zn concentration in both serum and CSF was less in febrile seizure children than in their matched non-seizure febrile peers ( $p < 0.001$ ). Kumar L *et al*<sup>5</sup> in a recent case control study found that mean serum zinc level was significantly lower in cases as compared to control ( $p < 0.05$ ) in children having febrile seizure. Ganesh R *et al*<sup>8</sup> compared serum zinc levels in 38 cases of simple febrile seizure with 38 age matched controls with statistically significant results ( $p < 0.001$ ), Hydarian F *et al*<sup>7</sup>, Lee J and Kim JH<sup>15</sup>, and Talebian A *et al*<sup>16</sup>, also gave similar results which are comparable with our study. However Garty BZ *et al* had their findings which did not support the hypothesis that febrile convulsions are related to the reduced zinc concentration. The serum zinc levels did not show any significant correlation with age of onset, sex, axillary temperature or fever seizure interval in our study. All previous studies have shown similar findings in this aspect. As serum zinc concentration in any population is influenced by factors such as dietary pattern, vitamin A, vitamin D deficiency, zinc levels in the soil and water, further studies are needed in this aspect to identify the probable cause for this finding. Among the children those who are presenting with febrile seizures, the mean Hb level in children with simple febrile seizures is 9.4062 and those who are controls, the mean Hb level is 10.6. The incidence of low Hb level is statistically significant in simple febrile seizures than with complex febrile seizures. From various hematological parameters, incidence of iron deficiency anemia was higher in cases with febrile seizures than controls. Occurrence of iron deficiency anemia was higher in simple febrile seizures than complex febrile seizures. It was statistically insignificant. Pisacane *et al* with 146 cases and 293 control, with age of 6-24 months, reported a significantly higher rate of iron deficiency anemia among children with first febrile seizure than control (odd's ratio=3.3, 95% CI of 1.7-6.5). Kumari *et al*<sup>14</sup> had done a study which showed highly significant association between iron deficiency and simple febrile seizures. Crude odds ratio was 5.34 (CI 3.27- 8.73,  $P < 0.001$ ) and adjusted odds ratio in the logistic regression analysis was 4.5 (CI 2.69- 7.53,  $P < 0.001$ ).

**CONCLUSION**

It can be concluded from our study that the patients with febrile seizure were significantly associated with low levels of Zn and Hb. So this finding can be helpful for the diagnostic and management purpose.

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