

# Determine the Deficiency of Serum Zinc Level in Children with Febrile Seizures

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## ABSTRACT

**Aim:** To determine the deficiency of serum zinc level in children presented with febrile seizures.**Study design:** Cross-sectional study**Place and duration:** Rai Medical College Teaching Hospital Sargodha from 1<sup>st</sup> January 2021 to 30<sup>th</sup> June 2021.**Methodology:** Total of 130 patients of ages 5 months to 5 years of both genders were included. Study participants were divided into group A and group B. Group A consist of 65 patients with febrile seizures and group B contained 65 patients having fever without seizures. Blood samples were collected for serum zinc examination and for the comparison between both groups.**Results:** There were 39(60%) males and 26 (40%) females in group A with mean age 28.25±12.6 months and 36 (55.38%) patients were males and 29(44.62%) were females with mean age 29.42±10.15 months in Group B. Significant difference between both zinc groups were noticed and the mean values were 59.50±12.88 µg/dl and 88.45±14.26 µg/dl respectively.**Conclusion:** Significant difference was observed and serum zinc level was significantly lower in febrile seizure children**Keywords:** Febrile seizures, Serum zinc level, Children

## INTRODUCTION

Febrile seizures are the commonest type of seizure experienced mostly by children of 6 months to 5 years. It affects upto 4% of the children worldwide<sup>1</sup>. Children affected by this type of seizures usually does not have any serious underlying condition including; encephalitis, meningitis, hereditary metabolic disorders, electrolyte imbalance and also structural/functional brain problems<sup>2</sup>. Contributing factors of such condition might be zinc deficiency, immunologic disorders, family backgrounds and sometimes genetic factors as well<sup>3-6</sup>.

Zinc is one of the most crucial trace element required for the proper and normal functioning of brain.<sup>7</sup> It plays a pivotal role in growth development and also act as a cofactor for RNA and DNA polymerase enzymes.<sup>8</sup> Main function of zinc that take part in normal brain functioning is that it regulates activity of glutamic acid that ultimately affects synthesis of enzyme important for the production of GABA, an inhibitory neurotransmitter<sup>9,10</sup>.

A trace element, zinc also impact on calcium production which indirectly inhibit stimulation of neuronal discharge by affecting N-Methyl-D Aspartate Receptors (NMDA)<sup>11</sup>. Studies have revealed that, this trace element seems affected in febrile seizures children and its concentration was also lower<sup>12,13</sup>.

Aim of the present study is to assess the level of zinc in children with febrile seizures in contrast to the level in children having fever but without seizure.

## MATERIALS AND METHODS

After approval from Ethical Review Committee, this cross-sectional/observational study was performed from 1<sup>st</sup> January 2021 to 30<sup>th</sup> August 2021 at Rai Medical College Teaching Hospital Sargodha. A total 130 children with ages 5 months to 5 years were enrolled in this study. Patients were divided into two groups. Group A consisted of 65 patients with febrile seizures and group B contained 65 febrile patients but no history of seizures. Patients detailed demographic including age, sex, weight and socio-economic status were recorded after taking informed written consent from parents/guardian. Children with history of consumption of zinc, chronic disease children, patient's with malnutrition and those with mental retardation were excluded.

Propylene acid washed tubes was used for blood sample collection within 24-hours of hospital admission when the seizure episode was under control. Proper labeled samples tubes were

centrifuged for few minutes. Normal zin range was considered 70-120 µg/dl and then serum zinc levels were compared between group A and B. Data were analyzed by SPSS 25. Chi square test was used for the comparative analysis by using p-value <0.05 as significant.

## RESULTS

In group A there were 40% females and 60% male with mean age 28.25±12.6 months and in group B 36 (55.38%) patients were males and 29 (44.62%) were females with mean age 29.42±10.15 months. In group A mean weight of patients was 11.54±3.06 kgs and in group B it was 11.01±2.64 kgs. In group A 26 (40%) patients had low socio-economic status, 32 (49.23%) had middle and 7 (10.77%) had high socio-economic status while in group B 30 (46.15%), 26 (40%) and 9 (13.85%) patients had low, middle and high socio-economic status (Table 1).

According to the serum zinc level, group A patients had significantly low serum zinc level 59.50±12.88 µg/dl as compared to group B 88.45±14.26 µg/dl with p-value <0.001 (Table 2)

In group A, 57(87.89%) of the patients and from group B 6 (9.23%) of the patients had hypozincemia (<70 µg/dl) while 8 and 59 patients from both the groups had serum zinc level >70µg/dl (Table 3).

Table 1: Demographics of all the patients

Variable	Group A	Group B	P-value
Age (months)	28.25±12.6	29.42±10.15	N/S
Weight (Kgs)	11.54±3.06	11.01±2.64	N/S
<b>Gender</b>			
Male	39 (60%)	36 (55.38%)	N/S
Female	26 (40%)	29 (44.62%)	
<b>Socioeconomic status</b>			
Low	26 (40%)	30 (46.15%)	N/S
Middle	32 (49.23%)	26 (40%)	
High	7 (10.77%)	9 (13.85%)	

Table 2: Mean serum zinc level in both groups

Serum zinc level (µg/dl)	Group A	Group B	P-value
	59.50±12.88	88.45±14.26	<0.001

Table 3: Comparison of deficiency of serum zinc level between both groups

Hypozincemia	Group A	Group B	P value
Yes	57 (87.89%)	6 (9.23%)	0.0001
No	8 (12.31%)	59 (90.77%)	

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## DISCUSSION

In present study we found that significant deficiency of zinc level was found in febrile seizures children in contrast to the normal participants  $59.50 \pm 12.88 \mu\text{g/dl}$  Vs  $88.45 \pm 14.26 \mu\text{g/dl}$ . Another research study also proved the same and reported similar results<sup>14</sup>. They reported a significant low value of serum zinc level in children with febrile seizure as compared to children without febrile seizure  $57.4 \pm 18 \mu\text{g/dL}$  Vs  $97.5 \pm 16 \mu\text{g/dL}$  with p-value 0.0001. Another study by Mahyar et al<sup>15</sup> reported that children with febrile seizure had significantly low serum zinc level as compared to healthy children without febrile seizure  $62.84 \pm 18.40 \mu\text{g/dl}$  Vs  $85.70 \pm 16.76 \mu\text{g/dl}$ . Several other studies demonstrated the similar findings to our study results. In these studies, significant association of zinc deficiency was found in febrile seizures children<sup>16-18</sup>.

In the present study, 57 (87.89%) of group A participants and 6 (9.23%) patients in group B had hypozincemia ( $<70 \mu\text{g/dl}$ ) while 8 and 59 patients from both the group had zinc levels  $>70 \mu\text{g/dl}$ . Similar findings have been reported by Rehman et al<sup>14</sup> in which 84% patients with febrile seizure had serum zinc level  $<70 \mu\text{g/dL}$  while only 8% patients without febrile seizure had low serum zinc level. Another study by Gattoo et al<sup>19</sup> reported 60% patients with febrile seizure had serum zinc level  $<65 \mu\text{g/dL}$ . Some of other studies demonstrated that patients with febrile seizure had significantly low level of serum zinc and accounted 65 to 90%<sup>20-22</sup>.

In present study we found that male patients were predominant among both groups, cases and controls, 60% and 55.38% respectively. We found no significant difference regarding demographical characteristics between both groups. Similar findings have been reported by others and affected age was almost similar<sup>23-25</sup>.

## CONCLUSION

Serum zinc plays a pivotal contribution in management and deterrence of neurological diseases. We concluded from this study that significant difference was observed and serum zinc level was significantly lower in febrile seizure children.

**Conflict of interest:** Nil

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