

Evaluation of Serum Zinc Level in Children (Age 6 Month – 2 Years) Suffering From Acute Diarrhea



Biochemistry

KEYWORDS : Zinc (Zn), acute diarrhea & children.

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ABSTRACT

Diarrhea is the leading cause of morbidity and mortality in children in developing countries, intervention trials showed that using zinc in acute diarrhea decrease morbidity and mortality. The aim of present study was planned to evaluate serum zinc level in children suffering from acute diarrhea. Venous blood samples was collected for the estimation of serum zinc level by colorimetric kit method. The mean \pm SD of serum zinc level in male (case and control) was 36.36 ± 3.84 and 87.84 ± 10.22 . Similarly, in female (case and control) was 27.18 ± 5.13 and 82.36 ± 7.17 respectively. Zinc therapy is useful in decreasing the duration and severity of acute diarrhea.

INTRODUCTION:

Diarrhea is responsible for 15% of all deaths in children under 5 years of age and accounts for about 1.4 million annual infant death worldwide.^(1,2) Data from the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) have shown a substantial decrease in deaths in adults over the age of 30 and the mortality rate for children under age 5 from acute diarrhea has fallen from 4.5 million deaths annually in 1979 to 1.6 million deaths in 2002. Despite these improvements, mortality due to diarrhea in developing countries remains too high.⁽³⁾ Severe diarrhea can quickly cause life-threatening dehydration. One major advance in reducing mortality from diarrhea was the introduction of WHO oral rehydration solution (ORS). However, WHO ORS is unable to reduce the volume, frequency, and duration of diarrhea: consequently, other approaches to improve or supplement ORS have been researched.⁽³⁾ It is the third leading killer of children in India today and is responsible for 13% of all deaths in children less than five years of age and kills an estimated 300000 children in India each year. Clinically, diarrhea is defined as passage of 3 or more loose or watery stools in 24 hours. For exclusively breastfed infants, a change in consistency of stool with increased frequency is regarded as diarrhea. When there are three diarrhea free days between two episodes, they are considered as two separate episodes.⁽⁴⁾ Types of diarrhea:- acute diarrhea: diarrhea lasting <2 weeks and persistent diarrhea: lasting 2-4 weeks.⁽⁵⁾ Persistent diarrhea is usually seen in infancy with more than 60% episodes occurring in infants < 6 months age and 90% before one year of age.⁽⁶⁾ Chronic diarrhea- Diarrhea lasting > 4 weeks.⁽⁵⁾ Severe diarrhea can quickly cause life-threatening dehydration. One major advance in reducing mortality from diarrhea was the introduction of WHO oral rehydration solution (ORS). However, WHO ORS is unable to reduce the volume, frequency and duration of diarrhea; consequently, other approaches to improve or supplement ORS have been researched.⁽⁷⁾ Among the available treatments, WHO currently recommends early oral rehydration therapy and zinc supplementation to treat diarrhea in children between 6 and 60 months of age.^(1,6-8) This recommendation is based on systematic reviews⁽⁹⁻¹³⁾ that have demonstrated the beneficial effect of zinc treatment in reducing the duration and severity of diarrhea episodes in children less than 5 years old.^(6,8,14) However, the effect of zinc in malnourished children is less known. The aim of present study was planned to evaluate serum zinc level in children suffering from acute diarrhea.

MATERIAL AND METHODS:

This present study was conducted in the Department of Biochemistry, Hi-Tech Medical college and Hospital, Rourkela, Odisha, India during the period from Nov 2012 to July 2013. The study protocol was approved by the Ethics committee of Hi-Tech Medical College & Hospital, Rourkela. Randomly selected 30 (19 male & 11 female) children in the age group of 6 months - 5 years who had suffering from diarrhea and admitted in paediatric ward of HMCH, Rourkela and along with 30 healthy controls.

Biochemical Analysis:

Venous blood samples was collected for the estimation of serum zinc level by colorimetric kit method described by M. Saito 1982.⁽¹⁵⁾

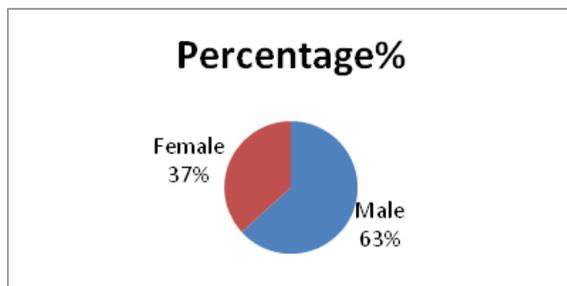
Statistical analysis:

We used student t-test and pearson's correlation coefficient to find the statistical significance. A P-value <0.05 was to be considered statistically significant.

RESULTS AND DISCUSSION:

In this present study, the percentage of cases & control (male and female) children was 63.33% and 36.66% respectively.

Chart-A Shows percentage of Male and Female.



The mean \pm SD of serum zinc level in male (case and control) was 36.36 ± 3.84 and 87.84 ± 10.22 . Similarly, in female (case and control) was 27.18 ± 5.13 and 82.36 ± 7.17 respectively (Table-1). In our study the level of serum zinc were significantly ($P < 0.0001$) lower in children suffering from diarrhea as compared to controls.

Table No. : 1
Comparison of serum zinc levels in case and control (Male & Female)

Parameter	Male (n=19)		P-value	Female (n=11)		P-value
	Case	Control		Case	Control	
	Mean \pm S.D.	Mean \pm S.D.		Mean \pm S.D.	Mean \pm S.D.	
Serum Zinc ($\mu\text{g/dl}$)	36.36 \pm 3.84	87.84 \pm 10.22	<0.0001	27.18 \pm 5.13	82.36 \pm 7.17	<0.0001

*Statistically significant ($P < 0.0001$)

Zinc deficiency may have adverse effects on physical growth and neurodevelopment particularly if the child is malnourished. A plausible link between malnutrition, diarrhea and zinc deficiency is depicted in fig.3. Zinc supplementation is a new addition to the diarrhea treatment strategy and one that promises to greatly improve diarrhea management. Two recent advances in managing diarrheal disease that can drastically reduce the number of child deaths include: i) newly formulated oral rehydration solution (ORS), containing lower concentrations of glucose and salts, to prevent dehydration and the need for intravenous therapy; and ii) zinc supplementation to decrease the duration and severity of diarrhea and the likelihood of future diarrhea episodes in the 2-3 months following supplementation.⁽¹⁶⁾

CONCLUSION:

These findings suggest that the level of serum zinc are significantly lower in children suffering from diarrhea as compared to controls. There is negligible correlation between diarrhea and gender. Oral zinc supplementation significantly decreases the duration of diarrhea and has a greater effect on malnourished children. As a public health measure, zinc administration is a good strategy for preventing diarrhea in addition to the use of oral rehydration therapy and is particularly important in countries where zinc deficiency is prevalent. Further research should consider presenting the results according to the nutritional status of the children to provide evidence with greater applicability.

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