

SERUM ZINC LEVELS AMONGST UNDER SIX CHILDREN WITH ACUTE GASTROENTERITIS¹Dr. Divya Dhiman, M.D Paediatrics and ^{2*}Dr. Twinkle Sood, M.D OBG.

India.

***Corresponding Author: Dr. Twinkle Sood**

M.S OBG, IGMC, Shimla, Himachal Pradesh.

Article Received on 23/12/2022

Article Revised on 13/01/2023

Article Accepted on 02/02/2023

ABSTRACT

Background- Diarrhea accounts for over 20% of all deaths in under -five children Zinc is an important micronutrient necessary for protein synthesis, cell growth and differentiation, immune function and intestinal transport of water and electrolytes. The prevalence of zinc deficiency among Indian Children totaled around 40%.

Materia and Methods - We conducted an observational prospective study that included children below 6 years of age who presented with acute gastroenteritis with mild or some dehydration who were admitted in paediatrics ward of Civil Hospital Palampur from July 2022 to December 2022. Acute gastroenteritis was defined as a loose or watery consistency of stool or increase in stool frequency (>3 times/day). The sample size was 50. After taking consent from the family members, at the time of admission, detailed history was taken, some blood investigations like CBC, RFT Serum electrolytes Serum zinc levels and stool analysis was done. **Results-** Out of total 50 children, there were 30(60%) males and 20(40%) females. 10(20%) children were < 1 year of age and 40(80%) were in the age group pf 1 – 6 year. In children < 1 year of age serum zinc levels were low in 4 (40%) patients and normal in 6 (60%) patients. In children from 1 to 6 years of age serum zinc levels were low in 28(70%) patients and normal in 12 (30%) patients. **Conclusion-** This study observed a high prevalence of zinc deficiency in under 6 children presenting with acute gastroenteritis so zinc supplementation should be done in these children.

KEYWORDS: After taking consent from the family members, at the time of admission, detailed history was taken, some blood investigations like CBC, RFT Serum electrolytes Serum zinc levels and stool analysis was done.

INTRODUCTION

The global annual burden of diarrhea is huge, affecting 3-5 billion cases and causing approximately 2 million deaths a year. Diarrhea accounts for over 20% of all deaths in under -five children The two most important consequences of diarrhea in children are malnutrition and dehydration. Malnutrition and diarrhea form a vicious cycle, since malnutrition increases the risk and severity of diarrhea. Impaired absorption, loss of nutrients, increased catabolism and improper feeding in diarrhea aggravate the severity of malnutrition. A child may lose as much water and electrolytes from the body during an episode of diarrhea as an adult, which translates into a higher proportion of total body water loss in the child. Causative agents can be bacterial (E.coli Shigella, salmonella), Viral (Rotavirus, adenovirus), Parasitic (giardia lamblia, cryptosporidium parvum, Cyclospora).

Factors determining susceptibility to diarrhea include poor sanitation and personal hygiene, non- availability of safe drinking water, unsafe food preparation and lower rates of breastfeeding and immunization.

Acute diarrhea constitutes a major health challenge in children <5 years globally, accounting for 8.6% of the 5.8 million deaths in 2015.^[1] Developing countries bear the greatest burden of the disease as it contributes 10% each to the deaths in Nigeria, India, Pakistan which together accounted for 40% of global under five mortality.^[2-3] Zinc is an important micronutrient necessary for protein synthesis, cell growth and differentiation, immune function and intestinal transport of water and electrolytes.^[4-5] The prevalence of zinc deficiency among Indian Children totaled around 40%.^[6]

MATERIALS AND METHODS

We conducted an observational prospective study that included children below 6 years of age who presented with acute gastroenteritis with mild or some dehydration, who were admitted in Paediatrics ward of Civil Hospital Palampur from July 2022 to December 2022. Acute gastroenteritis was defined as a loose or watery consistency of stool or increase in stool frequency(>3 times/day). The sample size was 50.

Inclusion Criteria – All children who were admitted in paediatric ward with mild or some dehydration in Civil Hospital Palampur from July 2022 to December 2022.

Exclusion Criteria – Children with chronic diarrhea, persistent diarrhea, immune deficiency lactose intolerance.

After taking consent from the family members, at the time of admission, detailed history was taken some

blood investigations like CBC, RFT Serum electrolytes Serum zinc levels and stool analysis was done After collecting samples, patients were treated as per standard treatment guidelines The normal range of zinc was considered as 60 -90 mcg/dl between the ages of 1-12 months, 80 -110 mcg/dl between the ages of 1-10 years, 90 -120 mcg/dl between the ages of 10-15 years.^[7]

Statistical analysis

RESULTS

Table 1: Distribution on the basis of gender.

Gender	Frequency	Percentage
Male	30	60%
Female	20	40%

Out of total 50 children, there were 30(60%) males and 20(40%) females.

Table 2: Distribution on the basis of age.

Age	Frequency	Percentage
<1 year	10	20%
1year -6 year	40	80%

10(20%) children were < 1 year of age and 40(80%) were in the age group pf 1 – 6 year.

Table 3: Frequency and percentage of some characteristics of the study population.

Variables		No.	%
Consistency of stool	Watery	34	68%
	Semi formed	16	32%
Degree of dehydration	No dehydration	13	26%
	Some dehydration	37	74%
Fever	yes	44	88%
	No	6	12%
CRP	Positive	7	14%
	Negative	43	86%

On the basis of history, there was a history of watery stool in 34(68%) of patients and semi formed in 16(32%) patients There was no dehydration in 13(26%) children and there was some dehydration in 37(74%) patients.

There was history of fever in 44(88%) patients and no history of fever in 6(12%) patients. CRP was positive in 7(14%) patients and negative in 43(86%) patients.

Table 4: Distribution on the basis of zinc levels.

Age	Zinc levels	
	Low	Normal
< 1 year(normal value 60-90)	4(40%)	6(60%)
1 to 6 years (normal value 80 -110)	28(70%)	12(30%)

In children < 1 year of age serum zinc levels were low in 4 (40%) patients and normal in 6 (60%) patients In children from 1 to 6 years of age serum zinc levels were low in 28(70%) patients and normal in 12 (30%) patients.

who were below 1 year of age and 40(80%) children who were between 1 to 6 year of age.

DISCUSSION

Zinc is an essential nutritional element with an important role in biological activities in humans.

In children less than 1 year of age serum zinc levels were low in 4 (40%) of patients and normal in 6(60%) of patients. In children between 1 to 6 year of age serum zinc levels were low in 28(70%) of patients and were normal in 12(30%) of patients Mahyar A et al also found lower serum zinc levels in children with acute gastroenteritis and normal zinc levels in healthy controls.^[8] Baqui AH et al also found similar results that

In our study we found that 30(60%) were males and 20(40%) were females There were 10(20%) of children

is lower serum zinc levels in acute gastroenteritis patients.^[9]

Zinc plays an important role in the function of the immune system through antimicrobial, antioxidant and anti – inflammatory roles.^[10] Serum Zinc is reduced during acute infections like acute diarrhea, inflammation due to the acute phase reactant – induced redistribution of zinc to the liver, as well as decreased plasma proteins such as albumin which is the main transport protein for zinc.^[11] So, 10 -20 mg daily oral zinc supplementation, for 7-14 days, among children with acute gastroenteritis was also recommended from common pediatric clinical practice guidelines and recommendations, particularly in high -risk regions.^[12]

CONCLUSION

This study observed a high prevalence of zinc deficiency in under 6 children presenting with acute gastroenteritis so zinc supplementation should be done in these children.

Recommendation -Zinc supplementation and food fortification should be done in all under 5 children to prevent morbidity and mortality.

BIBLIOGRAPHY

1. GBD 2015 Mortality and causes of death collaborators. Global regional and national life expectancy all – cause mortality and cause – specific mortality for 249 causes of death, 1980-2015: A systematic analysis for the global burden of disease study 2015. *Lancet*, 2016; 388: 1459-544.
2. World Health Organization. *World Health Statistics 2015*. Geneva: World Health Organization, 2015.
3. GBD 2015 Child Mortality Collaborators. Global, regional national, and selected subnational levels of stillbirths, neonatal infant, and under -5 mortality, 1980-2015: A systematic analysis for the global burden of disease study 2015 *Lancet*, 2016; 388: 1725-74.
4. Deshpande JD, Joshi MM, Giri PA. Zinc: The trace element of major importance in human nutrition and health. *Int J Med Sci Public Health*, 2013; 2: 1-6.
5. Prasad AS. Zinc: A miracle element Its discovery and impact on human health. *JSM Clin Oncol Res.*, 2014; 2: 1-7.
6. Akhtar S. Zinc status in South Asian populations – an update. *J Health Popul Nutr.*, 2013; 31(2): 139-149.
7. Salwen MJ. Vitamins and Trace Elements In: Pherson RA, Pincus MR, editors. *Henry's Clinical Diagnosis and Management by Laboratory Methods*. Twenty- First Edition Saunders, 2007: 379-389.
8. Mahyar A, Ayazi P, Chegini V, Sahmani M, Oveisi S, Esmaeily S, et al. Serum zinc concentrations in children with acute bloody and watery diarrhea. *Sultan Qaboos Univ Med J.*, 2015; 15: e512-6.
9. Baqui AH, Black RE, Fischer Walker CL, Arifeen S, Zaman K, Yunus M, et al Zinc supplementation and serum zinc during diarrhea. *Indian J Pediatr*, 2006; 73: 493 -7.
10. Berni Canani R, Buccigrossi V, Passariello A. Mechanisms of action of zinc in acute diarrhea. *Curr Opin Gastroenterol*, 2011; 27: 8-12.
11. Hess SY, Peerson JM, King JC, Brown KH. Use of serum zinc concentration as an indicator of population zinc status. *Food Nutr Bull*, 2007; 28: S403-29.
12. Wuehler SE, Peerson JM, Brown KH. Use of national food balance data to estimate the adequacy of zinc in national food supplies: methodology and regional estimates. *Public Health Nutr.*, 2005; 8(7): 812 -819.