Original article

Zn Status in Gastroenteritis Children under Five Years Old

Aliasgharpour, Mehri

Correspondence to :
Mehri. Aliasgharpour
Clinical Biochemistry Faculty Member at Reference Health Laboratory Research Center ,Ministry of Health & Medical Education, Tehran, Iran.
Tel:(+98)- 912-4713790
Email: aliasgharpour@health.gov.ir & mehri9@gmail.com

Abstract

Background. Acute gastroenteritis is one of the most prevalent infectious illnesses in childhood and frequently associated with severe zinc deficiency. The objective of present study was to determine zinc status in 32 gastroenteritis girls and boys under 5 years old not on Zn supplementation at Reference health laboratory, Tehran-Iran.

Materials &Method. Out of 32 gastroenteritis children six excluded and fasting serum samples of n=26 (10=girls & 16=boys) were collected. For analysis a Varian Spectra Flame Atomic Absorption was used.

Results. Out of10 girls and 16 boys serum samples, [6(60%), 95%CL(38% - 60%)] and [(11(68%), 95%CL (53% - 65%)] had zinc level less than reference interval range (70-120 µg/dL). Results of Pearson correlation indicated significant correlation between Zn and age at $p<0.05$.

Conclusion: The author concludes serum Zn determination is an important factor in gastroenteritis children under five years old. Although in developing countries, the role of zinc during acute diarrhea in children assess further future studies, conducting educational based programs could be useful to increase the community information on the impact of zinc during gastroenteritis and emphasize on the WHO recommendation , replacing 20 mg of elemental zinc per day for children above 6 months , to shorten the duration of acute gastroenteritis .

Key Words. Zinc- Gastroenteritis- Flame Atomic Absorption- Pearson Product Correlation.

Introduction

Zn a common metallic element, plays an important role in modulating host resistance to infectious agents and reducing the risk, severity, and duration of diarrheal diseases (1). Acute gastroenteritis, presenting mostly as diarrhea, is one of the most prevalent infectious illnesses in childhood and frequently associated with severe zinc deficiency (2,3). The symptoms of acute gastroenteritis are pathogen dependent and frequently include vomiting, diarrhea, abdominal pain, and fever. Nearly all causative organisms are viruses; other causes are bacteria and parasites(4).

The mechanism of zinc action in the management of diarrhea is not completely understood. However, it is likely derives from a regulation of intestinal fluid transport and helps with clearance of organisms, regeneration of mucosal integrity, immunity, gene expression, and oxidative stress. A complex homeostatic network is also able to regulate zinc status at cellular and extracellular level (5).

The objective of the present study was to determine and evaluate the zinc status in total of 32 gastroenteritis outpatient children under 5 years old referring to Reference health laboratory in Tehran-Iran . They were not on any kind of Zn supplement.

Materials & Method

From total of 32gastroenteritis outpatient children, six excluded because of their age range. The rest of n=26 (10= girls &16=boys) gastroenteritis outpatient children's fasting blood samples, referring to the Reference health laboratory research center for Zn determination, were drown. Sera were separated from the cells and transferred into acid washed polyethylene tubes within 45'. Serum samples were kept frozen (-70 0C) until the time of analysis. According to the filed questionnaires the children were not on any kind of Zn supplementation and their information were as shown in Table.1 .

The method for the serum Zn determination was based on a procedure described by Smith (6). A Varian spectra Flame Atomic Absorption (FAA-20 plus) with deuterium background correction system and a Hamamatsu light source (Japan) were used. The samples introduction were manual and all chemicals and materials had a grade for trace analysis.

Results

Out of10 girls and 16 boys; [6(60%), 95%CL (38% - 60%)] and [(11(68%), 95%CL (53% - 65%)] had serum zinc level less than reference interval

[Downloaded from intjmi.com on 2026-11-16]

range (70-120 µg/dL) 7 respectively (Table.2). Furthermore, significant Pearson product correlation between low serum Zn level (n=17) of patients, and age was obtained at p value less than 0.05 (Table.3). Mean diarrhea duration for n=17 was X=2.1±1.5 days.

Table 1. Children' s Information

GENDER	Number	Age Mean(Sd), Range(years)	Diarrhea Duration(Days)Mean(sd)	Zn Supplementation
GIRLS	10	3.0(1.3) (1-5)	1.8(1.5)	No
BOYS	16	2.8(1.5) (1-5)	2.2(1.4)	No

Table 2. Statistics on Children (n=17) with Low Zn Concentrations

Gender	Zn(µg/dL) Range	Zn(µg/dL)Mean(sd)	S.E*	95%CL**Zn(µg/dL)
Girls	35-66	49(13.2)	5.4	38%-60%
Boys	38-68	59(10.4)	3.1	53%-65%

* Standard Error of Mean ** Confidence Intervals

Table3.PearsonProduct Correlation Results (n=17)

Variables	r	P value
Age & Zn level	-0.50	0.048
Duration & Zn level	0.20	0.33

Discussion

Worldwide, gastroenteritis diseases are the leading cause of pediatric morbidity and mortality, with 1.5 billion episodes and 1.5-2.5 million deaths estimated annually among children below five years of age (8,9,10,11). During gastroenteritis episodes, the body loses major micro nutrients including Zn that is more critical in small children (2,3).

Many different studies have shown the positive impact of zinc on children's diarrheal episodes. In investigations evaluating the effect of zinc supplementation on diarrheal diseases a preventive and long-lasting impact were found (12,13). They showed that 10 mg of zinc daily for infants under six months of age and 20 mg per day for children age group six months -to five years for 10 – 14 days with acute diarrhea prevent further occurrences in the ensuing 2 -3 months (12,13,14) .

Furthermore, the results of a recent systematic review (15) found a preventive action of zinc supplementation and showed approximately 20% reduction of the mean duration of acute diarrhea. Another pooled analysis of randomized controlled trials of zinc supplementation in children up to 5 years old with acute or persistent diarrhea found that zinc-supplemented children had a 15% lower probability of continuing diarrhea on a given day (95% CI 5% to 24%) in the acute-diarrhea trials (16). A review study also reported that zinc supplementation can decrease the duration of acute diarrhea in children (17).

The obtained results in the present pilot study indicated that 64% of gastroenteritis children were Zn deficient (less than reference interval level) and significant correlation was obtained between low serum Zn level and age of the children. Furthermore, these children were not on any Zn supplementation.

Conclusion

[Downloaded from intjmi.com on 2026-11-16]

The author concludes that serum Zn determination is an important factor in gastroenteritis children under five years old. Although in developing countries, the role of zinc during acute diarrhea in small children assess further future studies, conducting educational based programs could be useful to increase the community information on the impact of zinc during gastroenteritis in children and emphasize on the WHO recommendation (18) , replacing 20 mg of elemental zinc per day for children above 6 months , to shorten the duration of acute gastroenteritis that is a simple effective therapeutic intervention .

Conflict of Interest

The author declares there is no conflict of interest for this study.

References

1.Geneva: WHO; 2006. Implementing the new recommendations on the clinical management of diarrhea-Guidelines for policy makers and program managers.

2.Brown KH. Peerson JM. Baker SK. Hess SY. Preventive zinc supplementation among infants, preschoolers, and older prepubertal children. Food Nutr Bull.2009;30(1):S12-40.

3.USAID Micronutrients Program. Zinc supplementation for the treatment of diarrhea. Moving from research to practice. Arlington, VA: USAID Micronutrients Program, Available from: www.zinc.org/case studies documents/zinc advocacy USAID.pdf.Accessed 2013 .

4.Strange GR. Ahrens WR. Lelyveld S. Schafermeyer RW. Pediatric emergency medicine: a comprehensive study guide.2nd ed. Toronto, ON: McGraw Hill;2002.pp347-52.

5.Berni Canani R, Buccigrossi V, Passariello A. Mechanisms of action of zinc in acute diarrhea. Curr Opin Gastroenterol. 2011 ;27(1):8-12.

6.Smith JC, Jr. Butrimovitz GP, Purdy WC. Direct measurement of zinc by atomic absorption spectroscopy. Clin Chem. 1979; 25: 1487-1479.

7.Milne D B. Trace elements. In: Burtis CA, Ashwood ER, eds. Tietz Textbook of Clinical Chemistry 3rd ed. 1999. Philadelphia, W.B. Sanders Co, pp1037-1041.

8.Kosek M, Bern C, Guerrant RL. The global burden of diarrhoeal disease, as estimated from studies published between 1992 and 2000. Bull World Health Organ. 2003;81:197–204.

9. Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year? Lancet. 2003;361:2226–33.

10.Unicef/WHO. Diarrhea: why children are dying and what can be done. New York: Unicef ; 2009.

11.Fische walker CL. Black RE. Zinc for the treatment of diarrhea: effect on diarrhea morbidity, mortality , and incidence of future episodes. Inter J Epid.2010;39(suppl1:163-i69).

12. WHO / UNICEF Joint Statement - Clinical management of acute diarrhea. WHO / FCH / CAH / 04.7. 2004 .

13.Scrimgeour AG, Lukaski HC. Zinc and diarrheal disease: Current status and future perspectives. Curr Opin Clin Nutr Metab Care. 2008;11:711–7.

14.Chaitali Bajait and Vijay Thawani . Role of zinc in pediatric diarrhea. Indian J Pharmacol. 2011;43(3):232-5.

15.Patel A, Mamtani M, Dibley MJ, Badhoniya N, Kulkarni H. Therapeutic value of zinc supplementation in acute and persistent diarrhea: a systematic review. PLOSONE. 2010; 5:e10386.

16.Bhutta ZA. Bird SM. Black RE, et al. Therapeutic effects of oral zinc in acute and persistent diarrhea in children in developing countries: pooled analysis of randomized controlled trials. American J Clin Nut 2000;72(6):1516-1522.

17.Zoo TT. Mou J. Zhan X. Zinc supplementation in acute diarrhea . Indian J pedia.2014; DOI 10.1007/s12098-014-1504-6.

18.Medicines used in diarrhea. WHO Model Formulary of Children. 2010. [Cited on 2012 Sep 30].p.369.Availablefrom:http://www.who.int/selection_medicines/list/wmfc_2010.pdf .

[Downloaded from intjmi.com on 2026-11-16]