

## ZINC DEFICIENCY IN CHILDREN INFECTED WITH *GIARDIA LAMBLIA*

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### ABSTRACT

*Giardia*, a protozoan parasite, resides in the small intestine in man. This parasite damages the mucosal intestinal surface and in severe cases produces malabsorption and it may also affect mineral absorption, especially zinc.

In this study a total of 118 infested and 43 non-infested persons as a control group were selected. From each patient a 5 ml blood sample was obtained. The serum was separated and zinc measured by atomic absorption method.

The results show mean serum zinc level in the infested group to be 75.364 microgram percent with the standard deviation of 19.433 while in the healthy control group it was  $97.707 \pm 28.258$ . Comparison between the two sexes indicated that in male subjects mean zinc content was 73.832 and 75.755 in the female group.

*MJIRI, Vol. 7, No. 3, 171-172, 1993.*

### INTRODUCTION

*Giardia lamblia* is a protozoan parasite that lives in the small intestine of man. This parasite damages the mucosal portion of the intestinal surface and disturbs the natural food absorption barrier in the gut. In severe cases it produces steatorrhea and malabsorption and may also affect the mineral absorption. Zinc is the main element that its deficiency in children produces growth retardation. This parasite is more prevalent in children due to its direct transmission pattern, and at the same time children are always in the growing state. If giardiasis causes zinc deficiency the infected person will be prone to growth retardation. Our main purpose in this study was to investigate zinc deficiency in the children infected with *Giardia lamblia*.

### MATERIAL AND METHODS

A total of 118 infected children and 43 non-infected children as a control group were selected. Patients all were school children selected from north of Tehran and those

who excreted *Giardia* cysts for at least 6 months entered this study. From each patient a 5 ml blood sample was obtained and immediately the serum was separated and frozen at  $-20^{\circ}\text{C}$ .

The collected serums were diluted five times and by atomic absorption method the amount of zinc for each specimen was measured. Meanwhile the amount of protein and albumin of each specimen was also measured.

### RESULTS

This study, as shown in Table I, revealed that the mean serum zinc level in the infected group was 75.364 micrograms percent with standard deviation of 19.443, while in the healthy control group it was 97.9070 with standard deviation of 28.258.

As shown in Table II, the results were also analyzed in the male and female groups, which indicated that in males the mean serum zinc level was 73.832 compared with 75.755 in the female group. Table III shows the results in different age groups (6-8, 8-10, and 10-12 years old). In the 10-12 years old age group, zinc deficiency was more

## Zinc Deficiency in Giardia Infection

**TABLE I: Serum zinc measurement in *Giardia lamblia* infection.**

group	number of patients	mean Zn mcgr/100	standard deviation
infected	118	75.3644	19.433
control	43	97.9070	28.258

**TABLE II: Serum zinc in *Giardia lamblia* infection in children according to sex.**

sex	group	number of patients	mean Zn mcgr/100	standard deviation
female	infected	94	75.755	19.943
	control	31	91.741	26.509
male	infected	24	73.833	17.604
	control	12	113.833	27.356

**TABLE III: Serum zinc measurement in *Giardia lamblia* infected children according to age group.**

age group (year)	mean Zn mcgr/100	standard deviation	control
6-8	74.340	23.174	infected
	92.444	26.697	control
8-10	76.384	14.819	infected
	97.238	31.682	control
10-12	75.512	19.295	infected
	102.769	24.451	control

**TABLE IV: Protein and albumin of serum in *Giardia lamblia* infected children.**

	number of patients	mean	standard deviation	control
protein	32	7.255	0.285	infected
	20	7.258	0.337	control
albumin	32	5.281	0.283	infected
	20	5.422	0.263	control

pronounced comparing with the control group of the same age. In protein and albumin measurements, as shown in Table IV, there were no significant differences between infected and non-infected groups ( $p>0.05$ ).

## DISCUSSION

Giardiasis causes mechanical damage to the epithelial surface of the small intestine and produces pronounced steatorrhea. This condition in the small intestine produces malabsorption for different nutrient particles and also malabsorption of the minerals, particularly zinc. In our observation only the surface damage of epithelial cells of the small intestine could perhaps be the main reason of zinc deficiency and subsequently the retardation of growth in children. As we know, zinc is mainly carried in the blood by albumin. In the case of albumin deficiency in liver disease, the zinc metabolism also can be affected. In our patients there was no albumin and protein deficiency.

We believe that many factors affect the growth retardation in children infected with *Giardia lamblia* the main of which are as follows:

A. chronic inflammatory lesions in the intestinal mucosa caused by the parasite is the main reason for malabsorption.

B. the parasite probably absorbs much zinc mineral in the gut and provides less chance for zinc absorption.

C. coverage of the epithelial surface of the small intestine with parasite inhibits direct contact of zinc with the cell surface of the gut which in long-term produces zinc and other mineral malabsorption.

## REFERENCES

1. Amirhakimi B: Zinc deficiency in man in Shiraz. Am. J. Med 53: 177-84, 1972.
2. Beaver, PC, Jung RC, Cupp EW: Clinical Parasitology., Ninth Edition, Lea & Febiger, Philadelphia, p. 45-47, 1984.
3. Chowdhury C, Ragbir S: Distribution of zinc in parasitic helminthes. J Helminthol 36: 149-153, 1989.
4. Henry JB: Clinical Diagnosis and Management by Laboratory Methods. Philadelphia, W.B. Saunders., p. 376-378, 1984.
5. Pandey KC, Chowdhury S: Inorganic elements in the adult of *Ascaridia galli*. J. Helminthology 639: 75-76, 1989.
6. Tandon BN: Consequence of giardiasis. Postgraduate Doctor Middle East 127, 1988.
7. Tietz NW: Textbook of Clinical Chemistry. Philadelphia, W.B. Saunders, 801-972, 1986.
8. Wiesehahn GP, Carrol EL, Lindmark DG, Meyer EA, Lesley M: *Giardia lamblia*, autoradiographic analysis of nuclear replication. Experimental Parasitology. 58(4): 100, 1984.
9. Wright SG: Giardiasis. Medical Education International, p. 2212-5, 1988.