

## 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.

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### 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: Protien 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.

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