The effect of Giardia lamblia on hematological and biochemical Parameters in school age children in Kirkuk

Najlaa Kadhim Ali Zangana, MSc., College of Medicine, Kirkuk
Mosaa Mahmood Marbut, PhD, College of Medicine, Tikrit
Mohammed A. Kadir, PhD, College of Medicine, Kirkuk

Abstract

Aim: - The study was planned to show the effect of Giardia lamblia infection on some hematological and biochemical parameters in school age children in Kirkuk city.
Subjects and Methods: - the study was conducted for the period from February 2002 till January 2003, on a six hundred and forty five pupils chosen randomly from six primary schools in Kirkuk city. The age of the pupils were ranging from 6-15 years old. The stool sample was collected from each child and examined by direct wet mount technique. Blood samples were collected in EDTA tube from them for hematological investigations and without anticoagulant for biochemical analysis. Results: - it was found that children infected with Giardia lamblia had lower Hb, PCV, RBC, MCV, MCH, MCHC and RBC values but their values were within normal range but was lower than control groups. The WBC values were increased in the infected groups, although the lymphocyte, monocyte percentage was at lowest normal range. While granulocyte percentage was lower in infected males and females than control group. The eosinophil percentage value did not differ in infected and control groups. Infected children had lower serum total protein, serum albumin and globulin, serum iron, serum zinc, and total iron binding capacity. Conclusion: - It is concluded from this study that Giardia lamblia infected children had lower hematological parameters, and biochemical values than controls.

Introduction

Today's children who will determine tomorrow's future and the development of any country depend on health standard of population from children until the adult life. School children are a group of individuals at risk, in which good health for them is needed, this play an important role in the performance of the children on their future life. Assessing the nutritional status of group of children is an essential part of monitoring the community health in developing countries (1).

Developing countries have complained in general from retardation of growth and development in comparison with the standard universal levels of growth and development due to poverty, wars, insufficient health care, malnutrition and many other causes (2).
School age is regarded as the most important phase of childhood life during which the child enters the society's training system and emerges as a contributing member of the community. If the child does not have adequate health, the benefits of education will be lost because of lack of attention due to ill health (3).

There is strong relation between the parasitic infection and nutritional status of the patient; the degree of iron and protein deficiency depends not only on the load of parasite infestation but also on the stores of iron and the nutrition of the patient as under nutrition, anemia and hypoproteinemia may develop and lead to physical and intellectual retardation (4).

Giardiasis can cause chronic diarrhea with malabsorption which leads to poor absorption of fat, lactose, protein and eventually leads to growth retardation and malnutrition (5).

Anemia represents another health problem affecting the primary school children which affect the attention and concentration of the students and lead to poor performance (6). Anemia is defined as reduction in the concentration of hemoglobin (Hb) in a sample of peripheral venous blood when compared with similar values obtained from a reference population (4).

The present study aimed to show the effect of Giardia lamblia on some hematological and biochemical parameters in school age children.

Subjects and Methods

Study population the study was carried out on 645 school's children in Kirkuk city (315 males and 330 females), for the period from 1st March 2002 to 30th July 2004. The age of children was ranging between (6-15) years. The study was done on six primary schools from different regions of Kirkuk city, the children were chosen randomly.

Selection of infected and control groups:

Six hundred and forty five stool samples of children were examination, 274 were positive for different types of parasites, 129 of them were positive for Giardia lamblia. Among Giardia positive cases only 71 were chosen as positive, due to in cooperation of children to obtain blood samples and 71 children from negative cases were chosen as control.

Collection of samples:

Stool samples:

Stool samples were collected from each child in clean containers labeled with name, date of collection, age, source and examined within (1/2 hours) by direct wet mount method using both normal saline and lugol’s iodine solutions in Kirkuk general hospital laboratories.
**Blood samples:** -
From each child, five ml of blood was collected in two tubes, one tube containing EDTA for hematological parameters, the second tube was plane tube without anticoagulant and the last one centrifuged at 1000 rpm for 20 minutes and the serum was kept in deep freeze (- 20°C) until required for biochemical tests.

**Hematological parameter:** -the hematological parameter was estimated according to method of Dacie and Lewis (7). The PCV value was estimated using micro centrifuge technique (NT-715/Turkey) (8). The Hb concentration was determined by using drabkin’s solution (Hb-meter) (Hb-210, Japan). The white blood and red blood cell numbers were counted under light microscope (10x and 40x) using Neubauer counting chamber.

For differential WBC count, blood smear was made from blood of each child. The smear was stained with Leishman’s stain and 200 leukocytes were counted from each smear. These were differentiated in to neutrophils, eosinophils, basophils, lymphocytes and monocytes and the percentage of each was calculated using oil lens microscope (100x) (7).

**Biochemical tests:** -
The total serum protein was measured by using kit from Randox laboratories Ltd., United Kingdom. The serum albumin was measured by using kit from Randox laboratories Ltd. United Kingdom. The value of serum globulin was estimated by subtracting the value of serum albumin from the total protein.

For this purpose colorimetric method was done using the kit of serum iron received from Randox Company U.K. Colorimetric method was done to assess serum T.I.B.C using the kit TI 1010 received from Randox Company U.K. Serum Zn level was estimated using atomic absorption spectrophotometer (AAS) which was designed by BRAIC Company made in China using the method of Milner and Whitesid (9).

**Statistical analysis:** -
Statistical analysis was done by using t-test to show the difference between each two groups (males and females, infected and control) for all parameters applied to show significant difference between them (10).

**Results**
Out of six hundred and forty five faecal samples of children examined, 129 (20%) were positive for *Giardia lamblia*.

**Hematological parameters:** -
Table (1) shows the comparison Mean and SD of Hematological parameters among infected and control groups. The Hb value was significantly lower in infected children than control groups (P<0.05, 0.01) among both sexes.
The PCV values among infected groups were significantly lower than control groups for both sexes (P<0.05).

The RBC values in infected groups were significantly lower than control groups in both sexes (P< 0.05).

Statistically, there was significant difference decrease in M.C.V value among infected groups in comparison with control groups (P<0.05).

There was significant difference in M.C.H among infected and control groups in both sexes. The MCH value in infected groups was lower than control ones (P< 0.05).

The MCHC was significantly lower in infected than control groups and among both sexes (P< 0.05).

Table (2) shows comparison Mean and SD in W.B.C and differential leukocyte count between infected and control groups in both males and females children. There was significant difference in WBC among infected and control groups in both sexes (P< 0.05), and infected groups had higher value than control groups.

There was significant difference in lymphocyte % among infected and control groups in both sexes (P< 0.05), and in infected groups was lower than control groups.

There was significant difference in monocyte % among infected and control groups in both sexes (P< 0.05), and infected groups had lower value than control groups.

There was significant difference in granulocyte % among infected and control groups in both sexes (P < 0.05), and infected groups had higher value than controls.

There was no significant difference in eosinophil % among infected and control groups in both sexes.

**Biochemical analysis**

Table (3) demonstrates comparison Mean and SD of serum total protein, albumin and globulin between infected and control groups in both male and female children. There was significant difference in their values among infected group and control group in both sexes (P< 0.05), and infected groups had lower value than control groups.

Table (4) shows the comparison Mean and SD of serum iron, T.I.B.C, and zinc value between infected and control groups in both male and female children. There was significant difference in serum iron values among infected and control groups in both sexes (P< 0.05), and infected groups had lower value than control groups. There was no significant difference in serum T.I.B.C values among infected and control groups in both sexes.

There was significant lower in serum zinc value in infected than control groups in both sexes (P< 0.05).
Discussion

Today nutritional deficiencies and parasitic infections constitute major public health problems in Iraq and other countries of the developing countries. Therefore the aim of the current study is to assess the nutrition status among children who are infected with intestinal protozoa by hematological parameters and biochemical tests and elemental examination of iron and zinc. *Giardia lamblia* is one of the main causes of malnutrition and malabsorption which affected all age groups of this study from 6-15 years.

The low value of Hb among both male and female children infected with *Giardia lamblia*, reflects that *Giardia lamblia* had an effect on Hb value and this finding agrees with Hesham and Edariah finding (11), that anemia was more frequent among infected children with giardiasis (61%) than among non-infected children (42%). They showed that Hb value decreased significantly with increase in the number of *Giardia lamblia*. Also this agrees with other two studies done by Tsuyuoka et.al (12), who found Hb concentration was below 11g / dl in 25 % of those infected with *Giardia lamblia* and not agrees with and Ish-Horowicz et.al (13), who did not find significant difference of Hb values, and iron concentration between asymptomatic infected children with giardiasis than controls.

The result of PCV value in both sexes infected with *Giardia lamblia* was lower than control ones. This finding agrees with a study done by Hesham and Edariah (11), which show of lower PCV values in cases infected with *Giardia lamblia*. This reflects the effect of *Giardia lamblia* on PCV value.

The red blood corpuscular count was lower among infected male and female children with *Giardia lamblia* than control groups; this reflects that *Giardia lamblia* has an effect on RBC.

The MCV values was lower in children infected with *Giardia lamblia* than control ones, this reflects that infection with *Giardia* had bad effect on MCV value, this finding agrees with a study done by Carlos et.al. (14), who showed the MCV value was lower than < 75fl in giardiasis.

The MCH values in infected male and female children was lower than control ones, may be there was no evidence to improve that *Giardia lamblia* has effect on MCH, so this might be due to malnutrition, this is affirmed by a study done by Bharat (15), who showed the MCH value was lower than < 27 pg with children who had malnutrition and anemia but they showed that MCV is much sensitive than MCH in determining changes of iron deficiency.
The MCHC values were lower among infected males and females. This is also reported by Tsuyuoka et.al from Brazil (12), who found that the MCHC value was below 30% in children infected with *Giardia lamblia* and this may be due to decrease in Hb that leads to decrease in MCH.

The significant lower value of PCV, Hb, and RBC than an infected one is not in agreement with Kadir and Mohammad Ali (16) found that *G. lamblia* had no significant effect on hematological value; this difference might be related to severity of infection and sample size.

The total white blood cell count value among infected children was higher than control groups in both sexes but its value was within normal range. This is identical with studies done by Cash et.al. (17), who found that white blood cell count among children infected with *Giardia lamblia* was within the normal range.

The values of lymphocyte in percentage in both infected males and females were lower than control groups. This is in agreement with a study reported by Schlesinger et.al. (18), who found that the peripheral blood lymphocyte was lowest among children infected with giardiasis.

The values of monocyte in percentage was lower in infected males and females than control groups; this reflects that *Giardia lamblia* has effect on monocyte.

The current results disagrees with a study done by Denhollander et.al. (19), which showed that during infection with *Giardia lamblia* the body defense mechanism, is maintained by increased peripheral blood monocyte, which spontaneously kill *Giardia lamblia* trophozoite.

The values of granulocyte in infected groups was higher than control, this might be due to increase in neutrophil as an inflammatory response.

The eosinophil value was normal in infected and control groups when examining twenty sample, ten of them control and other ten infected groups. This reflects that *Giardia lamblia* has no effect on eosinophil count, and this agrees with a study done by Cash et.al. (17), who showed that there was no eosinophilia in children infected with *Giardia lamblia*. Also in a study done by Carron et.al (20), who reported that eosinophilia is uncommon in giardiasis.

The white blood cell count appear normal in this study and this is in agreement with Cash et.al (17), decrease in lymphocyte and monocyte in infected groups, but their values were within normal range it may be due to decrease in zinc level lead to decrease in lymphocyte and monocyte. Granulocyte is increased in infected groups but also their values were within normal range, so the increase in granulocyte may be due to increasing in
neutrophil values because it’s the first line defense in the body for the infection.

Biochemical analysis:-

The values of serum total protein were lower among infected groups than controls. This is identical with a study done by Sherman and Lieberman (21), who reported that *Giardia lamblia* can cause intestinal protein loss without producing diarrhea. Also in a study done by Peterson (22) who showed that *Giardia lamblia* infection leads to decrease vitamin A, B12, and protein levels. The decrease in serum total protein among infected groups may be due to insufficient intake of protein of good biologic values, or due to impaired in absorption of protein which lead to abnormal loss of it.

The result of serum albumin value in infected group was lower than control groups. This reflects that *Giardia lamblia* had an effect on children with protein loss gastroenteritis. This agrees with a study done by Dubey et.al (23), who showed that *Giardia lamblia* in children leads to hypoalbuminemia and protein loss. However this study is not in agreement with that reported by Sullivan (24), who showed *Giardia lamblia* in infected children leads to increase of fecal-alpha-1-antitrypsin excretion without producing hypoalbuminaemia. This might be due to difference in type of diets from one country to another, so this affects on the result of the albumin. Albumin level was low among infected group, may be due to protein losing enteropathy, or altered gastrointestinal flora or zinc deficiency since 70% of albumin bound to zinc. The decrease in serum total protein and albumin is also reported in a study done in Kalar town (16).

The serum globulin value in infected children was lower than control ones; this reflects that infection had an effect on globulin level. This agrees with a study done by Enrique et.al. (25), who showed hypogammaglobulin in patients infected with *Giardia lamblia*, also the same study reported that giardiasis is present in patients with hypoglobulinemia, particularly IgA deficiency, which may contribute to protein energy malnutrition in children. Also decrease in globulin among infected groups may be due immunoglobulin deficiency especially IgA which is associated with giardiasis infection (25).

The decrease in serum iron level among infected groups reflects that *Giardia lamblia* has an effect on iron level. This is also shown by Demirci et.al (26), whom reported that malabsorption of iron, is a complication of giardiasis.

The serum total iron binding capacity values among infected children did not vary significantly from control group although it was lower in infected group; this reflects that *Giardia lamblia* has no effect on TIBC, and this agrees with a
study done by Agarwal et al.\(^{(27)}\), who reported that TIBC decreases in children infected with *Hookworm*, *Malaria*, and *Ascaris lumbricoides* and they did not find in those infected with *Giardia lamblia*.

The serum zinc level in children infected with *Giardia lamblia* was lower than the uninfected groups; this result agrees with that done by Demirci et al.\(^{(26)}\), who showed decrease in serum zinc level among children infected with *Giardia lamblia*. In Kalar town\(^{(28)}\) it was reported that both serum iron and zinc were significantly lower in infected children than control one.

The decrease in serum iron and zinc among infected groups may be due to Iraqi’s population diet which is rich in phytate as: grain bread, cereals, and legumes which lead to malabsorption of these minerals as reported by Wise\(^{(29)}\). Serum total iron binding capacity is not affected, which may be due to the fact that giardiasis is not so severe that leads to decrease serum TIBC as well as the change in serum TIBC is not correlated necessarily with the absorption of iron.

The following **conclusions** are arrived at in this study:

1- Although the (Hb, PCV, RBC, MCV, MCH, and MCHC) were lower among infected groups while WBC was higher than control group.

2- Differential leukocyte counts were lower in infected males and females than controls although their values were within normal ranges.

3- Serum total protein, albumin, and globulin were lower among infected groups than controls.

4- In infected children the serum zinc and serum iron levels were decreased, while the TIBC value was within normal range.

It is **recommended** to improve nutritional status, the child diet should contain the essential dietary component such as zinc, iron, to increase the immunity of child toward *Giardia lamblia* infection.

**References**

1- AL-Janabi M. H. Common health problems among primary school children in Sinnyia district, A diploma Dissertation in PHC College of Medicine, Tikrit University, 1999.


The effect of Giardia lamblia on hematological and biochemical Parameters in school age children in Kirkuk


Table (1): Comparison of hematological parameter among infected and control male and female children.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean ± SD</th>
<th>Male n=65</th>
<th>Female n=77</th>
<th>Group1 Control N=30</th>
<th>Group2 Infected N=35</th>
<th>Group3 Control N=41</th>
<th>Group4 Infected N=36</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hb g/L</td>
<td>130.40 ± 0.753</td>
<td>106.15 ± 0.898</td>
<td>130.39 ± 0.606</td>
<td>99.9 ± 1.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40.8 ± 2.32</td>
<td>35.4 ± 2.51</td>
<td>40.1 ± 6.54</td>
<td>34.3 ± 3.47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P.C.V %</td>
<td>5.19 ± 0.481</td>
<td>4.800 ± 0.622</td>
<td>5.23 ± 0.422</td>
<td>4.674 ± 0.605</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R.B.C No.×10¹²</td>
<td>78.61 ± 2.40</td>
<td>73.75 ± 4.70</td>
<td>76.67 ± 4.56</td>
<td>73.38 ± 2.74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.C.V fL</td>
<td>25.12 ± 1.70</td>
<td>22.12 ± 1.68</td>
<td>24.93 ± 2.04</td>
<td>21.37 ± 1.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.C.H pg.</td>
<td>319.60 ± 0.845</td>
<td>299.86 ± 2.74</td>
<td>325.16 ± 0.839</td>
<td>291.29 ± 2.92</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* t-test  NS = no significant  (*) P<0.05 = significant  N= number
Table (2): Comparison of total and differential WBC counts between infected and control children.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean ± SD</th>
<th>Male  n=65</th>
<th>Female n=77</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Group1 Control N=30</td>
<td>Group2 Infected N=35</td>
</tr>
<tr>
<td>W.B.C No. × 10^9</td>
<td>5.95 ± 1.18</td>
<td>7.90 ± 1.45 (*)</td>
<td>5.66 ± 1.01</td>
</tr>
<tr>
<td>Lymphocyte%</td>
<td>39.09 ± 3.50</td>
<td>35.5 ± 10.1 (*)</td>
<td>38.59 ± 1.05</td>
</tr>
<tr>
<td>Monocyte%</td>
<td>4.557 ± 0.383</td>
<td>3.61 ± 1.02 (*)</td>
<td>4.466 ± 0.265</td>
</tr>
<tr>
<td>Granulocyte%</td>
<td>57.18 ± 8.05</td>
<td>63.20 ± 7.26 (*)</td>
<td>56.93 ± 7.45</td>
</tr>
<tr>
<td>*Eosinophil %</td>
<td>2.0 ± 0.94</td>
<td>2.1 ± 1.197 (NS)</td>
<td>2.3 ± 0.82</td>
</tr>
</tbody>
</table>

T-test  NS= non significant  (*) P<0.05 = significant  (), N= number

Note:- Eosinophile % = was performed on (5) samples from each group
### Table (3): Comparison of serum total protein, serum albumin, and serum globulin in infected and control male and female children.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean ± SD</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male n=65</td>
<td>Female n=77</td>
<td>Group 1</td>
<td>Group 2</td>
<td>Group 3</td>
<td>Group 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Control</td>
<td>Infected</td>
<td>Control</td>
<td>Infected</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N=30</td>
<td>N=35</td>
<td>N=41</td>
<td>N=36</td>
</tr>
<tr>
<td>Serum total protein g/L</td>
<td>78.07 ± 0.90</td>
<td>52.36 ± 1.04(*)</td>
<td>74.86 ± 0.64</td>
<td>55.25 ± 1.38(*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum albumin g/L</td>
<td>43.87 ± 0.64</td>
<td>32.03 ± 0.47(*)</td>
<td>42.32 ± 0.53</td>
<td>30.56 ± 0.58(*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum globulin g/L</td>
<td>34.20 ± 0.40</td>
<td>20.34 ± 0.46(*)</td>
<td>32.54 ± 0.66</td>
<td>24.69 ± 0.67(*)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**t-test**  (*) P<0.05 = significant  
N= number

### Table (4): Comparison of serum Iron, serum T.I.B.C and serum Zinc between infected and control male and female children.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean ± SD</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male n=65</td>
<td>Female n=77</td>
<td>Group 1</td>
<td>Group 2</td>
<td>Group 3</td>
<td>Group 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Control</td>
<td>Infected</td>
<td>Control</td>
<td>Infected</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N=30</td>
<td>N=35</td>
<td>N=41</td>
<td>N=36</td>
</tr>
<tr>
<td>Serum iron µmol/L</td>
<td>22.87 ± 4.79</td>
<td>12.02 ± 1.34(*)</td>
<td>21.85 ± 5.34</td>
<td>10.96 ± 1.68(*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum T.I.B.C µmol/L</td>
<td>56.78 ± 6.66</td>
<td>53.6 ± 10.2 (NS)</td>
<td>56.19 ± 7.40</td>
<td>52.7 ± 11.9 (NS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum zinc µmol/L</td>
<td>14.991 ± 0.310</td>
<td>7.480 ± 0.171(*)</td>
<td>13.721 ± 0.186</td>
<td>8.398 ± 0.129(*)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**t-test**  NS = no significant  (*)P<0.05 = significant  
N= number

تأثير الجيارديا المبلية على المعايير الذموية والكيميائية في أطفال المذارش في مدينة كركوك

نجلاء كاظم علي زه نكنو ماجستير فسلجة، كلية الطب، كركوك/

د. موسى محمود مربط أستار، كلية الطب، تكريت

د. محمد عبد العزيز قادر أستاذ، كلية الطب، كركوك

الخلاصة:

الهدف : تهدف هذه الأنظمة لبيان تأثير طفيلي الجيارديا المبلية على بعض المعايير الذموية والكيميائية في أطفال المدارس في مدينة كركوك.

الأشخاص وطريقة العمل: حيث أجريت هذه الأنظمة على ستة مدارس وتسعة وأربعون طفلاً تم اختيارهم بصورة عشوائية من أطفال المدارس في مدينة كركوك. إذ تراوحت أعمار الأطفال الذين أجريت عليهم الاختبارات بين 5-16 سنة، ولمدة ما بين شهرين وثلاث شهور، بعد اعتماد نتائج الأشخاصين الذين تم جمع عينات البراز من كل طفل وتم فحصهم بطريقة الفحص المباشر، أما ما يصف فحص المقايس الذموية؟ في أن تكون أطفال الدم في أدنى حاولية على مادة مانعة للختان فقد شمل (الهيموكلورين، البيريديك، وتعدد الكريات الحمراء، متوسط حجم الكريات، متوسط تركز الخضاب، وتحديد الخلايا البيضاء) أما ما يخص التحليل البايوكيميائي يجمع عينات الدم في أدنى الدم في أدنى لا تحتوي على مادة مانعة للختان فقد شمل (البروتين الكلي، الفوسف، الكوليسترول، والكولسترول). أبين الحساسية أيضاً العناصر الضرورية.

النتائج: وجدت الأنظمة بأن المجموعة المصابية كان لديها نقص في قيم الهيموكلورين، الهيموأكورتاء، وتعدد الكريات الحمراء، متوسط حجم الكريات، وتعدد حمض اليمين، وتوزع تركز الخضاب، بين تلك ك东路 تعداد كريات الدم الحمراء كانت ضمن العملي الطبيعي ولكنها كانت أقل مقارنة بالمجموعة السيطرة، ولذلك زيادة في قيمة خلايا الدم البيضاء في المجموعة المصابية، ورغم ذلك تعدد الخلايا البولية، ووحيدة الوهبة كانت ضمن الحد الأدنى للمدى الطبيعي. وتحسب أيضاً أن الامتصاص بالجارديا المبلية أدت إلى نقص في مستوى البروتين الكلي، والوزنك وقوة الابتعاد الكلية للنظام. أنتجت هذه الأنظمة بأن الأطفال المصابين بالجارديا المعوية لديهم قيم أقل في القياسات الذموية، والكيميائية عن المجموعة السيطرة.