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# A STUDY OF SOME PHYSIOLOGICAL PARAMETERS IN THE CASE OF GIARDIA LAMBLIA PARASITE AND AMOEBA DYSENTERY IN HOLY KARBALA PROVINCE / IRAQ

Ali H. M. Al-Mammury[1], Furhan T. Mhaisen[2] and Hadi R. Hasan[3]
[1]College of Dentistry, University of Kerbala, Kerbala, Iraq
[2]Tegnervägen 6B, Katrineholm 641 36, Sweden
[3]College of Applied Medical Sciences, University of Kerbala, Kerbala, Iraq

## SUMMARY

The present study was conducted from January 2004 to December 2004 to investigate the microorganisms causing diarrhea among patients attending Al-Hussaini general hospital for children in Karbala city. The number of examined samples was 2032 faecal samples for ages ranging from one month to three years. The samples were examined by direct smear and culture methods. Results of examination revealed the record of six categories of diarrhea causes, including *Giardia lamblia* with a prevalence of 24.2% *and Entamoeba histolytica* (12.8%). The intestinal parasitic infections occurred at higher rates during the hot months with no significant differences; significant differences in the infection rate with different microorganisms were noted among studied age groups (1-6 months, 6-12 months, and 1-3 years). The most common double infections were those between G. *lamblia* and *E. histolytica* (30.5% and 20.3% of the total double infections, respectively).

The investigation of the relationship between *G. lamblia* and *E. histolytica* infections and some blood parameters indicated a significant increase in total white blood cell count in the studied cases of infection with different diarrhea causes and a significant decrease in values of both hematocrit and haemoglobin concentration.

***Keywords :*** **physiological parameters, giardia lamblia parasite, amoeba dysentery.**

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## INTRODUCTION AND LITERATURE REVIEW

Diarrhea is defined as a pathological condition resulting from a dysfunction in the digestive system as a result of infection by living or non-living causes, and it is represented by the increase in the number of times of defecation with the production of liquid or semi-liquid faeces, which leads to the loss of fluids and ions, causing dehydration and blood viscosity (1); this leads to an iron deficiency when infected with the flagellating parasite called Giardia lamblia and Entamoeba histolytica, as well as infection with bacteria and viruses, all of which lead to sudden malabsorption and damage to the villi lining the intestine and poor absorption of proteins, carbohydrates, (fats, calcium and vitamins (2.

Diarrhea can be controlled by giving glucose to a person with diarrhea, as it has been used successfully in millions of cases in the world because glucose is rapidly absorbed to replace fecal losses and giving cooked rice at a rate of 50 grams is also highly efficient in this area (3).

To investigate the prevalence of diarrhea, many studies were conducted. Study (4) showed that the primary animals were investigated by two educational hospitals in Baghdad (Baghdad Hospital on the Rusafa side and Yarmouk side on the Karkh side), and after examining 4334 faecal samples, it appeared that the infection with Giardia lamblia was By 9.6% and 6.7% for the two hospitals, respectively, as for the infection of dysentery amoeba, it appeared by 38.4% in Baghdad Hospital compared to 7.2% in Yarmouk Hospital, in addition to the appearance of injuries with four other types of primary animals.

(5) In an epidemiological study to determine the prevalence of intestinal parasites in 4,537 faecal samples from patients attending two hospitals in the city of Hilla (Babil Children's Hospital and Marjan Specialist Hospital) , the total infection rate in these two hospitals was 47.1%, and the incidence of Giardia lamblia appeared at 8.3% and amoeba. Dysentery by 10.3%, in addition to five other intestinal parasites.

(6) studied the prevalence of intestinal parasites among the residents of Al-Shatrah city. 3425 faecal samples were examined. Giardia lamblia infection was 27% compared to 14.2% for amoeba dysentery, in addition to the presence of six other types of intestinal parasites.

A study (7) to investigate the quality and prevalence of intestinal parasites in the city of Karbala showed.

During the examination of 4024 faecal samples for different age groups, the infection rate with Giardia lamblia was 9.3%, compared to 10.4% for dysentery amoeba, in addition to the presence of eight other types of intestinal parasites.

(8) studied the prevalence of intestinal parasites among students of some elementary schools in Al-Hashimiyeh district in Babil governorate, as 3996 faecal samples were collected, and Giardia lamblia infection was recorded at 10.3% compared to 11% for ameba dysentery, in addition to the presence of seven types of other intestinal parasites.

In a study in Anbar governorate on the prevalence of intestinal parasites infection and the relationship of infection to some blood components, 2140 samples of feces and blood were collected from patients attending four hospitals there, and the incidence of dysentery amoeba was 13.5%, while Giardia lamblia was 10% in addition to the presence of eight other types of parasites Intestinal parasites and there was a discrepancy in the values of blood components (hemoglobin and white blood cell counts) between people infected with intestinal parasites and those without (9)

Salman (2002) completed an epidemiological study on the prevalence of intestinal parasites among children with diarrhea, as 2203 faecal samples were collected from children whose ages ranged from seven days to 12 years old in two hospitals in Baghdad (Ibn al-Baladi Hospital in the side of Rusafa and the Children’s Hospital in Kadhimiya. On the side of Karkh). The incidence of Giardia lamblia was 11% compared to 33.9% for dysentery amoeba, in addition to the registration of seven other types of intestinal parasites.

(10) showed some epidemiological aspects of intestinal parasites among young age groups in the city of Karbala, as 1050 fecal samples were collected for children attending the Children’s Hospital in Karbala, and the incidence of dysentery amoeba was 9.6% compared to 7.3% for Giardia lamblia as well as pinworms.

Al-Kubaisi (2003b) conducted a survey of intestinal parasites in Hilla, where 6085 faecal samples were collected for eleven health centers, and the incidence of dysentery amoeba was 8.5%, lamblia Giardia 19.3%, in addition to the presence of nine types of other intestinal parasites.

In a study in Karbala governorate on the prevalence of intestinal parasites among people with diarrhea, 1174 faecal samples were collected from the visitors of Al-Husseini Hospital and Children's Hospital in Karbala. The incidence of dysentery amoeba infection was 19.9% compared to 17.1% for Giardia lamblia, in addition to the presence of six other types of intestinal parasites (11).

In Hilla, a study was conducted on the prevalence of rotavirus and intestinal pathological factors that cause acute diarrhea in infants, as 315 faecal samples were examined (225 samples from inpatients and 90 samples from outpatients), and the incidence of Giardia lamblia was 5.4% compared to 12.4% for ameba dysentery and 41 .8% of rotavirus, in addition to recording infection with six types of bacteria (12)).

In Nineveh, an experimental and translational epidemiological and immunological study of Cryptosporidiosis in hosts was conducted.

Different (children, calves, lambs, and goats) where 470 faecal samples were examined from children of different ages, and the infection rate in children was 17.1% (13).

## MATERIALS AND METHODS

Fecal samples were collected from patients suffering from diarrhea and gastritis at the Husseini General Children's Hospital in Karbala from January 2004 to December 2004, and information was taken on the age and gender of the patient and whether or not he took an antibiotic. As for the tests performed on faeces, they included a visual examination and a microscopic examination, which are: -

**A- Gross examination**

A sample examined the faecal samples before examining them microscopically, and the examination included their consistency and color, as they may contain blood or mucus. These parts must be examined separately and carefully (14).

**B- Microscopic examination**

The microscopic examination included the use of the direct swab method and the isolation of intestinal parasites that cause diarrhea as follows: -

First - Direct Smear Method

In this method, a drop of Normal saline (0.9% NaCl) was placed on one side of a clean, dry glass slide and another drop of Lugol's iodine solution on the other side, then a small amount of faeces was taken with a wood stick and mixed well with A drop of the physiological solution and iodine solution, and samples were taken from different places of the model to increase the probability of parasite emergence, then put the slide cover without causing air bubbles after removing any large particles from the sample (15)).

The total number of white blood cells was calculated as well as the hemoglobin level was determined as follows: -

Calculate the total number of white blood cells

Total Number of White Blood Cell Count

Haemocytometer was used, which consists of a glass slide called Neubauer's chamber. A pipette with a small onion containing a white crystal containing gradations from 5 to 11 was used for this examination. There is a solution called Turk's solution consisting of ice acetic acid that breaks down red blood cells and is colored Gensin, which colors the nuclei of white blood cells. The white onion pipette was used until it was filled to 0.5, and the dilution fluid was withdrawn to reach 11 20: 1 dilution products. The white blood cells were counted under the magnification force of the microscope's small objective lens (10x), and the total number of white

blood cells was calculated based on the product. The number of blood cells counted in all four large squares in 50 (3)

Determination of Haemoglobin Concentration

A quantity of blood was taken in a capillary tube and placed in a hematocrit meter for five minutes. The volume of PCV was calculated using a special ruler; then, the hemoglobin percentage was extracted according to the World Health Organization (1983) through a special equation: -

Hemoglobin = (volume of compacted cells ÷ 3) - 1.

## RESULTS

Between January 2004 and December 2004, 2032 faecal samples were examined by visitors to the Children's Hospital in Karbala. Table (1) shows the monthly changes in the incidence of different causes of diarrhea, where the total incidence of Giardia lamblia was 24.2% compared to 12.8% with dysentery amoeba and 12.2% compared to 3% with undiagnosed causes.

The incidence of diarrheal causes during June, July, and August was higher than in the other months. The incidence rates of lamblia Giardia ranged between 6.6% in December and 41.3% in July. As for dysentery amoeba, the incidence ranged from 2.1% in November compared to 27.4% during July. Undiagnosed injuries were observed during all months except for December, and the percentages ranged between 0.7% during November and 6.8% during June.

It was observed through statistical analysis (chi-square test) there were no significant differences with Giardia lamblia infection, amoeba dysentery, and undiagnosed etiology.

Table (2) shows the infection percentages of different age groups with different causes of diarrhea. The incidence of Giardia lamblia was lower in the 1–6 months age group (7%) compared to the 6–12 months age group (31.8%) and the 1-3 years age group (25.7%). As for dysentery amoeba, the incidence of infection in the age group 1-3 years was equivalent to 10.8% compared to the age group 1-6 months (13.7%) and the age group 6-12 months (16.1%).

Generally, it was observed from the chi-square test that there were significant differences below the level of 0.01 and 0.05 for different age groups with different causes of diarrhea, ameba dysentery, and Giardia lamblia that there are common infections with different causes of diarrhea.

The combined infection between Giardia lamblia and amoeba was dysentery (20.3%). Table (3) shows the total number of white blood cells, the blood volume, the hemoglobin concentration, and its relationship to the causes of diarrhea caused by the microorganisms, where it was observed that the number of white blood cells, in general, is high among the infections caused by diarrhea, as the average number was high among children with Giardia lamblia (11.4 x 310 cells / 3 ml blood for people with semi-solid diarrhea versus 10 x 310 cells/ml 3 blood for those with liquid diarrhea), and for children with ameba dysentery (9.6 x 310 cells/ml 3 for people with semi-solid diarrhea versus 12.4 x 310 cells/ml 3 blood for people with liquid diarrhea), and in children, Those with undiagnosed etiology (18.2 x 310 cells/ml 3 blood for people with semi-solid diarrhea versus 22 x 310 cells/ml 3 blood for those with liquid diarrhea) compared to the average number of white blood cells in children who did not suffer from any diarrhea (7 x 310 cells/ml 3 blood) ).

It was observed that the highest level of blood count among children with diarrhea was in children with dysentery amoeba with semi-solid diarrhea (27%), while the lowest value was in those with undiagnosed injuries who had semi-solid diarrhea (16%) compared to the level of blood accumulation in children who They did not suffer from any diarrhea (39%).

It was observed that the highest value of hemoglobin concentration in children with various groups was in children with dysentery amoeba with semi-solid diarrhea, reaching 8.5 g / 100 ml, while the lowest value of hemoglobin concentration was among children with undiagnosed causes and semi-solid diarrhea (5.2 g / 100 Ml) compared to the hemoglobin concentration in children without any diarrhea (12.7 g / 100 ml).

Generally, it was noticed from the t-test that there were significant differences below the level of 0.01 and 0.05 for the various measurements of blood images, including the total number of white blood cells, the blood volume and hemoglobin concentration with the causes of diarrhea.

Table (1): monthly changes in the percentages of infection with different causes of diarrhea.

| Months | Total examined number | Number (percentage) of infection with various causes of diarrhea: - | | |
|---|---|---|---|---|
| | | Giardia lamblia | Entamoeba histolytica | Etiology Not diagnosed |
| 04-Jan | 181 | 33 (18.2) | 7 (3.9) | 4 (2.2) |
| February | 204 | 23 (11.3) | 14 (6.9) | 2 (1.0) |
| March | 179 | 29 (16.2) | 19 (10.6) | 6 (3.4) |
| April | 196 | 61 (31.1) | 24 (12.2) | 4 (2.0) |
| May | 142 | 37 (26.1) | 25 (17.6) | 7 (4.9) |
| June | 163 | 59 (36.2) | 37 (22.7) | 11 (6.8) |
| July | 223 | 92 (41.3) | 61 (27.4) | 13 (5.8) |
| Ogest | 155 | 55 (35.5) | 35 (22.6) | 9 (5.8) |
| September | 173 | 42 (24.3) | 25 (14.5) | 2 (1.2) |
| October | 122 | 25 (20.5) | 6 (4.9) | 2 (1.6) |
| November | 143 | 26 (18.2) | 3 (2.1) | 1 (0.7) |
| December | 151 | 10 (6.6) | 4 (2.7) | 0 |
| total summation | 2032 | 492 (24.2) | 260 (12.8) | 61 (3.0) |
| | | 14.6 | 15.3 | 8.1 |
| | | 24.7 | 24.7 | 24.7 |
| | | 19.6 | 19.6 | 19.6 |

* significant

Table (2): Percentages of incidence of diarrheal causes among different age groups.

| | (Percentage) of infection with various causes of diarrhea: - | | | Etiology |
|---|---|---|---|---|
| The checked number | | Giardia lamblia | Entamoeba histolytica | Not diagnosed |
| 01-06 months | 344 | 24 (7) | 47 (13.7) | 43 (12.5) |
| 570 | | 181 (31.8) | 92 (16.1) | 7 (1.2) |
| 1-3 Years | 1118 | 287 (25.7) | 121 (10.8) | 11 (1) |
| Total | 2032 | 492 (24.2) | 260 (12.8) | 61 (3) |
| | | 55.3 | 10.3 | 129 |
| | | 9.2* | 9.2* | 9.2* |
| | | 6* | 6* | 6* |

* significant

Table (3): The relationship of the different causes of diarrhea with some blood measurements in the two cases of semi-solid and liquid diarrhea.

| Causes of diarrhea | Samples of children without giardia lamblia diarrhea | Giardia lamblia | | Amoeba dysentery | | Undiagnosed etiology | |
|---|---|---|---|---|---|---|---|
| | number | number | number | number | number | number | number |
| | 898 | 158 | 334 | 89 | 171 | 23 | 38 |
| state Diarrhea | Solid | Semi solid | liquid | Semi solid | liquid | Semi solid | liquid |
| Blood parameter | N | N SD ± | N SD ± | N SD ± | N | SD ± | N SD ± |
| | SD ± | | | | SD ± | | |
| White blood cell count (cells / ml 3 blood) | $7\times^{3}10$ | $11.4\times^{3}10$ | $10\times^{3}10$ | $9.6\times^{3}10$ | $12.4\times^{3}10$ ± 0.78 | $18.2\times^{3}10$ ± 1.45 | $22\times^{3}10$ ± 2.11 |
| | ± 1.3 | ± 1.05 | ± 1.3 | ± 0.49 | | | |
| Hematocrit (%) | 39 | 25.6 | 21 | 27 | 25 | 16 | 19 |
| | ± 0.4 | ± 0.8 | ± 0.4 | ± 0.8 | ± 0.8 | ± 0.2 | ± 0.8 |
| Hemoglobin concentration (g / 100 ml blood) | 12.7 | 8.2 | 6.8 | 8.5 | 8.2 | 5.2 | 6.3 |
| | ± 0.6 | ± 0.1 | ± 0.01 | ± 0.17 | ± 0.01 | ± 0.33 | ± 0.06 |

Calculated t (white blood cell count) = 6.07, calculated t (hematocrit) = 6.588, calculated t (hemoglobin concentration) = 6.603

t tabular (0.01) = 2.650 *

t-tabular (0.05) = 1.771 *

* Moral difference

## DISCUSSION

Parasitic infections are spread in tropical and subtropical regions of the world to increase population density, in addition to the lack of good health conditions, and in areas inhabited by people who suffer from poverty, ignorance, hunger, malnutrition, and a deficiency in the preventive health system, as well as the presence of insects that help spread infections among people.

The results of the current study (Table 1) showed that the total incidence of Giardia lamblia was 24.2%, and this percentage is close to what each of (16) found, which is 22.6% in nursery school children in Baghdad (6), which is 27% in the residents of Al-Shatra city and (10) It is 19.3% in Babil Governorate (11) and 17.1% in Karbala Governorate. But the current infection rate was high compared to what each of (1 17)) scored. It is 10.9% in the city of Erbil, (18), which is 12.9% in Basra, (5), and 8.3% in Babylon (7), which is 9.3% in Karbala, and (10), which is 7.33% in Karbala.

The similarity and difference in the rate of infection recorded in the current study compared with the aforementioned studies are due to several reasons, including the similarity of the environmental and climatic conditions of the country in general and the difference in the number of samples (sample size) as well as the period for research completion (17,18). Some studies also dealt with all age groups, young or old (19), while others were limited to specific age groups (16,11).

The current study showed that the incidence of dysentery amoeba was 12.8%, which is close to what was found (7) and 10.4% in Karbala and (21), which is 14.8% in Hilla. Also, the current infection rate was higher than that recorded by each of (16), which is 0.5% in Baghdad (4) and 7.2% in Yarmouk Teaching Hospital on the Al-Karkh side of Baghdad.

As for the undiagnosed causes, the infection rate was 3%. These causes may include other viral or bacterial causes or poor digestion of foodstuffs because of other diseases such as intestinal sensitivity to natural or artificial milk (22).

In general, the percentage of parasitic infections was high during the summer months and low during the winter months. This result is comparable to what was previously recorded (4) in Baghdad Teaching Hospital during the months of summer (May and June) and early autumn (September), which are 67.1%, 70.2%, and 83.4%, respectively, while the lowest infection rate was during March (52.6%).).

The highest infection rate was recorded in Study 7 during July (54.1%) compared to 26.2% during February. The high incidence rate during the hot summer months can be explained on the basis that the intestinal microorganisms are more developed, multiplied, and spread in hot regions compared to cold climates, as well as the proliferation of insect vectors, as the tropics and subtropics are the most suitable areas for the growth and spread of intestinal and intestinal microorganisms due to their climate Hot (23) as well as other factors of parasite transmission during the hot months.

The proliferation and spread of disease-carrying insects, especially house flies (24), in addition to the fact that water consumption during the summer is more than it is in the winter, as well as the consumption of juices, refreshments, and fast food in the absence of good health conditions as well as that the age groups from one to three years fall within Groups that do not have an integrated immune system, therefore, are more susceptible to those pathogens caused by the parasites that cause diarrhea.

As for dysentery amoeba, the incidence of infection in the age group 1-3 years was equivalent to 10.8% compared with the age group 6-12 months (16.1%) due to a lack of full

awareness of the quality and cleanliness of the food eaten, as well as that this group may be under breastfeeding; this makes them more susceptible to the risks arising from cleaning milk vessels (feeding bottles) and leaving milk for a period under climate conditions appropriate for the growth and reproduction of the micro-organisms that cause diarrhea, as well as the bad, unhealthy habits prevalent among this group that help the spread of infection (15).

Undiagnosed etiology appeared to have a higher incidence in the 1-6 month age group (12.5%) compared to the two older age groups; this is due to the bacterial presence of undiagnosed pathogens (viruses or other bacteria). The cause of diarrhea may result from poor absorption of bile salts and their return to the liver, resulting in a deficiency of bile acids. Most importantly, many unabsorbed salts are transported to the colon, which weakens water absorption and causes fatty diarrhea and malabsorption. The cause of diarrhea may be a deficiency of disaccharidase deficiency enzymes, where the intestinal juices secrete a group of enzymes that break down disaccharides such as lactose, sucrose, and maltose. Diarrhea, enteropathy, i.e., gluten-sensitive enteropathy. Therefore, protein sensitivity leads to significant necrosis of the intestinal mucosa, which leads to malabsorption and diarrhea (14).

About joint infections in people with diarrhea, it was found that the common infection between Giardia lamblia and amoeba dysentery was (20.3%) of the total joint infections.

Infection with intestinal parasites was associated with blood tests, and these results had a significant difference for all blood tests (total number of white blood cells, hematocrit, and hemoglobin concentration) as those tests were high among infections with the causes of diarrhea and this is consistent with what was recorded (8) in the Hashemite district In Babil Governorate and (9) in Anbar Governorate. The increase in the number of white blood cells is attributed to the that when the body is infected with microorganisms, the immune system of the body of the infected person stimulates the immune cells (stimulation by IgA) to the site of infection towards the production of some white blood cells and infiltration through the walls of capillary blood vessels to reach the site of infection. Low numbers of white blood cells are observed in unaffected (normal) tissues compared to cases of pathological microorganisms (25).

Concerning the decrease in blood supply and hemoglobin concentration in cases of micro-organisms under study, this is because inflammation in the gastrointestinal tract leads to obstruction of the intestine in absorbing the adequate amount of vitamin B12 present in many of the foods consumed, and this vitamin is necessary for the process of formation of red blood cells and that Loss of it leads to the accumulation of immature red blood cells in the bone marrow in large quantities, which leads to a decrease in the level of the blood supply and hemoglobin concentration (22). In addition, some causes of diarrhea, such as dysentery amoeba, cause ulcers and intestinal bleeding in the intestinal walls, necrosis, shattering, and atrophy at sites. Absorption substances are necessary to form hemoglobin, causing a decrease in hemoglobin level and blood supply (1)

Also, Giardia lamblia has a role in the process of covering the sites of absorption of vitamins and other necessary nutrients, as this parasite acts as a barrier to the transfer of these substances from the intestinal cavity to the bloodstream, causing anemia and a decrease in the blood supply (26). It is worth noting that some diseases cause iron deficiency, as in the abnormal state of the mucous layer lining the intestine when infected with parasites that cause diarrhea and cancer lining the intestine (25).

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