

Epidemiological Study of *Giardia Intestinalis parastie* Among Children with Diarrhea in Duhok

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Abstract

The current study included 926 faecal specimens for children with diarrhea who attended Dohuk Teaching Hospital, Maternity and Children Hospital, and some health centres and local laboratories in Dohuk governorate during the period June 2019 till February 2020 and with exclusively for the 1-12-year age groups. The current study showed that the total incidence of *Giardia* was 5.16% (52 samples out of 926 samples). It was examined by direct wet wipe and the method of flotation using light microscopy to detect the feeding and parasitic stages of the parasite, which were found in various faecal samples. The microscopic results examination showed that the infection rate among males was higher than that of females, 6.12% and 5.11%, respectively, the highest rate of infection was recorded in the age group 2-4 years, and the lowest percentage was in the age group 8-10 years, 46.15% and 5.67%, respectively. As for the monthly distribution of infection, the highest incidence was recorded in June and the lowest incidence was in January, at 10.09% and 1.92%, respectively. The infection was twice higher among the residents of rural areas, compared to the urban population with 7.07% and 4.45%, respectively, and the results of the statistical analysis showed that there were significant differences at the probability level at 0.05.

Keywords: *Giardia intestinalis*, Diarrhea, children, Duhok.

دراسة وبائية لطفيل جيارديا المعوي للاطفال المصابين بالاسهال في دهوك

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الخلاصة

تضمنت الدراسة الحالية فحص 926 عينة براز لاطفال يعانون من حالات الاسهال والمراجعين لمستشفى التعليمي ومستشفى الاطفال، اضافة الى بعض مراكز الصحية والمختبرات في دهوك خلال الفترة حزيران 2019 ولغاية شباط 2020، والتي تضمنت الاعمار مابين 1-12 سنة فقط. وقد اظهرت الدراسة ان نسبة 5.61% من حالات الاسهال كانت بسبب الاصابة بطفيل الجيارديا المعوي (52 حالة من مجموع 926 حالة اسهال) والتي فحصت بطريقتي المسحة الرطبة و التطويق للكشف عن الاطوار المتغذية والمعديّة (الكيس) من الطفيل والتي وجدت في العديد من عينات البراز المفحوصة.

اشارت نتائج الفحص المجهرى للعينات المشخصة ان اصابة الذكور كانت اعلى من الاناث وبنسبة 6.12% و 5.61% على التوالي، كما اظهرت النتائج ان اعلى نسبة للاصابة كانت للاطفال باعمار 2-4 سنوات، واقل نسبة اصابة للاطفال باعمار 8-10 سنوات وبنسب 46.15% و 5.67% على التوالي، بالنسبة لتوزيع الاصابة على اشهر السنة، لوحظ ان اعلى نسبة للاصابة كانت في شهر حزيران وبنسبة 10.09%. بينما اقل نسبة اصابة في كانون الثاني وبنسبة 1.92%. ايضا سجلت الدراسة اعلى نسبة للاصابة لدى سكان المناطق الريفية بالمقارنة مع سكان الحضر وبنسبة 7.07% و 4.45% على التوالي.

الكلمات المفتاحية: طفيل جيارديا المعوي، حالات الاسهال، الاطفال، دهوك.

Introduction

Giardia intestinalis, *Giardia lamblia*, and *G. duodenalis* is one of the most prevalent intestinal initiation in the world, and it is one of the most common parasitic causes of gastroenteritis, where its effect is primarily in children in both developed and developing countries, with infection rates that ranging between 2-5% in industrialized countries and may exceed 30% in developing countries [26]. This parasite *Giardia* is one of the most common non-viral diarrhea

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that leads to major health problems such as: mal-absorption, and weight loss that leads to delayed growth and development [22, 27]. The infection with the parasite *Giardia* parasite spread in all age groups, but the greatest risk of clinical infection is in young children, especially in child care centres (nurseries).

This parasite distributes all over the world and is considered a common pathogen zoonotic agent between humans and animals, and that symptoms of giardia infection appear on among 200 million people in developing countries such as Asia, Africa and Latin America [28].

The *Giardia* parasite undergoes two life cycle stages, namely Trophozoite, and Cyst [21]. The infection occurs by swallowing mature gastric cysts with contaminated water and food, if the wall decomposes and the cyst opens in the upper part of the duodenum with the exit process of the EX Cystation; as a result of its exposure to gastric acid, enzymes and derivatives and parasite enzymes such as Cysteine pancreatic protease [23].

Each gives two active phases, these activists relate to the mucous membrane through their absorbent tablets and begin the process of multiplication by binary fission longitudinal and part of the activists turns into cysts bags again, and exits with feces, it is worth mentioning that the catalyst for the development of *Giardia* in the small intestine is Bile, carbohydrates and low oxygen concentration [24].

Study Aims

This research aims to detect the prevalence of *Giardia intestinal* parasite infection among children in Duhok, and its relationship to diarrhea. A direct microscopic examination was used to study the effect of many factors such as, gender, age group, area of residence and months of the year on the infection.

Materials and Methods

Collecting stools samples

The current study included examining 926 faecal specimens from children who suffer from diarrhea and complaining of abdominal pain. The patients attended to the internal consulting clinic parasitology laboratory in Dohuk Teaching Hospital and Maternity and Children Hospital and some health centres in Dohuk city for the period June 2019 till February 2020 including the age groups from 12 - 12 years exclusively.

The stool samples were collected with approximately 20 ml plastic containers with a wide nozzle, and sterilized with a tight cap to preserve the samples moisture and prevent them drying in one of its sides. For sample lists and according to the questionnaire prepared for this purpose, appendix [1]. Samples were examined within a period not exceeding half an hour of obtaining them with optical microscopy using direct wet swabs.

Samples examination

Stools sample were examined using the following methods:

Direct wet mount method:

The stool samples were examined by preparing a direct wet swab to look for feeding or encysment phases of the *Giardia* parasite using a clean glass slide, and a small drop of physiological solution was applied 0. 9% or lukaline iodine 1% on the slide and mix well with a small piece of stool and mix well using wooden sticks, slide cover was put well, and the sample was examined using microscopy with 400 x 100 [4].

Floataion method:

Zinc sulfate solution is one of the best used solutions in the floataion process, as the principle of floataion depends on mixing stools with a high specific weight solution such as zinc sulfate

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solution, this solution is prepared by dissolving 33 g of zinc sulfate in 100 ml of distilled water by, Mixing 3g of faeces with 10 ml of distilled water well and filter through two layers Gauze Baker, in test tubes then centrifuge at 3000 rpm for two minutes, the precipitate was reduced with distilled water and the centrifugation process was repeated three times at a speed of 3000 rpm for two minutes. Zinc sulfate solution was added to the precipitate and inserted into the centrifuge at a speed of 3000 rpm for two minutes, the foam on top was taken with a pipette and put on a slide for microscopic test [25].

Statistical Analysis.

The results data were calculated using T-test of two independent samples, and analyzed according to the research variables on the basis of frequencies and percentages.

Results and Discussion.

The current study recorded a percentage of *Giardia* parasite infestation of 5.61% out of 926 faecal samples, which is almost similar to many studies, including what was recorded by [18] in Babil governorate, where he recorded a rate of 5.4% in infants from inspecting 315 faecal specimens as well as [5] in Al-Nasiriyah city, with an incidence of 4.8% when examining 500 faecal samples from *Al-Batha, Al-Gharaf*, [1] in Salah Al-Din governorate / Al-Tuz district, where he recorded a rate of 5.20% when examining 1500 faecal samples from patients attending Al-Tuz General Hospital, while this study recorded a less infection rate than [11], it recorded 16.13% in Duhok governorate and *Alsaeed & Issa*, with a rate of 38.5% in Erbil when examining 1261 faecal specimens, and [10] in the city of Babel, where the infection rate was 13.16%, and the ordeal (2013) in Najaf, the infection rate was 14.8% when examining 3383 faecal samples, while this study recorded a more infection rate than it recorded [16], where he recorded a rate of 3.6% in Tikrit among pupils of some primary schools, as well as [19] in Baghdad governorate, where he recorded a total infection rate of 3.78% in children, and the incidence in adults was 3.63%, and [20] in Baghdad in Al-Kasimiya Hospital, where it he

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recorded an infection rate of 1.77% when examining 1520 faecal samples for children with varied ages one month-12 years.

The percentage of infection with the parasite *Giardia* parasite, according to gender.

The current study recorded the prevalence of infection in both sexes by 5.61% and it was higher in males, as it was 6.12% (28 infection cases), while in females it reached 5.11% (24 infection cases). Significant differences were observed in the rates of infection between the two sexes at the probability level $P \leq 0.05$.

Table 1: The percentage of infection with the parasite *Giardia* parasite, according to gender, using microscopic examination.

Gender	No. of examined people	No. of infected people	Percentage of infection (%)
Males	457	28	*6.12
Females	469	24	5.11
Total	926	52	100

X^2 calculated = 7.525, X^2 table = 0.006

* There are significant differences at probability level $P \leq 0.05$

This study recorded a male infection rate of 6.12% higher than females 5.11%, which is consistent with gender, not value, with [2] in Karbala, where he recorded a male infection rate of 18.18% and in females 10.61%, and with what [1] recorded in Salah al-Din, as it recorded a percentage of infection in males 6.94% and in females 3.13%, and with adversity (2013) in Najaf, where the percentage of infection in males was 16.8% and in females 11.1%, and all these studies indicated that the difference in the percentage of infection between males and females may be due to the fact that males are the most mobile and sympathetic group with external environmental factors during play and that they are the working group in society, this makes them more related to pathogens than females, They also eat and drink in public places or from street vendors, and this increases the chances of infection[3] in AL-Najaf. while in Al-Diwaniyah indicated that there are no significant differences between the two sexes [6].

Relationship of the percentage of giardiasis infection with age

The current study recorded the occurrence of infection in different age groups from 1 - 12 years, and the highest rate of infection was in the age group 2-4 years, 46.15% (24 infection cases) and the lowest rate of infection was in the age group 8-10 years, 5.67 % (2 infection cases), significant differences were observed in the infection rates among the age groups at the probability level $P \leq 0.05$.

Table 2: The percentage of infection with Giardia parasite, according to age, using microscopic examination

Age group(year)	No. of infected people	Percentage of Infection (%)
Less than two years	10	19.23
2-4	24	46.15
4-6	8	15.38
6-8	3	5.67
8-10	3	5.67
10-12	4	7.69
Total	52	100

X^2 calculated = 64, X^2 table = 0.01

* There are significant differences at probability level $P \leq 0.05$.

The current study recorded the highest 13.87% within the age group 2-4 years, which is consistent with what the [1] recorded, with the highest percentage of infection 44.4% in the 24-48 months age group, and with what [19] recorded in Dhi Qar, and with what [20] recorded in Baghdad, with the highest incidence being 2.75% in the age group 2-4 years, as it recorded the highest incidence 41.2% in the age group 6-8 years, it did not agree with what Al-Mehna recorded [8] in Najaf. The high incidence of infection was noticed in the age group 2-4 years table 2. The result in this study may be due to the 2-4 years children, are more active, and have less awareness of hygiene rules such as washing hands before eating, and after using the toilet, and the practice of usually putting fingers in the mouth, especially in children who carry bags

furthermore being at this age eager to taste anything, and their weak immunity compared to the older age groups, this may increase the incidence in this age group [2].

The percentage of infection with *Giardia* parasite, according to residence location

The current results showed that there are differences in the rates of giardiasis infection according to the residence location in Dohuk Governorate, as the highest rates of infection were in rural areas (7.07%) and the lowest rate was in the city (4.45%), significant differences were observed in the infection rates among the age groups at the probability ($P \leq 0.05$).

Table 3: The percentage of infection with *Giardia* parasite, according to residence location, using microscopic examination

Residence location	No. of examined people	No. of infected people	Percentage of infection (%)
Countryside	410	29	*7.073
City	516	23	4.457
Total	926	52	5.615

X^2 calculated = 49.54, X^2 table = 1.90

* There are significant differences at probability level $P \leq 0.05$.

The current study is in agreement with his record [12, 6] in Al-Diwaniyah, where he recorded the highest incidence of *Giardia* parasites in Sumer and Hamza, with a percentage of 16.1% and 15.3%, respectively, as [6] also recorded the highest rate of infection in the countryside, at 18.65%, which is higher than the urban infection rate of 10.11%, and [8] in the province of Najaf, the highest rate of infection in the countryside was 19.6% and 9.1%, respectively. The reason for the high incidence in the countryside is due to several factors, including the lack of clean drinking water and depending on river water as a direct source of water, as well as a decrease in the health and cultural level of the rural population, raising and interacting with stored parasitic animals, and the use of animal wastes and sometimes human as organic fertilizer.

The percentage of infection with Giardia parasite, according to months of the year.

The current study recorded the infection in all months of the year, and the highest rate was in June (with 10.09) % (11 infected cases), when it reached (to 1.92) % (2 infected cases) in January, significant differences were observed in the infection rates among the age groups at ($P \leq 0.05$).

Table 4: The percentage of infection with Giardia parasite, according to months of the year, using microscopic examination

Months	No. of examined people	No. of infected people	Percentage of infection (%)
June	109	11	10.09
July	105	10	9.523
September	99	7	7.07
November	103	5	4.854
December	109	4	3.669
October	108	4	3.703
January	104	2	1.923

X^2 calculated = 97.1

X^2 table = 0.01

* There are significant differences at probability level $P \leq 0.05$.

It was noticed from the results of the current study that the highest incidence was 10 June and July by 10.09 % and 9.523%, respectively (table 4), is in agreement with [1]. also, that is in agreement with [7], as the Giardia parasite recorded the highest infection rate during the summer months of June, July and September by 18%, 18%, and 23%, respectively, and the lowest incidence was in January by 1.92% It is in agreement with [2], that he recorded the lowest rate of infection in January 1.52%.

The main reasons of high rates of infections with the parasite in the summer months may be due to the availability of appropriate conditions for parasitic growth, the presence of vectors such as flies, cockroaches and mosquitoes, which are carriers of parasite cyst echanics, and in

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the summer an increase in the drinking of water, juices and refreshments and the use of ice made from non-sterile water [4,7].

Conclusions

This study showed that the microscopic examination is unable to detect acute infections, and there is significant relationship between infection, and gender, age group, nature of housing and monthly distribution on the number of infected cases.

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