Original Article

Environmental effects on intestinal parasitic disease transmission in Mosul governorate

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Abstract

This study, which was conducted in the city of Mosul, through collected 1200 samples from the stool of patients with diarrhea attending hospitals and private clinics for the period from the beginning of January 2019 to the end of December 2019, those whose ages ranged from less than a year-60 year, and for both sexes and by reality 700 samples stool for males and 500 samples stool for females. Samples were collected in clean, sterile, and sealed 40ml plastic bottles. Patient information is noted, name of the parasite, history, sex, age, address. The result showed that climate and temperature have a significant effect on increase the incidence of intestinal parasites through the direct effect on the increase in infection rate. This effect was the temperatures are suitable for converting the cyst into the trophoizote and fatal phase . The results showed that the infection rate in Mosul governorate with intestinal parasites is 23.83%,which is Entamoeba histolytica & Giardia lamblia, The result showed the number of infected males 193 with an infection rate (27.57%) which is higher than the number of infected females 93 with an infection rate (18.6%) of the total infections and shown the highest percentage infection of intestinal protozoa, parasites occurred in May it has reached (61%) while the lowest percentage of infection was in January (7%). The showed the percentage of intestinal protozoa, parasites infection, according to the age, the highest rate of infection in age group (0-10) (25.09%) while the age group (10-30) recorded the percentage of infection (21.44%), the age group (30-60) percentage of infection is (19.56%) the percentage of intestinal protozoa, parasites infection, according to the age, the highest rate of infection in age group (0-10) (25.09%) while the age group (10-30) recorded the percentage of infection (21.44%), the age group (30-60) percentage of infection is (19.56%), showed the percentage of intestinal protozoa parasite infection, according to the seasons of year the highest rate of infection in spring (32.66%) while the Summer (30%) , the autumn recorded the percentage of infection (22%).

Keywords: Environment , intestinal parasitic , Mosul , Entamoeba histolytica and Giardia lamblia.

Introduction

Parasitic diseases causes about 30 to 50 million cases of illness and 100,000 people die every year [1,2]. Cysts enter the human body through oral transmission [3,4]. Parasitic infections are often asymptomatic, or may lead to clinical features such as dysentery, colitis, or extra-intestinal abscesses [3-5]. Symptoms are often similar to other gastrointestinal diseases caused by microorganisms and inflammatory bowel diseases [3,4].

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Methods of controlling this parasitic disease are very important, especially for children in endemic areas under the age of six, where nutrition, immunity, age and growth are negatively affected by intestinal infection and frequent diarrhea as a result of infection. [6-8].

Moreover, this parasite causes side effects in the body of affecting both the physical and mental development of children in the affected regions of the world, which is characterized by poor hygiene in those regions [13]. In addition to personal hygiene practices, environmental factors also influence the prevalence of parasite species and the severity of infection in host species especially children under 6 years [14] by influencing the survival of the ecological stages of these intestinal parasites. Environmental conditions indicate that temperature and relative humidity greatly influence the survival of (oo) cyst. Changes in temperature were associated with parasite development rates [15, 16], while humidity and relative humidity were reported to maintain parasite capacity [17, 18]. Humidity and temperature conditions are essential to maintain the survival of the (oo)cyst until it is ready for the next stage of its life cycle [19]. Because of the importance of climatic changes of temperature and relative humidity in the life cycle of the parasite, it has become necessary to study the effect of these factors on the extent of the spread of intestinal parasites that have been neglected in scientific studies during recent years. [7].

Materials and methods

Materials:

A-Slide.

B-Cover slide.

C-Distal water.

D-Stick wood.

E-Microscope.

Methods of works:

1-Sample collection

Collecting human stool

Collected 1200 samples from the stool of patients with diarrhea attending hospitals and private clinics.

for the period from the beginning of January 2019 to the end of December 2019, those whose ages ranged from less than a year-60 year, and for both sexes and by reality 700 samples stool for males and 500 samples stool for females. Samples were collected in clean, sterile, and sealed 40ml plastic bottles. Patient information is noted, name of the parasite, history, sex, age, address.

2-Stool examination

A-Macroscopic examination

A microscopic examination of stool samples was performed to determine the phenotypic characteristics ex(color, texture, smell, mucus).

B-Microscopic examination

Microscopy with a wet smear method:

1-I took a small amount of stool with a matchstick and spread it on a glass slide with a drop of distilled water or iodine dye and mixed well.

2-Put the cup on the slide.

3-Examine the slide under a microscope with a 10x objective lens force than on 40x.

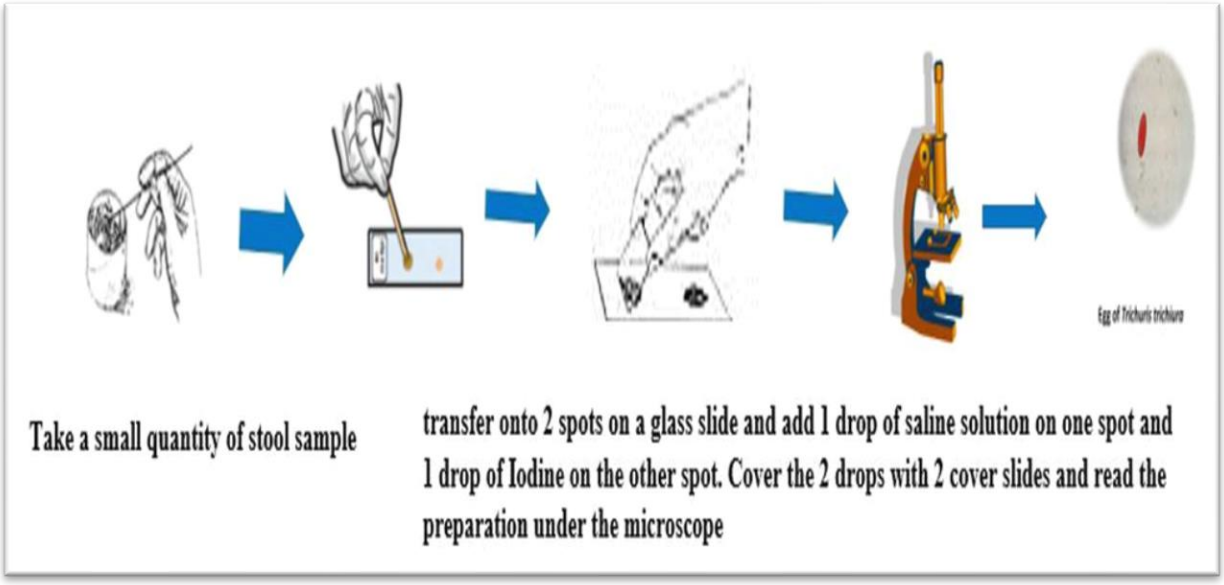

Fig (1) Microscopy with a wet smear method

3- Change of Environments

All differences in temperature, light and climatic changes from humidity and heat were measured by the Meteorological Authority of the Iraqi Ministry of Health and Environment.

Result:

Environmental

The Iraqi climate is desert in the center and south, but the winter is mild and the summer is very hot, and semi-desert in the north, and the winter is relatively cold, while in the northern mountain regions, the climate is cold and rainy (or snowy) in the winter and hot and sunny in the summer But at night it is cooler because of the height relative to the earth's surface

Mosul

Mosul city , far north of Nineveh, lies on the banks of the Tigris River. Its winters are mild, but certainly not tropical—January has an average temperature of 7°C (44.5°F). Rains abound in the period from December to the end of March, when the average rainfall is from seven to ten days per month, and sunny days alternate with periods of bad weather. It is often cold at night, and the temperature can sometimes dip a few degrees below 0 (0°C or 32°F). The summer in Mosul is very hot, with harsh sunlight, and daytime temperatures can reach over 40°C (109°F) in July and August despite the sharp rise in temperatures but low air humidity,

Mosul - Average temperatures

Month	Min (°C)	Max (°C)	Mean (°C)	Min (°F)	Max (°F)	Mean (°F)
January	2	12	7	36	54	44.6
February	3	15	9	37	59	48.2
March	7	19	13	45	66	55.4
April	11	25	18	52	77	64.4
May	16	33	24.5	61	91	76.1
June	21	39	30	70	102	86
July	25	43	34	77	109	93.2
August	24	43	33.5	75	109	92.3
September	19	38	28.5	66	100	83.3
October	14	31	22.5	57	88	72.5
November	7	21	14	45	70	57.2
December	4	14	9	39	57	48.2
Year	12.8	27.8	20.25	55.1	82.1	68.5

In Mosul the average rainfall, 365 mm (14.5 inches) is not much, but it is concentrated between November and April, with little rain in May and October, while it almost never rains between June and September.

Mosul - Average precipitation

Month	Millimeters	Inches	Days
January	60	2.4	11
February	65	2.6	11
March	65	2.6	12
April	45	1.8	9
May	15	0.6	6
June	1	0	0
July	0	0	0
August	0	0	0
September	0	0	0
October	10	0.4	5
November	45	1.8	7
December	60	2.4	10
Year	365	14.4	71

In the city of Mosul, the sun shines regularly in the summer, not much in the winter, while there are cloudy periods as well. Below are the average sunshine hours per day.

Mosul - Sunshine hours

Month	Average	Total
January	5	155
February	6	170
March	7	215
April	8	240
May	10	310
June	12	360
July	12	370
August	12	370
September	11	330
October	9	280
November	7	210
December	7	215
Year	8.9	3230

The seasons in the city of Mosul

A table shown in the four seasons in the city of Mosul.

The season	Starting	Ending
Spring	1 March	31 May
Summer	1 June	20 September
Autumn	21 September	20 November
Winter	21 November	28 February

Total infection rate and Types of intestinal protozoa, parasites and percentage incidence.

The results showed that the infection rate in Mosul governorate with intestinal parasites is 23.83%. it turns out that people are infected with two types of parasites, which are among the protozoa, which is Entamoeba histolytica & Giardia lamblia. It was a parasite Entamoeba histolytica it is

the most infected rate among the parasitic protozoan, the number of infected people was with this parasite 172 (14.33%) percentage infected while the incidence was of Giardia lamblia 114 (9.5%). As shown in table(1 and 2) below.

Table (1) Total infection rate of intestinal protozoa, parasites and percentage incidence

Samples	Number of the examined infected	percentage
1200	286	23.83%

Table (2) types of intestinal protozoa, infestation number, incidence rate during the study period.

Intestinal protozoa, parasites	Type of parasite	number	percentage
Protozoa parasitic	*Entamoeba histolytic*	172	14.33%
	Giardia lamblia	114	9.5%

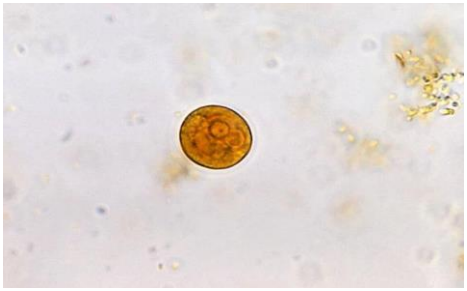

Fig (2) cyst of Entamoeba histolytic

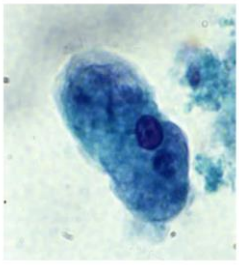

Fig (3) trophozoite of Entamoeba histolytic

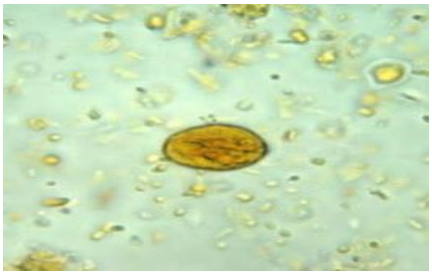

Fig (4) cyst of Giardia lamblia

Fig (5) Trophzoite of Giardia lamblia

- Distribution of infection, according to gender.

The result showed the number of infected males 193 with an infection rate (27.57%) which is higher than the number of infected females 93 with an infection rate (18.6%) of the total infections. As shown in table (2) below.

Table (3) the infected rate of intestinal protozoa by gender.

Gender	Number of samples	Number of the examined infected	Percentage
Male	700	193	27.57%
Female	500	93	18.6%
total	1200	286	23.83%

- Monthly distribution of intestinal protozoa parasites.

Table(3) showed the percentage of intestinal protozoa parasite infection, according to study months, it is shown the highest percentage infection of intestinal protozoa, parasites occurred in May it has reached (61%) while the lowest percentage of infection was in January (7%). As shown in table (3) below.

Table (4) the percentage of intestinal protozoa parasite infection, according to the month of the study.

Month	Number of samples	Number of the examined infected	percentage
January	100	7	7%
February	100	8	8%
March	100	13	13%
April	100	24	24%
May	100	61	61%
June	100	34	34%
July	100	27	27%
Aguste	100	29	29%
September	100	30	30%
October	100	28	28%
November	100	16	16%
December	100	9	9%
Total	1200	286	23.83%

- The percentage of intestinal protozoa parasite infection, according to age.

Table(4) showed the percentage of intestinal protozoa, parasites infection, according to the age, the highest rate of

infection in age group (0-10) (25.09%) while the age group (10-30) recorded the percentage of infection (21.44%), the age group(30-60) percentage of infection is (19.56%) .As shown in table (4) below.

Table (5) The percentage of intestinal protozoa parasite infection, according to age.

Age /years	Number of samples	Number of the examined infected	percentage
0-10	809	203	25.09%
10-30	345	74	21.44%
30-60	46	9	19.56%
Total	1200	286	23.83%

- The distribution of infection, according to seasons of study.

Table(5) showed the percentage of intestinal protozoa parasite infection, according to the seasons of year the highest rate of infection in spring (32.66%) while the Summer (30%) , the autumn recorded the percentage of infection (22%).

Table (6) the percentage of intestinal protozoa parasite infection, according to seasons of study.

The season	Number of samples	Number of the examined infected	Percentage
Spring	300	98	32.66%
Summer	400	120	30%
Autumn	200	44	22%
Winter	300	24	8%
Total	1200	286	23.83%

Discussion

Parasitic diseases in general and infective stages of helminths and protozoa are highly resistant to environmental conditions. Its presence in food and water used for human consumption or recreational purposes is one of the most important ways of transmitting these diseases to humans. Although sterilization and disinfection methods used in the treatment of drinking water and wastewater are often very effective in removing or killing transitional phases (7,8)

E.histolytic resist the low pH of gastric juice, and therefore are not destroyed in the stomach. It is also resistant to hydrochloride and many other chemicals, so it can easily withstand adverse environmental conditions, without losing its ability to cause disease relative to the human host [1]. Bag contamination of food may occur as a result of food contact with flies, a vector in the transmission of various cysts of protozoa, including Entamoeba histolytica and other pathogenic microorganisms (eg Salmonella and Shigella). Unlike water bags, Entamoeba histolytica can go along with the feces of infected humans and animals by releasing wastewater into surface waters (rivers and lakes). It is not without the importance of placing wells in the drinking water intake area. Predisposing factors for infection with bacteria E. histolytica is poor sanitary conditions, lack of running water in the house, violation of basic hygiene rules. (2)

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