



## Prevalence of Intestinal Parasites among Patients Attending Zella Central Laboratory, Zella City, Libya

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### Keywords:

E. histolytica  
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### ABSTRACT

Intestinal parasites have become one of the most important health problems for public health experts and decision-makers in many countries. In Zella city, the prevalence of intestinal parasites was not studied before, therefore, the current study was conducted to identify the intestinal parasites in Zella city. The data in this study was collected from the records of the central laboratory in Zella city over the period of time, from the beginning of 2015, till the end of 2019. A 839 samples were examined, and 728 samples were infected with parasites, which represent 87%. The results of the study revealed the presence of four types of intestinal parasites with different proportions as follows: Entamoeba histolytica by 65%, Ascaris lumbricoides by 24%, and Entamoeba coli by 10%, and Giardia lamblia by 0.7%. The results of the study also indicate that the infection rate of males and females were very close, 86% and 87%, respectively. The results of the current study also indicate that the single type infection pattern was the most common compared to the mixed parasite infection, 95%, and 5%, respectively. The study also shows that the percentage of intestinal parasites infection was higher during the autumn and spring seasons. Despite the increase in cultural and social awareness and the improvement of the living conditions of many families, the rate of intestinal parasites infection is still high, which requires more investigations.

إنتشار الطفيليات المعوية بين المرضى المترددين على مختبر زلة المركزي. مدينة زلة / ليبيا

خديجة سليمان محمد علي

قسم علم الحيوان، كلية العلوم، جامعة الجفرة، ليبيا

### الكلمات المفتاحية:

الطفيليات المعوية  
ليبيا  
زلة  
E. histolytica  
G. lamblia  
A. lumbricoides

### المخلص

اصبحت الطفيليات المعوية من أهم المشاكل الصحية لدى خبراء الصحة العامة وصناع القرار في جميع الدول، نظرا لانتشارها الواسع في مناطق مختلفة وبيئات متعددة، مسببة العديد من المشاكل الصحية التي تؤثر بشكل مباشر في الصحة العامة. في مدينة زلة، وبائية الطفيليات المعوية غير مدروسة من قبل. لذلك أجريت الدراسة الحالية لمعرفة انتشار الطفيليات المعوية في مدينة زلة. تم تجميع تلك البيانات من سجلات المختبر المركزي بالمدينة خلال الفترة من بداية سنة 2015م إلى نهاية سنة 2019م. خلال فترة الدراسة تم فحص 839 عينة، كان عدد المصابين بالطفيليات المعوية 728 عينة أي بنسبة 87%. أوضحت نتائج الدراسة وجود أربعة أنواع من الطفيليات المعوية بنسب مختلفة كما يلي: *E. histolytica* بنسبة 65%، *A. lumbricoides* بنسبة 24%، *E. coli* بنسبة 10%، وقلها تواجد طفيل *G. lamblia* بنسبة 0.7%. كما أوضحت نتائج الدراسة أن نسبة إصابة الذكور والإناث كانت متقاربة جدا وكانت بنسبة 86% و 87% على التوالي. كما أوضحت نتائج الدراسة الحالية بأن نمط الإصابة بالطراز المفرد كان هو الأكثر شيوعا مقارنة بنمط الإصابة بالطراز المزدوج بنسبة 95% و 5% على التوالي. أوضحت نتائج الدراسة الحالية إن نسبة الإصابة بالطفيليات المعوية كانت أعلى خلال فصلي الخريف والربيع بنسبة 27% و 26% على التوالي، مقارنة بنسبة انتشار الطفيليات المعوية خلال فصلي الشتاء والصيف، بنسبة 24% و 23% على التوالي. على الرغم من زيادة الوعي الثقافي والاجتماعي

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وتحسن الظروف المعيشية للعديد من الأسر، إلا أن نسبة الإصابة بالطفيليات المعوية لا تزال مرتفعة مما يتطلب وضع استراتيجيات خاصة لدراستها.

## Introduction

Intestinal parasites are one of the most important pathogens spread globally, especially in tropical and subtropical regions, as the number of infected people with Protozoa or Helminthes is estimated annually about 3.5 billion people, most of them children [1]. Parasites live in the gastrointestinal tract, especially the large intestine and small intestine of hosts in different age groups, causing many pathological symptoms such as diarrhea, weight loss and loss of appetite. The diarrhea is one of the main causes of death in children, especially in some countries that lack the necessary conditions for personal hygiene and health care [2]. Environmental, social, cultural conditions, and the level of family income in different societies are among the most important factors associated with the spread of intestinal parasites infection. Due to the overlap of clinical symptoms of parasite infection with the clinical symptoms of other causes of diarrhea such as bacteria and viruses, the mechanism of pathogen induced by intestinal parasites infection has not been sufficiently studied. Children are more likely to be infected with intestinal parasites, a study conducted by Kassem et al [3] in Sirte showed that the social and economic status of parents was related to the prevalence of intestinal parasites. Most of the diarrhea cases in developing countries, is related to intestinal parasites, in particular with in communities in rural areas, where poor health conditions, and the use of untreated sewage water in irrigation operations, [4].

Based on the results of many studies, the percentage of intestinal parasites infection varies from place to another depends on the location. In Saudi Arabia it was 27.8%, [5], in Yemen 53% [6], in Iraq 64.16% [7], in Pakistan 52% [8] and in Ethiopia 16.6% [9]. Inside Libya also, the rates of intestinal parasite infection varied between different regions, in Zawiya it was 10.6%, [10], Al Khums 15.4% [11], in Derna was 31%, [12] and in Huon was 12.7% [13]. It is noticeable that there is a variation in the percentage of infection with different parasitic species from one place to another. A study carried out by [14] in Mosul, Iraq on the causes of bloody diarrhea in children under five years of age, indicated that, the infection with *E. histolytica* were the highest 84%.

Previous studies showed a variety of intestinal parasites that infect individuals according to the study area. The study by Alsuqi and Daw [15] showed the presence of four parasitic types that were widespread among the cases that were reported in Tripoli Central Hospital with different rates as follows: *G. lamblia* by 42.36%, *E. histolytica* by 34.7%, and *E. coli* by 22.9%. The results of another study conducted by [16] on the spread of intestinal parasites in the Zintan region showed that the rate of infection with intestinal parasites was 59.86%, and the most common was *Entrobilus vermicularis* by 48.9%, then infection with *E. histolytica* by 48.9%. 24.48%, and the lowest percentage was due to infection with *G. lamblia* parasite 2.04%. Due to their medical and social importance, intestinal parasites around the world became interest to many researchers and decision-makers [17]. So, the current study was aims to identify the types of intestinal parasites, and infection rates during period of five years, in the Zella city, which located in the municipality of Al-Jufra, and obtained results will help of drawing a geographic map of distribution intestinal parasite in different regions.

## Materials and Methods

Data of this study were collected from the records of Zella Central Laboratory, the city is located 750 km to the southeast of the Libyan capital, Tripoli, on the coordinates of ° 32' 56" N 17 ° 33' 04" E, and the city is located in the administrative boundary of the municipality of Al-Jafra, as it connects it to the city of Wadan by a paved road with a length of 164 km, while it is linked to the city of Marada by a paved road of 225 km. The population of Zella is 13,000 people (Development Planning Guide for the Al-Jafra Municipality

for the year 2018), in addition to large number of refugee settlers inside the city. Data of this study were collected from the records of Zella Central Laboratory over the period of time, from the beginning of 2015, to the end of 2019. The samples were examined using direct wet mount preparation by using normal saline and iodine stain. According to the Data of Zella Central Laboratory, the following were counted: the total number of patients, the date of the analysis, patient sex, and the type of parasite infection.

**Statistical analysis.** In this study descriptive statistical approach (All the collected date were used), and results were presented as percentages.

## Results

### 1) Prevalence of intestinal parasitic infections during the study period.

The results obtained (Table 1) indicated that the total number of tested subjects was 839 patients, there were 728 of them infected with intestinal parasite (87%). The results of the current study also indicated that the percentage of infection varied in the study period. Where the highest rate of infection was during 2018, when the number of tested samples reached 150 patients, and 139 were infected (93%). Followed by the infection rate in 2015, which amounted to 90%, as the total number of tested samples were 178, of whom 161 were infected. Then the infection rate in the year 2017, which was 86%, as the number of tested reached 157 patients, the number of infected patients was 135 cases, but in the year 2019, the number of tested reached 232 people, and the number with the parasites were 197 cases, or 85%. While the lowest infection rate was 79%, during 2016, when the number of tested samples were 122 patient, and 96 patients were infected with the intestinal parasite.

**Table 1: prevalence of intestinal parasitic infections.**

Year	N. of tested samples	N. of infected samples	Percentage (%)
2015	178	161	90%
2016	122	96	79%
2017	157	135	86%
2018	150	139	93%
2019	232	197	85%
Total	839	728	87%

### 2) Type of intestinal parasites infection

Table (2) shows the types of intestinal parasites infection, their number and percentage of infection. The results obtained indicated that the single infection pattern was the most common type in Zella city, with percentage of 95%. It was also found that the percentage of single infection with *E. histolytica* the highest 65%, followed by the percentage of single infection with *A. lumbricoides*, and then the single infection with *E. coli*, with percentages of 24% and 10%, respectively. The lowest percentage of single infections only was 0.7% due to infection with *G. lamblia* parasite. The results obtained also showed that the mixed parasite infection was a low incidence, as it appeared in 39 cases out of the total number of 728 cases, with a rate of 5% of the total infection. The parasite presence was *E. histolytica* + *A. lumbricoides* are the highest among mixed parasite infection, with a rate of 64%. While the prevalence of *E. coli* + *A. lumbricoides* was 21%. The lowest mixed parasite infection it was formed by the presence of *E. histolytica* + *E. coli* together with an infection rate of 15%.

**Table 2: Type of intestinal parasites infection**

Type of infection	N.	%	Parasite species	N.	%
Single parasite infection	689	95%	<i>E. histolytica</i>	488	65%
			<i>E. coli</i>	71	10%
			<i>G. lamblia</i>	05	0.7%
			<i>A. lumbricoides</i>	165	24%
Mixed parasite infection	39	05%	<i>E. histolytica</i> + <i>A.lumbricoides</i>	25	64%
			<i>E. coli</i> + <i>A.lumbricoides</i>	08	21%
			<i>E. histolytica</i> + <i>E. coli</i>	06	15%

### 3) Single and mixed parasitic infection

The results of the current study (Table 3) showed that citizens in Zella were infected with four types of intestinal parasites, three of which belong to the parasitic protozoans: *E. histolytica*, *E. coli*, and *G. lamblia*, and the fourth type was due to the intestinal worms

*A. lumbricoides*. The *E. histolytica* was the most common parasite among the parasitic protozoa. The number of people infected with this parasite reached 448, with an infection rate of 65%. The results of the study also indicated that the highest rate of infection was in 2015 (71%), and the lowest rate of infection with the *E. histolytica* was in 2016 (57%). While the number of people infected with *E. coli* reached 71 patient, and the percentage of infection did not exceed 10%, and the results showed that the highest infection rate was in 2015 (14%), while the lowest infection rate was in 2016 (06%). While the percentage of *G. lamblia* was few and did not exceed 5 cases, with a percentage of only 0.7%. It is worth noting that *G. lamblia* infection were limited to the years 2018, with three cases, and in 2019 with only two cases. As for the infection with parasitic worms, it was represented by one type of worms, *A. lumbricoides*, where the number of infected people reached 165, with a percentage of 24%. The highest rate of *A. lumbricoides* infection was in 2016 (37%), while the lowest rate was in 2015 (14%).

**Table 3: Single and mixed parasitic infection**

Year	parasitic protozoans				intestinal worms		Total
	<i>E. histolytica</i>		<i>E. coli</i>		<i>A lumbricoides</i>		
	N.	%	N.	%	N.	%	
2015	114	71%	23	14%	0	0	160
2016	54	57%	6	6.0%	0	0	95
2017	78	61%	15	12%	0	0	129
2018	80	62%	9	10%	3	2%	130
2019	121	70%	18	10%	2	1%	175
Total	448	65%	71	10%	5	0.7%	689

### 4- Prevalence of intestinal parasite infections according to the gender.

Table (04) shows the percentage of intestinal parasites infection according to the gender. The results of the study showed that the number of males examined was 432 males, and the number of infected males was 374 patients (86%). While the number of examined females was 407, there were 354 of them infected (87%) with intestinal parasite.

**Table 4: Type of intestinal parasites infections according to the gender**

Sex	N. of tested samples	N. of infected samples	Percentage (%)
male	432	374	86%
Female	407	354	87%
Total	839	728	87%

### 5) Seasonal variation of intestinal parasitic infections.

Table (5) illustrated infection with intestinal parasites during the seasons of the year. The results of the study showed that infection with intestinal parasites in the city of Zella was close during the different seasons of the year.

However, the highest infection rate was 27% during the autumn, followed by 26% in the spring, and 24% in the winter. The results of the current study showed that the lowest rate of infection was 23% during the summer season.

**Table 5: seasonal variation of intestinal parasitic infections**

Year	Winter	Spring	Summer	autumn
2015	19	39	41	62
2016	27	32	19	18
2017	37	40	32	26
2018	39	25	33	42
2019	53	53	42	49
Total	175	189	167	197
(%)	24%	26%	23%	27%

### Discussion

Infection with intestinal parasites is becoming a big concern for public health in the developing as well as developed countries, due to their wide prevalence and the multiple health problems they cause.

Among the most important health problems caused by infection with pathogenic intestinal parasites such as *E. histolytica* and *G. lamblia* are gastrointestinal symptoms such as abdominal cramps, diarrhea, dyspepsia and anemia, [18]. Those symptoms lead to a direct effect on public health, body immunity and disease resistance, especially in children and families with limited income. Therefore, intestinal parasites have received international attention. Results of the current study showed that the rate of infection with intestinal parasites in general, during the years of the study was 87%, and this percentage is high compared to a study conducted in Zintan [16], where the incidence of intestinal parasites was 59.85%, while the rate of infection with intestinal parasites was 10.5% among the patients attending Sebha Central Hospital [19], while the rate of infection with intestinal parasites among school children in Wadi Shati was 23.82% [20], and in Tripoli was 15.7%. [21]

The results of this study confirmed the results of the other studies, which reported that infection with one type of parasite (single parasite infection) was more common, compared to mixed parasite infection. [10, 19, 22], the infection rate was 95% and 05%, respectively. These results were similar to the results of Zaed [13], which showed that the rate of infection with the single type was 16.83%, compared to the rate of infection with the mixed parasites of 6.33%. Also in Sabha city mixed infection was only 0.2% compared to 99.7% for the single infection [18]. Other study carried out by Hasan, et. al. [23] reported that, there was only five causes of mixed parasite infection were founded out of 142 sample (3.5%). It's worth mention that results of the current study showed that mixed infection of *E. histolytica* and *A. lumbricoides* was the most common (64%). The results also showed that the incidence of parasitic protozoans was higher (76%), compared to the rate of helminth infection 24%. This result was in agreement with the results of a study conducted in Benghazi by Hasan and Morad [18], where the incidence of parasitic protozoa was 75.6%. While the infection rate with parasitic worms was 24.4%. The incidence of intestinal worms in the city of Zella in the current study was high may be due to different environmental conditions, living conditions and geographical location.

The results of the current study also showed that there are four main types of intestinal parasites that were common in the city of Zella, and the rates of infection varied according to their type. *E. histolytica* parasite was the most common by 65%, followed by *A. lumbricoides* by 24%, then *E. coli*, with 10%, the least common parasite was *G.*

*lamblia*, 0.7%. However, the results of many studies showed that intestinal parasites and their prevalence rates varied in different regions. For example, the results of the study conducted in Huon, 180 km from Zella city, by Zaed [13], illustrated that the most common parasitic species were *E. dispar*, *E. histolytica* by 4.33%, followed by *E. coli* by 2.83%, then *G. lamblia* by 30.5%, *Endolimax nana* (2.83%), and *Blastocystis hominis* (1.83%). Whereas, the common parasites in Sebha city south of Libya, according to a study [18] were as follows: *B. hominis* by 6.8%, *E. histolytica*, *E. dispar* by 2.3%, *G. lamblia* by 0.9%, and *E. coli* by 0.3%. The main reason for the spread of intestinal parasites, especially *E. histolytic* parasite, may be due to the direct transmission methods of these parasites through the contaminated resources. Many studies have shown that the incidence of amoebiasis infection differs in different areas of the study. The infection rate in Zella city was high, reaching 65%. This was in agreement with the results of the study [24] in Nalut city west of Libya, where the incidence of infection with amoebiasis was 21% [25], in Huon was 4.3% [13], in Sabha it was 2.3% [18], and in Zintan it was 12.76% [17]. However, Esalem, et. al, [26] reported that the infection rate of *E. histolytica* does not exceed 4% among children in Sabha city. It is worth mentioning that the results of the current study showed that the prevalence of the non-pathogenic *E. coli* parasite was 10%, which is considered a high percentage compared to the results of other studies such as the study of [12] which showed that the infection rate was 3.2% in Derna city in the east, and in Zawia city west of Tripoli was 3.6% [10]. *G. lamblia* parasite is one of the most common parasitic protozoa that cause diarrhea in tropical and subtropical regions, specifically in areas that suffer from lack of safe drinking water sources.

The prevalence of *G. lamblia* in the current study was low compared to the other parasitic species in Zella city, and it did not exceed 0.7%. This result of this study was like the results of other studies. In Zintan was 1.2% [27], in Tripoli was 1.3% [28]. It is noticeable that the prevalence of *G. lamblia* was higher in some cities of the eastern region, where the infection rate was 11.4% in Benghazi [24], and in the city of Derna it was 12.7. % [15].

Intestinal worms' infection is widespread worldwide, and is considered one of the most important health, economic and social problems around the world [1]. However, results of this study showed that the infection with *A. lumbricoides* was 24%. No studies have been conducted before regarding the causes of the spread of intestinal worms in the region, while some studies indicated that the cause of their spread is due to lack of good ventilation and moist soil, and the eggs of the worms have the ability to be transmitted by rodents scattered in the affected areas. However, in Huon the results of [13] did not record any presence of *A. lumbricoides*. Also, the study of El-Araby and others did not record infection with *A. lumbricoides* in Zintan. [16]. Results of the current study indicated that the percentage of male and female infected with intestinal parasite was very close. The results of this study were consistent with some previous studies, as the results of the study [18] showed that the rate of infection of males and females with intestinal parasites in Sabha was 10.9% and 10.2% for males and females, respectively. As well as the results of the study of [13], which showed that the male infection rate was higher than that of the female, but the differences were not significant, and also Okyay, et. al [29], Akinbo et. al. [30] reported there were no significant difference between the infection of the male and female with intestinal parasite.

The results of the present study showed that the highest prevalence of intestinal parasites was during the autumn and spring seasons (27% and 26%) respectively. The lowest was during the summer, 23%. The results of the current study were in agreement with the results of [18], which showed that the highest prevalence of intestinal parasites in Sebha was during the autumn and winter seasons by 16.6% and 13.4%, then the rate of infection during the spring and summer season by 9.8% and 7.3%, respectively. This was explained by the fact that the high temperature and low humidity led to a decrease in the incidence of intestinal parasites infection.

#### Conclusion

Results of the current study illustrated that, there were high percentage of infection with intestinal parasite in Zella city. *E. histolytica* was the most important parasite with infection rate of 65%,

followed by *A. lumbricoides* 24%. The result also revealed that infection with single parasite was more common compared to infection with mixed parasite infection, and the rate of infection of male and female was very close. Interestingly the result illustrated that, the highest infection rate was during autumn season. From the results of the current study, attention should be paid to increase the public awareness, and intestinal parasite transmission. Furthermore, a comprehensive epidemiological study is needed to guide decision makers in the relevant sectors to control intestinal parasites.

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