

# Prevalence of intestinal parasitic infections among university female students, Gaza, Palestine

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## ABSTRACT

**Background:** The intestinal parasites are still endemic among children, women, and men in Gaza Strip. **Objectives:** To the best of our knowledge, this is the first study of intestinal parasites among young female students of Islamic University of Gaza to report the existence and prevalence of intestinal parasites. **Methods:** A total of 305 stool samples were collected from female students in all faculties and were examined by wet mount and formal ether sedimentation technique. **Results:** This study showed that the overall prevalence of intestinal parasites was 20.6%. The detected intestinal parasites were as follows: *Entamoeba histolytica/dispar* (7.5%), *Giardia lamblia* (4.9%), *Ascaris lumbricoides* (0.3%), *Entamoeba coli* (2.6%), *Dientamoeba fragilis* (1.0%), and *Blastocystis hominis* (3.9%). Science students showed the highest prevalence for parasitic infections (35.3%), and married students (16.7%) had higher prevalence than single students (6.5%). **Conclusion:** It was concluded that female students also are under risk of gaining parasitic infection in spite of their education. It is recommended that university students should be subjected to regular medical examinations for parasitic infections.

**Key words:** Adults, age, Gaza, parasitic diseases, prevalence

## INTRODUCTION AND LITERATURE REVIEW

During the last two decades, a considerable number of literature were published regarding intestinal parasitic diseases in Gaza Strip. Many studies have been carried out among school-age and preschool children either in Gaza Strip and globally. On the contrary, few studies have been carried out in the world to determine the prevalence and types of intestinal parasitic infection among adults to provide helpful information for epidemiological investigations and for planning public health control measures for the particular population involved. A total of 1222 students of Ambrose Alli University, Ekpoma, Nigeria, were examined for intestinal parasitic infections, and the prevalence of infection was found to be 12.52%.<sup>[1]</sup> The overall prevalence of infection was 20.4% among disabled adults aged 29 years

and that among male and female was 20.5% and 20.3%, respectively.<sup>[2]</sup> Hassan<sup>[3]</sup> reported that the prevalence of amoebiasis and *Hymenolepis nana* was 22.4% and 6.2%, respectively, among primary and secondary schools in Giza Governorate, Egypt.

Mezeid *et al.*<sup>[4]</sup> reported a prevalence of 40.8% among patients from five governorates of the Gaza Strip. In another study, *Enterobius vermicularis* constituted a high prevalence (46.3%) among preschool children.<sup>[5]</sup>

In a cross section of 1625 households, a total of 485 women who were interviewed (29.8%) reported intestinal parasites among their household members.<sup>[6]</sup> Prevalence of intestinal

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parasites was high in Jabalia village (more than 53%) in comparison to that in Rimal area (33%).<sup>[7]</sup> Yassin *et al.*<sup>[8]</sup> found that the prevalence of intestinal parasites among school children was 27.6% and the most common parasites were *Giardia lamblia* (62.2%), *Ascaris lumbricoides* (20.1%), and *Entamoeba histolytica* (13.3%).

On the contrary, few studies have been carried out in the world to determine the prevalence and types of intestinal parasitic infection among adults to provide helpful information for epidemiological investigations and for planning public health control measures for the particular population involved.

Changes in the prevalence and the seasonal fluctuations of common intestinal parasites were monitored through the records of the patients attending Nasser Hospital in Khan Yunis Governorate during 1996–2000, where the same intestinal parasites were found as in the aforementioned two studies. The overall monthly incidence of parasites showed significant seasonal fluctuations.<sup>[9]</sup>

In a study aimed to test the impact of health education programmer's intervention on the prevalence of intestinal parasites among school children "Gaza Strip," the final result indicated that the prevalence of intestinal parasites had declined from 21.5% to 5.1%.<sup>[10]</sup>

In West Bank, the prevalence of intestinal parasite infections was 22.2%.<sup>[11]</sup>

Al-Hindi and Al-Louh<sup>[12]</sup> found that 116,261 of 471,688 specimens were positive for intestinal parasites, representing an overall prevalence of 24.6%, which was observed from the Ministry of Health records.

The main aim of this study was to determine the existence and prevalence of intestinal parasites and to determine the most common types of intestinal parasites among female students of Islamic University in Gaza Strip.

## SUBJECTS AND METHODS

### Study area

The study was carried out in the Islamic University Gaza (IUG), an independent Palestinian institution, located in Gaza Providence Academic and Research Services for the Palestinian community in the sector of higher education.

### Ethical considerations and permission

A general meeting was conducted with the participated female students to explain the purpose of the study and taking agreement. An ethical approval was obtained from

the Deanery of Admission and Registration, IUG, and consent was taken orally from each participant.

### Study type and population

A cross-sectional study among female students of the IUG aged between 18 and 22 years was applied. The total number of IUG students at the time of the study was 11,000.

### Sample size and sampling

Three hundred and five female students were sampled in this study. Sample size was determined using a general formula considering the level of significances at 5% and assuming the prevalence of intestinal parasites in Gaza Strip to be 30%. Random sampling method was used to select the students from the eight faculties of IUG.

### Parasitological methods

Each female student was given a clean container to bring stool specimen in the next day. Each stool specimen was examined directly using wet mount saline and iodine in biology laboratory, Faculty of Science, IUG. Each stool specimen was preserved with sodium acetate acetic acid formalin, and then examined by formal ether sedimentation technique according to the recommendations of WHO.<sup>[13]</sup>

### Questionnaire

Each female student completed a questionnaire including information on age, residence, history of parasitic infections, symptoms, type of sewer system, education of father, faculty, level, and marital status.

### Data analysis

Data were analyzed statistically using the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) version 18 program to create frequencies, cross tabulation (chi-squared test). *P* value was calculated at  $P \leq 0.05$ . Chi-squared test of independence and expected frequencies less than 5 were considered acceptable when Yates' correction was used.

## RESULTS

A total of 63/305 (20.6 %) of the examined students were found infected with intestinal parasites. It was found that the common protozoa were *E. histolytica/dispar* (7.5%) and *G. lamblia* (4.9%). *Dientamoeba fragilis* was found with a prevalence of 1.0%. Other parasite types are shown in Table 1. Also, 19 female students (6.2%) were infected with intestinal parasites during the last two months before the beginning of this study and 70 (23.0%) were with clinical symptoms from self-reported questionnaire.

Table 2 shows the symptoms reported by each participant, where it was found that the most frequent symptom was

**Table 1: Prevalence of the diagnosed intestinal parasites by both medical analysis and questionnaire among 305 female students in IUG**

Parasites	Parasites detected by medical laboratory analysis		Parasites as reported using a questionnaire	
	No.	%	No.	%
<i>E. histolytica/dispar</i>	23	(7.5)	5	(1.6)
<i>G.lamblia</i>	15	(4.9)	4	(1.3)
<i>Ascaris lumbricoides</i>	1	(0.3)	13	(4.3)
<i>E. vermicularis</i>	0	0	8	(2.6)
<i>Taenia</i>	0	0	5	(1.6)
<i>Entamoeba coli</i>	9	(3.0)	0	0
<i>Dientamoeba fragilis</i>	3	(1.0)	0	0
<i>Blastocystis hominis</i>	12	(3.9)	0	0

**Table 2: Self-reported symptoms among females student of IUG, Gaza, Palestine (n=305)**

Symptoms	Yes		No		Don't know	
	No.	%	No.	%	No.	%
Did you get infected with intestinal parasites during the last two months	19	(6.2)	138	(45.2)	148	(48.5)
Did you have any clinical symptoms	70	(23.0)	235	(77.0)		0
Did you observe any wormed expelled	46	(15.1)	142	(46.6)	117	(38.4)
Did you complain constipation	130	(42.6)	138	(45.2)	37	(12.1)
Did you have any itching	105	(34.4)	146	(47.9)	54	(17.7)
Did you have a colic	149	(48.9)	124	(40.7)	32	(10.5)
Did you lose your appetite	73	(23.9)	185	(60.7)	47	(15.4)
Have you had diarrhea	74	(24.3)	202	(66.2)	29	(9.5)
Did you have bloody stool	28	(9.2)	248	(81.3)	29	(9.5)
Did you have any treatment after the infection	39	(12.8)	266	(87.2)		0

colic (48.9%). Similar prevalence for *E. histolytica/dispar* and *G. lamblia* was found in age 18 years (5.9%) and in age 22 years (10.7%).

However, the prevalence of *E. histolytica/dispar* was higher than *G. lamblia* in the age of 21 years but it did not reach the significance level as shown in Figure 1A. Regarding residence, the prevalence of *E. histolytica/dispar* was high in the city than *G. lamblia*, but *E. histolytica/dispar* was higher in the refugee camps. All cases of *E. histolytica/dispar* were concentrated among females students who reside in the village as shown in Figure 1B. Also, *G. lamblia* was found to be high in the city than the refugee camp,  $P = 0.06$ . Figure 1C shows that *E. histolytica/dispar* was higher than *G. lamblia* among female students who reside in homes of closed sewers and vice versa in open sewers, where *G. lamblia* was higher (12.0%). Employer had high prevalence of *E. histolytica/dispar* than that of *G. lamblia* (7.1% and 5.1%, respectively). Also, the same for labors, but similar prevalence for both *E. histolytica/dispar* and *G. lamblia* among non-employer [Figure 1D]. Figure 1E shows that *E. histolytica/dispar* was higher among female students from the Faculty of Science (23.5%) followed by the Faculty of Commerce (15%). Similar prevalence was observed for *G. lamblia* in the Faculty of Arts. Similar prevalence for *E. histolytica/dispar* and *G. lamblia* in the Faculty of Engineering, the same for the Faculty of Sharee'a was found. No cases of *G. lamblia* were observed

in both Arts and Commerce students. The highest level of infected female students with *E. histolytica/dispar* was found in the fourth level (12.3%), whereas *G. lamblia* was high in the first level (7.7%) as shown in Figure 1F. High infection was observed in married female students with *E. histolytica/dispar* (16.7%) than that in unmarried students (6.5%) with  $P = 0.06$ .

## DISCUSSION

To the best of our knowledge, this is the first study regarding prevalence of parasitic infection in the youth, all studies previously carried out focused with school-age children and preschool children.

In Thailand, the prevalence rate of intestinal parasitic infections in the older age groups ( $\geq 40$  years) was higher than that in the younger age groups ( $< 40$  years) and this was similar to our results.<sup>[14]</sup>

More of the infected patients were found to be among the age group of 21–30 years as they were affected by food habits and higher exposure of young adults to contaminated environments.<sup>[15]</sup>

In Malaysia, a prevalence of 9% was found in the age group of 16–30 years.<sup>[16]</sup> In a study among students aging 18–25 years who attended Qena University Hospital, Upper Egypt, it was found that young people aged 18–25 years

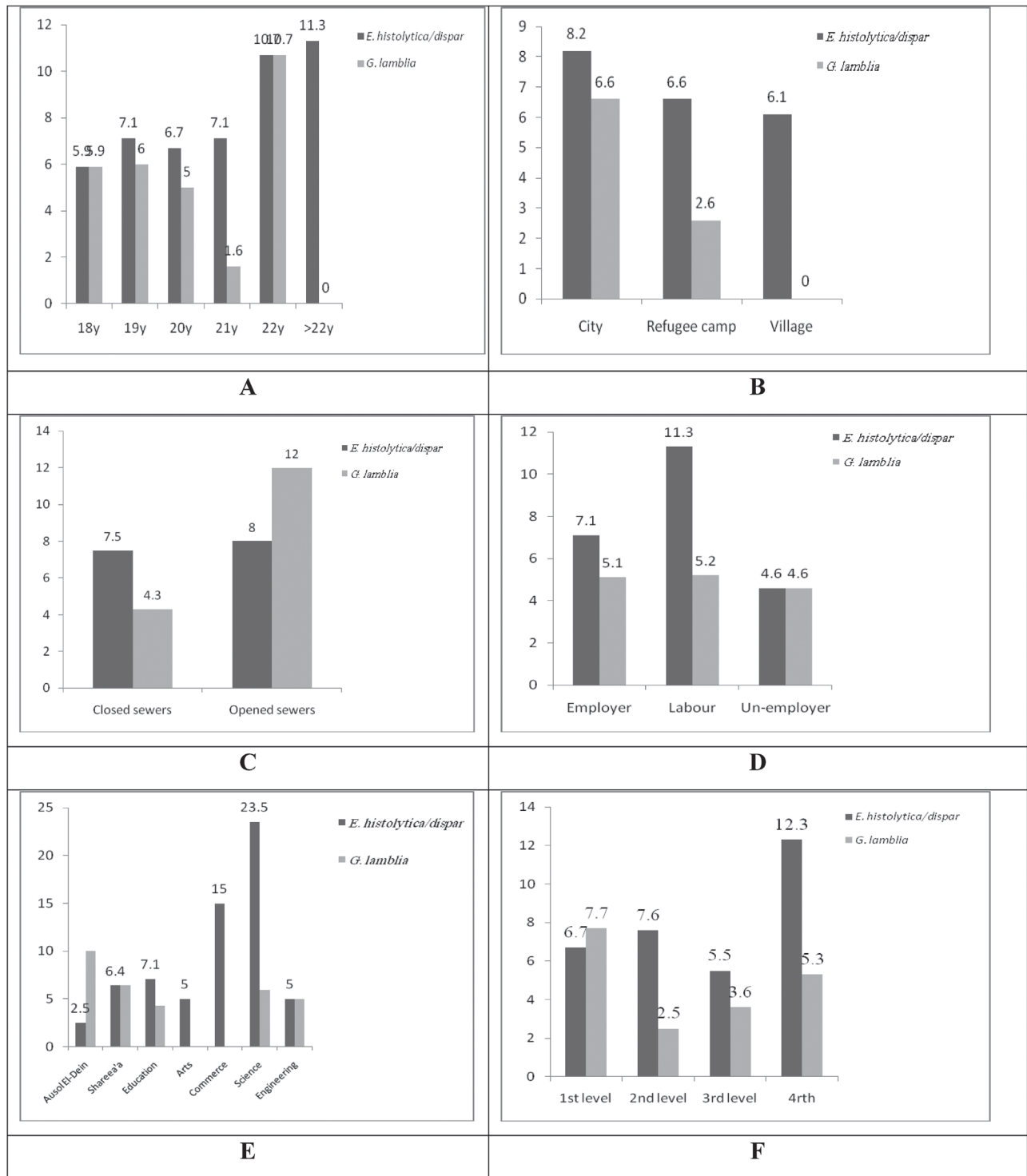


Figure 1: Prevalence of *Entamoeba histolytica/dispar* and *Giardia lamblia* due to age (A), residence (B), sewers type (C), occupation (D), faculty (E), and level (F)

living in rural areas had a marked significant association with parasitic infection than those living in urban areas ( $P < 0.001$  and this was not similar to our results. The most common detected parasites were as follows: *E. histolytica* (18.4%), *Blastocystis hominis* (11.2%).<sup>[17]</sup> In this study, the residents of Sulaimani city of both sexes in Iraq were infected

by *G. lamblia* (7.96%), followed by *E. histolytica* (4.05%), and these rates were opposite to our results.<sup>[18]</sup> Also, using laboratory examination methods was found to be more accurate than using interview methods. Our results showed that the *E. histolytica* was the highest among the labor group (11.3%). A comparative study of the prevalence of



intestinal parasites in low socioeconomic areas from South Chennai, India, showed that with respect to age, children and teenagers had surplus parasites compared to old age groups.<sup>[19]</sup>

The sewer type is considered a risk factor for the transmission of parasitic infection. Most of the Gaza Strip has the closed sewers but few regions still have the open sewer type in refugee camps, and during the last two decades, a large improvement on the infrastructure of Gaza Strip has been noticed.

So, different prevalence were recorded with regard to occupation in the Gaza Strip, this could be attributed to nature of the occupation and method of contamination. In this study, the most susceptible group to intestinal parasitic diseases was female students from the Faculty of Science. This could be explained by the fact that those female students are exposed to the risk of infection more than other students due to their attending of practical sessions in the medical laboratory sciences department. In this study, *E. histolytica/dispar* was examined by wet mount using saline and iodine, no confirmation was carried out by antigen or polymerase chain reaction technique, but Al-Hindi *et al.*<sup>[20]</sup> differentiated two types of Entamoeba based on deoxyribonucleic acid in Gaza Strip. This study recorded high prevalence of *E. histolytica/dispar*, this was similar to that reported in Al-Nusirat refugee camp in Gaza Strip in a study regarding intestinal parasites and diarrhea.<sup>[6]</sup> Three cases of *D. fragilis* (1.0%) and 12 case of *B. hominis* were detected during this study, these results were lower than that reported by Al-Hindi and Shammala<sup>[21]</sup> for *D. fragilis*, which was found by iron hematoxylin staining, this may be attributed to the variation in the methods of examination in the laboratory.

## CONCLUSION

The study concluded that the group of female university students was a vulnerable group to intestinal parasites infection as a youth in spite of their education. It is recommended to carry out regular stool examination for university students and to search for the source of infection.

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### Conflicts of interest

There are no conflicts of interest

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