



# Prevalence of *Enterobius vermicularis* among Appendicitis Children Using Histopathology Technique in Benghazi, Libya

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## Abstract

*Enterobius vermicularis*, is the most common nematode (roundworm) parasite responsible for gastrointestinal tract infection worldwide, they located in cecum, colon, and appendix lumen. Enterobiasis is a human intestinal parasitic disease which might cause acute appendicitis. Appendicitis is the most common abdominal disease requires emergency surgery; the current study aims to determine the prevalence of enterobiasis among appendicitis children in Benghazi city. A cross-sectional study was carried out two hundred fifty among appendicitis operated patients who admitted to surgical Unit in Al Jalla Hospital during the period from August 2018 and December 2018 using histopathological method for each appendix, in Benghazi Libya.

The chi-square test was used to determine significance ( $p < 0.05$ ). In The present study out of 250 patients who were operated for acute appendicitis, the overall prevalence of *E. vermicularis* infection was 7.2% (18\250), no significant difference in the prevalence and sex ( $P$ -value =0.835). Significant difference existed in the prevalence of enterobiasis among age groups, clinical description of appendix, acute appendicitis, presence of abscess ( $P=0.000$ ). From these results, it can be concluded that *E. vermicularis* could be associated to cause of appendicitis and thus, measures to prevent parasitic infection are recommended.

**Keywords:** *Enterobius vermicularis*; Histopathological; Appendicitis; Benghazi

## Introduction

Enterobiasis, also known as pinworm infection, is caused by *Enterobius vermicularis*; it occurs worldwide and is considered to be the most common childhood helminthes (round worm) gastrointestinal infection. In humans, *E. vermicularis* located in cecum, colon, and appendix lumen [1]. About 400 million persons worldwide are infected by pinworm. It is the most common helminthiasis among pediatric populations [2]. The commonly symptoms disease as nocturnal anal pruritus but insomnia, irritability, colitis are other symptoms can found in some cases [3]. Infection occurs by the fecal-oral route through ingesting the contaminated food or water containing parasite's infective stage (maturation egg) [4]. Also, human can get infected by two other mode of infections autoinfection-and-retroinfection these infections take place from the original host to itself in both. Among those factors, parasites may play a considerable role of spread acute appendicitis. Appendicitis is the commonest acute require immediate surgical condition of the abdomen emergency [5,6,7]. The found of *E. vermicularis* in the appendix usually produces symptoms which resemble acute appendicitis although the mechanism for this does not involve mucosal invasion by the parasite [8], but role of *E. vermicularis* in appendicitis remains controversial. The aim of this study is to determine prevalence of enterobiasis in surgically removed appendix from patients with appendicitis and analyze the different factors which may responsible for initiating the inflammatory reaction by histopathological methods.

## Materials and Methods

### Study setting

This study was conducted between August 2018 and December 2018 in Benghazi city, samples were collected from Al Jalla Hospital.

### Study population

In this cross-sectional study, 250 children from laboratory department Al Jalla Hospital aged

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less than 16 years

### Histochemical examination methods

Histopathological examination of the appendix was done according to the known standard procedures used in histopathology, this test using to detect any histochemical changes such as inflammation, granuloma of the appendix and the presence of parasites [9]. In the histopathological laboratory the specimens' sections of appendiceal stained were subjected to microscopic.

## Results

### Prevalence

The study was carried out on two hundred and fifty removed appendices from patients who attended to surgical Department of Al Jalla Hospital. The results showed that the infection with *Enterobius vermicularis* was (7.2%) out (18\250) (Table 1).

### Prevalence and sex

Infection with *Enterobius vermicularis* among patients with appendicitis (n=250) shown nearly the same rate in males 12 (7.4 %) and in females 6 (6.7%) children. Non-significant difference was detected between prevalence and sex ( $\chi^2=0.043^a$ ; df=1; P-value =0.835). The relationship between prevalence of *Enterobius vermicularis* and sex is presented in Table 2.

### Prevalence and age

The prevalence of Enterobiasis among different age groups (years) of appendicitis patients is presented show in Table 3 and the results revealed that the highest prevalence rate (29.6%) was observed in age group of 6 to 11 years followed by age group >5 and age group 12 to 16 years old at prevalence rates 9.1% and 4.2% respectively. Age had a high significant influence on the prevalence of enterobiasis among Patients with appendicitis (P=0.000).

### Morphological description of appendix and *E. vermicularis* infection

Table 4 showed that the Patients who had normal looking

**Table 1:** Overall prevalence rate of *Enterobius vermicularis* infections among patients with appendicitis (n=250).

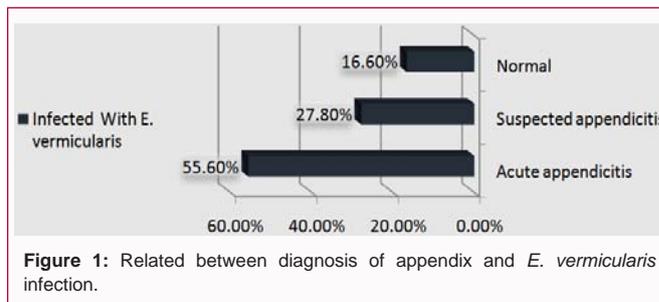
Participants	Parasites
18 (7.2%)	Infected patients
232 (92.8%)	Non infected
250 (100%)	Total

**Table 2:** Relationship between prevalence rate of *Enterobius vermicularis* infections and sex.

Parasites	Females (%)	Males (%)	Total
Infected patients	6 (6.7%)	12 (7.4%)	18
Non infected	83 (93.3%)	149 (92.5%)	232
Total	89	161	250

**Table 3:** Prevalence of *E. vermicularis* infection in each age group among patients with appendicitis.

Age groups (years)	Patients with appendicitis	
	Infected With <i>E. vermicularis</i> (%) (n=18)	Examined (n=250)
>5	1 (9.1%)	11
06-11	8 (29.6%)	27
12-16	9 (4.2%)	212
Total	18 (7.2%)	250



**Figure 1:** Related between diagnosis of appendix and *E. vermicularis* infection.

**Table 4:** Morphological description of appendix and *E. vermicularis* infection.

Form of appendix	Patients with appendicitis	
	Infected With <i>E. vermicularis</i> (%) (n=18)	Examined (n=250)
Normal looking appendix	5 (27.8%)	10
Inflamed	13 (72.2%)	240
Total	18	250

**Table 5:** Relationship between presence of abscess of appendix and *E. vermicularis* infection.

Presence of abscess	Patients with appendicitis	
	Examined (n=250)	Infected With <i>E. vermicularis</i> (%) (n=18)
Yes	232	12 (66.7%)
No	18	6 (33.3%)
Total	250	18 (100 %)

appendix were positive for *E. vermicularis* 7 (27.8%), while those who had inflamed appendix were positive for *E. vermicularis* 13 (72.2%). This result clearly indicates that there is a high significant difference ( $\chi^2=28.559^a$ , p=0.000).

### Related between diagnosis of appendix and *E. vermicularis* infection

Patients who had acute appendicitis were positive for *E. vermicularis* 10 (55.6%), while those who had suspected appendicitis and normal were positive for *E. vermicularis* 5 (27.8%) and 3(16.6%) respectively. This result clearly indicates that there is a high significant difference ( $\chi^2=21.587^a$ , 2 p=0.000) (Figure 1).

### Relationship between Presence of abscess of appendix and *E. vermicularis* infection

Patients who had Presence of abscess were positive for *E. vermicularis* 12 (66.7%), higher than patients infected with *E. vermicularis* with Absence of abscess 6 (33.3%). This result clearly indicates that there is no significant difference ( $\chi^2=32.556^a$ , 2 p=0.000) (Table 5).

## Discussion

Several studies have been conducted around the world to determine the association between children appendicitis and pinworm infection [2,4,5,10,11,12]. Pinworm infection is a public health problem in many countries, irrespective of socioeconomic status [13,14], this infection it caused by most common intestinal nematode parasite *Enterobius vermicularis* also at the same time the appendicitis is considered to be the one of the most common disease, all over the world. It affected about 7% to 10% of the world population [15,16,17]. Our study reported that 18 appendices (7.2%) out of 250 have an *E. vermicularis*, this result was higher than those results reported in other studies in the world, (Ramezani et al. [18],

Iran 2.9%, Yildirim et al. [19]. (3.8%) Pehlivanoğlu et al. [20] was 0.74% and Marjorie reported 1.7% [21].

Slightly higher incidence (15 %, 29 %) were described in another studies from Gaza and Argentina respectively This variation in different continents could be resulted from lifestyle, sanitation status, culture, socioeconomic conditions, and climate [22,23]. Both sexes of individual in the present study were found to be infected with *Enterobius* is shown nearly the same rate of susceptibility to the infection children males 12 (7.4%) and females 6 (6.7%), with no significant differences were found between infected male and female. (P-value =0.83), these results are in disagree with previous findings [19] which reported that the prevalence of *E. vermicularis* in females was significantly higher than males (OR, 0.47; 95% CI, 0.38-0.59) and it explain the higher rate of infection. However, the females more likely to contract *E. vermicularis* infections than males and the females could be attributed to different behavioral patterns, as well as gender-based differences. Actually, housewife females usually work in kitchen and have close-contact to raw vegetables that makes them more prone to be infected with parasite stages (cysts and eggs). On the other hand, it is interesting to mention that *E. vermicularis* was commonly seen in girls with average age of 12 years [24,25] that makes them more susceptible to ectopic infections such as vulvitis and vaginitis. Age had a high significant influence on prevalence of enterobiasis in appendices (P=0.000). Similar results were reported by [24]. The majority of studies have been shown a relatively high frequency of inflammatory changes (inflamed appendix, Acute appendicitis, presence of abscess in patients with appendiceal pinworms [26,27].

In present study the results are consistent with other studies conducted worldwide. According results we can conclude that *E. vermicularis* could be associated with appendicitis.

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