

# A Study On Enterobius Vermicularis Infection In A Appendices Removed By Surgery In Tabriz Hospitals

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## Abstract

The association of Enterobius vermicularis infestation with acute appendicitis varies from 0.2– 41.8% worldwide. Our purpose was to determine the significance of Enterobius-associated appendicitis by retrospective review of appendectomies performed during a 8-year period at a major Tabriz hospital. The Surgical Pathology database at Imam Khomeini's and Alinasab's Hospital, Tabriz, Iran was reviewed for appendiceal specimens found to have Enterobius infestation. Corresponding patient charts were evaluated for age, gender, presenting symptoms, laboratory data, operative findings, and clinical course. Of the 5981 appendectomies performed from 2005 to 2009, 38 specimens (1.38%) were found to contain Enterobius vermicularis. Twenty-six of the appendectomies were performed for symptoms of acute appendicitis; the remaining twelve were incidental appendectomies in conjunction with other operations. Between that age groups, and between two age groups of 5-10 and 11-16 the highest rate has been shown that among them females infection is more. In 38 cases there are pinworm that %67 present of it relates to females and %33 of it relates to males. Of the 26 symptomatic children, 12 presented with fever >99.0°F, and 14 had a WBC count >10,000. Intraoperative appearance of the appendix ranged from normal to perforation. Pathologic evaluation showed neutrophil or eosinophil infiltration in 27 of the 38 specimens. Enterobius infestation is an uncommon cause of acute appendicitis in children in the Islamic Republic of Iran. It may be associated with acute appendicitis, "chronic appendicitis," ruptured appendicitis, or with no significant clinical symptoms.

## INTRODUCTION

Enterobius vermicularis (pinworm) infections of the gas-trointestinal tract occur in 4–28% of children worldwide [1, 2, 3, 4, 5]. Although the most common manifestation of pinworms is perianal pruritus, pinworms have been found in multiple other locations, including the appendix [6, 7, 8, 9, 10]. Recent literature regarding appendiceal helminths focuses primarily on the pathologic changes induced by the presence of intraluminal parasites. We reviewed a cohort of children with asymptomatic and symptomatic pinworms of the appendix.

## METHODS

From 2005–2009, the Surgical Pathology database at Imam-Khomeini and Alinasab Hospitals, Tabriz, Iran, was queried for appendix specimens that had pinworms on histologic analysis. The patients' medical records were evaluated to determine age, gender, presenting symptoms, presenting vital signs, white blood cell (WBC) count, operative findings, and clinical course. Histologic findings were recorded.

## RESULTS

Thirty-eight of 5981 appendectomy patients (1.38%) were noted to have intraluminal pinworms within the appendix specimen (Table 1). In 38 cases there is pinworm that %67 present of it relates to females and %33 of it relates to males. Twenty-six operations were performed for symptoms of abdominal pain. Twelve incidental appendectomies were performed in conjunction with another primary procedure.

### Figure 1

Table 1: Demographics

Symptomatic (n=26)		Incidental (n=12)
Mean age (years)	8.2	12.4
Age range (years)	5–10	11–16
M/F	9/17	4/8

## SYMPTOMATIC PATIENTS

Twenty-six patients presented with symptoms of generalized abdominal pain (n=9) or right lower quadrant (RLQ) pain

(n=17). Duration of pain symptoms ranged from 12 h–10 days, with an average of 2.5 days. Median duration of symptoms was 2 days. Other symptoms described by the patients are listed in Table 2. Twelve children (47%) had recorded temperatures  $\pm 99^{\circ}\text{F}$ . Thirteen children (50%) had a heart rate  $\pm 100/\text{min}$ . On admission, white blood cell (WBC) counts ranged from 5.4–29.7, with 11 children having counts  $>10,000$ . The neutrophil counts (segmented neutrophils plus bands) were 32–98%. Table 3 correlates patients’ temperatures, presenting heart rates, WBC counts, and presence of left shift with the microscopic pathologic findings.

**Figure 2**

Table 2: Presenting signs and symptoms

Sign/symptom	Number of patients
RLQ pain	17
Generalized abdominal pain	9
Vomiting	1
Fever	12
Tachycardia	13
Leukocytosis	14

**Figure 3**

Table 3: Literature reviews of appendiceal enterobius infections

Study author	Year	Appendectomies	Appendiceal pinw	Appendiceal inflammation orms
Duran-Jorda	1957	691	52	0
Abramson	1966	1	1	1
Tolstedt	1968	NR	33	25
Boulos	1973	68	8	2
Mogenson	1980	1	1	1
Sterba	1984	2,1916	1,322	23
Sterba	1985	2,925	82	41
Budd	1987	1,529	38	19
Bredesen	1988	303	38	17
Williams	1988	12,132	182	58
Gupta	1989	2,921	41	17
Cerva	1991	414	36	NR
Sinniah	1991	NR	259	0
Wiebe	1991	2,267	94	26
Dalimi	1993	1,590	38	17
Dahlstrom	1994	1,867	63	23
Dorfman	1995	3,125	14	14
Zoorob	1996	1	1	0
Ajao	1997	1	1	0
Sazena	2001	62	3	2
Baitsatou	2002	1	1	0
Totals		51,815	2,308	286

**DISCUSSION**

Gastrointestinal infection due to *Enterobius vermicularis* occurs worldwide and is considered to be the most common

helminth infection [11]. Although seen in all ages and socioeconomic levels, it is most common in children ages 5 to 14. Pinworms have been present for thousands of years. *Enterobius ova* have been found in human coprolites from 7800 BC [12]. Fabricius Hildanus was the first to describe appendiceal pinworms in 1634 [13]. Since 1899, when the association of *Enterobius* infestation and appendicitis was first described [9], there have been several case reports and retrospective studies describing this entity. Humans are the only natural hosts of pinworms. Embryonated eggs measure 30–60  $\mu\text{m}$  and are found on fingernails, clothing, house dust, and other fomites. They are ingested and then hatch in the stomach, where the coiled larvae appear. Larvae travel to the cecum, where they mature to adult pinworms measuring 1 cm in length. Gravid adult female worms migrate by night to the perianal region and deposit up to 11,000 eggs. Eggs are infective within 6 h of ovideposition. The lifespan of a pinworm is between 11 and 35 days. Pinworms are considered essentially harmless. The most common clinical syndrome caused by pinworms is anal pruritus [4]. Occasionally, pinworms have been found to be associated with other disease states, including ileocolitis [14], enterocutaneous fistula [15], urinary tract infections [16], mesenteric abscesses [17], and salpingitis [11,18]. Other extraneous sites have been described, including the lung, breast, Meckel’s diverticulum, liver, and spleen [19]. Fecal sampling usually fails to reveal ova or adult worms; therefore, the diagnosis of pinworms is usually made by night-time application of cellophane tape in the perianal area of the child suspected to have pinworms [4]. Because there seems to be no protective immunity that humans develop against pinworms, reinfection is common. Treatment is with an oral dose of mebendazole, which is repeated in 1–2 weeks. Worldwide, the reported incidence of *Enterobius* infestation in patients with symptoms of appendicitis ranges from 0.2–41.8% [7]. In 1899, Still reported a 19% incidence of appendiceal infestation in children with appendicitis. Since then, the role of *Enterobius vermicularis* as a cause of acute appendicitis has been controversial [11]. A review of the published reports over the last 30 years does not settle this controversy (Table 3). Two previous studies focused primarily on children [7, 31] and found the incidence of appendiceal pinworms to be 7.5% and 12.5%, respectively. This study attempts to characterize the symptoms associated with appendiceal pinworms in the pediatric population. We found that appendiceal pinworms can cause symptoms of abdominal pain with associated tachycardia, low-grade fever, leukocytosis, and bandemia without microscopic

evidence of inflammation. Of the four appendiceal specimens that showed no inflammatory infiltrate on microscopic analysis, all children had localized RLQ peritonitis. Two of these children had fevers >100F, and two had a peripheral leukocytosis with a left shift. The three patients with subacute eosinophilic infiltrates within the appendix presented with RLQ pain but were afebrile. Two of these children had WBC counts >10,000 with a left shift. Their abdominal discomfort may be explained by the hypothesis that appendiceal lumen obstruction may cause appendiceal colic. Pinworms can definitely be associated with the evolution of classic appendicitis. In our series, there was a range of findings from early appendicitis to frankly ruptured appendicitis. Interestingly, the appendices with *Enterobius* ova present all had components of inflammation. This finding is consistent with other observations that ova are generally not deposited in the intestinal lumen and that their presence may indicate an obstruction [10]. In patients with persistent abdominal pain, laparoscopy with appendectomy is often offered as a diagnostic and therapeutic maneuver. Saxena et al. reported three cases in which pinworms were set free into the abdominal cavity during laparoscopic appendectomy [23]. Surgeons should exercise caution when performing laparoscopic appendectomy, using the endoloop technique to make certain that the pinworms are not released into the peritoneum upon amputation of the appendix. In our series, *Enterobius* infestation of the appendix was found to cause disease states including acute appendicitis, chronic appendicitis, and ruptured appendicitis. However, it has also been found in patients with no symptoms at all. It is imperative that patients with *Enterobius* receive the appropriate antihelminthic treatment, because the appendectomy treats a consequence and not the root of the disease.

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