

The Prevalence of Pinworm, Incontinence, and Appendicitis in Children in Diwaniyah Governorate, Iraq

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Abstract

The study was conducted during the period between July 2018 and until February 2019 were examined (419) random stool samples for children aged (1-12 years). It included a number of schools and kindergartens in each of the city center, and different areas of its surroundings province of Diwaniya and for both sexes. The results of the study showed that the incidence infected rates were 43.67%. As for the relationship between *E. vermicularis* and appendicitis, 109 surgically removed appendicitis were collected from Women and Children hospital and Diwaniya Teaching Hospital in Al Diwaniya Governorate. The results of the study showed a relationship between pinworm parasites and appendicitis by 11.92% in each Males and females depending on the examination of the contents of the appendix waste. The results of the examination of 419 children under the age of 12 years for the detection of *E. vermicularis* and study the relationship of the incidence of urinary incontinence in children. The results showed a relationship between the parasite *E. vermicularis* and the phenomenon of night incontinence by 66.66% for both sexes. The results of the study also showed a relationship between the incidence of night incontinence and the presence of pinworms with age and sex. The results of the statistical analysis confirmed a positive correlation between the phenomenon of night incontinence with the presence of the parasite *E. vermicularis* at the probability level $P < 0.05$. With the presence of significant differences between the occurrence of this phenomenon in the presence of parasite with age and gender at a level of probability 0.05.

Keywords: *E. vermicularis*, incontinence phenomenon, appendicitis.

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1. Introduction

According to the World Health Organization (WHO), it is estimated that more than 24% of people worldwide are infected with intestinal parasites with widespread prevalence in developing countries (1). He also stressed (2). That the import of food and animal uncensored uncontrolled may contribute to the spread of infections of various types of parasites, especially worms. Among the substances that cause the transfer of parasites are vegetables, which often transport the eccentric stages of primary parasites as well as eggs of worms (3). He has mentioned (4) Climatic and environmental conditions play an important role in the transmission of intestinal parasites. Migration and travel also contribute to the emergence of some parasites in non-endemic countries. As such, nematodes have been the subject of studies on their epidemiological, pathological, diagnostic and preventive strategy (5).

E. vermicularis are helminths that infect nearly a billion people worldwide for all socioeconomic levels and are the most common parasitic worms (6). It is considered as a harmful parasitic organism causing many health and psychological problems in children, adults and both sexes (7). The *E. vermicularis* parasite is called by this name because of its long-pointed tail, which looks like a pin (8). Infection rates are as high as 40% depending on age and gender (9). Children in school are often affected when they live in crowded conditions such as nurseries or orphanages (10). *E. vermicularis* is more common in temperate climates although it may affect the entire population in almost all climates but thrives in temperate regions (11). Some individuals do not show symptoms of infection and others have a variety of obvious symptoms ranging from nausea, diarrhea, insomnia, irritability,

urinary tract infection, loss of appetite, nightmares, anal itching and malaise, continued infection with this parasite can also affect the mental development of children (12). Persistent scratching of infected patients around the anal area may result in minor bacterial infection (13).

Nocturnal enuresis (Bedwetting) is a social disorder that affects about 15-20% of children over the age of five, researchers found a positive relationship between Enterobiasis and nocturnal enuresis in most children (14). Study conducted by (15) in Iraq- Najaf city aimed to study the relationship between *E. vermicularis* infection and the phenomenon of night incontinence where the results showed that the number of children infected with *E. vermicularis* parasite (83.9%) out of 124 children who were between the ages of 4-7 years Worms suffer 61.5% incontinence.

As for appendicitis, the presence of parasites may lead to appendicular colic even without the appearance of acute inflammation, and this colic is explained by the parasitic infection of the hypervolemia of the appendix of the appendix, the simple presence of *E. vermicularis* shows symptoms similar to acute appendicitis, although the mechanism involved does not involve invasions of parasites (16). Studies have indicated that *E. vermicularis* is the most common worm in appendix and its presence can cause pathological changes ranging from lymphocytic hyperplasia to acute sputum inflammation with life-threatening complications such as gangrene and peritonitis (17).

The study aimed to assess the epidemiology of Enterobiasis in children including sex, age and prevalence distribution according to geographical area. Study of the relationship between people infected with *E. vermicularis* and the phenomenon of nocturnal enuresis in children. To study the possible relationship between appendicitis and the presence of *E. vermicularis* in surgically excised appendages.

2. Materials and Methods

2.1 Stoll collection and examination:

Total 419 stool samples were collected from children aged (1-12) years of both sexes, males and females during the period between July 2018 to February 2019, and the study was conducted through random sampling from health centers, hospitals, schools and Kindergarten in the city center and township, They were collected by sterile plastic containers with an emphasis on the requirement to collect morning stool specimens, first protruding to the baby before bathing and cleaning the outlet area in order to obtain eggs pinworms. The patient's information was collected by filling in a questionnaire that included gender, age, and the phenomenon. Nocturnal enuresis as well as the question of some bed symptoms Abdominal pain, anal itching, worm stools, and other information such as the address of housing, economic status and level of education of the parents were observed, where microscopic examination was done after receiving the samples and within a period not exceeding two hours. Direct smear, Flotation method and Precipitation method. (18).

2.2 Scotch Tapesamples:

During the collection of exit samples, adhesive tapes were distributed to the infected families with instructions on how to use the tape and the time of use, in early morning and before defecation of the child or at night during sleep and collected for microscopy. Also, a swab was taken from under the fingernails of the children by sticks with cotton ends containing Normal saline and after taking the swab placed in sterile plastic bags with the title of the patient's name and transferred to the laboratory where they are examined microscopically for the purpose of investigating the presence of egg (19).

2.3 Appendix samples:

109 appendixes were collected from the Women and Children hospital and Al-Diwaniya Teaching Hospital in Diwaniya Governorate, where the excised appendages were placed in sterile plastic containers containing Normal saline in order to preserve their internal contents until examination and verification of the causes of inflammation associated with the appendix and learned bottles and transferred to the laboratory for the purpose of measuring their length and diameter, as well as microscopic examination, where the process of appendicular appendixes were examined microscopically in three ways namely the method of direct swab, examination by sedimentation, examination by the method of floating (18).

After the appendix is examined microscopically and the type of infected is recorded, it is stored in new bottles with the patient's name and age containing formalin at a concentration of 10% about 48 hours at room

temperature until it is cut histologically, the appendix is cut into three parts, taken from the rear end Transverse about 1 cm from the edge, longitudinal sections of the middle and front end of the appendix.

The sections were washed with normal saline for 2 hours, after which the tissue was treated by routine treatment methods as follows: Dehydration, Clearing, Infiltration, Embedding, Sectioning, Mounting, Rehydration, Staining, Drying, clearing and labeling (18, 20).

3. Results

3.1 Enterobiasis prevalence:

The results of the study showed that theinfected rates were 43.67%. These injuries were accompanied by symptoms such as weight loss, abdominal pain, anal itching, loss of appetite, pain in the appendix, nocturnal enuresis, anemia and insomnia. In some cases, there wereno clinical symptoms. The results also showed a relationship between*E. vermicularis* and appendicitis by 11.92% in both males and females based on examination of the contents of the appendix from waste, to detect the presence of eggs and adults *E. vermicularis* in the excised appendages. The results also showed that there is a relationship between parasite and night incontinence phenomenon by 66.66%, age groups in males and females between 4-12 years were taken to study this relationship, which number of 144 children infected with parasite. As for the relationship between Nocturnal enuresis and gender, it was found that the proportion of females (77.46%) was the highest severity of this phenomenon of males, which was 56.16%.

3.2 Microscopic examination:

The results of this study showed that the number of infected parasites *E.vermicularis* was 183 out of 419 fecal samples, an infected rate 43.67% infection for both sexes as shown in (Figure1). As for the method of microscopic examination by the Tape Scotch tape (cellophane adhesive tape) for the detection of intestinal infection with the parasite *E.vermicularis*, the results showed that *E.vermicularis* appeared with its oval and adult phases, in addition to the positive results of taking swabs from under the fingernails of the children where they were found on eggs of *E.vermicularis* in microscopy. Although the microscopic method has proven to be less sensitive and less specific than other methods such as PCR, microscopy is the main method for diagnosing Enterobiasis and is used in most laboratories.

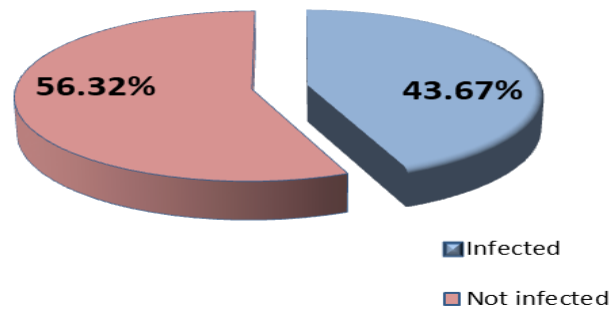


Figure 1. Infection rate of *E. vermicularis* among children in Al- Diwaniya.

3.3 Gender related prevalence of*E.vermicularis*:

The highest infection rate among females was 48.1% and 39.8% respectively as shown in (Table 1). The results of the statistical analysis showed significant differences between the incidence of *E. vermicularis* and its relationship to gender at a probability level of($p \leq 0.05$).

Table 1. Infection rate of *E. vermicularis* in male and female according to gender.

Sex	Infected numbers	Numbers	Rate	X ²	P value
Male	226	90	39.8	6.741	0.009*
Female	193	93	48.1		
Total	419	183	43.67		

3.4 Age related prevalence of *E. vermicularis*

The prevalence of *E. vermicularis* in children was calculated based on age groups. The results showed that the age groups that are less than 6 years and less than 9 years are the highest infected with 55.55% and 53.65% respectively. Age less than 3 years with an infected rate of 27.46%. The results of the statistical analysis showed significant differences between *E. vermicularis* infection and age groups at a probability level of ($p \leq 0.05$) as in (Table 2).

Table 2. Infection rate of *E. vermicularis* in Children according to age groups.

Age groups / years	Total number	Infected	Rate	X ²	P value
1-3	142	39	27.46	40.65*	0
4-6	117	65	55.55		
7-9	82	44	53.65		
10-12	78	35	44.87		
Total	419	183	43.67		

3.5 Geographical distribution related prevalence of *E. vermicularis*

The incidence rate and the relationship with geographical distribution were determined in this study by conducting a survey on some rural areas around Diwaniya governorate (Shafiya, Sunni, Daghara, Afak) and the governorate center (city), the results of the study showed that the infection was more prevalent in rural areas than in urban areas. In urban areas, the incidence rate was 61.05% in rural areas and 29.25% in the city. Statistically, there was a significant difference between the prevalence of infection in rural and urban areas at a probability level of 0.05 (Table 3).

Table 3. Infection rate of *E. vermicularis* in Children according to geographical distribution.

Locale	Total number	Infected	Rate	X ²	P value
Rural	190	116	61.05	40.65*	0
Urban	229	67	29.25		
Total	419	183	43.67		

3.6 Urinary incontinence in children:

By examining the stool samples for children and completing a questionnaire that includes the registration of the phenomenon of incontinence if found in patients with *E. vermicularis*, the results of the study showed a relationship between the parasite and the phenomenon of incontinence by 66.66% for both sexes, and the results of statistical analysis showed a positive correlation (0.615*, P value = 0) between the relationship of the disease with the presence of this the parasite at the probability level ($P < 0.05$).

Table (4) shows the relationship of Nocturnal enuresis with gender. The results of the study showed that the percentage of females (77.46%) was the highest severity of the disease among males (56.16%). The results of the statistical analysis showed significant differences between the incidence of urinary incontinence in the presence of *E. vermicularis* and gender at a probability level of 0.05.

Table 4. The rate of pinworm infected female and male with enuresis.

Sex	Infected	Incontinence	Rate	P value	X ²
Male	73	41	56.61%	0.007	7.34*
Female	71	55	77.46%		
Total	144	96	%66.66		

3.7 Isolate *E. vermicularis* from appendix

The results showed that there was a relationship between the parasite *E. vermicularis* and appendicitis by 11.92% in both males and females, based on examination of the contents of the appendix from waste products to detect the presence of eggs and adults *E. vermicularis* in the excised appendages. The number of positive appendages for microscopic examination was 13 samples.

8. Discussion

The results of microscopic examination are less than the previous results as in a study conducted by (19) in Iraq, Wasit province, which recorded an injury rate of 81.5%. And less than the rate of infection recorded (21) in Iraq, Diwaniya province by 56%. It is also lower than the rate of infection in an orphanage in Baghdad, which was 84.3% (22). And less than the proportion of infection in Iraq, Najaf, which amounted to 83.9% (15). While the study agreed in terms of infection with the parasite *E. vermicularis* with (20). Which recorded a rate of infection in females amounted to 60% and 51.51% males. It is also consistent with (23). Who received a total rate of 38.7% females, 31% males. These results differed completely with (24). Which indicated a higher infection rate in males when conducting a survey between (20789 cases) in Nineveh to study the eligibility of *E. vermicularis* infection, and (25) in Baquba city noted the infection rate in males was 37% higher than Females 32%.

It is likely that the high rate of infection among females is related to their daily work as in the case of contact with the clothes of infected people from the same family (26). The results between age and parasite infection were consistent with the results of (22). Which recorded the highest infection rates in the age group 4, 5 and 6 years in Baghdad? Approach to the results of the (27). Who recorded a higher infection rate among these children? It is also close to the results (19), in Iraq, Wasit province, which recorded the highest incidence in the category (7-9) years by 46.01%. The infection rate was high in children due to the scratching of the anus due to itching caused by parasite infection, eggs are picked under their nails and then deposited on toys or writing and eating, bad habits when the child with his fingers in his mouth, as well as overcrowded schools, nurseries, playgrounds this is consistent with (28). Who conducted several studies and their results showed that the low risk of gastrointestinal disease among children who wash their hands and the level of parental education are important factors and affect parasitic infection.

This result also coincided with what was reported (15). In Najaf governorate on the relationship of *E. vermicularis* and incontinence, where the incidence rate was 83.9% and the incidence of night incontinence was 61.5%. It also supported a study (22), of an orphanage in Baghdad, where the total incidence of *E. vermicularis* 84.31% and there was a direct relationship between the injury and the phenomenon of incontinence or bedwetting by 58.82%.

The study (29) in the province of Babylon incidence of incontinence in the presence of *E. vermicularis* and sex where the incidence of parasite *E. vermicularis* 49.05% The incontinence phenomenon in the presence of *E. vermicularis* was recorded by 72.72% (66.6% males, 80% females). The results were comparable to those found (30), which showed that the infection with the parasite *E. vermicularis* by 11.6%. This is almost consistent with what was stated (31-39), which confirmed that the most parasitic etiology of appendicitis is *E. vermicularis* where the adult parasite is isolated as well as its eggs from the inflamed appendix that has been surgically removed (40-42). The results are also lower than the results (32), Where 18.2% of those who suffer from appendicitis recorded the presence of the parasite *E. vermicularis*, also pointed to the presence of *E. vermicularis* in inflammatory appendages more than healthy appendages.

9. Conclusion

E. vermicularis is the most prevalent intestinal parasitic worm in the world and is associated with many pathogens, including appendicitis and nocturnal enuresis in children. It was concluded from the results of this study the effective role of *E. vermicularis* parasite in causing many health problems, including appendicitis as well as the phenomenon of night incontinence in children.

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