

General Urine Examination to determine the Eggs of Pinworms *Enterobius vermicularis*, in girls

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Abstract. The purpose of the study is to identify the most effective methods for early diagnosis of pinworms in children, particularly girls.

General Urine Examination was applied in the current study on 100 samples of urine from girls who suffered from pain and itching in the vagina and anus; For one age group (11-14 years), to detect pinworm eggs in urine. This test was applied for the first time in Iraq through this study. Two methods have been used to detect pinworm eggs in 70 cases: the first is the Flotation method, which involves treating stool samples with a saturated salt solution. Second: Scotch tape test, which is characterized by sticking a transparent tape directly to the anal area for 30 seconds.

Of the 62 positive urinary inflammation samples, 27 were positive for pinworm eggs. The infection rate was 27%, indicating that *Enterobius vermicularis* eggs were passed to the genitourinary system in these girls. Two methods were used to diagnose pinworm: stool flotation and Scotch tape adhesive. The best method was determined. A total of 75 samples were collected simultaneously for both. The flotation method appeared (9) 12% while the scotch tape appeared (33)44%.

General urine analysis revealed a significant rate of pinworm passage into the female reproductive system, indicating the effectiveness of this method for detecting pinworms in girls. To evaluate the efficiency of the examination using the two methods (the flotation method and the scotch tape method), the results demonstrate the efficiency of the scotch tape method in diagnosing these worms and that it gives more certain results than other methods, because the eggs are often not excreted in the feces except in severe cases.

1. Introduction

Pinworms, *Enterobius vermicularis*, have been known since ancient times, and were first studied by Leucheur (1865). They occur across age groups, but are more common in children than in adults [1,2].

It is an intestinal roundworm that infects humans and causes enterobiasis (oxyuriasis). Some studies on the clinical signs associated with pinworm infection, which are itching around the anus, indicate that it occurs especially after a hot bath or during the night, causing disturbances and anxiety for the sleeping child, due to the accumulation of eggs around the anus [3].

There are other clinical signs, such as loss of appetite, insomnia, bed-wetting, and stomach pain. In some cases, the infected person also suffers from “nervous symptoms, grinding of teeth, and vomiting” [1].

Regarding infection in girls, Chung *et al.* [4] reported vaginal itching that progressed to irritation and ulceration due to the entry of female worms into the reproductive tract and uterus.

Pinworms have received the attention of doctors and researchers all over the world after it was proven that they are migratory and that the adult female, after shedding her eggs in the anal area, returns to the colon, losing its way and entering the vaginal area, moving to the uterus and oviduct via fallopian tubes or may It penetrates the lining of the colon into the peritoneum and then takes the bloodstream to other organs, causing serious complications [5], especially in females compared to the males. Many cases of infection of the urinary and reproductive tracts together have been recorded. The researcher [6] found pinworm eggs in the vagina from routine cervical smears. Studies by some researchers have indicated cases of fallopian tube inflammation, and there are recorded cases of salpingitis [5].

Okuz *et al.* [7] reported an association between pinworm infection and urinary tract infections in females. At the same time, Sun *et al.* [8] reported that pinworms can penetrate the colonic lining and migrate to the peritoneum, causing peritonitis or granuloma formation.

In Iran, Bahador [9] recorded a case of a seven-year-old child suffering from an abscess in his abdomen. Upon histopathological examination, he identified adult pinworms with eggs within the tumor mass, along with a positive stool examination.

Tandan [10] also found a case of a 13-year-old girl suffering from abdominal pain and fever, severe inflammation in the pelvic area, and infiltration of inflammatory cells, caused by the presence of pinworm eggs infiltrated with eosinophilic infiltration cells.

In China, Sai-Cheong *et al.* [11] revealed a case of a 76-year-old man who suffered from a tumor in the colon area, a carcinoma colon, there were large numbers of pinworm eggs in the tumor, and he suffered from anal itching in his childhood.

The arrival of pinworms in the liver has been reported by many researchers, including Furnée *et al.* [12], who documented a case of colorectal carcinoma in the liver. Scientists agreed with the hypothesis that the pinworm migrates through the bloodstream and enters the liver from the narrow hepatic ducts [13].

The pinworm's entry into the bloodstream and capillary system enabled it to reach distant sites, such as the lungs, causing respiratory complications [14]. A case of pinworm infection was documented in the submandibular salivary gland, resulting in a tumor, abscess, and sialoadenitis [15]. The pinworm migration may reach the cerebrospinal fluid [16]. In Yugoslavia, a case was found of a 40-year-old woman suffering from chronic anal itching. The Scotch tape examination for pinworm eggs was positive. Then the itching spread to both legs, and the patient sustained Weakness in her legs, which led to complete paralysis and lack of control over urinary urgency. The condition was diagnosed as myelopathy, secondary to antiphospholipid antibody syndrome, which resulted in the presence of large numbers of pinworms in the perineal area and their penetration into the sphincter muscles. Jelena *et al.* [17] reported cases from various locations, including subcutaneous abscesses, caused by the accumulation of eggs within these abscesses [18, 19]. And maybe reach the eye [20]. Recently, Ummarino *et al.* [21] diagnosed pinworm in stool using PCR.

The current study aims to identify the most effective methods for early diagnosis of pinworms in children, particularly girls.

2. Materials and Methods

Two methods have been applied to detect pinworm eggs: the First is the Flotation method, which is done using a saturated salt solution for stool samples [22].

Second: Scotch tape test, in which transparent tape is applied directly to the anal area for 30 seconds, then removed, placed on a glass slide, and examined under a light microscope at 10X magnification. Scotch tape samples were taken from children visiting health care centers who showed signs of anal itching, and children from primary schools and kindergartens of Baghdad, Al Rusafa, in the period from March to November (Fig.1). 75 samples were collected, including children aged 1-9 years and of both sexes, to investigate pinworm eggs. Samples were taken in the morning between nine and eleven o'clock. All glass slides were placed in a special container and transported to the laboratory for examination under the light microscope.

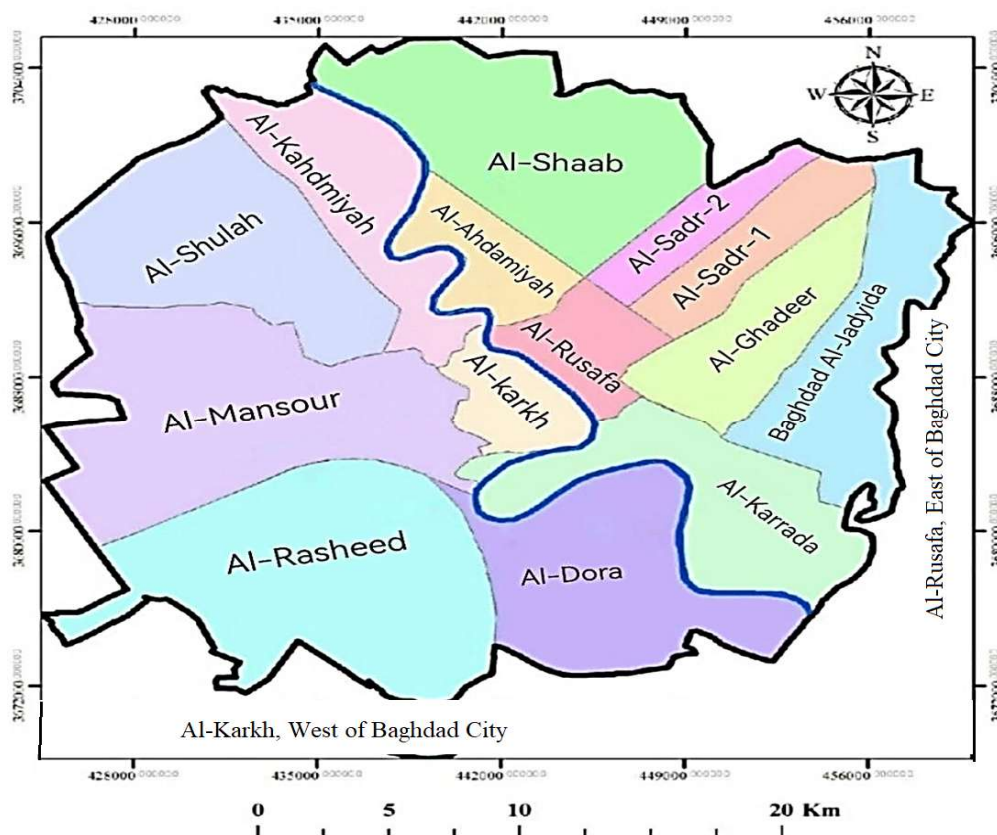


Fig. 1. Location map showing the study area's location.

To evaluate the efficiency of the two methods, 75 cases were selected, to which both methods were applied simultaneously.

Urine samples:

Urine samples were taken from girls' primary schools, especially from sixth-level girls, from three different schools in Sadr and Al-Shaab City:

School (1) _ Al-Maali Primary School for Girls.

School (2) _ Rufaida Islamic Primary School for Girls.

School (3) _ Taiba Primary School for Girls.

For one age group (11-14 years), to detect pinworm eggs in urine. This test was applied for the first time in Iraq through this study.

A total of 100 urine samples were collected from girls suffering from pain, burning when urinating, and anal or vulvar itching. They were placed in a 60 ml glass bottle with a tight cap. The girls' names, numbers, and ages were written on it. The samples were then transferred to the laboratory for examination.

3. Results

Examination of Scotch tape samples:

This method was used to diagnose pinworm infection because it is simple and effective, yielding more positive results than other methods [23, 24, 25].

The slides were examined under a light microscope at a minimum magnification (10X), and the egg appeared to have an oval shape, convex on one side, with two membranes surrounding the larvae inside the egg. The infection rate was 44%, whereas the flotation method for stool samples yielded 12%.

A total of 33 positive cases were identified using the Scotch tape method (44%), and the Flotation method identified 9 positive samples (12%). Table (1).

Table (1): Comparison of the efficiency of the two detection methods for pinworm infection rates.

No. of samples	No. of positives for the Scotch tape method	%	No. of samples	No. of positives for the flotation method	%
75	33	44	75	9	12

Examination of urine samples:

The General Urine Examination method [26] was applied to urine samples. The samples were centrifuged at 1500 rpm for 2 minutes. The solution was separated into two layers. The first layer (the clear) was neglected. The sediment was then dropped onto a clean glass slide and covered with a lid. The slide was examined under a light microscope at low power (10X) to see pinworm eggs. It is then examined under high power (40X) to identify inflammatory cells, pus cells, red blood cells (RBCs), amorphous cells, and epithelial cells.

The results of examining 100 urine samples using the general urine examination method for girls aged 11-14 years were used to detect pinworm eggs. A total of 62 cases had urinary tract infections, and 27 cases were positive for pinworm eggs, for a 27% rate. Table (2). Note that the selection of girls is not random. Instead, the search focused on girls who suffer from pain, burning during the urethra, and anal or vulvar itching from three different schools, specifically from female students in the sixth grade of primary school, that is, from one age group (11-14 years old). The current study showed a 27% infection rate in girls.

Table 2: Numbers and percentages of pinworm infection in urine samples for the age group (11-14) years in girls.

Locations	No. of examined samples	No. of urinary inflammations cases	Number of positive for pinworm infection	%
School (1)	25	13	4	16
School (2)	30	15	9	30
School (3)	45	24	14	31.1
Total	100	62	27	27

4. Discussion

The current study reported a 44% pinworm infection rate among children in Baghdad, consistent with Al-Kinany et al. [27], who reported 46.66% in the urban areas of Al Kut City, Wasit province, Iraq.

The widespread occurrence of this worm among children in Baghdad's Al-Rusafa district warrants attention. Even though most of the infected children do not show severe clinical symptoms, most of them show symptoms of anal itching, which causes discomfort and psychological disturbance to the child, as it appears in their behavior and interactions with their colleagues [28]. Several factors are essential to the spread of this infection and its recurrence despite ongoing treatment. Certain healthy habits in children are directly related to the infection, for example, "playing on the floor, sucking fingers, biting nails, washing hands before eating, and bathing daily." "And washing hands after bathing, the number of times changing underwear, and some children sleep without underwear, then the size of the family and the number of its members, especially those who mix and transmit the infection to each other, until the infection was observed in an eight-month-old child from a family with five children, all of whom are infected with the disease, that is, The infection of one child in the family could be a reason for spreading the infection to all members of the family, then the children sleeping together in a shared bed and a shared mattress and covers are all factors that help in transmitting the infection, then the type of housing, is it shared with several families or not. All of these factors, in one way or another, affect the epidemiology and spread of the disease [29]. Washing your hands before eating is a critical habit that must be taught to children. It is essential to spread the infection via contaminated food and drink, or through hand-contaminated eggs [2, 3].

In addition, the large number of eggs laid by one female, approximately 15,000 eggs, makes the opportunity for contamination of hands, clothes, covers, and the like great, in addition to the light weight of the eggs, which helps in their spread in the atmosphere of one room and the possibility of inhaling them with dust-borne infection. It becomes contagious only a few hours after introduction, and it can survive in the external environment for more than 10 days at an average temperature of 21°C. [30, 31].

The spread of these worms is global, with more than 400 million people infected worldwide. These worms are found in areas with both hot and cold climates, and they lack an immune system specialized for infection. They are found in crowded places and orphanages and are most prevalent among children; therefore, this worm is considered highly contagious and associated with numerous complications [32].

It has recently been proven that it is migratory, and that the adult female, after shedding her eggs at the anus, returns to the colon and gets lost. It may enter the vaginal area and then move to the uterus and fallopian tubes, causing complications such as inflammation of the fallopian tube and salpingitis [5]. Therefore, pinworm complications in girls and women are considered more common than in men. Many cases worldwide have been recorded of infections in the urinary and reproductive tracts occurring together. Kashyap *et al.* [33] found pinworm eggs in the vagina by routine cervical smears. Okuz *et al.* [7] showed that this worm causes vulvar or vaginal itching, pain, and difficulty with urination in girls over the age of 12 years old, due to the itching, scratching, and ulceration caused by this worm. This was demonstrated in the current study, which examined 100 urine samples from girls aged 11-14 years. All these girls were suffering from pain in the urine and itching in the anus and vulva. A total of 62 samples were infected with urinary tract infections, and 27 were positive for pinworm eggs, indicating a urine infection rate of 27%, which is high. This examination is the first to confirm the passage of pinworms into the urogenital area in girls; therefore, it should be extended to other regions and age groups of women.

Scientists and researchers have agreed that the pinworm migrates through the bloodstream hematogenously, thereby entering the liver via the narrow bile ducts [34]. The pinworm enters the bloodstream via the capillary network, enabling it to reach the lungs and cause respiratory complications [14]. It may affect the submandibular salivary glands, leading to sialoadenitis [15]. It even reaches the spinal fluid and bone marrow. It causes bone marrow disease myelopathy, not to mention cases of abscesses and tumors under the skin, or in the perineal region, and cases of granuloma [35]. In addition to cases in the Kidney [36] and Bladder [37].

Unusual and important cases have been recorded worldwide and across different body sites. It indicates the movement of this worm and its migration through the bloodstream. Therefore, we conclude that this parasite is no less critical than other parasites, such as *Ascaris lumbricoides* or *Ancylostoma* hookworms, and other parasites that cause pathologies that may be fatal. Especially after conducting this study, which showed an infection rate of 27% of girls aged 11-14 years, and their passage to the genitourinary region through urine examination, it becomes clear to us the necessity of conducting more comprehensive surveys and more detailed research, including all governorates of the country.

To evaluate the efficiency of the examination using the two methods (the flotation method and the scotch tape method), 75 cases were taken in which the two methods were applied together at the same time, as 33 (44%) cases appeared positive for the infection using the scotch tape method, while the flotation method showed 9 (12%) positive samples, from this demonstrates the efficiency of the scotch tape method in diagnosing these worms and that it gives more certain results than other methods because the eggs are often not excreted in the feces except in severe cases [2].

5. Conclusions

General urine analysis revealed a significant rate of pinworm passage into the female reproductive system, indicating the effectiveness of this method for detecting pinworms in girls.

To evaluate the efficiency of the examination using the two methods (the flotation method and the scotch tape method), the results demonstrate the efficiency of the scotch tape method in diagnosing these worms and that it gives more certain results than other methods, because the eggs are often not excreted in the feces except in severe cases.

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