

Evaluation of *Enterobius Vermicularis* Infection in Primary School and Relationship with Nocturnal Enuresis

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ABSTRACT: One of the most common worm infections in children globally is enterobiasis, also known as pinworm infection. Certain infections, such as intestinal helminthes infection, may have contributed to the tendency to develop nocturnal enuresis. 100 randomly chosen children of both sexes, ages 6 to 12, were recruited for the prospective study from elementary schools in the heart of Al-Kut City. The children was examined for *E.vermicularis* infection by microscopic examination . The percentage of children aged 6 to 12 who tested positive for enterobiasis was 14%, with 14 out of 100 evaluated children having a positive sample. 37 (16.2%) were males and 63 (12.6%) were females. Males had a slightly higher prevalence than females However, difference was non-Significance (NS) $P>0.05$. The results showed the highest prevalence (28.57 %) in the group age 6 years, although the group aged 10 to 12 had a lower infection rate (0%), the statistical analysis revealed significant differences between the age groups at the 0.05 significance level. One of the most prevalent intestinal helminths, *Enterobius vermicularis*, is associated with nocturnal enuresis in children in Al-Kut City. No significant differences (NS) $P>0.05$ have been found in the incidence of nocturnal enuresis and infection between boys and females.

Keywords: *Enterobius vermicularis*, Nocturnal enuresis, *Enterobius's*, children, pinworms.



1. INTRODUCTION

One of the helminths with a wider geographic distribution than others is *Enterobius vermicularis*, often known as pinworm, threadworm, or seatworm. Its main method of transmission is direct contact between infected and non-infected individuals [1]. A parasite invasion of the big bowel's cecum is called pinworm infection. Eggs caught under nails or on fingers are spread between children in schools and nurseries, as well as within the family at home. This condition is more common in children between the ages of five and fourteen. [2].

They are easily transported to the mouth, where some may be eaten. They can also spread through sharing bath towels. They can also live for a few weeks on bedding, clothes, carpets, and household dust. Suckering one's thumb and other fingers is a behavior that is closely linked to the occurrence of threadworms [3]. Most infestations with gastrointestinal nematodes are asymptomatic. This could be the reason why funding for study and public health identification of gastrointestinal nematode infestations, such as *E. vermicularis* infestations, have been abandoned [4]. A pinworm infection can cause a variety of symptoms in different people. Some, particularly children, may have perianal pruritus,

restlessness, loss of appetite, insomnia, and irritability. The pinworm life cycle is simple: the worm uses the gastrointestinal tract of its human host to mature, and the gravid female worm migrates to the anus at night to lay fertilized eggs. [5,6]. The female pinworm that is ovulating sometimes could also relocate to the external genitalia in order to lay fertilized eggs. Despite being found in the lumen of the large intestine, *E. vermicularis* can also infrequently be found in ectopic locations like the kidney, uterus, appendix, urinary system, female genital tract, eye(s), and subcutaneous nodule. [5,6]. 212 children between the ages of 6 and 12 in the province of Al-Basrah were found to have a prevalence of 70.75% of this virus, according to several research on its epidemiology. [6]. A prevalence rate of 18.01 percent was recorded among 261 children in Duhok, north of Iraq, who were between the ages of three and twelve [7]. In the capital city of Baghdad, 122 children between the ages of one and fourteen had a prevalence rate of 73.77%. [8]. Additional investigators examined the connection between enterobiasis and enuresis, anemia, biochemical markers, and deficiencies in micronutrients. [7,8]. The purpose of this study was to ascertain the incidence of *E. vermicularis* in school-age children and investigate the possible link between enuresis and enterobiasis infection.

2. MATERIALS AND METHODS

Sample Collection

There were 63 females and 37 boys among the kids (6–12 years old) who gave the stool samples. From December 2022 to April 2023, the research was carried out at the College of Education for Pure Sciences. The project's sample came from elementary schools located in the center of Al-Kut city. The collection of exit samples in the morning was given priority, and the sterile plastic jars used to gather these samples were utilized. A data questionnaire including the patients' age, gender, and collection date was handed to them. It also inquired as to if they experienced any other symptoms, such as weight loss, anal muzzle itching at night, abdominal discomfort, appetite loss, or urinary tract infections.

Samples Analysis

Microscopic Examination

A drop of regular saline was added, and a tiny quantity of stool (about 100 mg) was spread out in a 1–15 cm area on a glass slide. The samples were then examined under a 40X magnification and covered with a cover slip.

Statistical analysis

GraphPad Prism Software version 6.0.1 (GraphPad Inc., USA) was served to detect significant variation between values (percentage) of study groups. While the *t*-test was applied for comparison between the groups of gender, One-Way ANOVA was used to compare between groups of age. Values were considered significant at $P < 0.05$.

3. RESULTS

Out of 100 children evaluated, 14 had a positive sample for enterobiasis, representing 14% of the total positivity rate among children aged 6 to 12 years.

The prevalence rate of *Enterobius vermicularis* in the study population is displayed in Table 2. Out of the hundred kids, 37 (16.2%) were guys and 63 (12.6%) were girls. The prevalence of males was marginally higher (16.2%) than that of females (12.6%). Nevertheless, the difference was $P < 0.05$ non-Significant (NS).

Table 3 displays the highest prevalence (28.57 %) among children aged six years, while the group aged 10-12 years had the lowest infection rate (0%). The statistical analysis reveals significant differences between the age groups at the 0.05 significance level. Enterobiasis and were shown to be statistically significantly (NS) $P > 0.05$ correlated in Tables 4 and 5.

Table 1: Prevalence of *Enterobius vermicularis*

Number of samples	Positive samples	%
100	14	%14

Table 2: Prevalence of *Enterobius vermicularis* according to the gender

Gender	Total No.	Positive		p-value
		No.	%	
Male	37	6	16.2	0.0850 NS
Female	63	8	12.6	

Non-Significance (NS) $P > 0.05$ **Table 3:** Prevalence of *Enterobius vermicularis* according to the age:

Age	Total No.	Positive		p-value
		No.	%	
6	21	6	28.57 *	0.0389 S
7	12	3	25 *	
8	16	4	25 *	
9	17	1	5.88	
10	13	0	0	
11	13	0	0	
12	8	0	0	
Total No.	100	14	14	-

Significance (S) $P < 0.05$

Significant increase (*)

Table 4: Prevalence of *Enterobius vermicularis* according to the age in male

Age	Total No.	Positive		p-value
		No.	%	
6	9	3	33 *	0.0148 S
7	3	1	33 *	
8	6	2	33 *	
9	7	0	0	
10	5	0	0	
11	4	0	0	
12	3	0	0	
Total No.	37	6	16.22	-

Significance (S) $P < 0.05$

Significant increase (*)

Table 5: Prevalence of *Enterobius vermicularis* according to the age in female

Age	Total No.	Positive		p-value
		No.	%	
6	12	3	25 *	0.0438 S
7	9	2	22 *	
8	10	2	20 *	
9	10	1	10	
10	8	0	0	
11	9	0	0	
12	5	0	0	
Total No.	63	8	12.7	-

Significance (S) $P < 0.05$

Significant increase (*)

Table 6: Prevalence of *Enterobius vermicularis* and relationship with nocturnal enuresis

Gender	Total No.	Positive		p-value
		No.	%	
Male	6	4	66	0.0950 NS
Female	8	5	63	

Non-Significance (NS) $P > 0.05$

4. DISCUSSION

Enterobiasis was one of the most common infections that impact almost 1 billion individuals from all socioeconomic backgrounds [9]. Our study showed that the overall prevalence rate of *Enterobius vermicularis* among children was 14%. In close similar studies of *Enterobius vermicularis* were reported by different researchers in Iraq and several part of the world. *Enterobius vermicularis* was recorded 18.3% in Mexico [10], in Mosul which was 15%; [11], in Thailand orphanages which was 15.95 % [12], in Iran which was 17.2% [13], in the Marshall Islands which was 12.14% [14]. On the other hand, our results disagreed with the results of Laoraksawong *et al.*, (2020) in Nakhon Si Thammarat, Thailand [15], Al-Daoudy and Al-Bazzaz (2020) in Erbil Province, Iraq [16], Khayyat *et al.*, (2021) in Palestine [17]. The incidence of enterobiasis in different areas in Al-Kut City may be influenced by socioeconomic, topographical, sanitary, cultural, and nutritional factors. Furthermore, variations in the demographic, sample size, and data collection technique could account for variations in the prevalence of enterobiasis. Our findings regarding the enterobiasis infection with relation to sex revealed that males were more susceptible to infection (16.2%) than females (12.6%), There was no significance relationship between sex and pinworm infection. This result is in agreement with Khazaal *et al.*, (2020) in Thi-Qar province southern Iraq [18], Al-Waaly *et al.*, (2020) study in Al-Diwaniyah city [19]. Fan *et al.*, (2019) study in Marshall Islands [14], Khayyat *et al.*, (2021) in Palestine [17].

However, our findings were at odds with the findings of Meskin *et al.*, 2019 in Iran; [20], Rahi (2010), [21], Taei, 2019 in Babylon province [22]. The gender difference in the children may be because females have better personal hygienic measures against pinworms than males, the males play and spend more time outside house more than female and this may make them more likely exposed to infection [18].

The observation of current study showed significant association between pinworms infection and age group, the results show the high infection were in males with age 6-8 years, and females with age 6 years while the low infection was in males with age 9-12 years, and females with age 10-12 years. These results were contrary to results of Al-Daoudy and Al-Bazzaz (2020), [16] and Khazaal *et al.*, (2020), [18]. and Laoraksawong *et al.*, (2020), [15]. Small children are more likely to get it than older children. This could be due to factors like playing with dirty toys, sitting or playing on contaminated ground, putting their fingers in their mouths and cutting them with their teeth, or simply having poorer personal hygiene [18].

The result of this study has provided additional information about nocturnal enuresis and we tried to determine the possible association between nocturnal enuresis and enterobiasis infection in children. The positivity rates for enterobiasis were 66% in males and 63% in females had enuresis. Statistically, there was no significant differences $p > 0.05$ between total rate of pinworm infection and enuresis. this study was consistent with Hussein (2015) [1] and Genus *et al.*, (2009) [23] and Al-Shadood (2015), [24]. The findings demonstrate that infections can cause nocturnal enuresis in children for a variety of reasons, including physiological causes (deep sleep, decreased bladder capacity, and nocturnal polyuria) and emotional and psychological disturbances (large families, divorced cases, and educational variables) [1, 23].

5. Conclusions

The current study indicates that *E. vermicularis* is one of the intestinal helminthes that causes nocturnal enuresis in children most frequently in AL-Kut City. It is also one of the common agents that cause intestinal parasite infections in children.

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