

THE RELATIONSHIP BETWEEN *ENTEROBIUS VERMICULARIS* INFECTION AND NOCTURNAL ENURESIS

Gülnaz Çulha¹, Nizami Duran²

Mustafa Kemal University, Medical Faculty, Departments of Parasitology¹ and Microbiology²,
Hatay/Turkey

Aim: The possible association between certain childhood infections and the propensity to develop nocturnal enuresis may include intestinal helminth infections. Objective: To explore the association between *Enterobius vermicularis* and nocturnal enuresis among children 4 to 7 years of age in a Turkish orphanage.

Methods: Eighty children (45 boy, 35 girl, age range 4-7 years) participated in this study. The association between *Enterobius vermicularis* and enuresis was investigated after mebendazole therapy in the children with *Enterobius vermicularis* infection. The occurrence of *Enterobius vermicularis* was examined by adhesive cello tape anal swap method.

Results: The occurrence of *Enterobius vermicularis* was examined by perianal tape tests in 80 children. Total egg positivity rates of *Enterobius vermicularis* were 71.3% (57/80). The egg positivity rates of boys and girls were 75.6% (34/45) and 65.7% (23/35), respectively. Total enuresis rate was 51.3% (41/80), and 60% (27/45) of the boys and 40% (14/35) of girls had enuresis. After the mebendazole therapy, while the total egg positivity rate of *Enterobius vermicularis* was 33.8% (27/80), this ratio was 35.6% (16/45) for boys and 31.4% (11/35) for girls. While before the mebendazole therapy, total enuresis rate was 51.3% (41/80), after the therapy it was found to be 28.8% (23/80) in children.

Conclusion: In this study, it was shown that *Enterobius vermicularis* infection was quite prevalent among orphan children in Antakya. Besides this, the results indicate that nocturnal enuresis could be more frequent in children with *Enterobius vermicularis* disease. It was concluded that nocturnal enuresis may be related with pinworm infestation.

Key words: *Enterobius vermicularis*, enuresis, pinworm, parasite, children.

Eur J Gen Med 2006; 3(1):16-20

INTRODUCTION

Nocturnal enuresis (bedwetting) is a socially disruptive and stressful condition which affects around 15-20% of children older than five, and up to 2% of young adults. Although there is a high rate of spontaneous remission, the social, emotional and psychological costs may be harmful. Enuresis is an important childhood problem that has been associated with a wide variety of child disorders, and with the socio-environment of the family (1,2). Intestinal helminth infections are more prevalent among the school-age children, especially preschoolers.

In some groups, nearly 50% of children are infected. Infection often occurs in more than one family member. Adults are less likely to have pinworm infection, except mothers of infected children. Child care centers, and other institutional settings often more have cases of pinworm infection (3).

Enterobius vermicularis (pinworm) is one of the most prevalent worms found in children worldwide. Pinworms, also called threadworms, typically infect the bowel of children in tropical areas (4,5). *Enterobius vermicularis* is the causative agent of human enterobiasis. The disease is more prevalent in

Correspondence: Assistant Prof.Dr. Nizami DURAN
Mustafa Kemal University, Medical Faculty,
Department of Microbiology, Hatay/Turkey
Tel: 903262141649, Fax: 903262144976
E-mail: nizamduran@hotmail.com

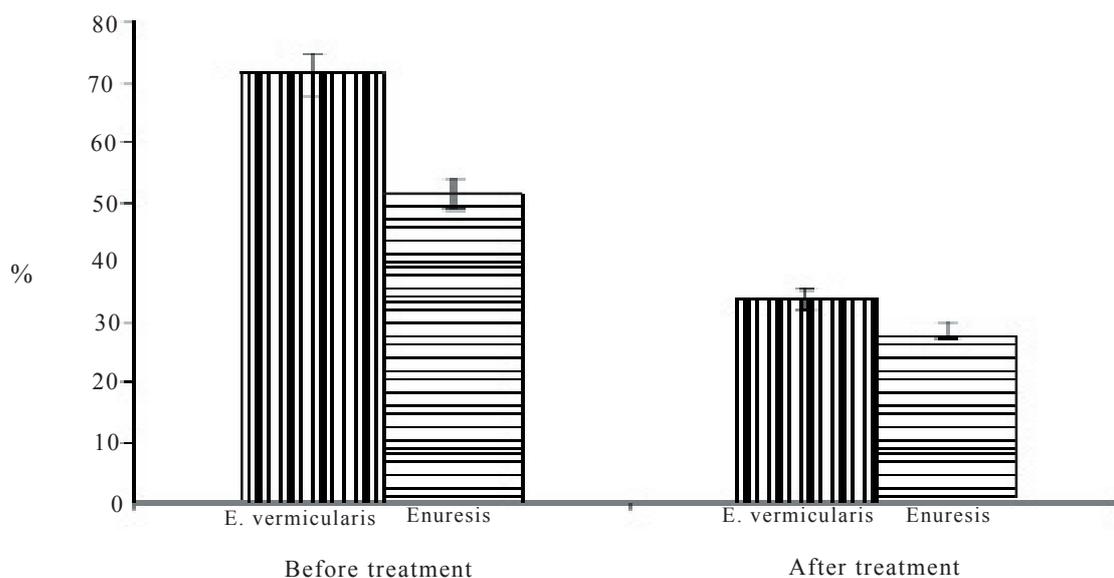


Figure 1. The rates of *Enterobius vermicularis* and enuresis before and after the treatment

temperate regions and is facilitated by factors such as overcrowding in schools and family groupings, as well as inadequate personal and community hygiene. (5).

There are several drugs, which can help to eliminate pinworm. One of the most common drug is mebendazole. It is usually taken in a single dose or perhaps in two doses two weeks apart. The whole family must take the medication; otherwise it will not be very helpful. These drugs only kill the adult worms so attention to cleanliness is still extremely important. Petroleum jelly or anti-itch creams and ointments may be applied 2-3 times per day to reduce the itching that continues the cycle of infection (4,5,6).

Urethral/vaginal reflux has been suggested as cause for enuresis. This concept is not widely accepted. Somewhat more realistic is the suggestion by Sachdev and Howards that a number of cases of secondary enuresis may be due to pinworm infestation (*Enterobius vermicularis*) (7). The association between enuresis and *Enterobius vermicularis* was reported in some studies (7-9). The prevalence of this problem as a cause of secondary enuresis is not clear at this time. However, it would seem practical to check all children with enuresis, especially girls, for pinworm infestation.

In this study, we aim to investigate the

frequency of *Enterobius vermicularis*, and its association with enuresis among children aged 4-7 years in an orphanage in Antakya.

MATERIALS AND METHODS

The current study was carried out in Antakya between March 2003-September 2003 to find the prevalence of enuresis and enterobiasis among children living in an orphanage in Antakya. For this purpose a total of 80 orphan children were included to this study. The mean age was 6.63 ± 0.66 (range 4-7). The children were examined for *Enterobius vermicularis* infection using the cellotape anal swab technique. Nocturnal enuresis rates were investigated before and after mebendazole treatment in children with *Enterobius vermicularis* to search for the association. One tablet (>2 years; 100 mg PO bid for 3 d) was given as a single dose for the purpose of treatment. At the end of the treatment, perianal tape samples taken all of the children were examined.

Data collection

Firstly, a questionnaire about enuresis was constructed and data on this item was gathered. Data collection was done in cooperation with childrens' nurse. Enuretic children's nurses were interviewed on the frequency of enuresis during the day and night.

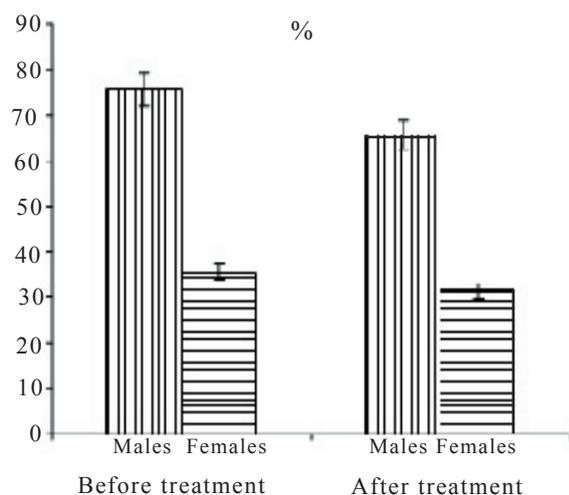


Figure 2. The rates of *Enterobius vermicularis* before and after the treatment in male and female children.

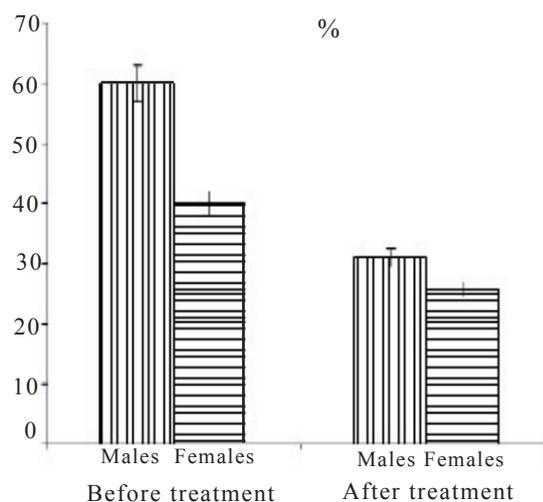


Figure 3. The rates of enuresis before and after the treatment in male and female children.

Enuresis was defined as an unintended leakage of urine at least once a week in an individual old enough (older than 4 years) to maintain bladder control (10). Diurnal enuresis was defined as an unintended leakage of urine during waking hours and nocturnal enuresis was defined as bed-wetting in children older than 4 years at least once a week.

Primary enuresis was defined as an unintended leakage of urine at least once a week in a child who had never had day or night bladder control for a period greater than 6 months. Secondary enuresis is considered when the child has been toilet trained for at least 6 months after the age of bladder control, and bladder control is subsequently lost (11).

Statistical analysis

The statistical analyses were performed by using Statistical Package for Social Sciences (SPSS, version 10.0) software. The chi-square test was used for statistical analysis. P values less than 0.05 were considered statistically significant.

RESULTS

The occurrence of *Enterobius vermicularis* was examined by perianal tape tests in 80 children. Total egg positivity rate for *Enterobius vermicularis* was 71.3% (57/80). The egg positivity rates for boys and girls were 75.6% (34/45) and 65.7% (23/35),

respectively. Total enuresis rate was 51.3% (41/80), and 60% (27/45) of the boys and 40% (14/35) of girls had enuresis. After the mebendazole therapy, while the total egg positivity rate for *Enterobius vermicularis* was 33.8% (27/80), this ratio was 35.6% (16/45) for boys and 31.4% (11/35) for girls. There was a statistically significant decrease in the prevalence of *Enterobius vermicularis* after the mebendazole treatment in both boys and girls ($P < 0.05$).

While before the mebendazole therapy, total enuresis rates was 51.3% (41/80), after the therapy it was found as 28.8% (23/80) in children (Figure 1). After the mebendazole treatment, the decrease of the enuresis rates in boys and girls was statistically significant ($P < 0.05$). After mebendazole therapy, while 16 (31.1%) of male children were positive for *Enterobius vermicularis* and 14 for enuresis, enterobiasis was found in 11 of female children and enuresis in 9 (25.7%). Statistically significant differences were found between the male and female children ($P < 0.05$), (Figure 2 and 3)).

DISCUSSION

Nocturnal enuresis is a common problem, affecting an estimated 5 to 7 million children in the United States and occurring three times more often in boys than in girls (12). Unfortunately, only about one third of the families of children with this frequently

troubling problem seek help from a physician. Recent studies have provided more information about nocturnal enuresis, and generally effective treatment are available (1,2,12). It is known that intestinal parasites play an important role in the etiology of enuresis cases. It has been reported that enuresis was one of the shown symptoms in enterobiasis (7,8,13). In this study, we tried to determine the potential association between enuresis and *Enterobius vermicularis* in children. While before mebendazole therapy total egg positivity rates for *Enterobius vermicularis* was 71.3% (57/80), and 51.3% (41/80) of these children had enuresis, after the mebendazole treatment, a significant decrease of the prevalence of nocturnal enuresis (51.3%, 41/80) occurred depending on the decrease of the prevalence of *Enterobius vermicularis* after the treatment (33.8%, 27/80), ($p < 0.05$, Figure 1).

Studies on the association between *Enterobius vermicularis* infection and nocturnal enuresis among children are limited in Turkey. In a study conducted by Erdemir et al (14), *Enterobius vermicularis* was present in 61% in the enuretic children (14). Also, they noticed that *Enterobius vermicularis* was the most frequent isolated microorganism among the enuretic patients (15). Similarly, from studies conducted in our country among the enuretic children, in the study of Tanyuksel et al (15), the rate of *Enterobius vermicularis* frequency was 31.3%, and, in the study of Yerel et al (16), it was 54% (15,16).

In another study, Zeyrek et al (17), investigated the frequency of *Enterobius vermicularis* in 50 children with enuresis nocturna complaints among the ages 5-15. *Enterobius vermicularis* was identified in 33 cases (66%) in their study (17).

With regard to studies from other countries, Otu-Basse et al (13), investigated the prevalence of enterobiasis and its relationship with enuresis among 799, randomly selected children aged 5-14 years. In their study, compared with the egg-negative subjects, the 60 children who were egg-positive for *Enterobius vermicularis* were found to be much more likely to be suffering from enuresis (13). In one study, Kim et al (18), (1991) reported that the egg positivity rate of primary school children was 19.9% in Kangwondo province, especially 61.9% among orphan children and the egg positivity rate of different regions such as urban and rural areas was significantly different (18). These values (61.9%) are very close to the rates we have

determined in our study (71.4%).

It has been demonstrated that the occurrence of *Enterobius vermicularis* seroprevalence was 9% to 61% in the general population and the egg positive rate of different regions such as urban and rural areas was significantly different in our country and different places of the world (14-26). In the present study, egg positivity rate of *Enterobius vermicularis* was found to be higher than the finding conducted before in Turkey (14-17,19-22). This result may be explained that the children living in orphanage have low life standards. In our study, the 71.4% *Enterobius vermicularis* prevalence found for orphan children approaches to the seroprevalence of *Enterobius vermicularis* prevalence reported by Kim et al (26).

In conclusion, these results confirm an association between *Enterobius vermicularis* infection and nocturnal enuresis. We recommend that enuretic children should be screened for *Enterobius vermicularis* infection. *Enterobius vermicularis* infections are frequently seen in kindergarden, primary school and orphanage, where children are crowded, so hygiene should be provided adequately. In addition, the official personnel of such should be educated about enterobiasis. In these places parasitic infections should be frequently screened.

REFERENCES

1. Yeung CK. Nocturnal enuresis (bedwetting). *Curr Opin Urol* 2003; 13(4):337-43
2. Van Hoecke E, Baeyens D, Vande Walle J, Hoebeke P, Roeyers H. Socioeconomic status as a common factor underlying the association between enuresis and psychopathology. *J Dev Behav Pediatr* 2003;24: 109-14
3. Garcia LS. *Diagnostic Medical Parasitology*. 4th ed. Washington DC: ASM; 2001;274
4. Neva FA, Brown HW. *Basic clinical parasitology*. 6th ed. Norwalk, Conn.: Appleton & Lange, 1994
5. Goldmann DA, Wilson CM. Pinworm infestations. In: Hoekelman RA. *Primary pediatric care*. 3d ed. St. Louis: Mosby, 1997:1519
6. Kucik CJ, Martin GL, Sortor BV. Common intestinal parasites. *Am Fam Physician* 2004;69:1161-8
7. Sachdev YV, Howards SS. *Enterobius vermicularis* infestation and secondary enuresis. *J Urol* 1975;113:143-4
8. Devera R. *Enterobius vermicularis* and

- enuresis. *Enferm Infecc Microbiol Clin* 2001;19:411-2
9. Gokalp A, Gultekin EY, Kirisci MF, Ozdamar S. Relation between *Enterobius vermicularis* infestation and dysuria, nocturia, enuresis nocturna and bacteriuria in primary school girls. *Indian Pediatr* 1991;28:948-50
 10. Robson Wm, Lane M. Diurnal Enuresis. *Pediatr Rev* 1997;18:407-12
 11. Howe AC, Walker CE. Behavioral management of toilet training, enuresis and encopresis. *Pediatr Clin North Am* 1992;39:413-32
 12. Thiedke CC. Nocturnal enuresis. *Am Fam Physician* 2003;67:1499-506
 13. Otu-Bassey IB, Ejezie GC, Epoke J, Useh MF. Enterobiasis and its relationship with anal itching and enuresis among school-age children in Calabar, Nigeria. *Ann Trop Med Parasitol* 2005;99:611-6
 14. Erdemir F, Ozcelik S, Saygi G. Distribution of symptoms among the primary School Pupils with or without Enterobiasis. *Turkish Parasitology J* 1992;16: 53-9
 15. Tanyuksel M, Haznedaroglu T, Bakir B, Gün H. The association of *E.nocturna* with parasitosis. *Acta Parasitologica Turcica* 1992;16:100-6
 16. Yereli K, Balcioglu YC, Ertan P, Oksel F, Ozbilgin A. *Enterobius vermicularis* incidence in the children with Enuresis nocturna. *Acta Parasitologica Turcica* 1997;21:31-3
 17. Zeyrek D, Zeyrek FY. *Enterobius vermicularis* incidence in the children with enuresis nocturna. *Dicle Medical J* 2001;28:163-5
 18. Kim JS, Lee HY, Ahn YK. Prevalence of *Enterobius vermicularis* infection and preventive effects of mass treatment among children in rural and urban areas, and children in orphanages. *Korean J Parasitol* 199;29:235-43
 19. Cakar A, Erguven S, Gunalp A. The rate of parasite detection over a 5-year period in the parasitology faculty laboratory at the Hacettepe University. *Mikrobiol Bul* 2002; 36: 207-13
 20. Gurses N, Ozkan Y, Peksen Y, Uysal S, Aydin M. Intestinal parasites in primary schools of different socioeconomic status and environmental conditions. *Mikrobiyol Bul* 1991; 25: 57-62
 21. Saygi G, Ozcelik S, Poyraz O. A survey of intestinal parasites in students of Adult Educational Center in Sivas, Turkey. *J Egypt Soc Parasitol* 1995;25:303-10
 22. Balci MK, Aydogdu S, Koc O et al. Parasite prevalence in schools with different socioeconomic status and evaluation of methods for diagnosing intestinal parasitic diseases. *Mikrobiol Bul* 1990;24:368-78
 23. Knudson A, Lemos E, Ariza Y, et al. Frequency of *E. vermicularis* in a rural school population of Quipile, Colombia, 2001. *Rev Salud Publica* 2003;5:87-99
 24. Tukaew A, Chaisalee T, Nithiuthai S, et al *Enterobius vermicularis* infection among pre-school children in Karen hilltribe villages in Chiang Mai, Thailand. *Southeast Asian J Trop Med Public Health* 2002;33:70-1
 25. Lohiya GS, Tan-Figueroa L, Crinella FM, Lohiya S. Epidemiology and control of enterobiasis in a developmental center. *West J Med* 2000;172:305-8
 26. Kim BJ, Lee BY, Chung HK, et al. Egg positive rate of *Enterobius vermicularis* of primary school children in Geoje island. *The Korean J Parasitol* 2003;41: 75-77