

Brief Communication

Infection rates of *Enterobius vermicularis* and *Clonorchis sinensis* of primary school children in Hamyang-gun, Gyeongsangnam-do (Province), Korea

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Abstract: The egg positive rate of *Enterobius vermicularis* and *Clonorchis sinensis* of school children in the rural area was studied in Hamyang-gun, Gyeongsangnam-do in Korea. Cellotape anal swab and formalin ether concentration methods were performed one time to 720 primary school children. The total egg positive rate of *E. vermicularis* was 12.6% in two schools (Baekjeon and Wiseong). In the Baekjeon and Wiseong primary school, the egg positive rate of *E. vermicularis* was 4.6% and 13.4%, respectively. Pinworm egg positive rate was 17.6% in the lower grades (1st, 2nd and 3rd), and 7.7% in higher grades (4th, 5th and 6th). The total egg positive rate of male and female was 12.6% and 12.7%, respectively. The egg positive rate of *C. sinensis* of Baekjeon and Wiseong primary school was 1.5% and 0.46%, respectively. The total egg positive rate of *C. sinensis* was 0.56%. This survey showed that continuous education and chemotherapy is necessary to treat and prevent reinfection of *E. vermicularis*. In the case of *C. sinensis*, health education for school children is recommended to prevent potential infection of adolescents.

Key words: *Enterobius vermicularis*, *Clonorchis sinensis*, egg positive rate, school children

We carried out the cellotape anal swab examination for pinworm and formalin ether concentration method for liver fluke to investigate the egg positive rates of *Enterobius vermicularis* and *Clonorchis sinensis* in a rural area. This study was performed from September to December, 2000 in the Wiseong and Baekjeon primary school in Hamyang-gun, known as a remote area of Gyeongsangnam-do in Korea. The Wiseong primary school is located in Hamyang-eup, which is a densely populated area, the center of Hamyang-gun. In contrast with the Wiseong primary school, the Baekjeon primary school is located in the Baekjeon-myeon surrounded

mountains and rice paddies and most of residents are engaged in agriculture.

The total number of school children tested was 66 in the Baekjeon primary school and 654 in the Wiseong primary school. The egg positive rate of *E. vermicularis* in Wiseong was higher than that of the Baekjeon primary school (Table 1). The total egg positive rate of males and females was 12.6% and 12.7%, respectively, which showed no significant difference between two groups. The lower grades (1st, 2nd and 3rd) showed higher egg positive rate than that of higher grades (4th, 5th and 6th). In the lower grades, the egg positive rate of females was higher than that of males but the egg positive rate of females was declined as the grade increases (Table 2). The egg positive rate of the Baekjeon primary school, which has small number of students, was lower than that of the Wiseong primary

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school. The differences between the two schools were the total number of students and student number per class, that is, the number of students per class was five in Baekjeon and 25 to 30 in Wiseong. The educational environment was not greatly different between the two schools except the number of students. This result suggests that the number of students per class may be a main factor for prevalence of *E. vermicularis* infections. Choi et al. (1987) reported that the egg detection rate of primary school children in Seoul was significantly lower than that of school children in rural area. Our results, however, showed there is a decrease of the egg

positive rate of *E. vermicularis* compared with previous reports in rural area (Hur and Park, 1984; Im et al., 1986; Choi et al., 1987) and did not show any difference compared with the infection rates of primary school children in Busan and Chuncheon (Koh et al., 2000; Yoon et al., 2000).

On the other hand, the total egg positive rate of liver fluke was 0.56% in two primary schools (Table 3). The egg positive rate of Baekjeon and Wiseong primary school was 1.5% (1/66) and 0.46% (3/654), respectively. All of four students were male. The egg positive rate of *C. sinensis* of Sancheong-gun, which is located around Hamyang-gun, was 24.4% in

Table 1. *Enterobius vermicularis* egg positive rate in Wiseong and Baekjeon primary schools in Hamyang-gun, Gyeongsangnam-do, Korea

Sex	No. positive/No. exam. (%)		
	Wiseong	Baekjeon	Total
Male	43/334 (12.9)	3/32 (9.4)	46/366 (12.6)
Female	45/320 (14.1)	0/34 (0)	45/354 (12.7)
Total	88/654 (13.4)	3/66 (4.6)	91/720 (12.6)

Table 2. Egg positive rate of *Enterobius vermicularis* by different grades in Wiseong primary school

Grade	No. exam. (male/female)	No. infected (%)		
		Male	Female	Total
1	118 (52/66)	7 (13.5)	15 (22.7)	22 (18.6)
2	138 (68/70)	15 (22.1)	17 (24.3)	32 (23.2)
3	101 (60/41)	8 (13.3)	3 (7.3)	11 (10.1)
4	110 (50/51)	4 (6.8)	5 (9.8)	9 (8.2)
5	91 (49/42)	3 (6.1)	1 (2.4)	4 (4.4)
6	96 (46/50)	6 (13.0)	4 (8.0)	10 (10.4)
Total	654 (334/329)	43 (12.9)	45 (14.1)	88 (13.4)

Table 3. Comparison of *Clonorchis sinensis* egg positive rates in school children primary school of Hamyang-gun and Sancheong-gun in 1984, 1993 and 2000

Location	No. positive/No. exam. (%)		
	Sancheong-gun		Hamyang-gun
	1984 (Kim et al.)	1993 (Lee et al.)	2000 Present study
Male	57/225 (25.3)	8/81 (9.9)	3/366 (0.82)
Female	63/226 (27.9)	6/64 (9.4)	1/354 (0.28)
Total	120/491 (24.4)	14/145 (9.7)	4/720 (0.56)

1984 and 9.7% in 1992 (Kim et al., 1993). This fact tells us there is a sharp decrease of infection rate of *C. sinensis* in school children.

The egg positive rate of *E. vermicularis* was decreased compared with results previously reported, but was still prevailed among primary school children. Enterobiasis seems to need intensive chemotherapy to treat the infected children as well as continual education to prevent reinfection.

We found that the *C. sinensis* infection rate in school children was greatly changing in rural areas. These results suggest that a continuous health education is required to prevent the childhood infection of *C. sinensis*.

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