

## *Enterobius vermicularis* egg positive rate of pre-school children in Chunchon, Korea (1999)

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**Abstract:** Pre-school children were examined for the presence of *Enterobius vermicularis* egg by perianal swab method. We visited 67 nurseries and 25 kindergartens between January, 1999 and April, 1999 in Chunchon, Korea. Of the 4,711 children examined, 434 (9.2 %) were found to be positive for *E. vermicularis* egg. The egg positive rates of boys and girls were 10.1% and 8.1%, respectively. The rates were 7.8% in kindergartens and 9.7% in nurseries. Positive rate of 50 institutions was less than 10%. Rate in 35 institutions was from 10% to less than 20%. Rate in 7 institutions was equal to or over 20%. Out of 1,113 children examined twice, 28 (2.5%) children were positive consecutively, 53 (4.8%) were positive with negative conversion, 47 (4.2%) were negative with positive conversion, and 985 (88.5%) were consecutively negative. It means that in the low endemic area of enterobiasis with around 10% positive rate, the two consecutive examinations may increase the egg detection rate of 4.2-4.8%. The small number of consecutive egg positive children also suggests that the worm burden of the positive children might be low. Since the egg positive rate of that age group in this City increased from 1.85% (1997), and 3.0% (1998), the more intensive regular control should be executed.

**Key words:** *Enterobius vermicularis*, enterobiasis, children, egg, Korea

*Enterobius vermicularis* (pinworm) is one of the most prevalent worms found in children worldwide. *E. vermicularis* egg positive rate had been reported as 0.6% in the entire Korean population according to the nationwide survey of intestinal parasites conducted in 1997. The rate (3.7%) was the highest amongst children between 5 to 9 years of age. In Korea,

the egg positive rate of *E. vermicularis* decreases year after year (Ministry of Health and Welfare and Korea Association of Health, 1997). However, a relatively high positive rate for *E. vermicularis* has been reported in certain local areas. The egg positive rate of primary school children in Chunchon was reported to be 17.5% (Yang et al., 1997). Pre-school children are the most prevalent age group with enterobiasis when compared to other age groups, including primary school children. Usually, many number of pre-school children go to the kindergartens or nurseries in every city before entering public or private schools; therefore, it is easily suspected that if one institution is contaminated with *E. vermicularis* egg, then the infection cycle can

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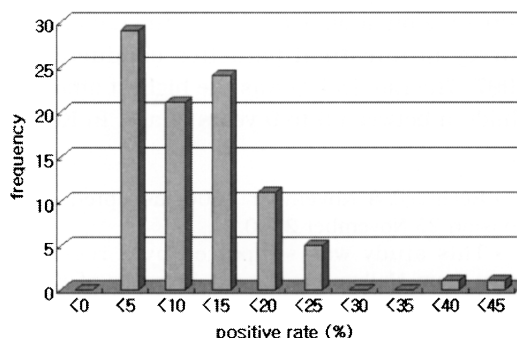
be actively maintained progressively. It is also very difficult to completely eradicate the enterobiasis unless infected children in an institution are treated at the same time. Therefore, the screening of *E. vermicularis* eggs and the treatment of infected children may reduce the *E. vermicularis* egg positive rate. This study was carried out in order to obtain data on the prevalence of *E. vermicularis* amongst pre-school children for the better control of enterobiasis in Chunchon.

We visited 67 nurseries and 25 kindergartens from January 1999 to April 1999 in Chunchon, Korea. Children in 22 institutions were visited twice for the examination. Pre-school children were examined for the presence of *E. vermicularis* egg by perianal swab method.

Of the 4,711 children examined, 434 (9.2%) were found to be positive. The egg positive rates of boys and girls were 10.1% and 8.1%, respectively. The rates were 7.8% in kindergartens and 9.7% in nurseries (Table 1). There was no correlation between the number of children in the institution and the positive rate ( $p>0.05$ ). There were no significant differences in the rate not only between boys and girls ( $p>0.05$ ), but also between kindergartens and the nurseries ( $p>0.05$ ). The egg positive rate was less than 10% from 50 institutions studied. The egg positive rates in 35 institutions were between 10 to 20%, and. On the other hand, 7 institutions showed the egg positive rate of equal to or over 20% (Fig. 1). Out of 1,113 children examined twice, 28 (2.5%) children were positive consecutively, 53 (4.8%) were positive with negative conversion, 47 (4.2%) were negative with positive conversion, and 985 (88.5%) were consecutively negative.

This survey was a whole number examination, meaning that every institution for pre-school children was included. The rate 9.2% may represent the *E. vermicularis* egg positive rate in a given age group in small cities all over Korea, like Chunchon with 250,000 inhabitants. Since the positive rate of pre-school children in Chunchon were 1.85% (total of 3,674) in 1997, and 3.0% (total of 4,005) in 1998 (Unpublished data), it can be said that there was a increase of the positive

rate in Chunchon, Korea. The children who were egg positive were prescribed with Mebendazole (Vermox®) 100 mg single *p.o.* three times at 3 weeks interval. Prescription of the whole members in an institution may be better. However, it was known that treating only egg positive children could reduce the positive rate of the entire group that were below 30% (Yang et al., 1997). In this survey, the positive rates of 90 out of 92 institutions were below 30%. It is very difficult to eradicate enterobiasis in a group due to newcomers who are infected. The continuous attention and screening on the enterobiasis can reduce the egg positive rate. A quarter of children was examined twice and the positive rate increased more than 4.2% in comparison with a single survey data. Egg positive rate at the first visit was 6.7%, and that at second visit was 7.3%. And the cumulative egg positive rate at two visits was 11.5 %. Therefore, if every subjected children were examined twice, then the positive rate in this survey would increase from 9.2% to more than 12.4% when it was calculated from survey results. For more sensitive detection of egg and also worm infection, the repeated examination is recommended. The possibilities of detecting the heavy infection cases were found in consecutively positive categories of anal swab since the processes of infection loss in *E. vermicularis* were taken place continuously, allowing daily small allotments of discharge of fully gravid worms in heavy infection cases and massive discharge in a very short period of time is practically rare event (Cho et al.,



**Fig. 1.** Frequency distribution of the egg positive rate of institutions in Chunchon, Korea (1999)

**Table 1.** *Enterobius* egg positive rate of pre-school children according to different types of institution and sex in Chunchon, Korea (1999)

Institution	Total		Male		Female	
	No. examined	No. positive (%)	No. examined	No. positive (%)	No. examined	No. positive (%)
Kindergarten	1,290	101 (7.8)	641	53 (8.3)	649	48 (7.4)
Nursery	3,421	333 (9.7)	1,855	201 (10.8)	1,566	132 (8.4)
Total	4,711	434 (9.2)	2,496	254 (10.2)	2,215	180 (8.1)

1976). Practically, it is difficult to examine twice in the mass survey. When single examination was done, and the result was around 10%, it may be deduced that the rate by two times examination is about 4% higher than the single examination. Not only Lognormal but also negative binomial distribution of worms per each child was known to be found to fit the data with rarity of heavy infection cases and high frequency of noninfected cases (Chai et al., 1976). Therefore, in the positive children examined, the heavy worm burden (more than 40 worms) cases may be very rare, since the consecutive positive cases are rare (Cho et al., 1976).

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