

Egg Laying Capacity of *Fibricola seoulensis* in Mice and Rats*

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Abstract: The egg laying capacity of *Fibricola seoulensis* was observed in mice and rats. In mice, the mean number of eggs produced by an adult worm a day was 116 at the 1st week after infection, 123 at the 2nd week and 42 at the 3rd week. Thereafter, the capacity of about 20 eggs/worm/day was maintained up to one year period. In rats, it generally produced more eggs; 49 at 1 week, 250 at 2 weeks, 216 at 4 weeks, 327 at 6 months and 11 at one year after infection. It survived longer than a year in mice and rats.

Key words: *Fibricola seoulensis*, mice, rats, egg laying capacity

INTRODUCTION

After the first recognition of the occurrence of human infection with *Fibricola seoulensis* (Seo *et al.*, 1982), a total of 27 cases have been reported so far (Seo *et al.*, 1982; Hong *et al.*, 1984, 1985 & 1986). The detection of fibricoliasis cases is mainly based upon the discovery of eggs from human feces. However, the detectability of eggs is influenced by the amount of eggs distributed in feces. The egg amount depends not only on the number of worms but also the egg laying capacity of the infected worms. Therefore, the latter is an important factor for the diagnosis.

The adult *F. seoulensis* contains only a few eggs (below 20 in number) in its uterine coils. It suggests that the worm does not reproduce many eggs. Exact amount of eggs laid daily by this worm, however, has not been studied yet. The present study was performed to observe the egg laying capacity of *F. seoulensis* in

mice and rats for a period of 1 year after infection.

MATERIALS AND METHODS

The metacercariae of *F. seoulensis* were collected from peptic digestion of the viscera of the snake, *Rhabdophis tigrina lateralis*. Each of 41 mice (ICR strain) and 21 rats (Sprague-Dawley strain) was fed with 20~30 metacercariae per os. Whole day (24-hour) fecal specimens of each mouse or rat were collected for 2 successive days after 1, 2, 3, 4, 8 weeks, 6 or 12 months following the infection. The fecal pellets were emulsified in water to make 60 ml in Stoll's flask. After the fecal emulsions were mixed thoroughly, 4 ml each was sampled. Eggs were counted in number under stereomicroscope using a scaled slide chamber as prepared by Cho *et al.* (1986).

The number of eggs in 4 ml multiplied by 15 times, was regarded as a total number of eggs per day in infected mice or rats. Mean of 2 countings was obtained.

Infected mice or rats were killed by cervical dislocation after the collection of feces at each

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period of infection. Number of adult worms was counted, and the number of eggs divided by the number of adult worms regarded representing the egg laying capacity at certain infection period.

RESULTS

In mice, mean number of eggs per day per worm (EPDPW) reached 123 at the 2nd week of infection but declined to 42 and 20 after 3 and 4 weeks, and 36 and 23 after 6 and 12 months respectively (Table 1). In rats, mean EPDPW was 49 after 1 week. Thereafter, mean EPDPW were ranging from 216 to 327 until 6 months, but declined to 11 after 12 months (Table 2).

Table 1. The number of eggs produced by *F. seoulensis* in mice

Period of infection	No. of exp. mice	Total No. of worms recovered	EPDPW*	
			Mean	Range
1 week	5	8	116	90~158
2 weeks	8	116	123	25~904
3 weeks	11	223	42	1~581
4 weeks	4	49	20	13~ 51
8 weeks	7	17	15	4~ 27
6 months	3	8	36	10~150
12 months	3	3	23	19~ 30

* EPDPW: Number of eggs per day per worm

Table 2. The number of eggs produced by *F. seoulensis* in rats

Period of infection	No. of exp. rats	Total No. of worms recovered	EPDPW*	
			Mean	Range
1 week	5	70	49	19~105
2 weeks	4	22	250	165~279
4 weeks	5	23	216	101~502
6 months	4	56	327	242~435
12 months	3	13	11	3~ 41

* EPDPW: Number of eggs per day per worm

DISCUSSION

Adults of *F. seoulensis* have not so many

eggs in their uteri. Hong (1982) observed the number of intrauterine eggs of worms in rats by infection day; 2 at the 5th day, 11 at the 6th day, 19 at the 7th day and 151 at the 28th day after infection. The worms in mice contained mean 13 (5~29 range) eggs at a week after infection (Hong *et al.*, 1983). Although a worm contains a small number of eggs in uterus, it may reproduce over 100 eggs per day for the first 2 weeks after infection in mice and 200~300 eggs for 6 months in rats viewing from the present results. It was revealed that *F. seoulensis* can reproduce maximum 300 eggs a day and has its maximum egg laying capacity for the first 2 weeks in mice or up to 6 months in rats. Also worms can survive more than a year in both mice and rats.

The egg laying capacity of this fluke may be affected largely by host species. Dogs, cats, rabbits and chicks could not be infected with this worm (Hong *et al.*, 1983). However, it grew to the adult in mice, rats, guinea pigs (Cho *et al.*, 1983) and humans (Seo *et al.*, 1982). When the present findings on egg production are considered, rats are the better host for *F. seoulensis* than mice. Worm burdens may also affect the reproducibility of a parasite, due to the density-dependent constraints on worm fecundity, which was recognized in hookworm infection, ascariasis, schistosomiasis (Anderson and May, 1982) or in metagonimiasis (Seo *et al.*, 1985). In the present study, however, such a constraint can be neglected because all experimental animals were infected with relatively low burdens.

It is assumed that human might be infected with *F. seoulensis* for 2 years or more, as the history of human cases is concerned (Hong *et al.*, 1984 & 1986). Although most of human cases were lightly infected, they were detected at fecal examination. Therefore, the egg laying capacity of *F. seoulensis* in human host seems to surpass the level of the sensitivity of routine fecal examination. Conclusively, above results showed that *F. seoulensis* could retain certain

degree of egg laying capacity in its suitable hosts at least for 1 year.

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＝국문초록＝

마우스 및 흰쥐에 있어서 *Fibricola seoulensis*의 산란력

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마우스와 흰쥐에 배으로부터 분리한 *F. seoulensis*의 피낭유충을 20~30마리씩 감염시키고 경시적으로 산란량을 측정하였다. 감염후 1주부터 12개월까지 각 실험동물의 24시간 대변을 수거하여 60ml로 희석하고, 이중 4ml를 뿔아 전 총란의 수를 세어 1일간 총 총란배출량을 산정하였다. 이를 한번 반복하여 그 평균치를 구하고, 동시에 동물을 희생시켜 성충을 회수하였다. 각 기간군에 따라 총란의 수를 총체의 수로 나누어 총체당 1일 평균 산란량(EPDPW)을 계산하였다.

마우스에 감염된 총체의 EPDPW는 감염후 1주에 116이고 2주에 123이었으나 3주에는 42로 감소하였고 그 이후에는 다소 더 감소하였으며 6개월과 12개월에는 각각 36 및 23의 산란량을 유지하였다.

흰쥐에 감염된 총체의 경우 EPDPW가 감염 1주후에 49이고, 2주후 250, 4주후 216, 6개월후 327 및 12개월후에는 11이었다. *F. seoulensis*는 마우스보다 흰쥐에서 훨씬 많이 산란하고 산란력을 유지하는 기간도 6개월로 비교적 길게 지속되었다. 또한 이 총체는 마우스와 흰쥐 모두에서 1년이상 생존할 수 있음을 확인하였다.