

Seroprevalence and Treatment for Skin Lesions of Rabbit Syphilis in Pet Rabbits

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Abstract : A total of 122 rabbits (40 males, 51 females, 25 castrated males and 6 spayed females; age range: 3 months to 11 years; weight range: 0.8-3.4 kg) were admitted to Veterinary Medical Teaching Hospital of Chungnam National University from January 2012 to February 2013. The syphilis rapid test was positive in 21.3% of rabbits, with a significant difference in the rates of positivity between male versus female rabbits and rabbits younger than 1 year versus older than 1 year of age (both $p < 0.01$). Skin lesions were detected around the lips (59.1%), nose (56.5%), genitalia (50.0%), anus (40.9%) and eyelids (18.2%). Coexisting skin lesions were found on the nose and lips (26.0%); anus and genitalia (21.8%); lips, anus and genitalia (17.4%) of rabbits. Twenty-two rabbits with skin lesions were subcutaneously treated with Penicillin G (48,000-84,000 IU/kg, Green cross, Korea) every 7 days for three or four weeks. All skin lesions were disappeared after Penicillin G treatment. In conclusion, a rabbits with skin lesions and serological test positive for syphilis should undergo prompt treatment and not be used for breeding.

Key words : rabbit syphilis, seroprevalence, skin lesions.

Introduction

Treponematosi, caused by the spirochete *Treponema paraluis-cuniculi* (*T. cuniculi*), is an infectious disease in rabbits that is transmitted by sexual, maternal and direct contact. Treponematosi is also called rabbit syphilis or vent disease. Although *T. cuniculi* is antigenically similar to human syphilis, which is caused by *Treponema pallidum* (*T. pallidum*), it is not a zoonotic disease. Antibodies to *T. cuniculi* cross-react with *T. pallidum* antigens. The clinical signs of rabbit syphilis include crusty, edematous lesions on the nose, lips, eyelids and genitalia. Early stage lesions appear red and edematous, and progress to vesicles, ulcers, and scabs; autoinfection leads to proliferative lesions around the perineum as well as on the face (5,6,12). Diagnosis can be made by skin biopsy or serologic testing. Serology tests can be used for the diagnosis of human syphilis (*T. pallidum*) infections, and include a rapid immunochromatographic test that detects syphilis-specific antibody to *T. pallidum* antigen, the Venereal Disease Research Laboratory (VDRL), rapid plasma reagin (RPR), and fluorescent treponemal antibody-absorption (FTA-ABS) test (1,3,4,6,7). The aim of this study was to survey the seroprevalence of rabbit syphilis and treat the syphilis-associated skin lesions in pet rabbits in Korea.

Materials and Methods

A total of 122 rabbits (40 males, 51 females, 25 castrated males and 6 spayed females; age: 3 months to 11 years; weight: 0.8-3.4 kg) were studied from January 2012 to February 2013. Breeds were included as follows; Lion-head (29 head), New Zealand White (27 head), mongrel (27 head), Giant (23 head), Dutch (7 head), Dwarf (3 head), Rex (3 head) and Lop ear (1 head). The rabbits were privately raised by 122 individual owners in owner's house, and didn't live together from the other rabbits. All rabbits were raised by feeding of hay and pellet, and they lived freely in owner's house and did not have experience of mating. This study was performed with the consent of the 122 individual owners.

Blood samples were collected from the auricular vein by venipuncture and allowed to clot.

The samples were then centrifuged at 1,400 g for 10 minutes to obtain the serum. Serum samples were tested using the Asan Easy test Syphilis[®] (Asan Pharmaceutical, Seoul, South Korea), an immunochromatographic test for the detection of human syphilis-specific antibody. The skin lesions in rabbits seropositive for syphilis were crusty and edematous, appearing on the nose, lips, eyelids and genitalia. Statistical analysis was performed using IBM SPSS Statistics, version 18.0 (SPSS Inc., USA). If a significant association ($p < 0.05$) was detected, a pair-wise comparison was performed with the Mann-Whitney U-test.

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Results and Discussion

In this study, the seroprevalence of rabbit syphilis was found to be 21.3% by the rapid syphilis test. The use of rapid syphilis tests has been proven to be a suitable replacement for the traditional syphilis serology diagnosis approach in human medicine (1,7). The rapid syphilis test is one of the serological tests available for human syphilis, and has also been found to be useful for the diagnosis of rabbit syphilis because antibodies to *T. cuniculi* do cross react with antigens of *T. pallidum* (5,6).

Commercial bred rabbits become infected with rabbit syphilis during mating, whereas household rabbits are frequently infected maternally during parturition (9). In this study the rabbits found to be positive for syphilis may have been maternally infected, because none of them had a mating history. There was a significant difference between the number of positive females and positive males ($p < 0.01$), and between the number of positive rabbits younger than 1 year (33.9%) and rabbits older than 1 year (8.3%, $p < 0.01$) (Table 1).

Many rabbits have been reported to remain seropositive for longer than a year after treatment (11). Saunders and Davies (11) reported that up to 25% of clinically healthy rabbits found to be seropositive for rabbits syphilis. In our study, only four out of 26 serologically positive rabbits were healthy and without skin lesions. Twenty-two rabbits with skin lesions were subcutaneously treated with Penicillin G (48,000-84,000 IU/kg, Green cross, South Korea) every 7 days for three or four weeks. All skin lesions were disappeared after Penicillin G treatment. In previous study, Kim *et al.* (8). reported favorable outcome by Penicillin G and chloramphenicol treatment in dermatitis associated with treponematosis. This may have been caused by residual antibodies after the infection was cleared. Rabbit syphilis skin lesions first appear around the genitalia. Grooming activity leads to skin lesions on the lips, nose and eyelids (5,12). Cunliffe-Beamer and Fox (2) reported that laboratory rabbits from a commercial

Table 1. Seroprevalence of rabbit syphilis by rapid syphilis test

	No. of examined	No. of positives	Positive rate (%)
Sex			
Females	51	15	29.4**
Males	40	7	17.5
Male castrated	25	3	12
Female spayed	6	1	16.7
Ages(yrs)			
< 1yr	62	21	33.9**
≥ 1yr	60	5	8.3
Total	122	26	21.3

** $p < 0.01$: Significant difference observed between males and females, and between less than 1 year and over 1 year

Table 2. Signalments of 22 syphilis infected rabbits with skin lesions

No	Sex	Breed	Age	Body weight	Skin lesions
1	F	Dutch	9 m	1.5 kg	eyelid, nose
2	F	Lion head	10 m	1.7 kg	anus, genitalia
3	F	Dutch	11 m	1.4 kg	nose, lips, eyelid
4	F	Lion head	1 yr	1.1 kg	nose, lips
5	F	Lion head	7 m	1.0 kg	anus, genitalia
6	F	Dutch	6 m	1.8 kg	nose, lips
7	M	Lion head	8 m	0.9 kg	lips, anus, genitalia
8	M	Lion head	6 m	1.4 kg	lips, anus, genitalia
9	M	Lion head	5 m	1.0 kg	anus, genitalia
10	F	Dutch	5 m	0.8 kg	lips, genitalia
11	F	Lion head	5 m	0.9 kg	nose
12	F	Lion head	11 m	1.2 kg	eyelid, anus, genitalia
13	M	Lion head	4.5 m	1.3 kg	nose, lips
14	F	Lion head	6 m	0.8 kg	nose, lips
15	M	Dwarf	6 m	1.1 kg	nose, lips, genitalia
16	M	Dutch	5 m	1.2 kg	nose, anus, genitalia
17	F	Lion head	4 m	1.7 kg	anus, genitalia
18	F	Rex	6 m	3.4 kg	lips, nose
19	F	Lion head	5 m	1.0 kg	lips, nose
20	M	Lion head	1.5 yr	1.7 kg	lips
21	M	Lion head	1.9 yr	1.6 kg	anus, genitalia
22	M	Lion head	9 m	1.2 kg	nose, lips, eyelid, anus

rabbitry most frequently developed lesions around the genitalia, followed by lesions on the anus, nose, eyelids and lips in 1981, USA. Saito and Hasegawa (9) reported lesions on the nose (87.3%), genitalia (34.9%), lips (31.7%), eyelids (19.0%) and anus (15.9%) in rabbits in 2004, Japan. In the present study, prevalence of breed were Lion-head (18/29, 62.1%), New Zealand White (0/27, 0%), mongrel (0/27, 0%), Giant (0/23, 0%), Dutch (5/7, 71.4%), Dwarf (1/3, 33.3%), Rex (2/3, 66.7%) and Lop ear (0/1, 0%) and skin lesions were found on the lips (59.1%), nose (56.5%), genitalia (50%), anus (40.9%) and eyelids (18.2%) (Table 2). Since in that study there were a significantly higher number nasal than lip lesions, it may likely that those coexisting lesions were a result of the infection spreading from the nose to the lips (9). However, our study found that lesions were more frequently detected on the lips than on the nose. This suggests that these lesions might have spread between the nose and lips. Saito and Hasegawa (9) reported that lesions on the nose and lips were frequently found to coexist. In our study, we detected coexisting skin lesions on the nose and lips (26.0%); anus and genitalia (21.8%); and lips, anus and genitalia (17.4%). Variation in the regional distribution of skin lesions might be explained by different route of infection. Saito *et al.* (10) reported that the 35% of rabbit were seropositive for rabbit syphilis. Saunders and Davies (11) reported that up to 25%

of clinically healthy rabbits were seropositive in UK. In the present study, 21.3% of rabbits were seropositive by the syphilis test. Saito *et al.* (10) reported that 2% of rabbits aged less than 1 year were seropositive for rabbit syphilis. In our study, however, 33.9% of rabbits younger than 1 year were seropositive. Saito *et al.* (10) also reported that there was no significant difference in seropositive between males and females, and no correlation between age and the seropositive rates. By contrast, the females in our study had a significantly higher seropositive rate than males and the seropositive rate of rabbits younger 1 year of age was significantly higher than the rate of rabbits older than 1 year of age. The different findings may reflect differences in the cohorts of pet rabbits studied. The prevalence of rabbit syphilis will continue to increase unless syphilis-positive rabbits are treated or prevented from breeding.

Conclusion

The syphilis rapid test was positive in 21.3% of rabbits, with a significant difference in the rates of positivity between male versus female rabbits and rabbits younger than 1 year versus older than 1 year of age. Twenty-two rabbits with skin lesions were subcutaneously treated with Penicillin G every 7 days for three or four weeks. All skin lesions were disappeared after Penicillin G treatment. Rabbits with skin lesions and that are seropositive for syphilis should be treated promptly and excluded from breeding. Additional studies are needed on the genetic characterization of rabbit syphilis in Korea.

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애완토끼에서 토끼매독의 혈청학적 발생을 및 피부병변 치료

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요 약 : 본 연구는 국내 애완용 토끼 총 122두를 대상으로 피부병변을 일으키는 토끼매독(*Treponema paraluis-cuniculi*) 감염율을 혈청학적 방법으로 조사하고 피부병변 부위를 알아보기 위해 실시하였다. 혈청학적 감염율은 21.3% 이었으며 수컷보다는 암컷이, 1세 이상보다는 1세 미만에서 유의성 있는 높은 감염율을 나타내었다(각각 $p < 0.01$). 피부병변은 입술(59.1%), 코(56.5%), 생식기(50.0%), 항문(40.9%) 및 눈꺼풀(18.2%) 순으로 나타났다. 혼합병변은 코와 입술(26.0%), 항문과 생식기(21.8%), 입술, 항문 및 생식기(17.4%) 순으로 나타났다. 모든 피부병변은 Penicillin G (48,000-84,000 IU/kg, 녹십자, 한국)로 1주일 간격으로 3-4회 치료 후 완치 되었다. 피부 병변을 가지고 있거나, 토끼 매독의 혈청학적 양성을 나타내는 환자의 경우 즉각적인 치료 및 교배에서 배제가 필요하다.

주요어 : 토끼매독, 혈청학적 발생, 피부병변