Cryptosporidium Infection in Juvenile Pet Rabbits

Takashi SHIIBASHI1), Takayuki IMAI1), Yukita SATO1), Niichiro ABE2), Masayoshi YUKAWA1) and Sadao NOGAMI1)

1)Department of Veterinary Medicine, College of Bioresource Sciences, Nihon University, Kameino 1866, Fujisawa, Kanagawa 252–8510
and 2)Department of Microbiology, Osaka City Institute of Public Health and Environmental Sciences, Tennoji-ku, Osaka 543–0026, Japan

(Received 13 May 2005/Accepted 8 November 2005)

ABSTRACT. Cryptosporidium infection was confirmed by fecal examination for the first time in pet rabbits in a wholesale store located in Kanagawa Prefecture, Japan. Fecal samples were obtained postmortem from juvenile rabbits (n=66), which had died after developing diarrhea. Feces from healthy rabbits (n=30) were also collected and examined as controls. Two types of Cryptosporidium oocysts distinctive in size and shape were found (Type A and B). Types A and B oocysts were detected from 16.7% and 13.6% of the diarrheic, and 3.3% and 0% of the normal feces, respectively. Since Cryptosporidium oocysts were detected at a higher rate in the diarrheic rabbits than in the healthy rabbits, special caution should be taken when handling a pet rabbit presenting with diarrhea.

KEY WORDS: Cryptosporidium, epidemiology, pet rabbit.


Domesticated rabbits (Oryctolagus cuniculus forma domestica) are among the most popular companion animals, particularly in Japan. The number of domestic pet rabbits is on the rise, estimated to be as many as 4,000,000 today. Therefore, there is an increasing need to carefully monitor the incidence of infectious diseases, particularly zoonoses that have the potential to raise public health concerns.

Cryptosporidium is a ubiquitous protozoan parasite that can infect a wide range of vertebrate hosts. C. parvum is an especially significant pathogen in humans and many other animals [3]. Although Cryptosporidium infections have been reported in laboratory-raised, farmed and wild rabbits [3, 4, 8, 9], there have been no reports of cryptosporidiosis in rabbits reared as companion animals. In this article, we report the prevalence of Cryptosporidium infections in pet juvenile rabbits in a wholesale store in Japan.

Fecal samples were collected from juvenile rabbits between March and December 2002 at a wholesale store located in Kanagawa Prefecture, Japan. The precise location of the breeding farm(s) where the rabbits were raised was unidentified. They were reared in a group of two to five individuals in a cage. Rabbits were categorized into two groups. Rabbits in the first group had died after developing diarrheal illness (diarrheic group, n=66), and fecal samples were obtained from the rectum during postmortem examination. In the second group, freshly excreted feces were collected from rabbits that were apparently in normal health conditions (normal group, n=30). Samples were stored at 4°C in 0.1% formalin (twice the volume of the collected sample) until use. Cryptosporidium oocysts were detected by the centrifugal sucrose flotation technique and acid-fast staining of fecal smears as described by Abe et al. [1] and Clarke and McIntyre [2], respectively. Fecal samples, 2 ml of diarrhea feces or 0.5 to 1 g of normal feces, were filtered through a metal-screen strainer, and the filtrate was centrifuged at 750 × g. After removing the supernatant, the sediment was used for examination. Floating oocysts were recovered onto a glass slide by sweeping the surface with a bacteriological platinum loop three times. The glass slide was covered with an 18 × 18 mm coverslip, and the number of oocysts was counted in 50 different fields under a microscope (400 ×) to calculate the oocyst density. The size of oocysts was measured with a calibrated ocular micrometer at 1,000 × magnification.

Cryptosporidium oocysts isolated in this study are shown in Fig. 1. They were classified into two types (A and B) by size and shape (Table 1). Type A oocyst was relatively small and spherical in shape, and the average shape index

![Fig. 1. Photomicrographs of the Cryptosporidium oocysts detected in juvenile pet rabbits. A: Type A oocyst. B: Type B oocyst. C: Type A oocyst in a fecal smear stained by acid-fast staining. Bar = 5 μm.](image-url)
The length/width ratio was 1.1. Type B oocyst was relatively large in size and oval in shape, and the average shape index was 1.4.

The prevalence and the density of each type of Cryptosporidium oocysts are shown in Table 2. In the diarrheic group, mixed infections of Types A and B were observed in 7 out of 13 oocyst-positive samples. The density was quite low in both groups. The prevalence of Cryptosporidium spp. was 19.7% (13/66) and 3.3% (1/30) in diarrheic and normal feces, respectively. This is the first report of Cryptosporidium infection in domestic pet rabbits. C. cuniculus, also called C. parvum [3], has been previously isolated in rabbits [4]. It has been reported that rabbits are experimentally susceptible to C. parvum [7] and C. muris [5]. The morphological features of the isolates in this study were consistent with the report by Upton et al. [11], although Type B was somewhat smaller in size than C. muris. These findings suggested that the Type A oocyst was C. parvum.

In this survey, a relatively high prevalence of Cryptosporidium spp. was found in the diarrheic group. Further examinations using rabbits experimentally infected with a single Cryptosporidium spp. may elicit the relation between Cryptosporidium infection and diarrhea symptoms in pet rabbits.

A previous study has reported novel rabbit genotypes of C. parvum isolates from two rabbits [10]. Furthermore, the rabbit-type C. parvum is very closely related to the cattle genotype of C. parvum and to C. hominis which are both human-pathogenic [6, 10]. Therefore, there is a risk that humans can be infected with the C. parvum-like organism detected in this study. Further studies are required to analyze the genotype of the isolates to determine its zoonotic impact. Additionally, it would be necessary to take precautions when making direct contact with juvenile pet rabbits presenting with diarrhea.

ACKNOWLEDGEMENTS. We would like to thank Ms. Y. Inada for cooperation for sampling and Ms. Y. Takaku for technical assistance.

REFERENCES