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Short Communication

Prevalence of *Balantidium coli* Infection in Bred Rhesus Monkeys (*Macaca mulatta*) in Guangxi, southern China

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Abstract

Background: *Balantidium coli* infects humans, primates and pigs, causing serious diarrhea and dysentery. Little information on the prevalence of *B. coli* in primates is available in China. This investigation was conducted to determine the prevalence of *B. coli* infection in bred rhesus monkeys in Guangxi Zhuang Nationality Autonomous Region (GZNAR), southern China.

Methods: A total of 120 fecal samples were collected from rhesus monkeys bred in cages in GZNAR and *B. coli* cysts and/or trophozoites were examined microscopically after sedimentation with water in May 2013.

Results: 77 (64.2%) samples were tested positive. The prevalence was 65% (39/60) and 63.3% (38/60) in female and male monkeys, respectively. 80% (48/60) cages in this nonhuman primate center were positive for *B. coli*.

Conclusion: The present survey revealed high circulation of *B. coli* in bred rhesus monkeys in GZNAR, which poses potential threats to animal and human health.

Introduction

Balantidiosis caused by *B. coli* is a parasitic zoonosis with a world-wide distribution among humans and animals (1). As a pathogen, *B. coli* can cause diarrhea (2, 3), severe peritonitis (4), *B. coli* pneumonia (5-7), chronic enterocolitis (8) and acute appendicitis (9, 10). To some extent, *B. coli* even poses life threatening for HIV/AIDS patients (11, 12). Occasionally, *B. coli* trophozoites can invade extra-intestinal tissues by lymphatic

channel or spread directly, and thus be found in urinary bladder (13), and cervico-vaginal (14). A recent study indicated that *B. coli* infection was associated with lower fat concentration in milk in captive rhesus macaques (15). Rhesus monkeys (*Macaca mulatta*) have been used extensively as experimental animal model of human diseases because of their phylogenetic proximity to humans.

The objectives of the present work were to determine the circulation of *B. coli* in bred rhesus monkeys in southern China's Guangxi Zhuang Nationality Autonomous Region (GZNAR), and draw more attention to carry out efficient management measures to prevent and control *B. coli* infection in monkeys and humans.

Materials and Methods

In May 2013, a total of 120 fresh faecal samples from rhesus monkeys bred in cages, approximately 5~20 g each sample, were collected from 60 cages in a nonhuman primate center in GZNAR, China. Fresh faecal samples were collected in triplicate in each cage to avoid faecal samples came from the same monkey (for example: different size, humidity and shape), and the 60 cages nearly covered the whole breeding rhesus monkeys in the center ranging from different ages and sexes. The monkey age was estimated based on the management record. Data on sexes and cages were recorded. Water sedimentation and low magnification ($\times 100$) were performed to detect *B. coli* trophozoites and/or cysts (16). A faecal sample is considered as positive by the presence of one or more trophozoites and/or cysts.

Results

The prevalence of *B. coli* infection in bred rhesus monkeys in GZNAR is shown in Table 1. The overall prevalence of *B. coli* was 65% (39/60) and 63.3% (38/60) in female and male monkeys, respectively. 80% (48/60) cages were positive in this nonhuman center. Of 120 monkeys, 77 (64.2%) monkeys were tested positive of *B. coli* cysts and/or trophozoites.

Discussion

The prevalence was 64.2% (77/120) which was higher than previous reports(17-19). The nonhuman primate center examined in the present study is surrounded by mountains in a village of west GZNAR, China. The staffs are from the village close to the center and most

of them go back home every day. Most of them feed pigs at home. During our investigation, some cats and mice were also found in the center. The staffs clean monkey cages once by water every morning. It is speculated that the following factors contribute to *B. coli* infection in bred rhesus monkeys in this non-human primate center: [1] Non-infected monkeys ingested the cysts which came from the positive monkeys faeces in the same cage. [2] Water and/or food contaminated by faeces of cats or rats containing cysts of *B. coli*. [3] Cross infection between humans and monkeys. It would be interesting to investigate the prevalence of *B. coli* in these staffs.

It is suggested by Hu et al. (20) that *B. coli* could damage the intestinal mucosal that lead to *Shigella* accelerate breeding and caused diarrhea. To avoid diarrhea outbreak in this non-human primate center, we recommend de-worming use secnidazole (21). Although there was no report of *B. coli* resistance to this medicine, it is suggested to detect *B. coli* regularly during the de-worming period and separate positive and negative monkeys timely.

Conclusion

The results of the present investigation revealed a high prevalence of *B. coli* infection in bred rhesus monkeys in Guangxi, southern China. Given that *B. coli* is a zoonotic parasite, *B. coli* high prevalence posed a potential threat for human health, especially for the possible transmission to the outer environments by staffs' activities. Effective strategies and efficient management measures should be taken to prevent and control *B. coli* infection in monkeys in this area.

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Table 1: Prevalence of *Balantidium coli* in bred rhesus monkeys in Guangxi Zhuang Nationality Autonomous Region (GZNAR), southern China

Age (year)	Female				Male				Total			
	Positive No./ examined No. (cage)	Prevalence (cage, %)	Positive No./ examined No. (animal)	Prevalence (animal, %)	Positive No./ examined No. (cage)	Prevalence (cage, %)	Positive No./ examined No. (animal)	Prevalence (animal, %)	Positive No./ examined No. (cage)	Prevalence (cage, %)	Positive No./ examined No. (animal)	Prevalence (animal, %)
<1	3/5	60	4/10	40	2/5	40	2/10	20	5/10	50	6/20	30
1~3	4/5	80	7/10	70	5/5	100	8/10	80	9/10	90	15/20	75
3<, >6	9/10	90	16/20	80	8/10	80	14/20	80	17/20	85	30/40	75
>6	8/10	80	12/20	60	9/10	90	14/20	70	17/20	85	26/40	65
Total	24/30	80	39/60	65	24/30	80	38/60	63.3	48/60	80	77/120	64.2

References

1. Schuster FL, Ramirez-Avila L. Current world status of *Balantidium coli*. Clin Microbiol Rev. 2008;21:626-38.
2. Yazar S, Altuntas F, Sahin I, Atambay M. Dysentery caused by *Balantidium coli* in a patient with non-hodgkin's lymphoma from turkey. World J Gastroenterol. 2004;10:458-59.
3. Bellanger AP, Scherer E, Cazorla A, Grenouillet F. Dysenteric syndrome due to *Balantidium coli*: a case report. New Microbiol. 2013;36(2):203-05.
4. Ferry T, Bouhour D, De Monbrison F, Laurent F, Dumouchel-Champagne H, Picot S, Piens MA, Granier P. Severe peritonitis due to *Balantidium coli* acquired in France. Eur J Clin Microbiol Infect Dis. 2004;23:393-95.
5. Anargyrou K, Petrikkos GL, Suller MT, Skiada A, Siakantaris MP, Osuntoyinbo RT, Pangalis G, Vaiopoulos G. Pulmonary *Balantidium coli* infection in a leukemic patient. Am J Hematol. 2003;73:180-83.
6. Vasilakopoulou A, Dimarongona K, Samakovli A, Papadimitris K, Avlami A. *Balantidium coli* pneumonia in an immunocompromised patient. Scand J Infect Dis. 2003;35:144-46.
7. Koopowitz A, Smith P, van Rensburg N, Rudman A. *Balantidium coli*-induced pulmonary haemorrhage with iron deficiency. S Afr Med J. 2010;100(8):534-36.
8. Sestak K, Merritt CK, Borda J, Saylor E, Schwamberger SR, Cogswell F, Didier ES, Didier PJ, Plauche G, Bohm RP, Aye PP, Alexa P, Ward RL, Lackner AA. Infectious agent and immune response characteristics of chronic enterocolitis in captive rhesus macaques. Infect Immun. 2003;71:4079-86.
9. Dodd LG. *Balantidium coli* infestation as a cause of acute appendicitis. J Infect Dis. 1991;163:1392.
10. Gonzalez SO. Acute appendicitis caused by *Balantidium coli*. Rev Cubana Med Trop. 1978;30:9-13.
11. Clyti E, Aznar C, Couppie P, El GM, Carme B, Pradinaud R. A case of coinfection by *Balantidium coli* and HIV in French Guiana. Bull Soc Pathol Exot. 1998;91:309-11.
12. Cermeno JR, Hernandez DCI, Uzcategui O, Paez J, Rivera M, Baliachi N. *Balantidium coli* in an hiv-infected patient with chronic diarrhea. Aids. 2003;17:941-42.
13. Maleky F. Case report of *Balantidium coli* in human from south of Tehran, Iran. Indian J Med Sci. 1998;52:201-02.
14. Rivasi F, Giannotti T. *Balantidium coli* in cervico-vaginal cytology. A case report. Pathologica. 1983;75:439-42.
15. Hinde K. Milk composition varies in relation to the presence and abundance of *Balantidium coli* in the mother in captive rhesus macaques (*Macaca mulatta*). Am J Primatol. 2007;69:625-34.
16. Tang LD, Liu Y, Tang HW, Tan LX, Luo XG. Investigation of *Balantidium coli* infection on scaled pig-farms in Hunan. Chinese J Vet Parasitol. 2007;15(2):25-7.
17. He ZL, Yang JF, Yang LY, Xu LF, Wang CQ, Chen LX. Survey of intestinal parasites in rhesus monkeys. Yunnan Animal Husbandry and Veterinary. 2006:42-3.
18. Lin KQ, Li YS, Zhang RY, Li ZX, Huang XL. Survey of intestinal parasites infected naturally in experimental rhesus monkeys, Fujian. Chinese Journal of Laboratory Animal Science. 1995;5:252.
19. Hu YC, Chen AC, Chen ZL, Zeng W, Zhang ZH, Wu M, Bi FJ. Intestinal parasites infection of wild *Macaca mulatta* in Mianyang, Sichuan Province. Sichuan Journal of Zoology. 2008;27:1038-40.
20. Hu YC, Chen ZL, Chen AC, Zeng W, Chen JT. Diagnosis and therapy of *Balantidium coli* and *Shigella* mixed infection in rhesus. Animal Husbandry & Veterinary Medicine. 2008;40:86-7.
21. Bilal CQ, Khan MS, Avais M, Ijaz M, Khan JA. Prevalence and chemotherapy of *Balantidium coli* in cattle in the river Ravi region, Lahore (Pakistan). Vet Parasitol. 2009;163:15-7.