کارگاه های آموزشی مرکز اطلاعات علمی جهاد دانشگاهی

کارگاه آنلاین
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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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Received 19 Aug 2013
Accepted 04 Dec 2013

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.

Keywords
Balantidium coli, Rhesus monkeys, Southern China

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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 (×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 nonhuman 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 diarrhoea. To avoid diarrhoea outbreak in this nonhuman 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.

**Acknowledgements**

Project support was provided by the Specialized Research Fund for the Doctoral Program of Dali University (Grant No. KYBS201217) and Natural Science Foundation of Yunnan Province (2010ZC140). The authors declare that there is no conflict of interests.
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 | Prevalence (cage, %) | Positive No./examined | Prevalence (animal, %) | Positive No./examined | Prevalence (cage, %) | Positive No./examined | Prevalence (animal, %) | Positive No./examined | Prevalence (cage, %) | Positive No./examined | Prevalence (animal, %) |
| <1         | 3/5 | 60 | 4/10 | 40 | 2/5 | 40 | 4/10 | 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 |
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