

## CASE REPORT

# FIRST CASE OF HUMAN INFECTION BY *Bertiella studeri* (Blanchard, 1891) Stunkard, 1940 (Cestoda; Anoplocephalidae) IN BRAZIL

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### SUMMARY

Cestodes of the *Bertiella* genus are parasites of non-human primates found in Africa, Asia, Oceania and the Americas. Species *Bertiella studeri* and *Bertiella mucronata* could, accidentally, infect human beings. The infection occurs from ingestion of mites from the Oribatida order containing cysticeroid larvae of the parasite. The objective of this report is to register the first case of human infection by *Bertiella studeri* in Brazil. Proglottids of the parasite, found in the stool sample of a two-and-a-half-year-old child, were fixed, stained and microscopically observed to evaluate its morphological characteristics. Eggs obtained from the proglottids were also studied. The gravid proglottids examined matched the description of the genus *Bertiella*. The eggs presented a round shape, with the average diameter of 43.7  $\mu\text{m}$ , clearly showing the typical pyriform apparatus of *B. studeri*. The authors concluded that the child was infected with *Bertiella studeri*, based on Stunkard's (1940) description of the species. This is the fifth case of human Bertiellosis described in Brazil through morphometric analysis of the parasite, the third in Minas Gerais State and the first diagnosed case of *Bertiella studeri* in Brazil.

**KEYWORDS:** *Bertiella*; Human bertiellosis; Helminth; Zoonosis.

### INTRODUCTION

*Bertiella* sp. is a cestode from the Anoplocephalidae family, common parasites in non-human primates, rodents and Australian marsupials, being the only representatives of the family with human infection case reports<sup>1,8,13,15</sup>. Among the 29 species of this genus listed by SCHMIDT (1986)<sup>18</sup>, two, *Bertiella studeri* (Blanchard, 1891) and *Bertiella mucronata* (Meyner, 1895) are the major causes of human bertiellosis, mainly in infants<sup>7</sup>. Cestodes of the genus *Bertiella* are heteroxenic parasites found in the small intestine of mammals, especially non-human primates. Their invertebrate hosts are mites of the Oribatida order<sup>7,11,22</sup>. DENEGRI (1993)<sup>6</sup> showed several oribatid mites that can act as intermediate hosts of 14 genera and 27 species of anoplocephalid tapeworms.

Human infection by *Bertiella* sp. is usually asymptomatic. However gastrointestinal disturbances, diarrhea, abdominal pain, anorexia, weight loss, vomit and constipation have been reported<sup>7</sup>. As this clinical presentation is common in numerous gastrointestinal pathologies, the bertiellosis diagnose is confirmed by parasitological stool examination<sup>7,9</sup>.

BLANCHARD (1913)<sup>2</sup> described the first case of human bertiellosis

in an eight-year-old-female patient from Mauritius, parasitized by *Bertiella studeri*. Since the initial records, over 50 cases of *Bertiella* sp. in humans have been reported around the world<sup>21</sup>. In Brazil, up to now, only four human cases were detected based on morphological and morphometric egg analysis<sup>3,16,17,19</sup>.

The objective of this paper is to report a case of human bertiellosis in Brazil originated in Perdígao, a city located in the Midwest region of Minas Gerais State.

### CASE REPORT

The patient was a Brazilian two and a half year old female, born and raised in the city of Perdígao, located in the midwest region of Minas Gerais State. The patient's prior history includes living on a farm inhabited by non-human primates. Since January 2011, the child started to present sporadic episodes of abdominal pain. A few months later, her parents noticed spontaneous elimination of proglottids in the feces. Fragments of the adult worm and stool samples were collected and parasitological examinations were carried out.

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## MATERIALS AND METHODS

Stool samples were collected and fixed in a 10% formalin solution for parasitological exams. Cestodes fragments and proglottids found in the feces were separated and washed in a 0.85% saline solution. Subsequently, the proglottids were pressed between two slides to flatten them uniformly, fixed in FAA (formalin-acetic acid-alcohol) solution, stained with alum acetocarmine solution, dehydrated in a crescent series of ethanol, diafanized in Faia's creosote and mounted in Canada balsam between a microscope slide and cover slip. The fecal samples were processed by KATO-KATZ<sup>12</sup> and LUTZ (1919)<sup>14</sup> methods for parasitological exams. Micrometric studies were performed and microphotographs were taken using an optical microscope (Leika) equipped with a digital camera (AxioCam ERC 5s, Carl Zeiss). Measurements were made using an image analysis software (Axio Vision version 4.8, Carl Zeiss Vision).

## RESULTS

Three 1 cm segments with 15 imbricated proglottids measuring 0.8 cm in length and 1.0 cm in width were examined (Fig. 1A). After staining proglottid fragments, unilateral, irregularly alternated, genital pores located between the anterior and posterior margin of each proglottid were observed (Fig. 1B). Similar structures to the muscular part of the cirrus pouch and masses of eggs can be observed in Fig. 1C.

Based on morphological features, the proglottids have been identified

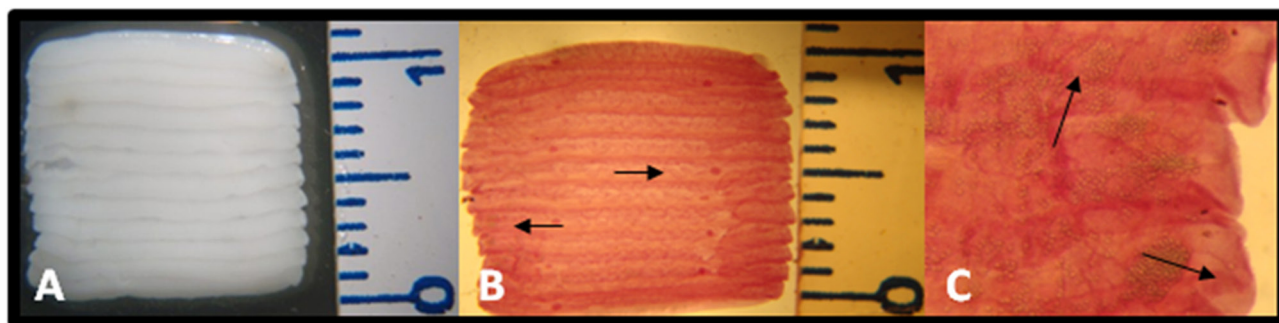
as *Bertiella* genus. Eggs observed by microscopic examination show spherical shape and an external rough membrane measuring 42 to 47.3  $\mu\text{m}$  in diameter (average of 43.77  $\mu\text{m}$ ). The average dimension of the hexacant embryo with the pyriform apparatus was 24.5  $\mu\text{m}$  and the measurement of just the hexacant embryo was 15.75  $\mu\text{m}$  (Fig. 2). Based on the morphometry of the eggs and the pyriform apparatus<sup>10,15</sup>, the authors identified the species as *Bertiella studeri*.

On the parasitological stool exams, the authors found only *Bertiella* sp. eggs. No other helminth or protozoan infections were detected.

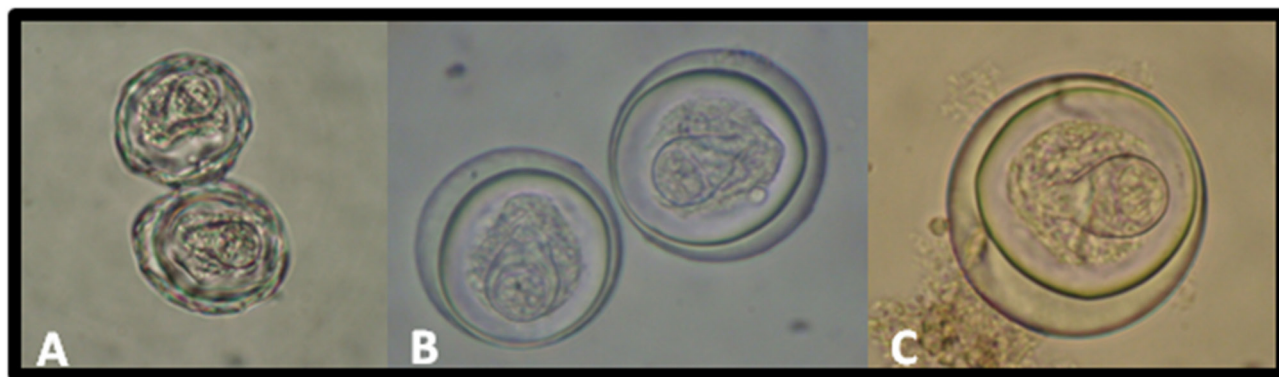
## DISCUSSION

The first report of human bertiellosis in Brazil was identified as *Bertiella mucronata* in an adult patient in the city of Sao Paulo, Sao Paulo State<sup>17</sup>. COSTA *et al.* (1967)<sup>3</sup> reported the second case of *B. mucronata* in an individual from the city of Formiga, Minas Gerais State. The third human infection by *Bertiella* sp. was diagnosed in a two-year-old infant from Goiania, Goias State<sup>16</sup>. SILVA *et al.* (2011)<sup>19</sup> reported the fourth case of *Bertiella* sp. infection in an eight-year-old resident of the municipality of Caete, Minas Gerais State. This current report is the third case of human bertiellosis in Minas Gerais State, and the fifth case in Brazil.

The proper bertiellosis diagnosis in humans is made by observing the morphological characteristics of the proglottids and the scolex.



**Fig. 1** - *Bertiella* sp. proglottids. A) Proglottids fixed segments in FAA; B) Proglottids stained with alum acetocarmine solution (muscular part of the cirrus pouch); C) Proglottids showing eggs and genital pores.



**Fig. 2** - *Bertiella* sp. eggs showing the pyriform apparatus. A) Eggs recovered from the patient's stool (200X); B) Eggs liberated from gravid proglottids (400X); C) Eggs washed with lactophenol of Amann (1000X).

In addition, the morphometric parameters of the eggs must be analyzed<sup>10,15,20</sup>.

The authors defined the species as being *Bertiella studeri* by considering the morphological description of the proglottids and morphometry of the eggs. To their knowledge, this is the first case of *B. studeri* human infection reported in Brazil.

This species is the main etiological agent of human bertiellosis in the world, except in South America, where infections were diagnosed to be caused by *Bertiella* sp. or by the species *B. mucronata*.

The symptoms reported by the child's guardians are compatible with human bertiellosis. Following diagnosis, the patient was medicated orally with praziquantel (10 mg/Kg) in a single dose. After treatment, no further elimination of proglottids occurred and the symptoms disappeared.

Probably, the infection described here was acquired by accidental ingestion of Oribatid mites, harbouring cysticercoid larva, present in the soil or contaminated food. This process was also described in the MALIK *et al.* (2013)<sup>15</sup> study.

DENEGRI (1985)<sup>4</sup> has predicted that the introduction of monkeys, in places where *Bertiella* is endemic and there is close contact of monkeys and humans are the cause of parasite spreading. He also suggested that an epidemiological inquiry should be performed in humans to ascertain the true prevalence of this parasitosis. It is difficult to control and prevent this zoonosis since the intermediate hosts are cosmopolitan with a large distribution<sup>5,6</sup>.

According to LOZANO *et al.* (2010)<sup>13</sup> several cases of human bertiellosis in non-endemic countries are currently reported. This reinforces the importance of correctly identifying the parasite in order to prevent misdiagnosis with other cestode infections.

This report contributes to alerting the public health authorities of this helminthic zoonosis occurrence in humans.

## RESUMO

### Primeiro caso de infecção humana por *Bertiella studeri* (Blanchard, 1891) Stunkard, 1940 (Cestoda; Anoplocephalidae) no Brasil

Os cestódeos do gênero *Bertiella* são parasitos de primatas não humanos, os quais são encontrados na África, Ásia, Austrália, Oceania e Américas. As espécies *Bertiella studeri* e *Bertiella mucronata* podem, eventualmente, vir a infectar os seres humanos e a infecção acontece pela ingestão acidental de ácaros da ordem Oribatida infectados com larvas cisticercóides do parasito. O objetivo deste estudo foi relatar o primeiro caso humano por *Bertiella studeri* no Brasil. Proglotes do parasito, encontrado na amostra de fezes de uma criança com idade de 2,5 anos, foram fixados, corados e observados ao microscópio para avaliar as suas características morfológicas. Ovos, obtidos a partir dos proglotes também foram estudados. As proglotes grávidas examinadas estavam de acordo com a descrição do gênero *Bertiella*. Os ovos apresentam forma arredondada com diâmetro médio de 43,7 µm, demonstrando claramente aparelho piriforme típico de *B. studeri*. Os autores concluíram

que a criança estava infectada com *Bertiella studeri*, de acordo com a descrição da espécie por Stunkard (1940). Este é o quinto caso de Bertiellose humana descrita no Brasil por meio de análises morfológicas do parasito, o terceiro em Minas Gerais e o primeiro caso de diagnóstico por *Bertiella studeri* no Brasil.

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