

# Investigate the Presence of *Balantidium coli* in Human Feces and House Rats in Several Regions of AL-Ramadi City

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## Abstract

The isolated fecal samples were taken from 113 individuals suffering from abdominal pain and colic and watery diarrhea with blood and mucosa. The patients ranged in age from (1-12) years from various districts in Al-Anbar province to the Al-Ramadi hospital. After detecting *Balantidium coli* inside the fecal samples, were taken (279) fecal samples from house rodents in the same research regions were immediately brought to the laboratory and evaluated using the Floatation technique with NaCl solution to generate wet mounts for *Balantidium coli* and stained with Logal's iodine. The immediate results showed a percentage of (45.1%) in girls and (54.8%) in males of all infected cases. The infection rate in ages 1-3 years was higher (38.9%), While the rate in ages 10–12 years (7.9%). The overall number of infected cases within all study locations was observed as a percentage (12.3%), with Al-Jazeera Q having the highest number, followed by AL-Sofia Q. The feces recovered from these rodents included a significant percentage of isolated trophozoite and cyst-stage *Balantidium coli* infections, 88(19.5) of the total collected samples (279). Al-Jazeera had the largest percentage of infected individuals, followed by Al-Sofia, while Al-Tamim Q had the lowest percentage. Finally, balantidiasis is uncommon throughout Iraq for the absence of pigs. As a result, this study discovered that *Balantidium coli* infections in Al-Ramadi city were a result of the high level of environmental pollution as well as the degradation of health care owing to the political situation in recent years. percentage of (5.71%).

**Keywords:** *Balantidium coli*, Rodents, environmental pollution, Al-Ramadi city.

## INTRODUCTION

*Balantidium coli* is a ciliated protozoan parasite that infects humans and causes dysentery. It has an average length of 50-200 and a width of 40-70, and it is one of the ciliate groups of pathogens for humans. The normal host is a pig, whereas humans are an accidental host. The parasite's infective stage is a cyst, and the method of transmission is femoral (Assafa et al., 2006). Infection can be results in environmental contamination spread for food and water by cysts (infective stage) from human or pig feces; infection can also be passed from person to person through food handlers.

Humans, pigs, monkeys, and rodents' big intestines serve as parasite reservoirs. Many wild and domestic animals, such as camels, cattle, buffaloes, pigs, and monkeys, can act as parasite reservoirs or transporters (Lerman and Hall, 1970; Pearce-Duvet, 2006).

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Balantidiasis is most commonly found in the gut, but infections can also occur in the lung, liver, and genitourinary systems. *B. coli* pathogenicity is typically rather variable, with reduced host resistance, particularly in youngsters. As a result, it causes significant disease by infiltrating the intestine's mucosa and submucosal membranes (Al-Hares, 2006). *B. coli* was found in 60–90% of the cattle in a single herd. It's most usually diagnosed among people who have had contact with pigs or who have been exposed to environmental pollution and poor hygiene. *B. coli* infections are most common in the large intestine mucosa, although they can also spread to the liver and lungs (Vidan et al., 1985; Ladas et al., 1989).

Clinical signs included abdominal pain with intermittent diarrhea, tenesmus anorexia, and watery diarrhea mixed with mucus, soreness, blood in the stool, and a decrease in body weight gain (Assafa et al., 2004). The method of diagnosing *B. Coli* The presence of trophozoite and cysts in diarrheal feces was revealed by the microscopic investigation of straight saline (Soulsby, 1982). Tetracycline and Metronidazole are safe and effective and may be the preferred routes of therapy (Lerman and Hall, 1970). The current study's goal is to discover the presence of *Balantidium coli* in various areas of Al-Ramadi city, as well as the dispersion of the parasite in rodent dwellings.

**MATERIAL AND METHODS**

Fecal samples were taken from 113 patients who had colic and abdominal pain, watery diarrhea, mucosa, and blood in their feces. The patients ranged in age from one to twelve years old and came from various districts in Al-Anbar province to the Al-Ramadi hospital. The samples were collected from the patient's feces and placed in a plastic container with a high tide. Evaluate samples under a microscope within one hour using the dyeing technique using Logos iodine described by Souls (1982) to examine the stool. After detecting *Balantidium coli* inside the fecal samples taken from children, (279) samples were collected from household rodents within the same research regions using plastic gloves. The samples were brought to the laboratory and evaluated using the Floation method using NaCl solution with specific gravity (1.18) to make wet mounts for *Balantidium coli* and stained with Logal's iodine.

Statistical analysis:

Statistical analysis of the data collected during the study was done by using Chi –Square in (P < 0.05).

**RESULTS**

The fecal matter samples gathered from 113 patients were examined by direct examination and staining with Logal's iodine, but significant infection with *B. coli* was found in 45.1 percent of the females and 54.8 percent of the males of all infected cases, as shown in figure 1.

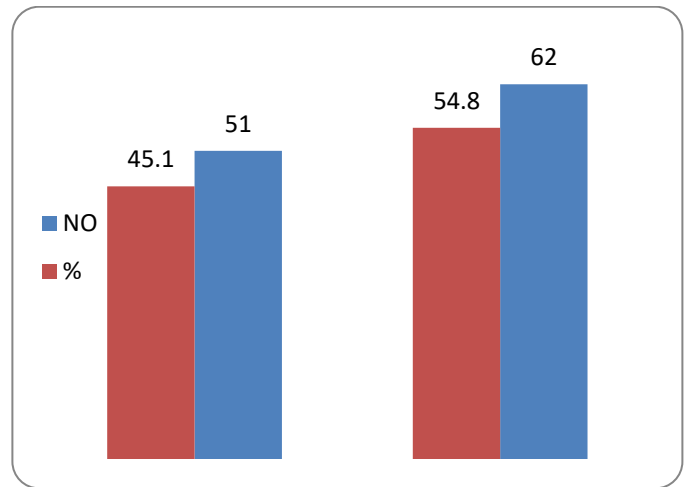


Figure 1: The display the total number of individuals infected by *Balantidium coli*, including males and females. [NO:113].

The infection rate in ages (1-3) years is highest (38.9%), while the infection was found in ages (10-12) years lowest (7.9 %), as displayed in figure 2.

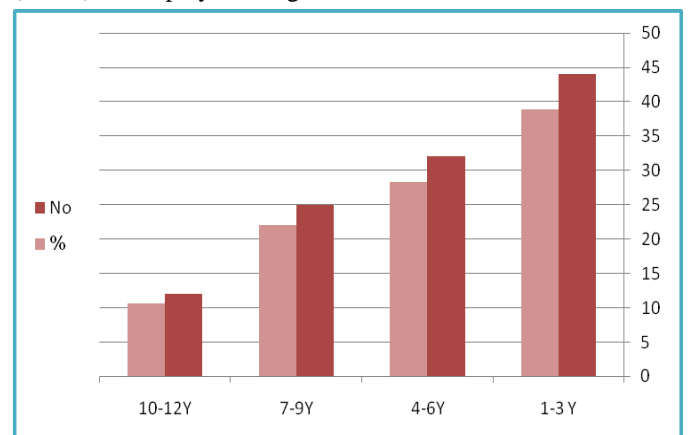


Figure 2: Shows the relationship between the patients ages and the infection with *Balantidium coli* [NO:113].

The total number of *Balantidium coli* infections in all study regions was recorded in percentage (12.3%), with the majority of people infected being found in Al-Jazeera Q 8 (17.7%), followed by AL-Sofia Q3 (9.6%), as shown in table 1.

Table 1: The number and percentage of *Balantidium coli*-infected people in different Al- Ramadi urban areas

Residence of the patients	No of children	No of infection	Percentage of infection
AL- Sofia Q	31	3	9.6
AL- Aziziya Q	12	1	8.3
AL-Qtanh Q	8	1	12.5
AL- Jazeera Q	45	8	17.7
AL- Tamim Q	17	1	5.8
<b>The total</b>	<b>113</b>	<b>14</b>	<b>12.3</b>

3.2: Fecal samples of the hose rodents.

The fecal samples taken from the rodent using the floatation technique included a high percentage of isolated sporozoites as well as cysts from stage Balantidium coli infections, 88 (19.5) of the total collected samples (279). Al-Jazeera Q 31(25.8) had the greatest rate of infection, followed by Al-Sofia 19 (22.8), while Al-Tamim had the lowest rate of infection (10.9%). as shown in table 2.

Table 2: display the number and percentage of infected fecal samples with Balantidium coli acquired from house rodents in various AL-Ramadi urban areas

Regions of examination	No fecal sample	No infected sample	Percentage of infection
AL- Tamim Q	53	10	10.9%
AL-Qtanh Q	54	13	15.4%
AL- Aziziya Q	58	15	19.2%
AL- Jazeera Q	60	31	25.8%
AL- Sofia Q	53	19	22.8%
<b>The total</b>	<b>279</b>	<b>88</b>	<b>19.2%</b>

The following staining was used to demonstrate the direct stool examination and floatation procedure with iodine for trophozoite and cyst stages:

1- The trophozoite stage is oval in appearance and brown in color, with the mouth orifice covered with cilia around it and moving aggressively and swiftly over the field, as shown in figures 3,4,5.

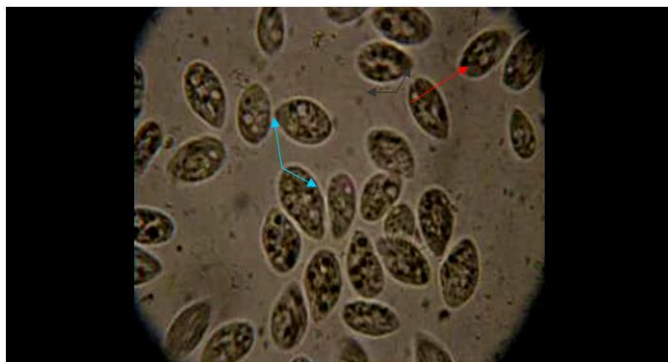


Figure 3: depicts a portion of a B. coli trophozoite, which has an oval shape and is covered with cilia around the cytostome, as well as contractile vacuoles and cytophyge [400x].

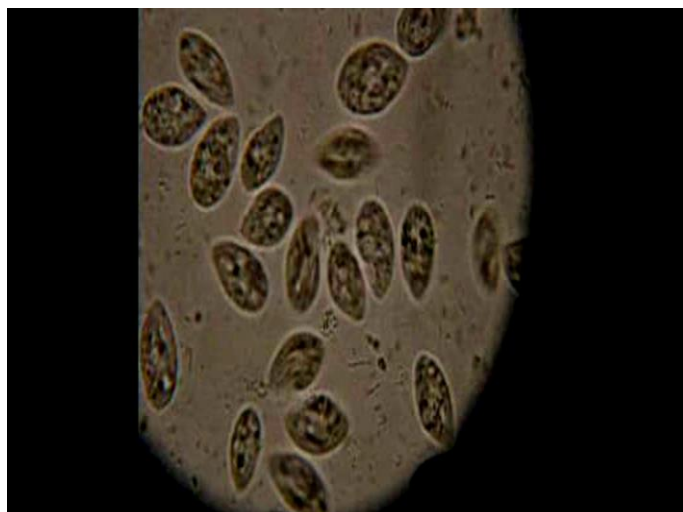


Figure 4: depicts the trophozoite stage of B. coli, which is coated with cilia (a hallmark of this parasite).



Figure 5: The trophozoite stage of B. coli is covered with cilia (a distinguishing feature of this parasite) [400x].

2- The cyst stage is characterized by a rounded, brown appearance and a shell formed of layers, as shown in figure 6.

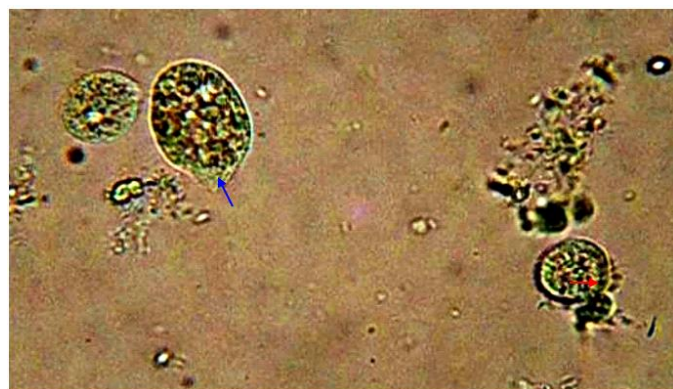


Figure 6: depicts the cyst phase of B. coli being converted by a thick shell, and the trophozoite stage engulfing the feeding materials. (rodents) [400x].

## DISCUSSION

Balantidiasis *B. coli* is a disease caused by environmental pollution that's also transmitted through the fecal-oral route, with cysts, but less frequently trophozoite, being ingested with focally contaminated water and food. 113 individuals were found to have an infection of *B. coli*, where the incidence of males was higher than females.

Human balantidiasis is more common in populations such as farmers and workers in abattoirs in endemic areas who have close contact with pigs or pig feces (Ochoa and White, 2005). Because of hygienic standards, environmental pollution, and cultural mores, *B. coli* is a rare human disease that is largely limited to tropical and subtropical locations. The prevalence of infected pigs and a lack of both animal and human disposal are important contributors to the disease's spread to people.

The infection rate in children aged 1-3 years was determined to be 38.9%, while the infection was observed for ages 10–12 years (7.9%). These findings are consistent with Al-Hares (2006), who discovered that the risk of *B. coli* infection increases with age (>6-12) months because infants begin crawling and placing polluted objects in their mouths at this age. Furthermore, as the children begin to walk, the infection rate decreases. Sharma and Harding (2003) discovered that *B. coli* infections originated in disadvantaged rural communities with inadequate levels of hygiene, environmental protection, and health care. As a result of the same cause mentioned above, epidemics and infections occurred in mental institutions and orphan asylums in Canada and the United States. Because *B. coli* was found in the feces of all five study animals, rodents (mice and rats) may be considered the reservoir and primary source of the parasite's dissemination. According to Murray (2006), rodents, along with pigs and monkeys, are the most important reservoirs for *B. coli*.

The majority of *B. coli*-infected cases were detected on Al-Jazeera, followed by AL-Sofia, across all research regions. The fecal samples taken from the rodents using the flotation method revealed a significant percentage of isolated trophozoite and cyst-stage *Balantidium coli* infections. The highest infection rate was identified in Al-Jazeera, followed by Al-Sofia, with Al-Tamim having the lowest percentage due to a lack of health and environmental care. The presence of sewer water pathogens in human feces and rats indicates a lack of bathroom facilities in most households and its prevalence in humans exposed to poor hygiene and environmental contamination (Yatswako et al., 2007; Bauri et al., 2012). The contamination of drinking water with rat feces may be a route of transmission of cyst stages that can survive for a long time in damp soils (Bauri et al., 2012). The examination of fecal samples revealed that the trophozoite stage was more apparent in all infected patients than the cyst stage. Lerman and Hall (1970) discovered that the diagnosis of *B. coli* in diarrheal feces is dependent on the revealing trophozoite stage, which is enormous in size and has cilia and a nucleus. It can also potentially infect and

penetrate the mucosa layer with cellular infiltration in the area where ulcers are developing (Bauri et al., 2012). Smith (2003) demonstrated that *B. coli* has the potential to excrete hyaluronidase enzyme, which allows the parasite to infiltrate mucosa and cause identical lesions to those seen in amoebiasis, resulting in colon perforation, appendicitis, and hepatic abscesses.

Balantidiasis is uncommon in Iraq since there are no pigs. As a result, the current study aims to evaluate *B. coli* contamination in Al-Ramadi city. The infection by *B. coli* may be caused by contamination of water and vegetables from various countries, or by arrivals to Iraq from East Asia with companies working specifically, and there is also the workplace location of these companies near residential districts, which may have caused the transmission of the parasite from rodents and sewage water. In all five research regions, the trophozoite and cyst phases were identified in rat feces. The end consequence is the existence of casualties in Ramadi as just an outcome of the high degree of environmental pollution, as well as the degradation of health problems due to the governorate's political situation in recent years.

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