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Acari-Induced Diarrhea in Young Adult Patients: Case Report From Indonesia

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Statistical Analysis C
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Case series

Patients: Female, 27-year-old • Male, 25-year-old • Male, 26-year-old

Final Diagnosis: Intestinal acariasis

Symptoms: Diarrhea

Clinical Procedure: —

Specialty: Laboratory Diagnostics • Gastroenterology and Hepatology • Infectious Diseases • General and Internal Medicine • Tropical Medicine

Objective: Rare disease

Background: Intestinal acariasis is caused by the ingestion of mite-contaminated food and may lead to symptoms such as diarrhea and abdominal pain. Storage mites can survive in the human intestine and may contribute to intestinal acariasis-associated diarrhea. However, awareness of this condition as a potential cause of diarrhea remains limited. These mites, particularly *Tyrophagus putrescentiae* and other storage mites, are commonly found in food products such as flour and grains.

Case Reports: This report describes 3 cases of intestinal acariasis. Complete clinical data were available for the first case; only demographic information (age and sex) and stool laboratory findings were available for the second and third cases. All 3 patients presented with diarrhea and exhibited mites in their stool specimens. The etiologic agents in the first 2 patients were identified as *Tyrophagus* spp. The arthropod detected in the third patient could not be identified because the specimen was fragmented. Mites may induce intestinal inflammation, mucosal necrosis, and immune activation through their metabolic products. In intestinal acariasis, mites can damage the intestinal mucosa, penetrate the intestinal muscle layer, and further stimulate immune responses through their metabolites and body components.

Conclusions: Mites should be considered a potential cause of diarrhea. Further investigation into intestinal acariasis-associated diseases is warranted.


Keywords: Acariasis • Diarrhea • Mites

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Introduction

Intestinal acariasis occurs when a person consumes mite-contaminated food, leading to symptoms such as diarrhea, abdominal pain, and a burning sensation around the anus. The causative agents belong to the family Acaridae (Acariformes; Astigmata; Acaroidea); the most common species is *Tyrophagus putrescentiae*, commonly known as the storage mite [1,2]. This mite is an allergen associated with bronchial asthma, allergic rhinitis, and atopic dermatitis. Storage mites thrive in various food products and ingredients, including flour, sugar, grains, hay, herbal medicines, and even dog food [3-5]. Furthermore, storage mites can survive in the human intestine and may cause intestinal acariasis-associated diarrhea [5]. In this report, we describe a case of intestinal acariasis in a young woman and present 2 additional findings involving the detection of mites in human stool, along with a review of recent literature on the topic.

Case Reports

Case 1

A 22-year-old woman from Jakarta, Indonesia, was hospitalized with diarrhea that had been present for 3 days. She experienced diarrhea more than 10 times per day. Her stools were dark brown, watery, and foul-smelling (Figure 1). The patient was admitted because of acute diarrhea and dehydration. Stool examination revealed fecal occult blood, which was confirmed by microscopic analysis. Microscopic stool examination upon admission showed 15 to 20 erythrocytes per high-power field, 2 to 4 leukocytes per high-power field, positive starch, negative fat, positive plant fibers, and the presence of muscle fibers. During hospitalization, 3 stool samples were collected over 3 consecutive days for laboratory investigation; mites were identified in all samples. Examination of Lugol-stained preparations under a microscope at 100× and 400× magnification (high-power field) showed the clearest morphological features in Figure 2B. The adult parasite had an oval body composed of a fused cephalothorax and abdomen. It possessed 4 pairs of legs: 2 pairs attached to the cephalothorax and 2 pairs attached to the abdomen. The mouthparts were closed and formed a pyramid-shaped structure. The anterior legs were located in the propodosoma region, whereas the posterior legs were located in the metapodosoma region. Notably, the posterior legs were longer than the anterior legs; setae (hairs) were observed on the ventrocaudal region, dorsal surface, and legs. Figure 2C shows that the chelicerae were divided into 2 parts, which became visible when the mouth opened, along with clearly identifiable pedipalps. Based on these morphological characteristics, the parasite was identified as a mite in the genus *Tyrophagus* [6,7]. In the Gram-stained



Figure 1. Watery, dark brown stool from a 22-year-old female patient. Fecal occult blood was confirmed, and microscopic examination revealed numerous erythrocytes (15-20 per high-power field).

preparation shown in Figure 2D, the mite structure was not clearly visible. The final stool sample revealed an incomplete or damaged parasite, as shown in Figure 2E. Blood eosinophil count (2%) and IgE levels were within normal limits. Additional history revealed that the patient worked as a bookkeeping assistant and had consumed spicy food before the onset of diarrhea. Her condition improved after treatment with intravenous metronidazole (500 mg daily for 3 days) and other symptomatic medications for diarrhea. She was discharged after 5 days of hospitalization in good condition.

In addition to the first case, we received 2 stool specimens submitted for diarrhea evaluation without accompanying treatment information. Therefore, these cases are presented solely as stool examination findings.

Case 2

Tyrophagus spp. mites were identified in the stool of a 25-year-old male patient through direct microscopic examination using Lugol's stain (Figure 3). At 100× and 400× magnification (Figure 3A, 3B), adult parasites were observed with 4 pairs of legs distributed between the cephalothorax and abdomen, as well as thick and robust chelicerae. Long setae were present on the ventrocaudal region, legs, and nearly all body surfaces. Two pairs of legs were located on the propodosoma; the remaining 2 pairs were located on the metapodosoma. An egg with morphological characteristics similar to those of the *Tyrophagus* egg described by Khalifa et al in 2016 [6] was also identified. The egg was oval-shaped and measured approximately 105 to 110 μm in length and 72 to 75 μm in width, with a thin eggshell surrounding the larva inside. Based on these findings, the egg was classified as *Tyrophagus* sp. (Figure 3C).

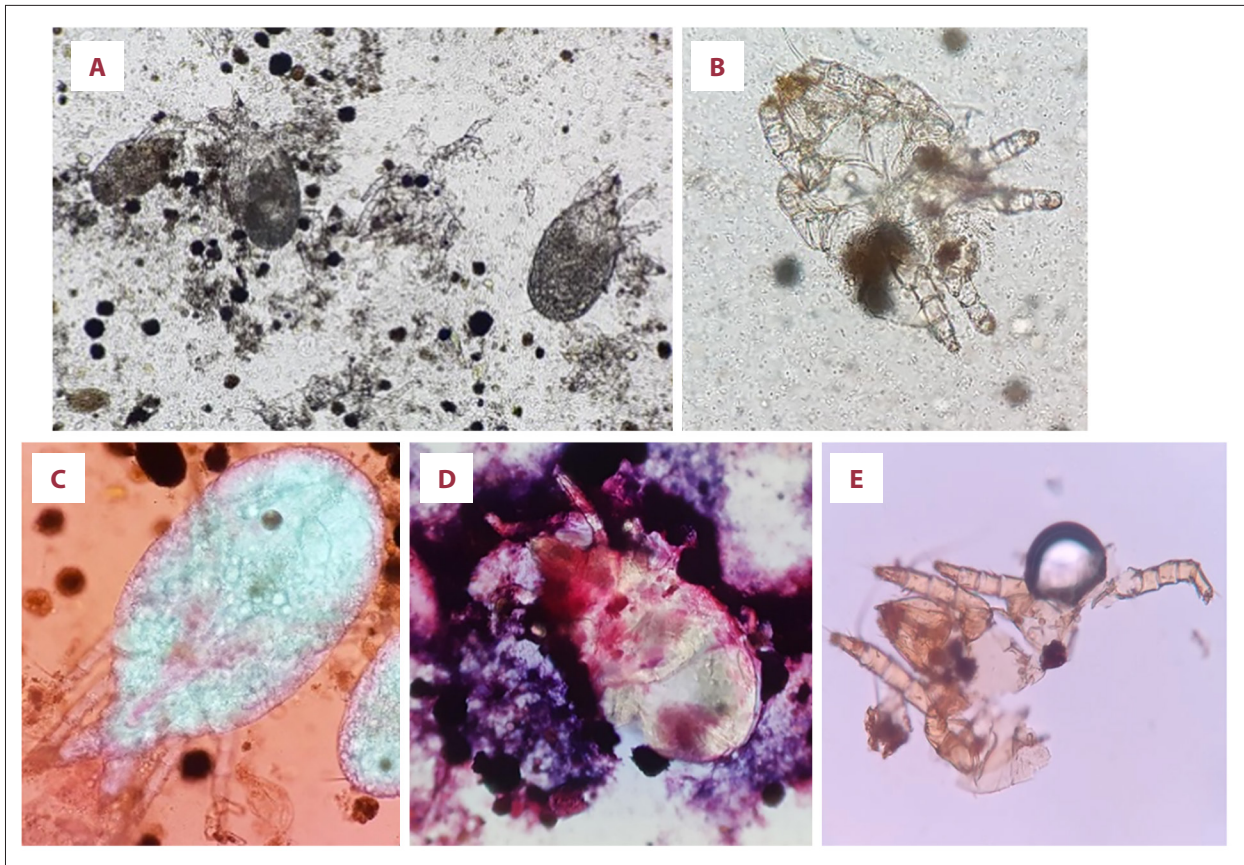


Figure 2. Microscopic examination of stool from a 22-year-old female patient showing adult-stage *Tyrophagus* spp. mites: (A) direct Lugol examination at 100× magnification; (B) direct Lugol examination at 400× magnification; (C) direct eosin examination at 400× magnification; (D) Gram-stained permanent smear at 400× magnification; and (E) third stool examination using Lugol at 400× magnification.

Additionally, sporangia and hyphae of Mucorales were observed during stool examination (Figure 3A).

Case 3

The third patient presented with acute diarrhea and dehydration; however, the exact frequency of diarrhea per day was unknown. Arthropod fragments were identified in the stool of this 26-year-old male patient through direct microscopic examination using Lugol's solution (Figure 4). At 400× magnification, segmented 2-legged fragments (suspected mite parts) were observed.

Discussion

In this report, we described a case of intestinal acariasis in a 22-year-old woman. Macroscopic stool examination revealed dark brown, liquid stool; laboratory testing showed occult blood. Microscopic examination confirmed the presence of

occult blood, with numerous erythrocytes present in the stool. Additionally, the mites identified during microscopic examination exhibited morphological characteristics consistent with *Tyrophagus* sp. [8,9]. The potential for contamination was considered minimal because sterile containers were used, and stool examinations performed over 3 consecutive days consistently revealed the same parasite. Mites can mechanically damage the colonic mucosa through their mouthparts and legs, resulting in tissue injury and diarrhea [5,6]. This mechanism may explain the presence of erythrocytes in the stool, which has also been reported in cases of intestinal acariasis in Anhui [4].

The patient may have ingested mite-contaminated food and had a history of consuming hot, spicy foods before the onset of diarrhea. The combination of these factors may have contributed to the severe diarrhea, characterized by watery and bloody stools occurring more than 10 times per day. Blood eosinophil count and IgE levels were within normal limits, suggesting that an allergic reaction was unlikely. Therefore, the patient was diagnosed with isolated intestinal acariasis in the

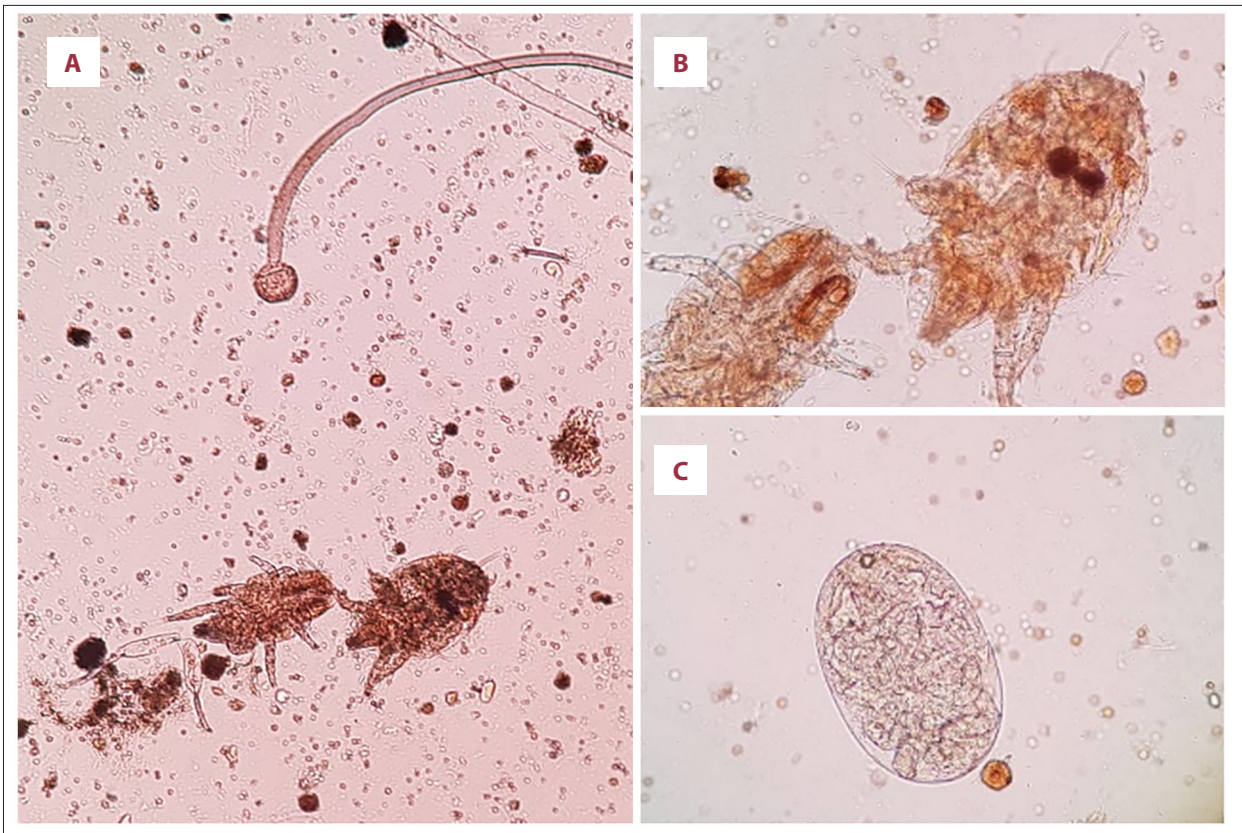


Figure 3. *Tyrophagus* spp. mites identified by direct microscopic examination of stool from a 25-year-old male patient: (A) adult stage at 100× magnification; (B) adult stage at 400× magnification; and (C) egg stage at 400× magnification.



Figure 4. Microscopic examination of stool from a 26-year-old male patient using Lugol's iodine at 400× magnification, showing fragmented arthropod structures suspected to be mites.

absence of accompanying allergic manifestations. She presented with diarrhea and had no additional symptoms suggestive of allergy. Nevertheless, previous studies have reported that eosinophilic gastroenteropathy may also contribute to diarrhea in intestinal acariasis [6]. Mites can induce inflammation,

intestinal mucosal necrosis, and immune activation through their metabolites [3-5]. Intestinal acariasis can also damage the intestinal mucosa, invade the intestinal muscle layer, and stimulate immune responses via mite metabolites and body components [5].

In addition to the patient described above, we identified mites in diarrheal stool samples from 2 male patients (aged 25 and 26 years). Both patients presented with dark brown liquid stools; additional clinical information, including the duration and frequency of diarrhea, associated symptoms, and administered treatments, was unavailable. Overall, 2 of the 3 stool samples in this report clearly contained *Tyrophagus* spp. (Figures 2, 3). In the third patient, definitive identification could not be established because only fragmented body parts—suspected to belong to mites—were observed (Figure 4). The first case included complete clinical data, whereas the other 2 cases were limited to stool examinations revealing mites. These findings highlight the need to consider mites as a potential cause of diarrhea in Indonesia. Several factors support this concern: (1) Indonesia's warm and humid climate is favorable for rapid mite reproduction; (2) fungi, which serve as a food source for mites, also proliferate in humid environments; and (3) the high prevalence of soil-transmitted helminths, particularly

hookworms, may contribute to misdiagnosis because mites can be mistaken for helminths [7].

The mites identified in our 3 patients with diarrhea have also been associated with intestinal acariasis in published reports. Storage mites, the most common mites implicated in human disease, are well known to cause allergic reactions [10]. Although less common than allergic manifestations, storage mites can also cause other conditions, including intestinal acariasis, pulmonary acariasis, and urinary acariasis [4]. Li et al reported cases of intestinal acariasis presenting as diarrhea caused by several mite species, including *Acarus siro*, *T. putrescentiae*, *Dermatophagoides farinae*, *Dermatophagoides pteronyssinus*, *Glycyphagus domesticus*, *Glycyphagus ornatus*, *Carpoglyphus lactis*, and *Tarsonemus granarius* [4]. *Tyrophagus* spp. are mycophagous mites, also known as fungus mites, that feed on fungi [10,11]. In the stool sample from the second patient, Mucorales hyphae and sporangia were observed (Figure 3A). Although the dietary histories of the latter 2 patients were unavailable, it is possible that the fungi had grown in mite-contaminated food, given that *Tyrophagus* spp. are recognized food-associated mites. Fungi such as *Fusarium*, *Aspergillus*, *Candida*, *Hyphopichia*, *Penicillium*, *Rhizopus*, and *Trichophyton* serve as nutritional sources for *T. putrescentiae*. A study conducted in Turkey also identified *T. putrescentiae* in fungi isolated from cheese. High-humidity storage environments provide ideal conditions for both fungal growth and the proliferation of fungus mites, whose primary food source is fungi. These mites feed on fungal spores and hyphae, promoting their own growth and reproduction. Fungal hyphae, which contain chitin-rich cell walls, provide abundant lipids and proteins, making them a nutritious food source for mites. Additionally, mites contribute to fungal spore dissemination by carrying spores on their bodies. Undigested fungal spores may also be excreted in mite feces [11,12].

Mite-associated diarrhea is typically watery and may occur more than 10 times per day. In Indonesia, *Vibrio cholerae* is among the most common causes of acute diarrhea, and the stool consistency in cholera may resemble that observed in mite-associated diarrhea [13]. Furthermore, *Escherichia coli* has been reported as a common cause of diarrhea in children [14]. Several pathogenic types of *E. coli* exist, including enteropathogenic, enterohemorrhagic, enteroaggregative, enterotoxigenic, and enteroinvasive strains, resulting in varying clinical presentations of diarrhea [15]. These presentations can include watery or mucoid diarrhea, with or without mucus and/or blood, and stool color ranging from yellow and brown to green; in some cases, stools may be entirely blood-stained [16-18]. Therefore, mites should also be considered a potential cause of diarrhea. The low number of reported cases in Indonesia may be related to the limited availability of laboratories that can identify mites in stool specimens. A study conducted in Anhui identified

mites in 30 stool samples where no other etiologic agents were detected. The most common clinical manifestation was diarrhea (86.67%), followed by abdominal pain (66.67%), abdominal discomfort (63.33%), mucus in the stool (50%), anal burning (46.67%), and bloody or purulent stools (43.33%) [4]. In the other 2 patients described in this report, no additional clinical symptoms were documented, and mites were detected only during stool examination. Zia et al [19] similarly reported the incidental identification of mites during routine stool examination. In contrast, a case report from Egypt described a 3-year-old child who presented with perianal redness and failure to gain weight, in the absence of other gastrointestinal symptoms [6].

Our female patient received intravenous metronidazole at a dose of 500 mg for 3 days, resulting in clinical improvement. Salem et al [20] reported that metronidazole has acaricidal effects, which may also explain the improvement observed in our patient. Further studies are needed to evaluate its effectiveness in the treatment of intestinal acariasis. Khalifa et al [6] reported that administration of ivermectin (200 µg/kg body weight every 10 days; 3 doses in total) resulted in favorable clinical and laboratory outcomes; no mites were detected in post-treatment stool examinations. Albendazole has also been reported as a potential treatment for mites, although its mechanism of action remains unclear [21]. Probiotic administration can also be considered in intestinal acariasis, given that probiotics have been proposed as a preventive and therapeutic approach to restore the optimal composition and functional integrity of the gut microbiome [22].

Currently, limited information is available regarding intestinal acariasis, a condition commonly associated with occupations such as farming, food service, livestock breeding, baking, and herbal medicine sales. Intestinal acariasis occurs when humans accidentally ingest mites through contaminated food or dust; such ingestion may occur when food is opened and stored unsealed for prolonged periods. Additionally, mites can survive exposure to gastric acid and digestive secretions [6,10,23]. This survival capability may allow mites to persist within the intestine and damage the intestinal mucosa, leading to diarrhea. A study by Li et al [4] demonstrated that the mites responsible for intestinal acariasis are highly resilient. The study showed that these mites could survive exposure to 10% formalin, distilled water at 20 to 25°C, running water at room temperature, and even prolonged confinement in sealed plastic bags [5].

In Indonesia, there have been no previous reports of mites identified in the stool of patients with diarrhea. Furthermore, this condition has rarely been reported worldwide. Symptoms of intestinal acariasis may include diarrhea (86.67%) and abdominal pain (66.67%) [5], which can lead to misdiagnosis as amebiasis, intestinal schistosomiasis, allergic enteritis, or

chronic colitis [1-3]. These conditions are commonly encountered in Indonesia. Mite eggs can also be mistaken for hookworm or *Trichostrongylus* spp. eggs. Intestinal acariasis is diagnosed by identifying mites or their eggs in the stool of patients with diarrhea [7,23].

The high prevalence of diarrhea in Indonesia among both children and adults, together with stool characteristics and laboratory findings that resemble those of mite-associated diarrhea, raises concern regarding the true incidence and prevalence of intestinal acariasis. Further research on diseases associated with intestinal acariasis is needed. Mites should be considered a potentially important cause of diarrhea in Indonesia. More comprehensive studies are required to investigate the possible role of mites in diarrhea across different regions of the country.

Conclusions

This report represents the first documented cases of mites identified in the stool of patients with diarrhea in Indonesia.

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These findings raise concern regarding the possibility of intestinal acariasis and highlight the importance of parasitological stool examination to confirm the diagnosis.

Institutions Where Work Was Done

Mitra Keluarga Hospital Kemayoran, Jakarta, Indonesia; Eka Hospital BSD, Tangerang, Indonesia; Siloam Hospital TB Simatupang, Jakarta, Indonesia.

Patient Consent

The patients described in this report can no longer be contacted. There are no factors that compromise privacy or affect patient safety.

Declaration of Figures' Authenticity

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