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Case Report: A Symptomatic Case of *Hymenolepis diminuta* Infection in an Urban-Dwelling Adult in Malaysia

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Abstract. A case of *Hymenolepis diminuta* infection in a 43-year-old Malaysian male with persistent abdominal colicky pain is reported. Endoscopy revealed whitish worms in the lumen of the small intestine, which were identified as *H. diminuta* after microscopy. Patient was successfully treated with a single dose of praziquantel (25 mg/kg).

Hymenolepis diminuta is a common rat and mice tapeworm with a worldwide distribution throughout the world; however, it is rarely found in man.[1,2] The tapeworm has an indirect life cycle in which it requires the obligatory intermediate host (arthropods as) in addition to the definitive host (rodents). Beetles (*Tenebrio* and *Tribolium*), fleas (*Ctenocephalides*, *Xenopsylla*, and *Pulex*), cockroaches, or caterpillars may serve as the intermediate hosts after ingestion of *H. diminuta* eggs excreted in the rodent's feces.[1] These eggs then develop into the cysticercoid larvae stage in the arthropod's body cavity. After ingestion of these infected arthropods by the rodents, the cysticercoids develop into adult worms and eggs are released in the stool.[1] In a study done by Pappas and Barley, transmission and dispersal of *H. diminuta* have also been observed via ingestion of eggs in feces of infected beetles by other beetles.[3]

On May 20, 2013, a 43-year-old Chinese male, who lives in an urban housing area in Selangor, was seen by a gastroenterologist at a private hospital for persistent abdominal colic for the past 2–3 months. The patient had no history of pruritus ani, vomiting, diarrhea, fever, or passing of worm during defecation. Before this, the patient had been to a few private clinics where abdominal ultrasound was done. Despite normal ultrasound, his symptom persisted. He later went to another private hospital and was diagnosed as constipation and was given lactulose. During his current presentation, the attending gastroenterologist performed a full blood count and an endoscopy. The full blood count revealed hemoglobin 13.9 g/dL, total leukocyte count 7.8 × 10^9/L, and total platelet count 293 × 10^9/L (neutrophils 73%, lymphocytes 19%, monocytes 6%, eosinophils 1%, and basophils 1%). Images taken from the endoscopy revealed many small unidentified whitish worms in the lumen of the small intestine (Figure 1A). A worm was removed and sent to the Parasite Southeast Asia Diagnostic Laboratory, Department of Parasitology, Faculty of Medicine, University of Malaya, Kuala Lumpur, on the same day for further identification.

In the laboratory, the whitish worm was placed in a petri dish and subjected for microscopic examination. Scolex with four cup-shaped suckers was observed (×40 magnification) (Figure 1B). Numerous eggs were observed in the mature proglottids of the worm (×100 magnification) (Figure 1C). The eggs measured on average 70–80 μm and each contained six hooklets and was surrounded by a thin inner membrane and a thick outer shell (×400 magnification) (Figure 1D). Polar filaments were not seen in the eggs. On the basis of the characteristics of the eggs, they were identified as *H. diminuta*. On May 22, 2013, the patient was requested to provide his stool sample and of his family members. Similar eggs were seen on microscopic examination of the patient's stool sample after a concentration technique. Examination of stool samples from other family members was negative. The patient was prescribed with a single dose of praziquantel (25 mg/kg of body weight). Further stool examination carried out a month after treatment (June 20, 2013) was negative for eggs, and the patient remained asymptomatic.

Although uncommon, *H. diminuta* can cause infection in humans with prevalence ranging from < 1% to 6%. Human infection was highly reported among low-socioeconomic populations in tropical and subtropical countries.[4,5] Nevertheless, human cases have also been identified in developed countries such as the United States and Europe as reviewed by Riley and Shannon[1] and Keller.[6] Majority of the human cases were acquired through accidental ingestion of intermediate hosts containing *H. diminuta* cysticercoid larvae, as the eggs of this tapeworm are not infectious to humans.[6] In fact, reports have shown that children are the ones frequently associated with *H. diminuta* infection rather than adults, probably due to the unhygienic eating habit.[5,7,8]

In Malaysia, there have been only three human *H. diminuta* cases reported since 1978 and all were from rural and semirural areas.[9–11] The first human case was an incidental finding after a large fecal screening involving oil palm workers.[9] The latter two cases were reported in two female children aged 21–24 months with one child showing symptoms including abdominal discomfort and itchiness over the abdomen.[10,11] To the best of our knowledge, this is the first detailed report of *H. diminuta* infection in an adult from an urban area in Malaysia.

Besides Malaysia, *H. diminuta* infection in humans have been sporadically reported in a few southeast Asian (SEA) countries including Thailand,[8] Singapore,[12] the Philippines,[1]

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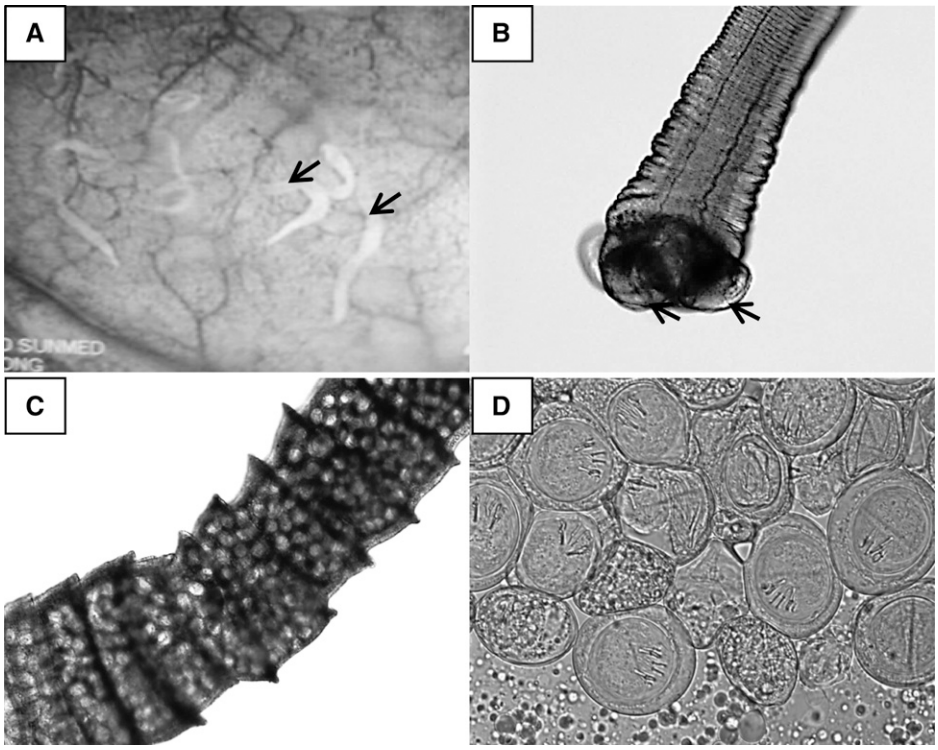

FIGURE 1. Endoscopic and microscopic images of *Hymenolepis diminuta*. (**A**) Endoscopic image of the patient's intestinal lumen showing many whitish worms (arrows). (**B**) Scolex of an adult worm with cup-shaped suckers (arrows) (×40 magnification). (**C**) Numerous eggs were observed in the mature proglottids (×100 magnification). (**D**) Eggs from the ruptured proglottids were spherical in shape with an average diameter of 70–80 μm and each contained six hooklets and was surrounded by a thin inner membrane and a thick outer shell (×400 magnification).

and Indonesia.[13] In contrast, countries such as Cambodia, Myanmar, Lao People's Democratic Republic, and Brunei have had no documented case. Although it is believed that human infection does exist in these countries, the cases might have gone unreported due to lack of expertise in making a diagnosis. Similar to what was seen in most developing countries, most of the cases in SEA were detected among children from low-socioeconomic status with poor hygiene.[8,10,11] Most of the human infections were asymptomatic, and niclosamide or praziquantel have been used as drugs of choice.[8,11] In Thailand, the habit of eating uncooked insects was postulated as the potential route of human infection.[8]

To date, very scanty reports are available on *H. diminuta* infection in adults. In Mexico, a case was seen in a 38-year-old female with a long history of anorexia, diarrhea, and intestinal cramps. She was successfully treated with a 3-day course of nitazoxanide (500 mg/day) as praziquantel and niclosamide were not easily obtained in rural areas of Mexico.[2] Recently, a human case has been reported in an 18-year-old male from India with symptoms of maculopapular pruritic rash and left iliac fossa pain for 6 months. He was initially diagnosed with food allergy before receiving the correct diagnosis for his illness. The patient was successfully treated with two doses of praziquantel (20 mg/kg).[14]

In this report, the patient lives in an urban housing area but has spent most of his time working in his factory that is poorly maintained and infested with rodents. As the patient routinely has his lunch at the restaurants located near to his factory, he could be infected with *H. diminuta* via accidental ingestion of infected arthropods that might be present in grains such as rice, wheat, and barley. This is further supported by the findings that none of his family members were positive for *H. diminuta* infection.

The common detection method for *H. diminuta* infection is by examination of concentrated stool samples for the presence of eggs or proglottids.[2,15] However, since many infected persons were mostly asymptomatic and some were detected during field surveys, it was not able to give prompt treatment to them.[8] In addition, there has been a report of an untreated *H. diminuta* case due to incorrect diagnosis by laboratory personnel.[15] In the case presented here, the utilization of endoscopy before microscopy confirmation has aided early diagnosis and treatment of the infected person. Endoscopy is only available in big medical center, is costly, and is not used as a routine screening tool. Stools from patients with gastrointestinal symptoms have to be thoroughly screened for intestinal parasites using the routine method of stool examination. Hence, adequate laboratory facilities and well-trained medical and laboratory personnel are important to avoid misdiagnosis.

Hymenolepis diminuta infection in humans is rarely reported. Since a century ago, about 500 cases of *H. diminuta* in humans have been sporadically reported globally. Although majority of the human cases were reported in children from rural areas and were commonly asymptomatic, clinicians should be aware that infection may also occur in adults living in urban areas where rodents and mice are abundant. The description and illustrations of

H. diminuta presented here should facilitate proper identification of the parasite and expedite appropriate treatment of the patient.

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