

Challenge PA1607-1

July 2016

Stool: *Hymenolepis nana*, *Chilomastix mesnili*, *Blastocystis hominis*, *Entamoeba coli*, and *Giardia lamblia*

CMPT QA/QC/ Statistics

This sample was verified by two reference laboratories. Laboratories were expected to report *Hymenolepis nana*, *Chilomastix mesnili*, *Blastocystis hominis*, *Entamoeba coli*, and *Giardia lamblia*.

All challenge components are confirmed before shipping by the reference laboratories. No further statistical analysis is performed on the results beyond that described under "Suitability for grading."

SURVEY RESULTS

Reference laboratories: Both laboratories reported the presence of *Hymenolepis nana*, *Chilomastix mesnili*, *Blastocystis hominis*, *Entamoeba coli*, and *Giardia lamblia*.

Participants (Table 1) 18/19 (95%) laboratories reported *H. nana*, *G. lamblia*, *B. hominis*, and *E. coli*; these laboratories were given an acceptable grade. One participant did not report the presence of *G. lamblia*, this laboratory was graded unacceptable.

Suitability for Grading

A challenge component is considered suitable for grading if agreement is reached by both (100%) reference laboratories and at least 70 percent of the participants.

Parasite identification was correctly performed by both reference laboratories and greater than 70 percent of all laboratories and was thus, determined to be suitable for grading.

This critique will focus on *Hymenolepis nana*

IDENTIFICATION

The diagnosis of *H. nana* depends on the demonstration of eggs in stool specimens. Concentration techniques and repeated examinations (of the same concentrate, or repeat specimens, or both) will increase the likelihood of detecting light infections.

Of note, specimens preserved in formalin-based fixatives are recommended over polyvinyl alcohol, which can cause egg distortion.

Microscopic examination

Eggs: spherical or ovoid with a thin hyaline shell and measure 30-47 µm in diameter. The oncosphere with its 3 pairs of hooklets lies in the center of the egg and is separated from the outer shell by considerable space. The oncosphere has an internal membrane with polar thickenings from which arise 4 to 8 filaments extending into the space between it and the colourless hyaline shell (Figure 1).^{1,2}

Important

The thin-shelled eggs of *H. nana* tend to collapse on the permanent stained smear and may be difficult to identify. Therefore, the direct wet mount of the concentrate is recommended.

Macroscopic examination

The adult *H. nana* tapeworm ranges from 7-50 mm in length with up to 200 proglottids.

Grading

Reporting *H. nana*, *C. mesnili*, *B. hominis*, *E. coli*, and *G. lamblia* was graded acceptable.

Not reporting a pathogen like *G. lamblia* was graded unacceptable.

Table 1. Results reported

Reported	Labs	Grade
<i>Hymenolepis nana</i>	18	Acceptable
& <i>Giardia lamblia</i> , <i>Blastocystis hominis</i> , <i>Entamoeba coli</i>	18	
& <i>Chilomastix mesnili</i>	18	
<i>Hymenolepis nana</i> , <i>Blastocystis hominis</i> , <i>Chilomastix mesnili</i> , <i>E. coli</i>	1	Unacceptable
Total	19	

Proglottids are rarely found in feces samples, as they do not ordinarily break off from the main strobila.

The scolex is knob like in shape, has a rostellum with hooklets and 4 suckers.^{1,2}

Differential diagnosis

Eggs of *H. nana* must be distinguished from those of *H. diminuta*, the rat tapeworm. Eggs of *H. diminuta* have a moderately thick shell, are larger (70-85 µm by 60-80 µm), and the oncosphere lacks polar thickenings or filaments.^{1,2}

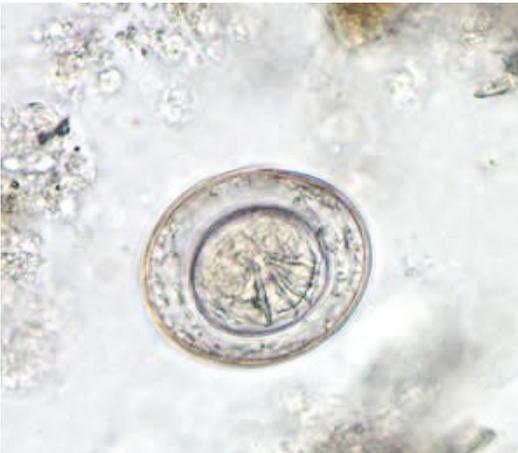


Figure 1. Egg of *H. nana* in an unstained wet mount. Note the presence of hooks in the oncosphere and polar filaments within the space between the oncosphere and outer shell. Photographs courtesy of CDC Division of Parasitic Diseases⁷.

LIFE CYCLE

H. nana is the only tapeworm that can be transmitted directly from person to person.

Eggs of *H. nana* are immediately infective when passed with the stool and cannot survive more than 10 days in the external environment.

When eggs are ingested by an arthropod intermediate host (various species of beetles and fleas may serve as intermediate hosts), they develop into cysticercoids, which can infect humans or rodents upon ingestion and develop into adults in the small intestine.

When eggs are ingested by humans (in contaminated food or water or from hands contaminated with feces), the oncospheres contained in the eggs are released, penetrate the intestinal villus, and develop into cysticercoid larvae.

Upon rupture of the villus, the cysticercoids return to the intestinal lumen, evaginate their scoleces, attach to the intestinal mucosa, and develop into adults that reside in the ileal portion of the small intestine producing gravid proglottids.

Eggs are passed in the stool when released from proglottids through its genital atrium or when proglottids disintegrate in the small intestine.

There is a high likelihood of internal autoinfection, without passage through the external environment.

The life span of adult worms is 4 to 6 weeks, but internal autoinfection allows the infection to persist for years.

CLINICAL RELEVANCE

Hymenolepis nana is the smallest tapeworm to infect humans. This cestode belongs to a large family known as Hymenolepididae.

H. nana, known as the human tapeworm, has a cosmopolitan distribution and is thought to be the most common tapeworm throughout the world. It is most prevalent in conditions of poor sanitation where people share the same living quarters. In temperate areas its incidence is higher in children and institutionalized groups.

Symptoms include weakness, headache, anorexia, abdominal pain, and diarrhea. However, symptoms often go unnoticed.⁶

Mono-infections are rare and usually co-occur with a number of other enteric parasites such as *Giardia*, *E. coli*, *Blastocystis*, *Chilomastix*.⁷

Of note, it is estimated that 11% of wild brown rats carry *H. nana*.⁵

TREATMENT

Praziquantel or niclosamide are the drugs most frequently used to treat *H. nana* infection. Developing *H. nana* cysticercoids are not as susceptible to drug therapy as adult tapeworms therefore either a higher dose of antiparasitic or prolonged duration of antiparasitic to eliminate emerging tapeworms is required to successfully treat infection.⁶

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