Trichuriasis
Species *Trichuris trichiura*
**Trichuris trichiura**

**Phylum** Nematoda

**Class** Enoplea

**Order** Trichocephalida

**Family** Trichuridae
Anatomy

• Endoparasites

• Can be found in the digestive tract of the host

• Only the adults eat,
  • They feed on tissue secretions of intestinal epithelium
Anatomy

- Dioecious
  - Females typically larger than male.
  - Male has curled posterior end.

- Common name: Whipworm
  - Narrow anterior esophagus and a thick posterior anus.

- Attach to host via slender anterior end.

- Size varies from 3 to 5 cm.

- Typically pink
Reproduction

- Each female produces 2,000-6,000 eggs per day.
  - Life expectancy of a worm within a host is ~ 1-3 years.
- Females may produce a pheromone to attract males.
- Males have a spiracle surrounded by a sheath with an ejaculatory duct
- The curved portion of the male coils around the females genital pore.
- The male uses spicules to hold the female in place during copulation.
Egg Anatomy

- Barrel shaped
- Thick walled
- Plug at each pole
Transmission

• The main mode of transmission is through contaminated water, soil, and food.
  • Touching contaminated soil, typically in areas with poor sanitation practices.

• Children are the most effected by whipworms
Epidemiology

- Soil-transmitted helminthes are considered a **neglected tropical disease**, despite their prevalence.
  - Most prevalent in the under developed countries.
  - Chronic illness, not an acute illness.
  - Effect of this infection on economic and education burden is not quantified.

- STH prevalence is generally higher in rural areas due to,
  - Poor sanitary measures
  - Inadequate water supply
  - Overcrowding
Geographic Distribution

• The global prevalence of *Trichuris trichiura* was 795 million (2003)
  • 3rd most common round worm of humans.
  • Most frequent in areas with tropical weather and poor sanitation practices.
  • Most prevalent in equatorial Africa and Southeast Asia.
**Lifecycle**

- Eggs pass out of body via feces
- Become infective after embryonation
- Molt to become adults in large intestine
- Reproduce with nearby worms
- Eggs hatch in small intestine & migrate to large intestine
Trichuriasis

- Infects;
  - Wild/domestic canines
  - Wild/domestic pigs
  - Humans
  - Non human primates

<table>
<thead>
<tr>
<th>Host species</th>
<th>Sampled numbers</th>
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<tbody>
<tr>
<td>Golden snub-nosed monkey (<em>Rhinopithecus roxellana</em>)</td>
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<tr>
<td>Anubis baboon (<em>Papio anubis</em>)</td>
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<td>Vervet monkey (<em>Chlorocebus aethiops</em>)</td>
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<td>Northern pig-tailed macaque (<em>Macaca leonina</em>)</td>
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<td>Rhesus monkey (<em>Macaca mulatta</em>)</td>
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<td>Northern white-cheeked gibbon (<em>Nomascus leucogenys</em>)</td>
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<td>Hamadryas baboon (<em>Papio hamadryas</em>)</td>
<td>2</td>
</tr>
<tr>
<td>Black snub-nosed monkey (<em>Rhinopithecus bieti</em>)</td>
<td>2</td>
</tr>
</tbody>
</table>

Xie, Y. et al. Genetic characterization and phylogenetic status of whipworms (*Trichuris* spp.) from captive non-human primates in China, determined by nuclear and mitochondrial sequencing.
Disease

- Trichuriasis
- Abdominal colitis
- *Trichuris* dysentery syndrome
Symptoms

Light Infections

• Asymptomatic

Heavy Infections

• Diarrhea
• Abdominal pain
• Malnutrition (anemia)
• Rectal prolapse
Pathology

Diarrhea/Malnutrition
• Burrowing of worm heads into intestinal epithelium can result in increased fluid secretion and decreased absorption of fluid in colon.

Abdominal Pain
• Adults burrow through mucosa in large intestine.
• Leads to cell destruction and immune response

Rectal Prolapse
• High numbers of worms embedded in the rectum can lead to excess fluid in the body, leading to rectal prolapse.
Diagnosis

• Microscopically identifying the presence of eggs in a stool sample.
  • Difficult to identify in light infections.
  • Kato-Katz technique, a thick smear of stool sample is prepared prior to searching for parasite eggs.

• Proctoscopy
  • Examination of rectal mucosa can occasionally demonstrate adult worms.

• Colonoscopy
  • Identify adults worms embedded in colon

Adult *T. trichiura* found during colonoscopy.
Treatment

• Albendazole (egg/larval/adult stages)
  • Anthelmintic agent
  • Blocks egg production and development.
  • Impairs uptake of glucose by the larval and adult stages and depletes glycogen stores.

• Ivermectin
  • Used in combination with Albendazole
  • Interferes with nervous system and muscle function

• Mebendazole (larval/adult stages)
  • Anthelmintic agent
  • Poorly absorbed into blood stream.
  • Used alone in mild to moderate cases, kills parasites slowly with limited adverse side effects.
  • Selectively and irreversibly blocks glucose uptake and other nutrients in the intestine.
References


