Trichuris trichiura

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Introduction

*Trichuris trichiura,* also known as ‘whipworm’, is the third most common round worm infection in humans, behind Ascariasis and hookworm.

The worm looks like a whip with a thick posterior end, and a long, thin anterior end. Light infections are usually asymptomatic, although heavy infections can cause diarrhea, mucous stools, abdominal pain, painful urination, and a prolapsed rectum.

Heavy infections in children can cause nutritional deficiencies.
Epidemiology

- About 500 million people are infected with *Trichuris trichiura* and is the third most common round worm infection in humans. In some parts of Asia prevalence rates are as high as 50 to 80%.

- Trichuriasis is a tropical disease of children (5 to 15 yrs). Whipworm is prevalent in countries with poor sanitation, and can be seen in Asia, Africa, South America, Europe and North America. However, it can be found almost all over the world.

- Worms require hot and humid environments to develop outside the host in the soil. However, sanitation is the key in predicting whether or not a particular area is endemic. Areas without sanitary systems to separate feces and food will have more *T. trichiura* infections. In places where human feces are used as fertilizers, whipworm infections are common and hard to eliminate from the population.
Taxonomy

- **Phylum** - Animalia
  - **Class** - Adenophorea,
    - **Order** - Enoplida,
      - **Family** - Trichuridae,
      - **Genus** - Trichuris,
        - **Species** - T. trichiura.
Trichuris trichiura is also called whipworm because of its appearance. The adult whipworm, is about 5 cm. long, it has whip like thin anterior (three fifths) and handle like thick posterior (two-fifths) portion. The adult worms reside in the gut where they intertwine their heads in the lining of the large intestine.

The barrel-shaped eggs are 50 to 54 µm by 23 µm and have a very typical plug-like prominence in each pole of the egg. Eggs are clear to dark-brown, and they can hardly be confused with the eggs of other nematodes.
Life cycle at a glance

Life cycle stages: Adult, larva, ova
Host: Single host, man (definitive)
Infective form: Embryonated egg
Pathogenic form: Adults & larva
Route of infection: Fecal oral
Site of localization: Caecum
Time required for completion of life cycle: 1-3 months
Virulence Factors

- **Invasion** - The adult *Trichuris trichiura* invade the colonic mucosa which is the main mechanism of its pathogenicity.
Pathogenesis

- Infection is spread via the fecal-oral route. Ingesting eggs initiates infection. Eggs hatch in the duodenum, where the larvae invade and mature in the mucosa before migrating to the large intestine. Adult whip like worms embed their heads into the superficial mucosa of the colon and cecum. The life cycle is completed in about 3 months. Adult worms may live 7 to 10 yr.

- Infection with *T. trichiura* is characterized by the invasion of the colonic mucosa by the adult *Trichuris* and production of minor inflammatory changes at the sites of localization. The presence of adult worm in the mucous membrane, irritate the nerves, causing diffuse colitis, and diarrhea and cramps. In heavy infections, attachment of the worms to the mucosa of rectum causes dysentery and rectal tenesmus.
Clinical Features

- Clinical manifestations are determined largely by the worm burden: less than 10 worms are asymptomatic.
- Heavier infections (e.g., massive infantile trichuriasis) are characterized by chronic profuse mucus and bloody diarrhea with abdominal pains and edematous prolapsed rectum.
- The infection may result in malnutrition, weight loss and anemia and sometimes death.
Laboratory Diagnosis

- **Principle:** Microscopic identification of whipworm eggs in feces is the evidence of infection.
- Because eggs may be difficult to find in light infections, a concentration procedure is recommended.
- Because the severity of symptoms depend on the worm burden, quantification of the latter (e.g. with the Kato-Katz technique) can prove useful.
- Examination of the rectal mucosa by proctoscopy (or directly in case of prolapses) can occasionally demonstrate adult worms.
Treatment

- No treatment is needed for asymptomatic or light infections.
- A single-dose therapy of *albendazole* produces 79.3% “cure rate” of adult worms and a 93.8% egg-reduction rate.
- *Mebendazole* (100 mg orally bid for 3 days) is used for more severe infections which works by selectively and irreversibly blocking glucose uptake and other nutrients in the intestine where helminths dwell.
Prevention

- Infection is most common in areas with poor sanitation and tropical climates. Improved sanitation is the most effective way to prevent the spread of whipworm infections.
- Prevention requires adequate sanitation and good personal hygiene. Areas where human feces are used to fertilize crops have high rates of transmission and can reduce those rates by using non-human feces or synthetic fertilizers.
- Also, since *T. trichiura* eggs are sensitive to heat, cooking fresh produce will reduce the risk of infection. Improved hygiene and sanitary eating habits are most effective in control.
Summary

- *Trichuris trichiura*, also known as whipworm, is an intestinal nematode, that inhabit in the cecum. About 500 million people of the world are infected by it.
- *T. trichiura* has three stages in its life cycle, *ova, larva and adult* of which embryonated ova are the infective stage and adults are the pathogenic stage. It is transmitted by feco-oral route.
- *T. trichiura* causes trichuriasis which is mostly asymptomatic in mild infections and in heavy infections are characterized by chronic profuse mucus and bloody diarrhea with abdominal pains and edematous prolapsed rectum.
- Diagnosis of trichuriasis is based on identification of barrel shaped ova of *Trichuris trichiura* by microscopic examination of stool.
- Trichuriasis can be effectively treated by albendazole and mebendazole.
Study Questions

1. What is the prevalence and clinical significance of *Trichuris trichiura*?
2. Describe life cycle of *Trichuris trichiura*.
3. Write about the laboratory diagnosis of *Trichuris trichiura*?
4. Write about the pathogenesis of Trichuriasis.
5. Which worm is called whipworm? Why it is so called? Describe its morphology and life cycle.