



Tania solium

Kingdom – Animalia

Phylum - Nematohelminths

Class – Cestoda

Species - *Taenia solium* (Pork tapeworm)

- a) *Taenia saginata* ([beef tapeworm](#))
- b) *Hymenolepis nana* ([dwarf tapeworm](#))
- c) *Diphyllobothrium latum* ([fish tapeworm](#))
- d) *Echinococcus granulosus* (Dogs tapeworm.)

General characteristics of *Taenia solium*

1. *Taenia solium* commonly known as the pork tapeworm or the armed tapeworm.

2. It is a flat-ribbon like tape worms
3. Adult worms are rarely pathogenic except for the encysted larval stage (*cysticercus cellulosae*) that cause a serious disease in human called **Cysticercosis**.

Morphology and habitat

Adult *worm* is flattened ribbon like tapeworm and white in color measuring about 2-3 meters in length.

The body of parasite is divided into 3 parts:- Head (Scolex), neck and body (strobila)

The adult worm habitates the **small intestine (upper jejunum)** of human.

Cysticercus cellulosae larvae

The parasite larvae is *cysticercus cellulosae* (*Taenia* cyst) and is the Infective form of parasite.

The larval form develops in the muscle of pigs as well as various organs of the human.

A mature cyst has ellipsoidal body shape measuring about 10mm width by 15mm in length with fluid filled milky white bladder like structure.

Geographical distribution

Taenia solium is found worldwide (cosmopolitan), but more common in pork-eating countries with low socio-economic and poor sanitation.

The parasite is endemic in central and South America, non- Islamic countries of South East Asia, South Africa especially among the Bantu communities. Eastern Europe and China areas of highest prevalence include Latin America and Africa.

Mode of transmission:

Man become infected through the ingestion of uncooked pork infected with cyst of tape worm. Also through the ingestion of food and water contaminated by the eggs passed out with faeces of an infected host (Man).

Occasionally, endogenous autoinfection may occur through anus-hand-mouth transfer of eggs by contaminated hands of person with poor personal hygiene.

Additionally, autoinfection may also occur through reverse peristalsis in which eggs produced by *T. solium* are thrown back to the duodenum, where they hatch and cause tissue infection

Life cycle

The life cycle of *Taenia solium* is completed in two hosts, and man is the definitive host while pigs are the intermediate hosts.

Man become infected by *Taenia solium* through ingestion of undercooked cooked pork infected with *cysticercus cellulosae*.

Inside the small intestine (Duodenum and jejunum) the larva is stimulated by the alkaline environment (bile juice) to exvaginates out of the cyst and anchor onto the gut wall using hooks and suckers of the mouth.

The larvae then develops to sexual mature adult worm in 2-3 months and start producing eggs which are then passed out with faeces along with the gravid segments into the soil , grass or water.

Pig become infected with *Taenia solium* upon ingestion of eggs or gravid proglottids in water or grass contaminated with human faeces.

In the intestine of pig, the embryo (oncospheres) hatch out of eggs and attach to the intestinal mucosa by hooks, and penetrate the gut-wall from where they gain entrance into the portal vessels or mesenteric lymphatic system and finally reaching the systematic circulation passing through

the liver, heart, lungs entering the brain and other tissue with high blood flow.

In the process, some larva are filtered out from the circulating blood into the muscular tissue where they ultimately settle down and undergo further development into a fluid-filled cyst form called *cysticercus cellulosae*, the infective stage to man.

Man becomes infected upon ingestion of undercooked pork containing encysted larva and the cycle is repeated.

Occasionally man may get infected through eating food or drinking water contaminated with eggs, thus becoming an intermediate host.

On ingestion, the onchospheres (embryo) are released from the eggs in the intestine which then penetrates the intestinal mucosa and are carried by the circulation to different tissue where they develop into cysts causing cysticercosis.

Majority cysts in man are produced in the CNS, skeletal muscles, eye and subcutaneous tissue giving rise to a multiple conditions of **cysticercosis**.

Pathogenesis of *Taenia solium*:

- 1. Cysticercosis:** The cyst, (*Cysticercus cellulosae*) are more pathogenic. They cause a serious disease called cysticercosis in human, mostly cyst are produced in the skin, skeletal muscles, eye and CNS. Clinical manifestation depend on the affected organ; neurocysticercosis and ophthalmic cysticercosis.
- 2. Intestinal Taeniasis:** Mostly the infection is asymptomatic, except with mild nausea, abdominal discomfort, hunger pain, loss of weight, chronic indigestion, vomiting, headache and diarrhea are present in few cases.
- 3. Extraneural cysticercosis:** Subcutaneous cysticercosis present as small, movable, painless modules that are commonly noticed in the

arms or chest. The modules become swollen, tender and inflamed and gradually disappears.

Muscular cysticercosis is a causal finding, appearing as dot shaped or ellipsoidal calcifications.

- 4. Epileptic seizures** are the commonest presentation and generally represent the primary or sole manifestation of the disease.

Laboratory Diagnosis of *Taenia solium*:

Specimen: Faeces, muscle tissue, blood, csf

- 1. Macroscopic examination:** A naked eye examination of the specimen can be made for segment or proglottids.

- 2. Stool Microscopy:** Demonstration of eggs and less frequently proglottids and scolex in faeces is used as tool for diagnosis.

- 3. Antigen detection / Serological test.** This is a very useful for screening the cases of intestinal taeniasis. Antigens capture ELISA polyclonal antisera raised against *Taenia* is employed to detect antigen in faeces.

- 5. Histopathological diagnosis** Diagnosis of Neurocysticercosis (NCC) is made by demonstrating cysticerci in the biopsy tissue obtained from brain during post mortem. Skeletal cysticercosis can be diagnosed by histological examination of biopsy.

- 6. Imaging method:** X-ray of the soft tissue in arm and thigh, chest and neck may show dead, calcified or elongated cysts. X-ray of the skull may reveal cerebral calcification and intracranial lesions in the neurocysticercosis. CT scan is best method for detecting dead, calcified and multiple cysts is pathognomonic of neurocysticercosis. MRI shows a mural nodule within the cyst which is pathognomonic for NCC.

- 7. Other test:** CSF protein level are elevated in neurocysticercosis. Also lymphocytosis- Mononuclear pleocytosis is frequent. Glucose levels

may be mildly to moderate low. Cell counts rarely exceed 300/mm. Eosinophils in the CSF are common but nonspecific binding

Treatment of tape worm infection:

- i. Praziquantel**
- ii. Niclosamide**
- iii. ii. Albendazole:**
- iv. iv. Surgery:** For cysticercosis of ocular, ventricular and spinal cord.

Prevention and control

1. Mass deworming of the community
2. Proper cooking of pork meet
3. Proper hand washing
4. Improve sanitations and hygiene
5. Public health education of better hygiene
6. Deworming pigs.