University of Tikrit

College of nursing

Basic Nursing Sciences

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Parasitology

Echinococcus granulosus

By:

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Echinococcus granulosus

Common name:Dog tape worm or hydatid worm

Habitat: Adult worml lives in small intestine of dog and other canine animals. Morphology

Responsible for most cases of echinococcosis. Echinococcosis is caused by larval tapeworms. The disease is common in East Africa (the highest prevalence is seen in Kenya: 10-15%).

The adult worm measures 3-6 mm in length (up to 1 cm). It has scolex, neck and strobilla. Adult worms live in small intestine of definitive host (dog). Man is an intermediate host - carrying the hydatid cyst (larva). Man contracts infection by swallowing eggs in excreta of definitive host.

Infective stage: Embryonated egg. Diagnostic stage:

Embryonated egg.. Mode of human infection:

Ingestion of eggs by the following ways:

i) Ingestion of water or vegetables polluted by infected dog feces.

ii) Handling or caressing infected dogs where the hairs are usually contaminated with eggs

Life cycle and Pathogenecity

Oncosphere hatch in duodenum or small intestine into embryos (oncosphere) which:

♦ Penetrate wall

♦ Enter portal veins

♦ Migrate via portal blood supply to organs: eg: lungs, liver, brain etc., thus, causing extra intestinal infections. In these organs, larvae develop into hydatid cysts. The cysts may be large, filled with clear fluid and contain characteristic protoscolices (immature forms of the head of the parasite). These mature into developed scolices, infective.

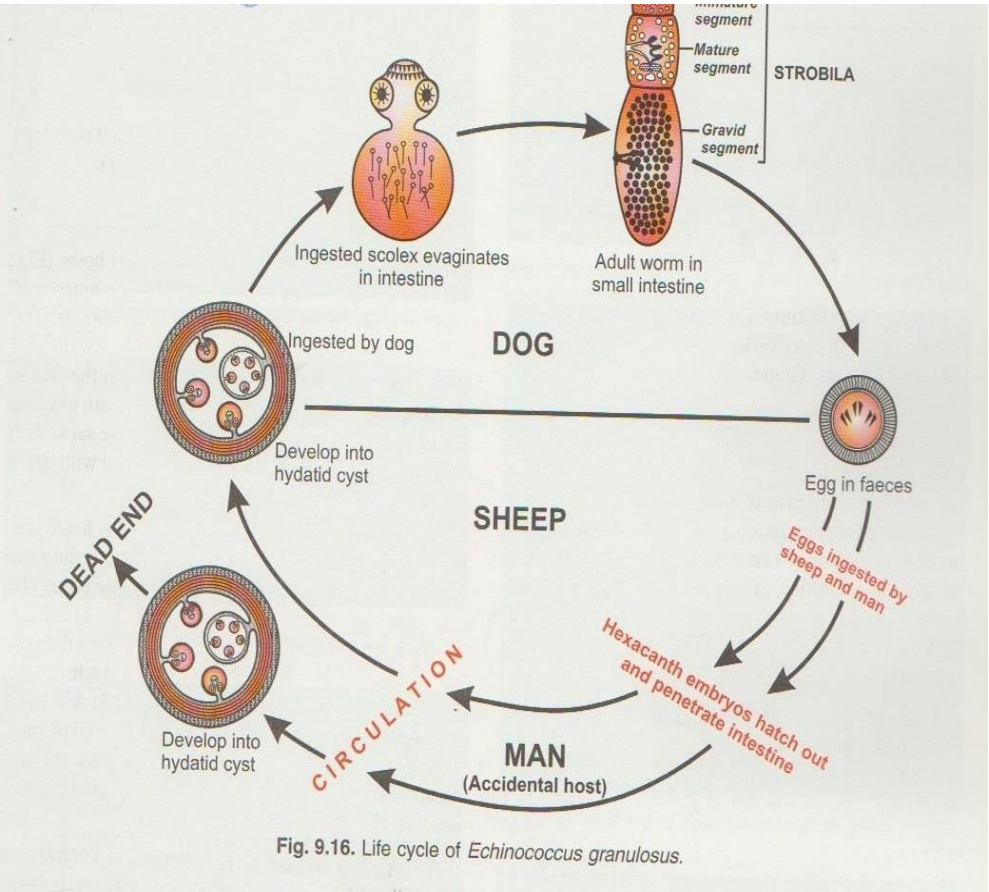

Fig. 9.16. Life cycle of *Echinococcus granulosus*.

Life cycle of *Echinococcus granulosus*

Clinical features

Asymptomatic infection is common, but in symptomatic patients

♦ It may cause cough - with hemoptysis in lung hydatid disease.

♦ Hepatomegaly - with abdominal pain and discomfort

♦ Pressure -from expanding cyst

♦ Rupture of cyst - severe allergic reaction - anaphylaxis.

Diagnosis:

♦ X-ray or other body scans

♦ Demonstration of protoscolices in cyst after operation

♦ Serology Treatment:

♦ Surgery

♦ Albendazole

Schistosomiasis (Bilharziasis)

It is estimated that about 600 million people in 79 countries suffer from schistosomiasis (Bilharziasis). The schistosomes cause intestinal, hepatosplenic, pulmonary, urogenital, cerebral and other forms of schistosomiasis.

Schistosome is the only fluke with separate sexes. The female worm lies in the gynecophoral canal of the male. This condition is important for transportation.

There are five medically important species:

1. *Schistosoma mansoni*: causes intestinal schistosomiasis.
2. *Schistosoma haematobium*: causes vesical (urinary) schistosomiasis.
3. *Schistosoma japonicum*: causes intestinal schistosomiasis.

Schistosoma mansoni

Habitat – This species lives in the veins of the intestine. The eggs are ovoid, have lateral spine.

This species lives in Africa, South America, Middle East

(some Arab countries) etc. Stream and lake-based transmission is

common. The snail hosts that harbor *S. mansoni* are the genera:

Biomphalaria

1-*Schistosoma haematobium*(URINARY SCISTOSOMIASIS)

Habitat - The worm lives in the veins of the bladder of humans.

Egg has terminal spine.

The snail hosts that harbor *S. haematobium* are the genera

Bulinus . 2-*Schistosoma japonicum*

The eggs are ovoid, bearing only a minute lateral spine or a small knob postero-laterally.

Within the intrahepatic portion of the portal system, the worms feed and grow to maturity.

Symptoms and complications:

Patients infected with *S. haematobium* suffer from terminal haematuria and painful micturition. There is inflammation of the urinary bladder (cystitis), and enlargement of spleen and liver. *S. haematobium* causes squamous cell carcinoma in the bladder.

Patients infected with *S. mansoni* suffer from cercarial dermatitis (swimmers itch) and dysentery (mucus and blood in stool with tenesmus) as well as enlargements of the spleen and liver.

Laboratory Diagnosis:

3-*Schistosoma mansoni*

♦ Microscopic examination of the stool for eggs after concentration by sedimentation method. The egg has characteristic lateral spine.

♦ Rectal snip

S. haematobium:

♦ Examination of the urine after allowing it to sediment in a conical urinalysis glass. A drop from the sediment is taken and examined for eggs. Egg has terminal spine.

♦ Biopsy from bladder

Treatment: Praziquantel: single oral dose of 40 mg/kg divided

into two doses.

Prevention:

1. Health education:

A. On use of clean latrines and safe water supply

B. Avoid urination and defecation in canals, avoid contact with canal water.

2. Snail control:

A. Physical methods:

i. Periodic clearance of canals from vegetations.

Manual removal of snails and their destruction.

B. Biological methods: Use of natural enemies to the snails such as Marisa.

C. Chemical methods: Molluscides are applied in the canals to

kill the snails. e.g. Endod.

Life cycle of Schistosomes:

Adult worms reside in pairs: the female lying in the gynecophoral canal of the male. After fertilization, eggs are passed into the venules. A larval form – the miracidium - develops within the egg. Its lytic enzymes and the contraction of the venule rupture the wall of the venule liberating the egg into the perivascular tissues of the intestine (*S. mansoni*) or urinary bladder (*S. haematobium*). The eggs pass into the lumens and organs and are evacuated in the feces (*S. mansoni*) or the urine (*S. haematobium*). On contact with fresh water the miracidia hatch from the eggs and swim about until they find the appropriate snail, which they penetrate. After two generations of sporocyst development and multiplication within the snail, the fork-tailed cercariae emerge. Infection to man takes place during bathing or swimming. The cercariae penetrate the skin, are

carried into the systemic circulation and pass through to the portal vessels.

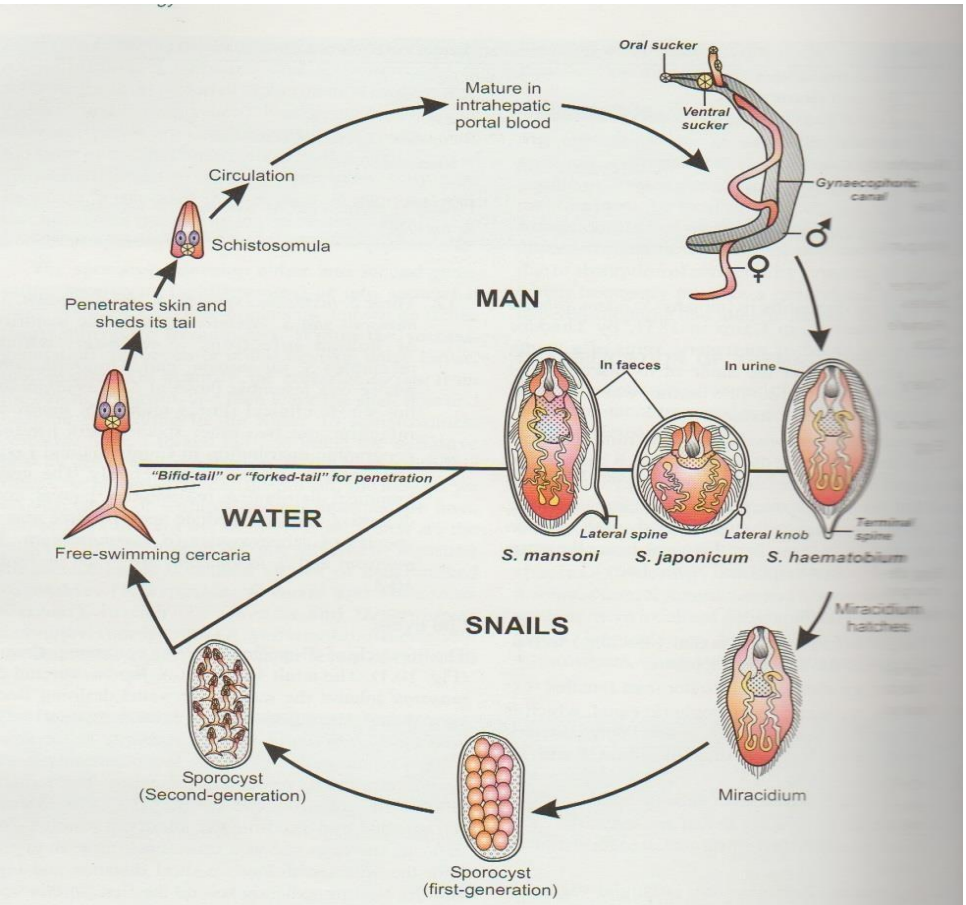

Fig. 10.1. Life cycle of *Schistosoma* species.

Life cycle of *Schistosoma* sp.