Human fascioliasis

*Fasciola gigantica* & *Fasciola hepatica*

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Objectives

1. Overview on fascioliasis.
2. Geographical distribution.
3. Morphology of *Fasciola gigantica*.
4. Life cycle.
5. Pathogenicity & clinical picture.
6. Diagnosis of fascioliasis.
7. Treatment of fascioliasis.
8. Prevention and control.
9. Difference between *F. gigantica* & *F. hepatica*. 
Overview

- **Fasciola** is parasitic flatworm of class Trematoda.
- It infects biliary tract of various mammals, including humans.
  - *Fasciola gigantica*, known as **common liver fluke** or **large liver fluke**.
  - *Fasciola hepatica*, known as **sheep liver fluke**.
- The disease caused by the flukes is called **fascioliasis**.
- It causes great economic losses in cattle and sheep.
**Fasciola gigantica**

**Geographical distribution:**
- Worldwide, including **Egypt**, Africa and far East.
Adult morphology:

1) Large fleshy leaf – like worm, 3\text{-}7\times1\text{ cm}.

2) Body formed of small \textit{cephalic cone}, shoulders with parallel borders and posterior round end.
3) **Suckers**: oral sucker and large ventral sucker.

4) **Digestive system**: intestinal caeca with lateral compound branches and medial T or Y-shaped ones.

5) **Genital system**:
   - **Testes**: two highly branched.
   - **Ovary**: branched in front of testes.
   - **Uterus**: short and convoluted.
   - **Vitelline glands**: highly branched along the lateral fields.
Egg:
- Size: 140 x 70 µ.
- Shape: oval.
- Shell: thin.
- Colour: light yellowish brown (bile stained).
- Contents: immature (ovum & yolk cells).
- Special character: operculated.

- Eggs discharged with feces of infected host, in fresh water of canals, drains and River Nile, hatch within 2 weeks into miracidium.
**Miracidium:**

- A phototrophic pyriform ciliated organism that can swim in water but cannot feed.

- It penetrates the snail intermediate host's soft tissue.
Sporocyst:
- Simple elongated sac.
- Body cavity with germ cells that proliferate giving daughter sporocysts or rediae.
**Redia**: cylindrical larva with germ cells from which cercariae arise and leave through the birth pore.
Cercaria:

- **Leptocercous cercaria** formed of a body (0.3 mm) and a simple tail (0.7 mm).
- Body with 2 suckers, primitive gut, flame cells, and cystogenous glands that secrete cyst wall.
- Cercaria moves in water, attaches to aquatic vegetations, loses its tail and encysts → encysted metacercaria.
Encysted metacercariae:
- Spherical, 0.25 mm in diameter.
- Thick white or brown cyst walls, contain suckers and primitive gut.
- They can keep alive in water for 6-10 months.
**Life cycle:**

**Habitat:** bile ducts and gall bladder.

**Definitive host:** man.

**Intermediate host:** snail, *Lymnea cailliaudi*.

**Reservoir hosts:** herbivorous animals as cattle, buffalo, camels, sheep, and goat.

**Infected stage:** encysted metacercariae in water and on water vegetation.

**Stages in life cycle:**

- egg → miracidium → sporocyst → redia → cercaria → encysted metacercaria → adult.
Life cycle:

1. Unembryonated eggs passed in feces
2. Embryonated eggs in water
3. Miracidia hatch, penetrate snail
4. Snail
   - Sporocysts in snail tissue
   - Rediae
   - Cercariae
5. Free-swimming cercariae encyst on water plants
6. Metacercariae on water plant ingested by human, sheep, or cattle
7. Excyst in duodenum
8. Adults in hepatic biliary ducts

≤ Infecive Stage
≤ Diagnostic Stage
Mode of infection:

- Eating raw vegetables or vegetables previously washed in infected water.

- Drinking infected water, polluted by encysted metacercariae, **6-12 hours after encystations**.

- In the duodenum, the cyst wall dissolves and the metacercariae penetrate the wall of intestine → peritoneal cavity.
• Metacerariae pass to the liver through its capsule and pass through the liver tissue → final habitat in the bile duct.

• They settle and maturate to adults in about two months after infection.

• Eggs appear in the stool 3-4 months after infection.
Pathogenicity:

**Disease:** fascioliasis.

1- **Abdominal pain** due to penetration of intestinal wall.

2- **Peritonitis**: occurs by penetration of intestinal wall and the presence of metacercariae in the peritoneal cavity.

3- **Liver rot**: occurs by mechanical and toxic destruction of liver tissue by passage of immature worms → necrosis, fibrosis, hepatitis, and hepatomegaly.
Hypertrophia of bile ducts in liver caused by *Fasciola*.

Liver rot
4- **Obstructive jaundice**: adults in the bile duct → irritation, thickening of the duct and stone formation → obstructive jaundice and cholangitis.

5- **Allergy and eosinophilia**.

6- **Ectopic fascioliasis**: when metacercariae enter the circulation and are distributed in abnormal sites e.g. peritoneum, lungs, brain, eyes and cause fibrosis.
7- **False fascioliasis**: due to eating of infected animals liver and passage of eggs in stool.

8- **Halazoun**:

- In Lebanon, Syria and Armenia where people prefer to eat raw liver.
- The living *Fasciola* adult worm attaches to the mucosa of the pharynx by its' suckers.
- Odematous congestion of the pharynx and larynx → dysphagia and suffocation.
Clinical picture:

1- Irregular fever.

2- Digestive disturbances: nausea, vomiting, diarrhea, biliary colic & obstructive jaundice.

3- Pain in the upper right hypochondrium with enlarged tender liver.

4- Anemia and high eosinophilia.

✓ The triad of fever, hepatomegaly, and eosinophilia in endemic area suggests fascioliasis.
**Diagnosis:**

I-Clinical: fever, hepatomegaly, abdominal pain (clinical triad), with history of green salad consumption.

II-Laboratory:

1. Detection of immature eggs by:
   
a. Stool examination (ask patient to stop eating liver for 7 days before testing).

   b. Examination of duodenal aspirate.

3. Serological tests: are of value during migratory or chronic stage and ectopic infection.

   - ELISA, IHA and CFT.

4. Sonogram and CT (computerized tomography).
**Treatment:**

1- Triclabendazole (Fasinex): *drug of choice.* It is acting on immature and adult worms.

2- Bithionol (Bitin).

3- Surgical removal of ectopic flukes.

4- **Treatment of halzoun:**
   a. Gargling with strong alcoholic drink.
   b. Use of emetics.
   c. Picking up of the worm by forceps.
   d. Tracheostomy in suffocation.
Prevention and control:
1- Mass treatment of infected animal reservoir.
2- Snail destruction.
3- Proper washing or cooking of aquatic vegetation.
   - Immerse raw vegetables in water + few drops of potassium permanganate for 20 min, or in 5 parts water + 1.5 parts vinegar for 5 min.
4- Sanitary disposal of stool.
5- Boiling or filtration of polluted water.
6- Health education & treatment of infected cases.
**Fasciola hepatica**
(Sheep liver fluke)

**Geographical distribution:** it is common in sheep raising countries (Europe), detected in Egypt.
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<tr>
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<th><strong>F. gigantica</strong></th>
<th><strong>F. hepatica</strong></th>
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<tbody>
<tr>
<td><strong>Length</strong></td>
<td>3-7 x 1 cm</td>
<td>2-3 x 1.3 cm</td>
</tr>
<tr>
<td><strong>Cephalic cone</strong></td>
<td>smaller</td>
<td>larger</td>
</tr>
<tr>
<td><strong>Lateral sides</strong></td>
<td>parallel</td>
<td>converging</td>
</tr>
<tr>
<td><strong>Inner intestinal branches</strong></td>
<td>T and Y-shaped</td>
<td>rudimentary</td>
</tr>
<tr>
<td><strong>Suckers</strong></td>
<td>Ventral larger than oral</td>
<td>equal</td>
</tr>
<tr>
<td><strong>Snail</strong></td>
<td><em>L. cailliaudi</em></td>
<td><em>L. trancatula, L. columella</em></td>
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<td><strong>R.H.</strong></td>
<td>mainly cattle, buffalo</td>
<td>sheep</td>
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Pathogenicity:

• Adult worm can live in sheep for 5 years and cause liver cirrhosis and ascitis.

• In man: young adults burrow through the liver tissue feeding on its cells, inflammation, necrosis (liver rot) and marked eosinophilia.

• The other pathological findings are similar to *F. gigantica*. 
**Clinical picture:**

- Fever, and general malaise.
- Pain in the right hypochondrium.
- In heavy infection enlarged tender liver.

**Diagnosis, treatment, prevention and control are similar to those of** *F. gigantica*. 
Thank you