

Fasciolosis in Ruminants

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Abstract: Fasciolosis is disease caused by a liver worm called *Fasciola* is one of the dangerous parasites that affects the livestock specially sheep are wide spread in many countries of the world including some Arab countries. This worm attacks animals such as cows, buffaloes, camels, horses, donkeys, sheep, goats and rabbits that feed on grass and plants. The worms inhabit the bile ducts in the liver of humans and animals and they multiply and spread in all tissues causing many damages and risks to public health and great losses in animal production Therefore we will present the detailed aspects of this disease its classification and description of species symptoms methods of infection life cycle, epidemiology pathological diagnosis of prevention

Keywords: Fasciolosis, life cycle, epidemiology.

Introduction: Fascioliasis or (liver rot) is an infection caused by worms of the genus *Fasciola*, is one of the most dangerous parasitic diseases to which ruminants are exposed in different regions of the country(1). These worms belong to the phylum Platyhelminthes Openwork

Trematodes, dioecious host order Digenia, genus *Fasciola* (2) which includes two main types *Fasciola gigantica* and *Fasciola hepatica* with life cycles complex as it requires one or more intermediate hosts, which may be the mollusca and the final host of vertebrate(3). These worms have

been known for nearly 2000 years ago , and they are a long-lived worm that can live a long time (4). The worms that cause the disease parasitize in the biliary ducts of the liver, causing enlargement and blockage of these channels(5) and the occurrence of symptoms of obstructive jaundice and the affected animal suffers from anemia and intestinal disorders that lead to weight loss, due to severe economic damage ,hepatitis resulting from infection with these worms(6) also leads to fibrosis of the liver tissues and anemia also causes disease and decreased ability to fertilize(7), wasting and weakness in newborns of affected mothers, increase abortions, and the changes that occur in the affected liver make it unhealthy for human consumption, in addition to the material losses and human efforts being made to treatment and disease control(8). Human infection occurs by eating unwashed aquatic plants that contain the cystic larval stage (Metacercaria) and undercooked livers containing immature worms (9).The World Health Organization (WHO) announced that the incidence of liver worms has become a great danger to human health (10).

Classification of parasite:The liver worms of genes *fasciola* classified under the phylum platyhelminths within the class of

trematoda flukes of the second order the host digenea, the family of Bowman fasciolidae and it is one of the large parasites that inhibit the bile ducts and cause liver function disorder and both *Fasciola hepatica* and *Fasciola gigantica* are important species in Ruminant's liver worms (11, 12)

Description species of the genus *fasciola*:

Fasciola hepatica Were distinguished as flat leafy worm's greyish brown in color and with sharp spines on the skin (13). The parasites is 20-30 mm long, Its width 8-15 mm,The front end is conical and distinctive shoulders because it has a mouth cone, most parts of the body are covered with five spines(14). Oral sucker is smaller than the ventral sucker the mouth leads to a well-developed pharynx followed by esophagus which branches into the intestinal ceca, which contain many closed side branches (15,16).The male reproductive system consists of two testicles and located in the middle of the body and this system opens into the common genital opening which is located midway between the oral and ventral sucker (17). The uterus is small and contain many folds and opens into the genital tract (18).

Fasciola gigantica: General name of the worm: *Fasciola gigantica* or giant liver worm (19). One of the main important differences between it and *Fasciola hepatica* is that it is larger in size 6-9 cm and the thinnest and the vertical cone is shorter (20), the intestines are testicleless and the vitelline glands are branched and excessively (21). The natural hosts are livestock, buffaloes, sheep and the rest of the animals that eat herbs. Humans are infected by chance, and their life cycle is similar to the *Fasciola SPP* and differs from it by the formation of more than one generation of redia (22). At different temperatures the intermediate host is snails of the genus *lymnea* (23). The pathological effect symptoms methods of diagnosis and prevention are similar to *Fasciola hepatica* (24).

Life cycle: The final hosts of the liver worms are sheep. Livestock, horses, goats, rabbits, pigs, dogs etc. All animals eat herbs and human infection occurs by chance (25). The worms lay undeveloped eggs that pass with the bile into the intestine and then out with the feces of the final host (26). The eggs are large transparent oval in shape yellowish-brown in color and have a cover and they are not fully developed when laid

the worm inhabits the proximal bile ducts and the bile sac and is sometimes found in other places in the body it obtains its nourishment from bile secretions and feeds on blood (27,28). These eggs grow between (9-15) days at a certain temperature to miracidium a free swimming if it encounters the first intermediate host it penetrates and loses its cilia (29), the first intermediate host of the worm various types of snails of the species of *lymnea truncatula* or *succinea* or *fossaria* in which the sac turns into sporocyst and then to one or two generations of redia depending on the temperature (30) finally comets leave the snail when they mature and cyst the life cycle of liver flukes needs one intermediate found on the edges of the rivers and turns into metacercaria when these weeds are eaten by lambs (31,32).

The metacercaria liberates from its cover in the duodenum or jejunum, penetrates the intestinal wall, migrate worms to the body cavity, and then to the liver was penetrated into the liver tissue until it reaches the bile ducts and becomes adult worms within 3-4 months (33).

Methods of infection: Attaches the larvae and sticks to a lot of plant through a sticky waxy substance and vegetables that are eaten by humans and animals it is difficult to

get rid of these infections larvae by washing with water because it is attached to the sticky substance and the metacercaria enters the body when eating these vegetables or drinking water contaminated with this larva(34).Then it reaches the stomach and comes out of the sac because of the effect of the secretion and juices of the stomach and quickly takes its way to the duodenum, begins to choose the ways to reach the bile ducts in the liver, One of these ways to reach one of the portal veins and travel through it to the liver(35), then to the duct in the liver or it takes another route, which is to travel through the pancreatic bile duct which is shared between the liver and the pancreas then it takes way to the bile ducts in the liver or perhaps it uses a third route it is penetrate the wall of the duodenum until it reaches the peritoneum living the lining the abdomen from the inside then it penetrates the liver cells on its way to its last place, Which is the bile ducts (36,37).

Epidemiology of parasites:The epidemiology of liver rot disease belongs to the species of *Fasciola*. *F.gigantica* is spread especially in the tropical subtropical regions of east Africa, the Indian subcontinent, Asia, some Islands of the pacific ocean (38), while the *F.hepatica*

worm predominates in the temperature regions of the world in the America Australia and New Zealand. *F. hepatica* spreads in cold regions of the world in America, Australia. The incidence of cattle infection in Britian reaches 10% (39) in Spain reached 29% (40). While Italy the incidence of cattle infection was 5% (41). In France the incidence of infection in cattle fluctuated from 11.2% - 25.2% (42). While the *F.gigantica* worm spreads in hot regions of the world especially in Africa and Asia. in Africa, the infection rate of cows in Egypt 11-85% Sudan 66%, Nigeria 65% and Ethiopia is 11-85 % (43).In a study conducted by (44) in the Ismailia region in Egypt during the period from January 1997 to June 1998. the total infection rate in goat was 9.9% when examined by sedimentation method to detect eggs in the feces. As for the continent of Asia, in Singapore indicated that the rate of infection buffalo and cows were 59%, 46% respectively (45) .The rate of infection of cattle with the parasite *F.gigantica* in china was 78% (46). In Jordan the rate of infection in buffalo and cows was 42%, 23% respectively 47).

In Iraq the species *F.gigantica* is prevalent especially in the central and southern regions (48) found that the infection rate of

this parasite reached 33- 41% the season of the spread of this parasite is Autumn (49). In addition, the infection rate of this parasite was 42.6%- 33%, 0.42 % in buffaloes- cows and sheep, respectively (50, 51) found that the highest percentage of infected sheep during the months from October 1976 to June 1997. It reached 40.8% it was concentrated during the month of November.

that the rate of infection with this parasite in the sheikh Omar slaughter house in each of the buffalo,cows, goats and sheep reached 70.7%, 27%, 11.5% and 71% respectively(52).

It a study conducted by (53) in Baghdad pointed the juvenile rate infection with *F.gigantica* parasite was 9.1%, 13% and 8.3% is sheep and buffalo and cows respectively. In the Mosul governorate, the infection rate of the parasite was 13.3% (54). (55) Was recorded the infection of camels was 84%. (56) Found the percentage of infection animals was 7.33%. (57) Indicated that the incidence of parasite in Mosul was 1.2% in cattle during the period 1980- 1993. (58) that the rate of infection of *F. gigantica* in local cows slaughtered in Mosul slaughterhouse was 26%.(59) indicated that the percentage of *F.gigantica*

eggs in sheep in Mosul city was 4.4% by examining stool.(60) indicated that the infection rate of *F.gigantica* eggs was 17.4% by examining the feces of cows in the mousl governorate In Al-qadisiyah governorate, the infection of cows, sheep and goats with liver worms was (36.9%, 42.5% 53.7%) respectively (61). In Basra governorate, (62) found that, the infection was caused by the *F.gigantica* reached 94.8%, 3.2%, 0.72% of buffalo, sheep and goats respectively.

(63) indicated that the difference in infection rates in different animals is due to the difference in liver tissue in these animals' pigs has a high resistance against the parasite *Fasciola* sp. Cows come second place, which goats and sheep are weak as a sheep liver is characteristic by containing a little fibrous tissue compared to pig liver. Which contains a large part fibrous tissue. We find that the infection rates are not constant during the months of the year, but they are consented in a number of months due to the different periods of time during which the animals are exposed to the infection. For example in the dry season (Summer), the plants far from the banks of rivers attract animals to them to feed on them. Thus increasing the chance in infection at this time of the year (64).

Pathological effect: When the adult worms migrate to the liver they cause two types of harm to the host the first type is the destruction of visceral cells and feeding on them during their penetration and the second is the chemical damage resulting from toxic secretions and when it is present in the large bile ducts it causes rapid generation of the epithelial cells (65) which leads to the reduction of the bile duct and causes infiltration of blood cells and fiber-generating cells (66). The presence of eggs in the bile sac is a center for the formation of gallstones in addition to the liver juvenile and adult worms were found inside abscesses in other areas of the body (67).

A cute fascioliasis: Its severe form occurs in sheep and requires the ingestion of large numbers of parasites usually in excess of 10,000 to be ingested large numbers of migratory larvae invade the liver and cause traumatic hepatitis, which is often fatal (68). Occasionally the capsule of the liver in the peritoneal cavity may rupture, causing death due to peritonitis (69). Sudden death without the appearance of previous symptoms in some cases, death precedes the appearance of symptoms of anemia and loss of appetite. Cows and buffaloes have no

acute symptoms except for a partial loss of weight gain (70).

Chronic fascioliasis: the appearance of yellow on the mucous membranes of the animal. There will be watery diarrhea without odor (71). Often the decrease in the animal's appetite is with obvious emaciation. Lots of wool or hair fall, the appearance of a tumor under the chin in some animals and this condition is known as bottle jaw (72). Economic losses resulting from infection with liver worms, reducing the animal's ability to convert food, decreased rate of weight gain, inhibiting the immune system, which leads to the chance of contracting various bacterial diseases & decreased milk production (73).

Symptoms of *Fasciola* infection: After eating food or water contaminated with the larvae of metacercaria, a symptom-free incubation period begins and lasts from a few days to a few months, followed by acute and chronic (74). The acute phase, which lasts from two to four months, begins when the immature worms penetrate the wall of the intestine and peritoneum membrane. From here they penetrate the surface of the liver and work their way through its tissues to reach the bile duct, This invasion kills liver cells and causes

severe internal bleeding typical symptoms include fever, hepatitis, rash and severe abdominal pain(75).

Chronic stages: The chronic stage begins when the worms reach the bile ducts where they mature and begins to produce eggs; these eggs are released in the bile and reach the intestines where they are extracted in the feces (76). Thus completing the cycle transmission symptoms include intermittent pain. Jaundice and anemia. Pancreatitis, gallstones and bacterial infections can also (77).

Diagnosis: Diagnosis of infection in the terminated hosts is one of the important aspects in any disease related to the epidemiological treatment – methods of controlling its (77, 78). Several methods have been used to diagnosis parasite infection:

- 1- The direct method: it is a quantitative method considered the most applied in this based on the detection of parasite eggs in the stool.
- 2- The in direct method depends on the clinical pathological signs.

The method of immunological test depends on measuring the immune response to parasite antigens and metabolites released in the blood.

3-Elevated white blood cell count, eosinophils and complement fixation test (CFT) are positive especially in the migratory stage of *Meta vercavia* and the skin can be tested with antigen (Ag) countents of the worm.

4- Gall bladder endoscopes and sound waves may indicate the worm damage to the bile ducts or the presence of eggs (79).

Controlling of the parasite:To control the spread of this parasite the spread of its intermediate hosts must be reduced (80).As the spread of snails can be reduced by using organic and inorganic molluscicide and snailicides in addition to the use of plant snails *lymnaea* snails have a high biological ability to quickly re-spread when the environmental conditions improve after treatment with pesticides (81-83), Treating the injured, Providing drinking water, Avoid eating fresh aquatic plants, Elimination of worms in storage hostels. Not to use feces as fertilizer for plants and if used it must be treated with so we chemicals to eliminate the parasitic stages that cause infection (84).

Conclusions: *Fasciola*, is one of the most dangerous parasitic diseases to which ruminants are exposed in different regions of the Iraq. Economic losses due to morbidity

and mortality and due to liver condemnation thereby contributing to loss in productivity of livestock industry in Iraq. Infection occurs by eating unwashed aquatic plants that contain the cystic larval stage and undercooked livers containing immature worms. Control the spread of its intermediate hosts must be reduced, by using organic and inorganic molluscicide.

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داء ديدان الكبد في المجترات

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الخلاصة : ينجم داء المتورقات عن ديدان الكبد وهي من الطفيليات الخطيرة التي تصيب الأغنام والماشية وتنتشر على نطاق واسع في العديد من دول العالم بما في ذلك بعض الدول العربية وتهاجم هذه الديدان الحيوانات التي تتغذى على الأعشاب والنباتات مثل الأبقار والجاموس والإبل والخيول والحمير والأغنام والماعز والأرانب. تسكن الديدان القنوات الصفراوية في كبد الإنسان والحيوان وتتكاثر وتنتشر في جميع الأنسجة مسببة العديد من الأضرار والمخاطر على الصحة العامة وخسائر كبيرة في الحيوان لذلك سنعرض الجوانب التفصيلية لهذا المرض وتصنيفه مع وصف الأنواع والأعراض وطرق العدوى ودورة الحياة وتشخيص طرق وأساليب الوقاية.

الكلمات المفتاحية: ديدان الكبد، دورة الحياة، الوبائية.