

LIVER FLUKE DISEASE (FASCIOLIASIS) : EPIDEMIOLOGY, ECONOMIC IMPACT AND PUBLIC HEALTH SIGNIFICANCE

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Abstract. Liver fluke disease (fascioliasis) is an important parasitic disease found worldwide affecting sheep, goats, cattle and buffalo, as well as other domestic ruminants. The common causative agents are *Fasciola hepatica* and *F. gigantica* which require various species of *Lymnaea*, fresh water snails, as their intermediate hosts. The epidemiology of the disease and its prevalence in Malaysia is mentioned briefly. The disease causes considerable impact on the economy of the livestock industry. The economic losses consist of costs of anthelmintics, drenches, labor, liver condemnation at meat inspection; and losses in production due to mortality, reduction in meat, milk and wool production; and reduction in growth rate, fertility and draught power. The disease also has public health significance, causing human fascioliasis and "halzoun".

INTRODUCTION

Liver fluke disease (fascioliasis) is considered one of the most important parasitic diseases of domestic ruminants. It is distributed worldwide. The causative agents are various species of liver flukes belonging to the genera *Fasciola* and *Fascioloides*. *Fasciola hepatica*, is commonly found in sheep in Europe, North and South America, Australia and New Zealand. *F. gigantica* is common in cattle and buffalo in tropical Asia, Southeast Asia and the Pacific Regions. Other *Fasciola* species include *F. nyanzae*, *F. tragelaphi*, and *F. jacksoni*. The *Fascioloides* species consists of *Fascioloides magna*, found in deer in North America.

EPIDEMIOLOGY

The development of liver flukes requires a suitable intermediate host, *Lymnaea*, a fresh water snail and various species of ruminants as the final definitive host. The other primary factors are adequate amounts of moisture and favorable temperature (above 10°C) which are required for the development of larvae (miracidia), the reproduction of the snails and larval development within the snails. These factors are also responsible for the level of

infection and prevalence in the livestock population.

A wide variety of secondary factors are also involved in the life cycle and epidemiology of liver fluke disease, which include biological, topographical, climatic and human factors. These factors can determine whether the liver fluke produces serious epidemics and mortality or whether it produces subclinical or clinical disease (Boray, 1982).

Depending on the climatic conditions, the seasonal occurrence of fascioliasis varies from country to country. The disease usually occurs continuously if suitable temperature (above 10°C) and moisture are available. High incidence and clinical disease with high mortality are reported to occur in wet seasons.

Domestic ruminants which are chronically infected are responsible for the spread of the disease by contaminating the pastures with liver fluke eggs; this is especially so in areas that have favorable climatic conditions and suitable snails.

The disease can also be spread to areas where no infected animal grazed; this is brought about by the active and passive migration of infected snails and by the passive dispersal of cercariae.

Accidental introduction of snails by man or waterbirds and the introduction of infected stock

Table 1
The prevalence of liver fluke disease (fascioliasis) in Malaysia.

Period of study	Prevalence rate of fascioliasis	Remarks	Author (Year)
Cattle and Buffalo			
1971-1976	14.7%	From parasitology records of 3 laboratories.	Mohd Anwar (1977)
1975-1979	73.8%	From records on liver condemnation at an abattoir (Selangor).	Yap <i>et al</i> (1983)
1978-1979	88.7%	From records on liver condemnation at an abattoir (Selangor).	Tham and Sheikh-Omar (1981)
1981	41.7%	From records on liver condemnation at an abattoir (Perak).	Loganathan and A Aziz (1983)
Goats			
1977-1983	1.0%	From pathology and parasitology records at Faculty of Veterinary Medicine and Animal Science, UPM (Selangor).	Sani <i>et al</i> (1985)
1975-1986	1.6%	As above.	Lee and Sheikh-Omar (1986)
1981	31.8%	From records on liver condemnation at an abattoir (Perak).	Loganathan and A Aziz (1983)
Pigs			
1981	7.1%	As above.	Loganathan and A Aziz (1983)

can cause the disease to occur in previously non-infected areas and establish endemicity, especially when climatic conditions are favorable.

From a survey in 1972, only certain states in Malaysia are found to have fascioliasis, that is, in Kedah, Perak, Selangor, Pahang, Negeri Sembilan, Melaka and Johore; and in these states, the disease is restricted to certain areas (Rajamanickam, 1983). The disease is prevalent in cattle and buffalo, and to some extent, in goats and pigs (Table 1).

The *Fasciola* species involved was mainly *F. gigantica*; *F. hepatica* was detected only in imported cattle. The snail involved was *Lymnaea rubiginosa*.

IMPACT ON LIVESTOCK PRODUCTION

Liver fluke infection can exert serious effects on the animal host, subsequently causing losses

on production. The effects are often so insidious that it is difficult to assess precisely these losses. However, each of the production losses caused by liver fluke infection can be estimated by comparing the performance of naturally infected animals, in which the parasites are well controlled with animals that receive minimal control or no control at all.

The damage caused by liver flukes to the animal host include the destruction of tissues during their migrations in the body, especially in the liver and, in the case of *F. hepatica*, thickening of bile ducts. Such livers, when they are seriously damaged, are subject to condemnation at meat inspection. The parasites are avid blood suckers, thus causing loss of blood. Also, the entire metabolism of the animal host undergoes functional deterioration (Bohnel, 1990).

A number of studies showed that meat production is affected by liver fluke infection. Infected

cattle not only showed a reduction in body weight gain but also in growth rate, and this reduction was significantly related to the number of liver flukes and to concurrent nutritional stress. Ross in 1970 stated that the loss in productivity was about 8% in low grade infections (about 100 liver flukes present), 16% in moderate infections (about 250-300 liver flukes) and 23 + % in heavy infections (about 500 or more liver flukes) (Chick, 1980). The loss appeared to be greatest in high yield animals as shown by these figures: as much as 27 kg/animal in winter quarters in Germany, 25 kg/animal/year in Australia, 2 kg/animal/year in Uganda, while no weight difference was seen between infected and treated animals in Madagascar (Bohnel, 1990).

Infection with liver flukes also reduces milk production and affects its composition and quality (Chick, 1980). In 1983 it was demonstrated that in heifers infected with approximately 300 liver flukes, the first estrus was delayed by 30 days, and in the first calving, produced significantly less milk. In sheep, evidence showed there were losses in wool production (Armour and Gettinby, 1983). Liver fluke infection also affects fertility and in draught animals, it causes reduction in draught power (Thakur, 1990).

In chronic diseases and high infections, there is general weakness which usually leads to death.

PUBLIC HEALTH SIGNIFICANCE

Man is usually infected accidentally by eating raw aquatic plants, such as watercress, with encysted metacercariae. These metacercariae can survive for long periods because the plants are usually submerged.

Human fascioliasis is reported to be common in Cuba, Uruguay and Argentina. The disease, largely caused by *F. hepatica*, is reported to occur in France, England, the Netherlands, and Australia. Disease caused by *F. gigantica* occurs less commonly and has been described in the USSR, Indochina, West Africa, and Hawaii. Many infected persons are asymptomatic during the migration of the larvae, though some experience fever and pain in the right upper quadrant of the abdomen with an associated eosinophilia and general malaise of varying degree, including myalgia and urticaria.

In heavy infections, there is enlargement of the liver. These symptoms subside until about 3 months later when the clinical disease appears in association with the presence of mature worms in the bile ducts; the severity of the disease, such as biliary colic and jaundice, depends on the number of worms involved. *F. hepatica* has also been reported to cause pharyngitis and laryngeal edema or "halzoun" due to consumption of raw, infected liver from freshly slaughtered goats and sheep. Halzoun causes intense pain in the back of the throat; extensive edema may cause laryngeal obstruction. (Boray, 1982; Katz *et al.*, 1982). Thus far, there is no reported case of human fascioliasis in Malaysia.

FASCIOLIASIS

From the above discussion, it can be seen that liver fluke disease causes considerable economic losses to the livestock industry. The economic losses are categorized as direct losses which consist of costs of drugs, drenches, labor and liver condemnation at abattoirs and the indirect losses consist of the production losses (Chick, 1980; Thakur, 1990). In a number of countries, such as Indonesia and Nepal, the estimation on such losses run into millions of dollars. The disease also bears public health importance. Thus, effective methods are required to control liver fluke disease in livestock populations. Such methods include the strategic use of anthelmintics, reduction in the number of snail intermediate host and correct farm management practices.

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