



Prevalence of Bovine Fasciolosis in Central Malawi

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

Article Information

Open Peer Review History:

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Original Research Article

Received: 17/06/2024

Accepted: 20/08/2024

Published: 08/10/2024

ABSTRACT

Fasciolosis is an important helminth disease of livestock and other ruminants. This study investigated the prevalence of bovine fasciolosis in the Lilongwe and Salima districts in central Malawi. About 384 and 204 faecal samples were collected in Lilongwe and Salima districts respectively. The faecal samples were analyzed using sedimentation test to detect the presence of *Fasciola* eggs. The presence of *Lymnaea* snails was also observed in the catchment area. *Lymnaea* snails had been reported in both Lilongwe and Salima districts. Cattle breed had a significant effect on the prevalence of fasciolosis ($p= 0.001$) while age of cattle had no significant effect on the prevalence of fasciolosis ($p= 0.147$). Lilongwe registered a prevalence rate of 19.3%, while Salima registered a lower prevalence rate of 15.7%. There was a higher prevalence rate of *Fasciola* in Lilongwe than in the Salima districts.

Keywords: Malawi; *Lymnaea*; *fasciola*; bovine; fasciolosis.

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Cite as: Msiska, Eatim Katundu. 2024. "Prevalence of Bovine Fasciolosis in Central Malawi". *South Asian Journal of Parasitology* 7 (4):355-60. <https://journalsajp.com/index.php/SAJP/article/view/199>.

1. INTRODUCTION

Fasciolosis is a parasitic and zoonotic disease caused by flatworms of the genus *Fasciola*, also known as liver flukes. Fasciolosis is one of the most neglected zoonotic diseases, despite their global distribution. These parasites are found globally, in more than 70 countries. *F. hepatica* is predominately found in temperate areas, but is also prevalent in the tropical and subtropical countries [1].

The growth of the livestock industry in Malawi is currently unsatisfactory due to disease and parasite burden, which have negatively impacted production of livestock [2]. The productivity of cattle has been limited by fasciolosis [1]. Fasciolosis is potentially one of the most economically important parasitic diseases resulting in poor livestock productivity in Malawi, and its prevalence could be greater than currently envisaged. However, as fasciolosis manifests predominantly as a subclinical or apparent parasitic infection and rarely results in severe clinical signs in cattle, and as such it is currently regarded as a disease of lesser importance, and consequently very little research has been done on the disease in Malawi.

Fasciolosis is transmitted by freshwater lymnaeidae snails. The life cycle of *Fasciola* depends on two hosts and these are a snail, which is an intermediate host, and a mammal, which is a definitive host. The diagnosis of fasciolosis in cattle had been made solely by the detection of *Fasciola* eggs in the faeces of infected animals (Taylor et al., 2007). Serologic diagnoses, such as the enzyme-linked immunoassay (ELISA), are an alternative approach to the detection of fecal eggs [3]. Sometimes, plasma enzyme levels released by damaged liver cells and DNA-based techniques can be used for diagnosis. Currently, the use of environmental DNA (eDNA) has been a new tool for epidemiological studies.

Cattle management systems sometimes influence the prevalence of fasciolosis, with a higher prevalence in livestock raised under traditional management systems than those managed under modern improved systems (Keyyu et al., 2005); [4]. The common agronomic practice of using animal manure as fertilizer promotes contamination of snail habitats and subsequent infection of snails with *Fasciola*. Furthermore, grazing management of livestock can allow infected stock dung to enter snail

habitat and, at the same time, allow livestock to access contaminated water or vegetation from metacercariae.

Climate change, economic losses due to condemnation of infected livers, mortalities, abortions, retarded growth, reduced meat and milk production, reduced carcass value, and cost of animal treatment have prompted the need for this study to appreciate the prevalence of fasciolosis in Lilongwe and Salima districts. Since fasciolosis is a zoonotic disease, it is necessary to have accurate and reliable information regarding its prevalence so that relevant policies and strategies are designed to counter it. In addition, the prevalence of bovine fasciolosis had recently not been investigated in Lilongwe and Salima Districts amidst changing climatic conditions. Therefore, the objective of this study is to assess the prevalence of bovine fasciolosis in Central Malawi.

2. METHODOLOGY

Malawi is a landlocked country in South East Africa. It is wholly within the tropics; from about 9° 30S at its northern-most point to about 17° S at the southern-most tip. Malawi shares borders with Tanzania, Zambia, and Mozambique. This study was carried out in the central region of Malawi in the Lilongwe and Salima districts as indicated in Fig. 1. Lilongwe is a highland district, while Salima is a lakeshore district. This study was done in Malawi because there was no current data on the prevalence of the disease in Malawi. In addition, Lilongwe and Salima districts were chosen because of their geographical location. Lilongwe is a highland district while Salima is a lakeshore district. All data were analyzed using the statistical package for social sciences (SPSS) Version 20.0.

Sampling was done according to management practice i.e., animals on a free range and intensive system. Data on animal characteristics (age, sex and breed) were recorded and used to investigate the relationship with the prevalence of the parasite. Animals were classified into two groups according to age: <4 years and >4 years. The age of the animals was determined from the records maintained on the farms.

About 5g of feces was collected from each cow using a plastic glove, which was turned inside out to act as a receptacle (Taylor et al., 2007). The faecal samples were packaged in cold packs and preserved in 5% buffered formalin. Examination

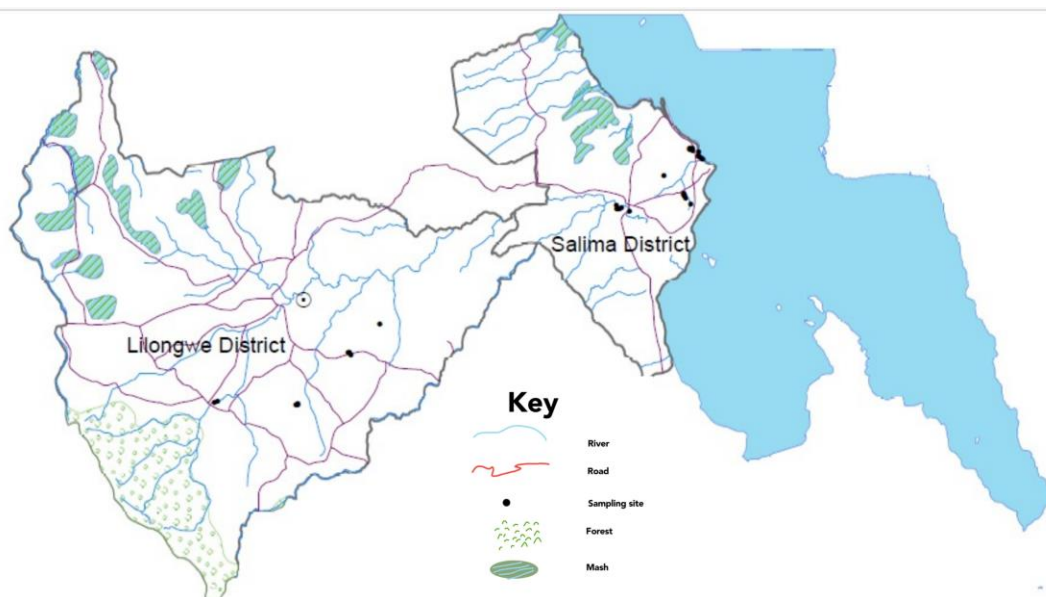


Fig. 1. Map of Salima and Lilongwe districts

of the faeces for *Fasciola* eggs was carried out using sedimentation test according to [5]. The prevalence of fasciolosis was calculated as the number of cattle found to be infected with *Fasciola* expressed as a percentage of the total number of cattle.

3. RESULTS

In Lilongwe district, out of 384 cattle sampled, 74 were positive for fasciolosis, representing a prevalence of 19.3%. Of all infected animals, 77% were raised in the semi-intensive system and 23% in the intensive system as shown in Table 1. About 21.8% of the cattle raised under the semi-intensive (traditional) system and 13.8% raised under intensive system were positive for fasciolosis. Young animals constituted 44% and the adult group contributed 56%. There were more young males (57.2%) than adults (42.8%).

In Salima district, 204 faecal samples were purposefully collected and analyzed in the laboratory. Of this, 32 samples were positive for

fasciolosis, representing a prevalence rate of 15.7%. On the other hand, there were more adult females (65.3%) than young ones (34.7%) and this could be due to retaining the females for milk production and reproduction.

In terms of composition, 84% of young cattle were negative for fasciolosis and 16% were positive. For adult cattle, 78.1% were negative and 21.9% were positive, as indicated in Table 1.

Snails were sampled in Lilongwe and in all the three sampling sites *Lymnaea* spp. dominated. Fig. 2. shows the *Lymnaea* species.

4. DISCUSSION

In Lilongwe, prevalence rate was much lower than what was previously reported by Mzembe and Chaudhry [6], who reported a prevalence rate of 50.8%. This rate could have gone down due to increased farmer knowledge of the disease, improved extension services, and availability of anthelmintic drugs on the market.

Table 1. Shows the effect of age on the prevalence of fasciolosis

AGE	Number	Presence of <i>Fasciola</i>	
		Negative (%)	Positive (%)
0 to 4 years	169	84.0	16.0
Over 4 years	215	78.1	21.9
Overall	384	80.7	19.3
<i>p</i> -value		0.147	



Fig. 2. *Lymnaea* spp

Table 2. Snails sampled in Lilongwe

SITE	<i>Lymnaea</i>	<i>Biomphalaria</i>	<i>Melanooides</i>
1	23	10	0
2	18	3	1
3	20	2	1
TOTAL	61	15	2

In this survey, there was an association between the cattle management system and *Fasciola* infection ($X^2=3.34$), ($p=0.0631$). These findings concur with Khan et al. [4] who concluded that cattle management systems influence the prevalence of fasciolosis, with prevalence higher in livestock raised under traditional management systems than those managed under modern improved (intensive) systems. This result could be due to more exposure to high-risk areas during grazing of cattle in a semi-intensive system unlike cattle under an intensive system.

The results showed that adult cattle were infected than young ones, and this could be due to more exposure to metacercariae. However, this study showed that cattle age had no significant effect on the prevalence of fasciolosis ($p= 0.147$). Phiri et al., [7] found a similar result that adult cattle had higher prevalence rates than young cattle, although the differences were not significant. Tsegaye et al [8] showed that age groups had no effect on the presence or prevalence of fasciolosis, suggesting that all animals were equally exposed to infection.

In Lilongwe, *Lymnaea* snails were found in all sampling areas such as swamps, and dams as indicated on Table 2. Other snail species were

also found, and these include: *Biomphalaria* spp. and *Melanooides* spp. Apart from *Lymnaea* spp. *Melanooides* were the only species found both in Lilongwe and Salima along the shores of Lake Malawi and in the Lilongwe River. This is in agreement with what was reported by Stauffer and Madsen [9].

Patsanjoka is the swampy area in Salima. Surprisingly, it has all the necessary conditions for snail breeding and multiplication, as well as hundreds of cattle feeding on the area during dry season. The snails were found only at one sampling site. This could be because there are a lot of water birds that might be feeding on the snails or some snails could have gone to aestivating and hibernation deep in the mud due to extreme temperatures (Taylor et al., 2007).

Surprisingly, no snails were found in the rice fields at the Lifuwu Rice Irrigation Scheme despite meeting all the conditions necessary for the survival and multiplication of snails. Farmers were interviewed and confirmed that no snails were found in the area. It was postulated that this could be due to the fact that the water used for irrigation comes from Lake Malawi, and probably snails are crushed during water pumping. Similarly, *Lymnaea* snails were not found along

Lake Malawi in Salima. Other snail species were found. This is a confirmation of what Mzembe and Chaudhry [10] reported that no *L. natalensis* species were recorded along the shores of Lake Malawi. Nguyen et al. [11] also did not find snails along the shore of the lake.

Lymnaea natalensis snails were easily found in the dry season rather than in the rainy season. These snails were more abundant at the beginning of the dry season than at the end of the dry season. The reason for this change in abundance could be because of a conducive climatic environment for their survival. The snail population was decreasing at the end of the dry season, probably due to drying of water bodies such as streams, swampy areas, etc.

5. CONCLUSIONS

There was a higher rate of prevalence of bovine fasciolosis in Lilongwe than in the Salima districts. Despite the difference, that the parasite burden is very high in central Malawi and there is need to control the disease. The rate of prevalence is to be reduced by breaking the lifecycle of the parasite.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

ACKNOWLEDGEMENT

Special thanks to staff at the faculty of veterinary medicine at lilongwe university of agriculture and natural resources and faculty of science at the university of malawi. Specifically, we thank winchester mvula and kondwani chiumya for their support in data collection.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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