CUSTECH INTERNATIONAL JOURNAL OF EDUCATION, VOL.1, NO. 1, JULY, 2024
http://custechijoe.org.ng
ISSN 1595-1839

ASSESSMENT OF THE PREVALENCE OF FASCIOLIASIS AMONG GOATS SLAUGHTERED IN SELECTED ABATTOIRS IN LOKOJA METROPOLIS

BY

ABDULAZEEZ, SIYAKA UMAR*, HUSSEIN, SALIHU AND HUSSAINAT, YAKUBU

School of Applied Science,
department of Science Laboratory Technology
Kogi State Polytechnic, Lokoja Kogi State.

Corresponding Author: abdulazeezumar97gmail.com

Abstract

Fascioliasis is a zoonotic disease of public health importance that affects man and farm animals. The aim of this study was to assess the prevalence of Fasciola infection among goats that were slaughtered within Lokoja metropolis. In the course of this research, fresh faecal samples and 150 gallbladders were collected from slaughtered animals, were also collected from three selected abattoirs in Lokoja, and were analyzed using standard parasitological technique. Upon the parasitological analysis of the fecal samples, 13.3% of the samples were positive for fasciola infection. There was significant difference in the prevalence of parasites among the three study areas as shown in Table). The prevalence rate in location C abattoir (9.3%) was statistically higher than that of location A abattoir (3.3%), while location B had the least prevalence of (0.7%). Overall, a prevalence of 11.3% was detected in gallbladder samples. The prevalence of infection was significantly different within the three study areas. Statistically, location A abattoir had the highest prevalence of ova in gallbladder specimens (6.0%) followed by location C abattoir (4.0%) and location B abattoir with (1.3%) prevalence. Thus, this study showed a high prevalence of facioliasis, and this could be attributed to lack of proper awareness on the need to keep clean sanitary environment around our houses and farmsteads to safeguard the health of the animals during rearing.

Keywords: Prevalence; Zoonotic; Fasciola; Faecal; Infection

Introduction

Fascioliasis is a parasitic disease with zoonotic potential. It is considered as a of disease of public health and veterinary importance, and it is caused by the species of liver fluke known as *Fasciola hepatica* and *Fasciola gigantica* (Mas-Coma *et al*., 2014). *Fasciola hepatica* is the species of concern in Europe, even though the distributions of the two species often overlap each other in several areas in Asia and Africa (Rehman, 2021). According to the World Health Organization (2018),

it was reported that the human fascioliasis is on the priority list of neglected tropical diseases (NTDs). Fascioliasis has been described as a rising food-borne disease and is said to affect almost 56 million people (WHO, 2018). The fasciola species besides being an important parasite of man in several countries, it usually infects cattle, sheep, and other herbivores. Incidentally, the meats from these animals which are definitive hosts of the parasite constitute the main source of protein for many people in Nigeria. The symptoms include ill thrift, anaemia, sudden weakness and death due to rapid blood loss, jaundice, abdominal pain and reluctance to move. More chronic signs include anaemia, loss of appetite, and 'bottle jaw' (submandibular oedema). Chronic disease is the most common form and is due to the accumulation of adult fluke within bile ducts and signs develop slowly. Black disease can also occur usually due to young fluke migrating through the liver. This is acute and fatal liver disease and is preventable by vaccination with 5-in-1 clostridialvaccine.

Geographically, the distribution of fascioliasis is determined by the presence and distribution of Lymnaea species, the intermediate hosts of the parasite, and conditions such as weather pattern and climate change. The prevalence of this infection is also aggravated by poverty, as it often linked to the sanitary condition of the environment within endemic areas (Mera *et al*., 2011). Aliyu *et al*. (2014) reported that the first occurrence of fascioliasis in Nigeria was in Borno Province where it resulted in the death of 3000 goats, with colossal and all time unequal liver damage for an individual abattoir above a period of 3 years. Studies on fascioliasis in Nigeria predominantly report incidences of the infection in cattle and sheep (Shita *et al*., 2013), with paucity of information on goats especially in the Southern and North-central Nigeria.

This study aimed at assessing Fasciola infection among goats slaughtered in some abattoirs in Lokoja metropolis. The pathogen (fasciola species) has two genera Fasciola and Fascioloides. *Fasciola hepatica* is found in sheep in Europe, North and South America, Australia and New Zealand. *Fasciola gigantica* is common in cattle and buffalo in tropical Asia, South-east Asia, the arid regions as well as the pacific Regions. Other Fasciola species include *Fasciola nyanzae*, *Fasciola tragelaphi*, and *Fasciola jacksoni*. The Fascioloides species consists of *Fascioloides magna*, often found in Deer in North America. The symptoms of fascioliasis vary among cows and endemic areas depending on the size of the infection and the degree of its transmission. Acute symptoms include ill thrift, anaemia, sudden weakness and death resulting from rapid blood loss, jaundice, abdominal pain and reluctance to move. More chronic signs include anaemia, loss of appetite, and 'bottle jaw' (submandibular oedema). Chronic disease is the most common form and is due to the accumulation of adult fluke within bile ducts and signs develop slowly. Sometimes, Black disease can occur usually due to young

flukes migrating through the liver. This is acute and fatal liver disease and is preventable by vaccination with 5-in-1 clostridial vaccine.

Literature Review

Fascioliasis, is a term often used to describe clinical disease caused by *Fasciola gigantica*, and is considered a neglected tropical disease. *Fasciola gigantica* is primarily found in domestic and wild ruminants. *Fasciola gigantica* flukes are approximately 75mm by 15mm in size. *Fasciola gigantica* has shown long-term survival due to their adaptableness in the host's immune system. These parasites are large leaf-shaped pathogens found in the liver of infected animals. The fluke requires fresh water snails and wet conditions to complete its life cycle in herbivorous hosts such as sheep, cattle, horses and goats. The burden of liver fluke results in deterioration in wool quality, impact meat production, reduced lambing percentages and ill-thrift occurrence in young stocks, which may result in their death; and affected livers are condemned. Occasionally, the carcass of infected animals may be condemned if found to be emaciated or oedematous.

Humans and animals become infected by ingesting the infective Fasciola larvae (metacercariae) through contaminated vegetation or water; the duodenum is the primary location where metacercariae penetrate through the intestinal wall into the peritoneal cavity of the definitive host. After approximately 7-8 weeks, metacercariae migrate through the parenchyma of the liver into the biliary ducts, where maturation into adult flukes occurs over a period of approximately 3 to 4 months. 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. Adult flukes can survive in their definitive host for several years.

Other primary factors that favour the disease transmission include adequate amounts of moisture and suitable temperature (usually above 10^{O}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 infection, which include biological, topographical, climatic and human factors. These factors often determine whether the liver fluke produces serious epidemics and mortality or whether it produces subclinical or clinical disease (Nkurunziza *et al*., 2024). Depending on the climatic conditions, the seasonal occurrence of fasciolasis varies from country to country. The disease usually occurs continuously if suitable temperature (above 10°C) and moisture are available.

High incidence and clinical symptoms of this disease with high mortality are reported to occur in wet seasons (Isah, 2019). 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 were

no infected animal grazed; this is brought about by the active and passive migration of infected snails and by the passive dispersal of cercaria. Accidental introduction of snails by man or water birds and the introduction of infected stock can cause the disease to occur in previously non infected areas and establish endemicity, especially when climatic conditions are favorable.

Methodology

This study will be conducted in abattoirs located within the geographical areas of Lokoja Township. Geographically, it is located at latitude 07°52' 12.68979''N and longitude 06°46' 29.74729''E. Lokoja is the capital city of Kogi State in the north-central part of Nigeria and is also a Local Government Area headquarter in Kogi State. It measures approximate 3180 km² with a population of 195,261 based on the 2006 census. The area covers both wet and dry seasons with a total annual rainfall between 1000 and 1500 mm. Light microscope, Protective gloves, Nose mask, Petri dish, Formalin, Water, Clean glass slide, Cover slip, Gall bladder tissue, Fecal sample, Microtome, Sieve tube, Camera, Sterile container, Eosin, stain and Test tube. The abattoirs were visited between early hours of each day mostly between 7am and 9am three times weekly until the total number of the required sample population was obtained. Samples of faeces and gallbladder were collected from randomly selected goats in each of the abattoirs. Fresh fecal materials were collected directly from the rectum of slaughtered animals using a pair of sterile hand gloves to avoid infection and observe precautions. The samples were placed in clean labeled bottles containing 10% formalin and transferred to the parasitology laboratory of Animal and Environmental Biology, Kogi State Polytechnic for the examination of the eggs of *Fasciola gigantica*, *Fasciola hepatica* and other intestinal parasites following the WHO standard (WHO, 2017). The sex and sources of each randomly selected goat were recorded. Adult flukes seen were removed, measured, and recorded. The content of gallbladder was emptied into a clear sterile bottle containing 10% formal saline and later examined for various stages and species of Fasciola as described by (Cheesbrough, 2005). Formol-ether concentration technique. In this technique as described by Arora and Brij (2010), 4ml of well-mixed stool sample was put into a test tube containing 4 ml of 10% formalin. The suspension was sieved into centrifuge tube using a coffee strainer. The filtrate was centrifuged at 2000 rpm for 2 minutes. The supernatant was discarded and the sediment re-suspended in 10ml of physiological saline. The sediment was suspended in 7ml of formal saline, after which 3ml of ether was added. The tube was closed with a stopper and shaken vigorously. The stopper was removed and the tube centrifuged at 2000 rpm for 2 minutes. Four layers became visible: The top layer of ether, the second layer of plugs of debris, the third layer of formalin, and the fourth layer of sediment. The plug of debris was detached from the side of the tube with the aid of a glass rod and the liquid was discarded leaving small amount of formal saline for re-suspending the sediment. A little was

transferred to a clean glass slide at a time, covered with a cover slip and examined under the microscope at 10× and 40× objectives, respectively, to view for eggs and this was repeated until the whole sediment was examined. The Fasciola ova were identified with their characterized large, oval, and yellowish color with distinctive flat operculum, which were seen as described, by other researchers (WHO, 2017). Furthermore, species identification of the recovered Fasciola from postmortem specimen of the livers collected was based on the morphological features of the parasites according to differential keys (WHO, 2017).

Result

Table 1

Prevalence of Fasciola gigantica ova in faecal and gallbladder samples from the three locations

Abbattoir location	Faecal samples Number examined N=150 (%)	Number infected (%)	Gallbladder Number examined, n=150 (%)	Number infected (%)
Location A(Zango)	65 (43.3)	5 (3.3)	65 (43.3)	9 (6.0)
Location B(Felele)	30 (20.0)	1 (0.7)	30 (20.0)	2 (1.3)
Location C(Adankolo)	55 (36.6)	14 (9.3)	55 (36.6)	6 (4.0)
Total	150 (100)	20 (13.3)	150 (100)	17 (11.3)
X^2 value		10.11 (0.01)*		0.91 (0.339)

Statistically significant ($p<0.05$)

Table 2.

Prevalence of infection among sexes from the three locations

Abattoir locations	Males (n= 25) Number examined (%)	Number infected (%	Females (n=125) Number examined (%	Total= 150 Number infected (%)
Location A(Zango)	15 (10.0)	1 (0.6)	40 (26.7)	1 (0.7)
Location B(Felele)	7 (4.7)	1 (0.6)	59 (39.3)	10 (6.7)

Location C(Adankolo)	3 (2.0)	0 (0.0)	26 (17.3)	0 (0.0)
Total	25 (16.7)	2 (1.3)	150 (83.3)	11 (7.3)
X^2		Not derivable		6.233**

Statistically significant (p)

Discussion

In table 1 above, laboratory analysis of the faecal sample show that, 13.3% were positive for *Fasciola* infection. The prevalence of the parasite seemed to be significantly different among the three study areas (Table-1). The prevalence rate in location C abattoir (9.3%) was statistically higher than location A abattoir (3.3%) while location B had least infection of (0.7%). Overall, the prevalence of 11.3% was detected in gallbladder samples. The prevalence of infection was significantly different within the three studied areas. Location A abattoir statistically, had the highest prevalence of ova in gallbladder specimens (6.0%) followed by location C abattoir (4.0%) and location B abattoir with (1.3%) prevalence.

For table 2, a total of 7.3% of female and 1.3% of males were positive. At location A abattoir, *Fasciola* ova in fecal specimen were isolated from female goats. At location B abattoir, Fasciola ova in fecal sample of female goats were higher 6.7% than male goats 0.6%, the difference in proportion was statistically significant with $\chi 2=6.233$. Location C abattoir had no infection. From the abattoirs in Lokoja, fecal specimens showed that Fasciola infection was prevalent in two of the abattoirs, location A and C abattoirs with an overall prevalence of 13.3%. This preponderance was higher than 9% reported in a similar study in Zaria (Esonu, 2014). The present result is comparable with those obtained in Ethiopia (Lakem, 2015), where 10.2% was reported in young goat. This high prevalence could be attributed to the level of unconsciousness and unawareness by the management of the Abattoirs, if not, the climatic condition, moisture, and swampy nature of Lokoja is unfavourable for both the snail intermediate host and the parasite survival and transmission.

The present study also revealed that female goats harbored more 22 infections than male goats. The overall prevalence obtained from this study showed 7.1% for female goats and 1.3% for male goats from fecal samples and gallbladder. This result is similar to the observations obtained in Maiduguri, Nigeria (Mbaye *et al*., 2010) where female goats had a higher prevalence rate 0.47% than male goats 0.26% as well as a similar report from Zaria (Esonu, 2014). They attributed their findings to an exhibited increased susceptibility to helminthosis associated with hormonal activity, especially at pregnancy (Mbaye *et al*., 2010) which was attributed to immune suppressive effect of reproductive hormones of the female animals during pregnancy and lactation period (Esonu, 2014). However, in this present study, more female goats were available for sampling in the abattoirs selected as they do not slaughter young female goats, and very old ones with reduced reproductive hormones. The young female goats are naturally allowed to stay for propagation.

Conclusion

There is a high prevalence of *Fasciola gigantic* ova in fecal and gallbladder samples from two locations among the three studied showing a significant difference. There is high prevalence of infection among slaughtered female goats as seen in fecal sample and gallbladder samples in the three locations as compared to the male goats.

Recommendations

There should be massive orientation and education of the public on the infections to avoid loss of lives.

References

Aliyu, A.A., Ajogi, I.A., Ajanusi, O.J., Reuben, R.C. (2014). Epidemiological studies of Fasciola gigantica in cattle in Zaria, Nigeria using coprology and serology. *Journal of Public Health and Epidemiology*; 6:85-91.

Cheesbrough, M. (2005). Parasitological testing. In: District Laboratory Practice in Tropical Countries. Part 1. 2nd ed. Cambridge: Cambridge University Press;. p. 196-8, 223-5.

Esonu, D.O. (2014). Prevalence of *Fasciola gigantica* Eggs in Sheep and Goats and on Salad Vegetables in Zaria and Environs, Nigeria. *A Thesis Submitted to the School of Postgraduate Studies, Ahmadu Bello University, Zaria for the Award of the Degree of Master of Science in Veterinary Public Health and Preventive Medicine*. p. 32-63.

Isah, UM. (2019). Studies on the Prevalence of Fascioliasis among Ruminant Animals in northern Bauchi State, Noth-eastern Nigeria. *Parasite Epidemiology and Control*. 5:e00090. https://doi.org/10.1016/j.parepi.2019.e00090

Mas-Coma, S., Bargues, M.D., Valero, M.A. (2014). Fascioliasis. In: Bruschi F, editor. Helminth Infections and their Impact on Global Public Health. *Vienna: Springer*;. p. 93-122.

Mbaye, A.W., Shingu, P., Luka, J.A. (2010). Retrospective Study on the Prevalence of Fasciola Infection in Sheep and Goats at Slaughter and Associated Economic Losses from Condemnation of infected liver in Maiduguri abattoir, Nigeria. Niger Vet J; 31:224-8.

Mera Sierra, R., Agramunt, V.H., Cuervo, P., Mas-Coma, S. (2011). Human Fascioliasis in Argentina: Retrospective Overview, Critical analysis and baseline for future research. *Parasite & Vectors*;4:104.

Nkurunziza, S., Nishemezwe, G., Ntirandekura, J., Niyokwizera, P., Nyabongo, L., Omore, A., Odhiambo, R. (2024). Prevalence and Associated Risk Factors Assessment of Bovine fascioliasis in the Imbo Region, Burundi. *Parasitol Res*. 123(1): 33; doi: 10.1007/s00436-023-08040-w

Rehman, ZU., Martin, K., Zahid, O., Ali, Q., Rashid, I., Abdul Hafeez, M., Ahmad, N., Ashraf, K., Betson, M., Sargison, ND.,Chaudhry, U. (2021). High-throughput Sequencing of *Fasciola* spp. shows Co-infection and Intermediate forms in Balochistan, but only *Fasciola gigantic* in the Punjab Province of Pakistan. *Infection, Genetics and Evolution*; 94:105012. https://doi.org/10.1016/j.meedgid.2021.105012

Shitta, K.B. (2013). Gastro-intestinal helminths of slaughtered cattle at Wukari abattoir Taraba state, North-Eastern Nigeria. *International Journal of Epidemiology and Infectious Disease*;1:15-8.

Suhardono, Roberts, J.A. and Copeman, D.B.C. (2006b). Biological Control of *Fasciola gigantica* with Echinostomarevolutum. *Veterinary Parasitology* 140, 166–170.

World Health Organization. (2018). Evaluation of Certain Contaminants in Food. *World Health Organization Technical Report* Ser; (1004):1-66.