Research Article

Prevalence of Fascioliasis among Humans and Slaughtered Ruminants in Katsina Abattoir, Katsina State, Nigeria

*Nanafaraha Sanusi, Nkiru Charity Eberemu, and Manir Nasiru

Department of Biological Science, Faculty of Life Science, Federal University Dutsin-Ma, Katsina State, Nigeria
***Corresponding Author's email*: nanafsanusi@gmail.com; Phone: +2348148441713**

ABSTRACT
Fascioliasis is a zoonotic parasitic disease of significant public health and economic importance in tropical regions. This study investigated the prevalence of fascioliasis among humans and slaughtered ruminants at Katsina abattoir, Nigeria. A cross-sectional study design was adopted involving 200 human participants and 300 ruminants (including cattle, sheep, and goats). Samples including faeces, bile, and liver tissues were collected and analysed using standard parasitological techniques. The overall prevalence in humans of 2.6% was recorded, with a significant association between age and infection (p = 0.011). The findings indicated a moderate level of endemicity in the study area. The overall prevalence of fascioliasis among ruminants was 14.3%. Species-specific prevalence showed that sheep had the highest infection rate (21.7%), followed by cattle (17%), while goats recorded the lowest prevalence (10%). In cattle, infections were most frequently detected in faecal (10.20%) and bile samples (8.84%), with liver samples having the lowest detection rate (1.36%). Among the sheep, bile samples had the highest occurrence of the infection (13.04%), whereas in goats, faecal samples recorded slightly higher occurrence (3.07%) than bile and liver samples (2.30% each). Statistical analysis revealed no significant difference in prevalence among animal species (p = 0.145). The higher prevalence observed in sheep and cattle may be attributed to grazing habits and increased exposure to contaminated environments. This study highlights the need for improved control measures, including proper meat inspection, public health education, and strategic deworming programs to reduce transmission.

Keywords: Fascioliasis; Katsina; Nigeria; Prevalence; Ruminants; Zoonosis

INTRODUCTION

Fascioliasis is a parasitic infection caused by liver flukes belonging to the genus *Fasciola*, mainly *Fasciola hepatica* and *Fasciola gigantica*. It is recognized as a neglected tropical disease (NTD) due to its considerable impact on both human health and livestock production worldwide (Mas-Coma *et al*., 2019). The infection affects a wide range of herbivorous animals such as cattle, sheep, goats, and buffaloes, and can also be transmitted to humans, making it a significant zoonotic disease (Ashrafi *et al*., 2022).

Fasciola hepatica has a global distribution, largely because of its ability to adapt to diverse environmental conditions and the widespread occurrence of its intermediate host, freshwater snails of the family Lymnaeidae (Garcia *et al*., 2020). In contrast, *Fasciola gigantica* is predominantly found in tropical and subtropical regions, especially in Africa and Asia (Le *et al*., 2021). Transmission occurs when humans or animals ingest water or vegetation contaminated with metacercariae, the infective stage of the parasite (Mas-Coma *et al*., 2019).
The disease has serious economic consequences, particularly in livestock production. Infected animals

often experience reduced growth, decreased milk yield, anaemia, and liver damage, which frequently results in condemnation of affected organs during meat inspection (Vassilev & Jooste, 1991; Schweizer *et al*., 2020a). Although human infections are less frequently reported, there has been a noticeable increase in cases in endemic regions, emphasizing its public health importance (Itagaki *et al*., 2015; Terasaki *et al*., 2017).

In Nigeria, fascioliasis remains a major concern, particularly among cattle, where it contributes to economic losses and poses a potential risk to human health. Several abattoir-based studies have reported notable prevalence rates, indicating continuous transmission within livestock populations and possible spillover to humans (Oyeduntan *et al*., 2017). The disease is commonly associated with the consumption of contaminated water and aquatic vegetation, particularly in rural communities where humans and animals share water sources (Mas-Coma *et al*., 2019).

The life cycle of *Fasciola* species involves freshwater snails as intermediate hosts and mammals, including humans, as definitive hosts. Infection occurs when metacercariae are ingested, after which the parasites migrate to the liver and mature within the bile ducts (Szyfres *et al*., 2021). Despite its importance, there is still limited information on the prevalence and associated risk factors of fascioliasis in many endemic areas, including Nigeria (Ajayi *et al*., 2018).

MATERIALS AND METHODS
Study Area
The study was conducted in Katsina State, Nigeria, specifically at the Katsina Central Abattoir. The area is characterized by a tropical climate with distinct dry and rainy seasons; conditions that favour the survival of intermediate snail hosts and facilitate transmission of fascioliasis. The study population consisted of human subjects whose faecal samples were collected from selected primary schools within Katsina metropolis as well as

Slaughtered ruminants (including cattle, sheep, and goats) at the abattoir. A cross-sectional study design was employed to determine the prevalence of fascioliasis in both humans and slaughtered ruminants over the study period.
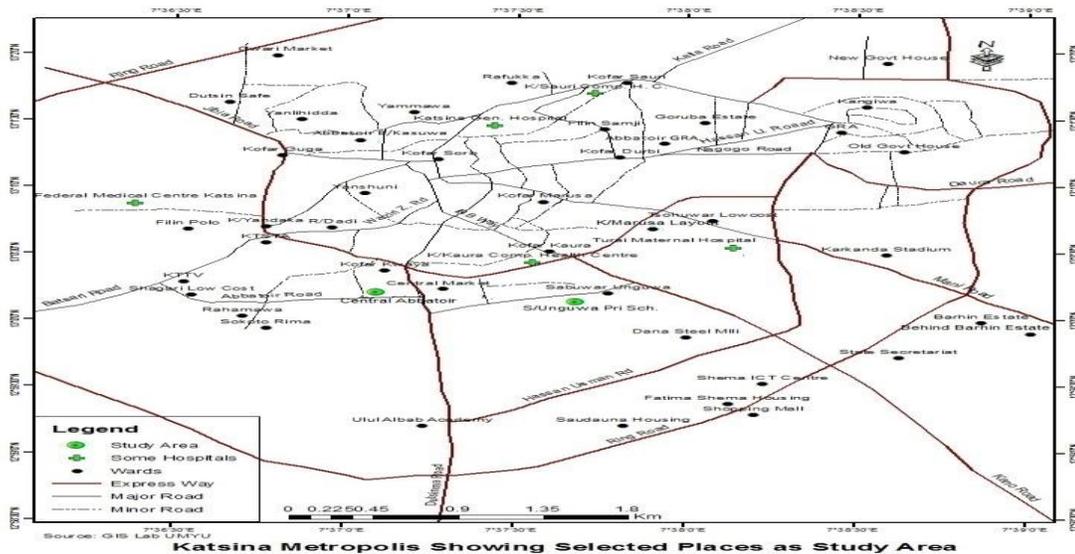

Figure 1: Map of Katsina Metropolis Showing the Selected Place as Study Area (Source: GIS Lab UMYU, 2025)

Human Samples
Human Stool samples were collected from consenting individuals following ethical guidelines.
Animal Sampling
Liver, bile, and faecal samples were collected from slaughtered cattle, sheep, and goats immediately after slaughter at the abattoir.
Faecal Examination

The stool samples were examined using sedimentation techniques to detect *Fasciola* eggs, as this method is more sensitive for detecting heavy eggs (Boray *et al*., 1969).
Bile Examination
Bile samples were microscopically examined for the presence of the parasite's eggs.

Liver Inspection

Postmortem examination of livers was conducted to identify lesions and adult flukes.

Data Analysis

The data obtained were analyzed using statistical tools. Prevalence was calculated as the proportion of infected samples relative to the total number examined. Chi-square (χ^2) tests were used to determine associations between infection and variables such as age, sex, and breed. A p-value of less than or equal to 0.05 was considered statistically significant.

Ethical approval

Ethical approval was obtained prior to sample collection. Consent was secured from human participants, and all procedures involving animals complied with standard abattoir inspection guidelines.

RESULTS

The findings of this study revealed that fascioliasis is present among both humans and slaughtered ruminants in the study area for human participants, 200 stool samples were examined, of which 8 were positive, giving an overall prevalence of 2.6%. Males had a higher prevalence (5.6%) compared to females (1.29%), although this difference was not statistically significant (P = 0.188). Age-related distribution showed variation in infection rates, with the highest prevalence observed among 13-year-olds (10.9%), while no infection was detected among 10- and 12-year age groups. The association between age and infection was statistically significant (P = 0.011), suggesting age-related exposure differences.

A total of 300 ruminants comprising cattle, sheep, and goats were examined. Out of these, 43 animals were infected, giving in an overall prevalence of 14.3%. Species-specific analysis showed that sheep recorded the highest prevalence (21.7%), followed by cattle (17.0%), while goats had the lowest prevalence (10.0%). With respect to diagnostic samples, infection in cattle was more frequently detected in faecal (10.20%) and bile samples (8.84%), whereas liver examination alone yielded the lowest detection rate (1.36%). Multi-site infections involving combinations of bile, faeces, and liver were also observed. In sheep, bile samples showed the highest detection rate (13.04%), while faecal and liver samples recorded equal but lower prevalence (4.34%). In goats, faecal samples had slightly higher detection (3.07%) compared to bile and liver samples (2.30% each). Analysis based on breed showed no statistically significant difference in infection rates (P = 0.543), indicating that breed was not a major determinant of infection in this study population.

Table 1: Prevalence of *Fasciola* Infection in Human Faeces

Gender	Number examined	infected	Prevalence	p-value
Male	123	7	5.6	0.188
Female	77	1	1.29	
Total	200	8	2.6	

Table 2: Prevalence of Human Fascioliasis in Relation to Age

Age	Number examined	infected	Prevalence	p-value
10	2	0	0	0.011
11	68	2	2.9	
12	75	0	0	
13	55	6	10.9	
Total	200	8	2.6	

Table 3: Prevalence of *Fasciola* infection in faecal, bile and liver among slaughtered ruminants at katsina abattoir

Ruminant	Organ	No examined	Total present	Prevalence (%)	P-value
Cattle	Bile	147	13	8.84	0.145
	Faecal		5	10.20	
	Liver		2	1.36	
	Bile & faecal		2	1.36	
	bile, faecal &liver		3	2.04	
Total			25	17.0	
Sheep	Bile	23	3	13.04	
	Faecal		1	4.34	
	Liver		1	4.34	
	Bile & faecal		0		
	bile, faecal &liver		0		
Total			5	21.7	
Goat	Bile	130	3	2.30	
	Faecal		4	3.07	
	Liver		3	2.30	
	Bile & faecal		1	0.76	
	bile, faecal &liver		2	1.53	
Total			13	10	

Table 4: Age and Sex distributions of fascioliasis among cattle, goats, and sheep.

Ruminants	Age	No Examined	Infected	Prevalence	P-Value
Cattle					0.03
Male	1-2 yrs	1			
	3-4 yrs	1			
	5-6 yrs	66	12	18.18	
	7-8 yrs	11	1	9.09	
	9-10 yrs	13	5	38.46	
Female	3-4 yrs	7	3	42.85	
	5-6 yrs	30	4	13.33	
	7-8 yrs	12			
	9-10 yrs	6			
Goat					
Male	1-2 yrs	100	7	7	
	3-4 yrs	5	2	40	
	5-6 yrs	1			
Female	1-2 yrs	23	4	17.39	
	3-4 yrs	1			
Sheep					
Male	1-2 yrs	12	2	16.66	
Female	1-2 yrs	8	2	25	
	3-4 yrs	3	1	33.33	
Total		300	43	14.33	

Table 5: Prevalence of *Fasciola* infection and relation to breed

Ruminant	Breeds	Total examined	Infected	Prevalence (%)	P-Value
	Red Bororo	9	2	22.22	0.543
Cattle	White Fulani	69	11	15.94	
	Sokoto Gudali	30	5	16.66	
	Bufaloe	39	7	17.94	
Goat	Sahel Red Sokoto	113	11	9.7	
	West African Dwarf	18	2	11.11	
Sheep	Yankasa	19	5	26.31	
	Balami	4	0	0	
Total	**8**	**300**	**43**	**14.33**	

DISCUSSION

This study shows that the overall prevalence in humans is 2.6% indicates that fascioliasis is present in the study area, although less common than in animals, is present and poses a public health concern. The higher prevalence observed among males compared to females may be related to increased exposure due to outdoor activities and contact with contaminated water sources; however, the lack of statistical significance suggests that sex is not a major risk factor. Age-related variation in infection, with a significantly higher prevalence among older children (13 years), may reflect increased environmental exposure and behavioral factors such as playing near water bodies or consuming contaminated food or water. This finding highlights the importance of health education and improved sanitation in reducing transmission among vulnerable populations. The study demonstrated a moderate prevalence (14.3%) of fascioliasis among slaughtered ruminants in Katsina abattoir, indicating that the disease remains endemic in the study area. This prevalence aligns with previous reports from Northern Nigeria, where infection rates between 10% and 20% have been documented (Biu *et al*., 2012; Lawal *et al*., 2019). The persistence of infection may be attributed to favourable environmental conditions, including the presence of suitable snail intermediate hosts and shared water sources.

Among the examined animal species, sheep exhibited the highest prevalence (21.7%), followed by cattle (17.0%), while goats showed the lowest infection rate (10.0%). The higher prevalence observed in sheep may be due to their grazing behavior, which increases exposure to contaminated pastures and water bodies. This observation is consistent with earlier studies that reported higher susceptibility of sheep to fascioliasis compared to other ruminants (Magaji *et al*., 2014).

The variation in detection rates across sample types suggests that bile and faecal examinations are more sensitive diagnostic approaches than liver inspection alone. In cattle, the higher detection in faecal and bile samples may be linked to the presence of eggs and parasites within the biliary system. Similarly, bile samples in sheep showed the highest detection rate, supporting the reliability of bile examination for diagnosing fascioliasis. These findings are in agreement with previous studies that emphasize the limitations of relying solely on liver examination due to its lower sensitivity, especially in early or light infections (Schweizer *et al*., 2020b).

Although goats had lower prevalence, the presence of infection still indicates exposure to contaminated environments. The relatively low infection rate in goats may be due to differences in feeding habits, as goats tend to browse rather than graze, thereby reducing contact with infective stages of the parasite. The absence of a significant association between breed and infection ($P > 0.05$) suggests that environmental and management factors play a more important role than genetic predisposition in the transmission of fascioliasis. This finding is consistent with previous reports indicating that infection is largely influenced by ecological and husbandry practices rather than breed difference. Overall, the findings of this study underscore the zoonotic importance of fascioliasis and the need for integrated control strategies targeting both livestock and human populations. Measures such as improved water hygiene, snail control, regular deworming of livestock, and public health awareness are essential to reduce the burden of the disease.

CONCLUSION

Fascioliasis is present among both school children and slaughtered ruminants in the study area, in humans, males were more affected than females, likely due to higher exposure to contaminated water, livestock, or

vegetables. Age showed a significant association, with older children (especially age 13) having the highest infection rates. In animals, sheep were the most affected species, and bile examination was identified as the most reliable diagnostic method. Infection prevalence varies by species, age, and sex, with older animals especially cattle being more affected due to prolonged exposure; goats were less affected, Environmental factors, grazing habits, host susceptibility, and management systems influence infection rates. Certain breeds, such as Yankasa sheep and Red Bororo cattle, showed higher infection rates. Fascioliasis remains a significant public health and veterinary concern, affecting humans' particularly older male children due to environmental exposure and animals, especially sheep and older cattle, where improved management, grazing control, and deworming are essential to reduce infection rates.

REFERENCES

Ajayi, O. O., Akinwale, O. P., Adebayo, A. O., & Ojo, D. A. (2018). Prevalence and risk factors of fascioliasis in Nigeria. *Nigerian Journal of Parasitology*, 39(2), 123–130.

Ashrafi, K., Bargues, M. D., O'Neill, S., Mas-Coma, S., & Valero, M. A. (2022). Fascioliasis: Epidemiology and control. *Veterinary Parasitology*, 300, 109–118.

Biu, A. A., Ahmed, M. I., & Mshelia, S. S. (2012). Economic assessment of bovine fasciolosis in Maiduguri abattoir, Nigeria. *Tropical Animal Health and Production*, 44(3), 511–515.

Boray, J. C., Fraser, G. C., Williams, J. D., & Wilson, J. M. (1969). The sedimentation technique in diagnosis of fascioliasis. *Journal of Parasitology*, 55(4), 789–795.

Garcia, H. H., Valero, M. A., Bargues, M. D., & Mas-Coma, S. (2020). Global distribution of Fasciola hepatica. *Parasites & Vectors*, 13(1), 1–10.

Itagaki, T., Sakai, H., Terasaki, K., Shibahara, T., & Ito, A. (2015). Human fascioliasis epidemiology. *Infection, Genetics and Evolution*, 35, 117–125.

Lawal, J. R., Jajere, S. M., Ibrahim, U. Y., Geidam, Y. A., Gulani, I. A., & Musa, G. (2019). Prevalence of fasciolosis in ruminants slaughtered in Nigeria: A review. *Journal of Veterinary Medicine and Animal Health*, 11(3), 55–63.

Le, T. H., Nguyen, K. T., Nguyen, N. T., Nguyen, T. D., & Blair, D. (2021). Molecular epidemiology of Fasciola species. *Acta Tropica*, 213, 105–112.

Magaji, A. A., Ibrahim, K., Salihu, M. D., Mohammed, A. A., Saulawa, M. A., & Muhammad, A. A. (2014). Prevalence of fasciolosis in cattle slaughtered in Sokoto metropolitan abattoir, Nigeria. *Advances in Epidemiology*, 2014, 1–5.

Mas-Coma, S., Valero, M. A., & Bargues, M. D. (2019). Fascioliasis as a neglected tropical disease. *PLoS Neglected Tropical Diseases*, 13(4), e0007153.

Ovedunton, O. O., Adedokun, O. A., Fasina, F. O., & Fagbemi, B. O. (2017). Prevalence of fascioliasis in cattle in Nigeria. *Tropical Animal Health and Production*, 49(6), 1239–1245.

Schweizer, G., Braun, U., Deplazes, P., & Torgerson, P. R. (2020a). Estimating the financial losses due to bovine fasciolosis in Switzerland. *Veterinary Record*, 150(16), 484–488.

Schweizer, G., Braun, U., Deplazes, P., & Torgerson, P. R. (2020b). Liver fluke infections in livestock. *Veterinary Journal*, 257, 105–112.

Szűrés, B., Kovács, T., Nagy, L., & Molnár, Z. (2021). Zoonotic diseases and their transmission. *W H O Publications.*

Terasaki, K., Itagaki, T., Sakai, H., & Shibahara, T. (2017). Increasing human fascioliasis cases. *Parasitology International*, 66(6), 712–718.

Vassilev, G. D., & Jooste, R. (1991). Economic impact of fascioliasis. *Onderstepoort Journal of Veterinary Research*, 58(4), 273–276.