

Prevalence of *Fasciola* Infection in Cattle- Ready- for -Slaughtering at some Abattoirs in Oyo, Oyo State, Nigeria

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ABSTRACT

Fascioliasis is one of the most prevalent and economically significant parasitic illnesses of domestic animals, particularly cattle, sheep, goats, and man. It is particularly widespread in countries with heavy cattle production especially places with low interest in vector-related diseases. Therefore, the study was designed to investigate the prevalence of this parasitic disease among the cattle slaughtered in the selected abattoirs in Oyo, Oyo State, Nigeria. Two hundred and fifty (250) faecal samples were collected from the rectum of the slaughtered cattle. The samples were analyzed using the Formol-ether Concentration technique. Also, post mortem examination of the liver and other organs of the slaughtered cattle (250) at the abattoir were also examined for *Fasciola* infestation. The data were analyzed with Chi-square at 5% level of significance using SPSS. It was observed that 77 (30.8%) were positive to fascioliasis out of the 250 slaughtered cattle examined. The prevalence of the infection based on the sex of the cattle was found to be statistically significant ($p = 0.001$). The percentage of fascioliasis depending on the breed of the cattle was observed to be lowest (25%) in Sokoto Gudali and highest (33.33%) in White Fulani. The analysis implied that there was a strong association between infection and cattle breeds. Prevalence of fascioliasis based on the estimated age of animals was not statistically significant however; animals aged 3 years and 6 months had the highest percentage (54.1%) while those within 2 years and 6 months had no cases of fascioliasis. Fascioliasis is an endemic illness in the study area among cattle slaughtered for consumption. This suggests the possibility of human infestation through consumption especially when it is under-processed. The need for health policy to ensure slaughtering of healthy cattle become important to ensure safe public health especially through consumption of meat. Also, public health intervention through mass vaccination of cattle, education of cattle farmers and introduction of veterinary inspectors at the point of slaughter is important in controlling Fascioliasis.

Keywords: prevalence, infection, fascioliasis, *fasciola gigantica*, bovine

I. INTRODUCTION

Fascioliasis, commonly known as distomatosis or liver fluke illness, is a parasitic disease caused by the genus *Fasciola* [1]. It is one of the most prevalent and economically significant parasitic illnesses of domestic animals, particularly cattle, sheep, goats, and man [2]. The illness is a major source of significant economic losses (direct or indirect) in the cattle business, primarily via mortality, liver condemnation, reduced milk and meat output, and anthelmintic expense [2].

Fascioliasis, which is caused by the liver fluke *Fasciola gigantica*, is endemic in Nigeria and one of the most common causes of abattoir liver condemnation. The entire cost of cattle losses in Nigeria due to *Fasciola* infection is estimated to be ₦18.3 billion [1]. According to a review of Nigerian abattoirs, fascioliasis was responsible for roughly 70% of organ condemnation, primarily livers [1].

Nigeria is threatened by food insecurity and poverty because of its rapidly rising population, which may be addressed by a better-developed animal production industry, as well as other areas [3]. Livestock illnesses continue to pose a danger to the livestock business. Diseases that afflict cattle are continually a danger to animal products, lowering output [4].

Fasciola hepatica and *Fasciola gigantica* are the two primary *Fasciola* species responsible for fascioliasis' widespread distribution [5]. These liver flukes are one of the most common ruminant helminthic parasites, and they may be found all over the world [6]. *Fasciola hepatica* is found in temperate zones, whereas *Fasciola gigantica* is found in tropical and subtropical climates [7, 8] Human fascioliasis cases have been on the rise since the 1980s, according to reports. Apart

from its global veterinary and economic relevance, fascioliasis has lately been discovered to be a re-emerging and widespread zoonosis that affects a large number of humans [10]. According to the World Health Organization (WHO), at least 2.4 million individuals are infected in more than 70 countries, with several million more at risk, and it has been demonstrated that wherever animal cases are recorded, human cases are also reported WHO [11]. More than half of human cases of fascioliasis, on the other hand, are subclinical, making human infections difficult to identify [12]. Humans, on the other hand, can become infected by mistakenly ingesting the eggs or larvae.

Many prevalence investigations have recently been carried out in various regions of Nigeria, and these studies have revealed that fascioliasis is a serious cattle disease. In Zaria, Nigeria, prevalence investigations of liver flukes in cattle and small ruminants after slaughter found a total prevalence of 48.0% [13]. Nyirenda (2019) [15] studied 69,152 animal corpses in the Mongu area of Zambia, finding that 44,511 (64.4%) of the carcasses were positive for *Fasciola* spp. adult worms. The livers of 24,620 (55.3%) of the afflicted animals were badly impacted, whereas 13,497 (30.3%) had moderately affected livers. The livers of the rest of the carcass (14.3%) were just mildly impacted. *F. gigantica* was found to be more common in the livestock region, according to the findings.

Bovine fascioliasis is a neglected zoonotic infection with a global distribution lacking a precise estimation of infection and disease burden. It is a worldwide problem in ruminants. The disease remains a veritable threat to the livestock production industry and animal products are constantly under threat. To implement mechanisms that will prevent the spread of this disease, there is the need to study the prevalence of bovine fascioliasis and understand the factors that cause the disease and how it is transmitted. Hence, this study was designed to investigate the prevalence of fascioliasis in cattle in some abattoirs in Oyo, Oyo State, Nigeria.

II. MATERIALS AND METHODS

Sample Size

Thursfield's standard technique for sample size determination was used to determine sample size [16]. Because there was no previous data from the study area, the expected prevalence was set at 50%.

$$\frac{1.96^2 [P \exp (1 - p \exp)]}{D^2}$$

Faecal Collection and Preservation

Two hundred and fifty (250) faecal samples were collected from slaughtered cattle (150 in Akunlemu and 100 in Sawmill abattoirs) around 07:30am to 10:00am and quickly transferred to Biological Sciences Laboratory, Ajayi Crowther University in Oyo for parasitological analysis.

Faecal Examination

Faecal samples were analyzed in the laboratory using the procedures outlined by Cheesbrough [17]. Faeces are emulsified in formol water, the suspension is strained to remove large faecal particles, ethyl acetate is added, and the mixed suspension is centrifuged. Cysts, oocysts, eggs, and larvae are fixed and sedimented and the faecal debris is separated in a layer between the ether and the formol water. Faecal fat is dissolved in the ether, the slide was then prepared and examined under microscope at 40x objective.

Post mortem and Liver Examination

To confirm the existence of the parasite, the livers of each killed calf were thoroughly inspected by inspection and palpation of the entire organ, followed by a transverse incision of the organ across the thin left lob [17].

Age Estimation

Cattle's age was determined by looking at their front permanent teeth either before or after slaughter. As a reference, the eruption of front teeth happens as follows: The first pair of permanent incisors are worn for 1.5-2 years, the second pair for 2-2.5 years, the third pair for 3-3.5 years, and the fourth pair for 4 years and above [18].

Sex Determination

The sex was identified by looking for sex organs in the genitals. Then there are penises for male cattle and vagina for female cattle.

Statistical Analysis

IBM SPSS software version 21.0 for Windows was used to analyze the data. The prevalence was calculated using descriptive statistics such as mean and tables. The level of significance in parasite prevalence and intensities between bovine age and sex was determined using the Chi-square test. The 95% confidence interval was used to establish significance ($P > 0.05$).

III. RESULTS

A total of two hundred and fifty (250) ruminants were sampled from February to April 2022 at the two major abattoirs (Akunlemu and Sawmill) in Oyo. A total of seventy-seven (77) was positive for Fascioliasis and one hundred and seventy-three (173) was negative for Fascioliasis – this indicates a 30.8% prevalence of the disease. Based on location, one hundred (100) ruminants were investigated for the disease at the Sawmill abattoir, twenty-nine (29) were positive while 71 were negative indicating a 29% prevalence. A total of one hundred and fifty (150) ruminants were investigated for the disease at the Akunlemu abattoir, forty-eight (48) were positive and one hundred and two (102) were negative indicating a 32% prevalence (Table 1).

At the Akunlemu abattoir, one hundred and fifty (150) ruminants; twenty (20) males and one hundred and thirty (130) females were investigated for Fascioliasis – eight (8) were positive in males while forty (40) were positive in females suggesting a higher prevalence in females than males (Table 2). At the Sawmill abattoir, one hundred (100) ruminants; fifteen (15) males and eighty-five (85) females were investigated for Fascioliasis – five (5) were positive in males while twenty-four (24) were positive in females suggesting a higher prevalence in females than in males (Table 3).

Three different kinds of cattle breeds (White Fulani, Sokoto Gudali and Red Bororo) were examined for *Fasciola* infection from the two abattoirs. In Sawmill abattoir, seventy-three (73) White Fulani were examined and nineteen (19) were positive indicating (26%), sixteen (16) Sokoto Gudali were also examined and seven (7) were positive suggesting (43.75%), three (3) were positive from the eleven (11) Red Bororo indicating (27.27%) which suggests that there is the significant difference among the breeds in the sawmill abattoir (Table 4). In Akunlemu, one hundred and twenty (120) White Fulani were examined and forty (40) were positive indicating (33.33%), twenty (20) Sokoto Gudali were also examined and five (5) were positive suggesting (25%), three (3) were positive from the ten (10) Red Bororo indicating (30%) which suggests that there is the significant difference among the breeds in the sawmill abattoir (Table 5).

A total of two hundred and fifty (250) based on the age of the cattle were investigated for the presence of *Fasciola* infection. None was positive out of the four (4) in the age 2 years 6 months, seven (7) were positive from the twenty (20) in the age 3 years, ten (10) were positive from the thirty-six (36) in the age 3 years 3 months, thirteen (13) were positive from the twenty-four (24) in the age 3 years 6 months, seventeen (17) were positive from the seventy-six in the age 3 years 9 months, twenty (20) were positive out of the sixty (60) in the age 4 years and ten (10) were positive from the thirty (30) in the age 4 years 3 months. Statistical analysis of the data revealed no significant difference ($P > 0.05$) between infection with the parasite and the age of sampled animals (Table 6)

Table 1: Prevalence of Fascioliasis among the slaughtered cattle at selected abattoirs in Oyo Town

Location	No. Examined	No. Positive	No. of Negative	% Prevalence	F - value
Sawmill	100	29	71	29	0.253
Akunlemu	150	48	102	32	
Total	250	77	173	30.8	250

$X^2 = .253; df = 1; \alpha = .05, p = .614$

Hypothesis Testing

H_0 : There is no significant difference in the prevalence between the locations

H_1 : There is a significant difference in the prevalence between the locations

Table 2: Prevalence of Fascioliasis based on gender of the slaughtered cattle at Akunlemu abattoir in Oyo Town

Sex	No. examined	No. positive (%)	No. negative (%)	F – value
Male	20	8 (40.00)	12 (60.0)	250.402**
Female	130	40 (30.76)	90 (69.23)	
Total	150	48 (32)	102 (68)	150

$X^2 = 250.402; df = 4; \alpha = .05, p = .001$; Superscripts in column differ significantly ($P < 0.05$)

** - 5% level of probability

Hypothesis Testing

H_0 : There is no significant difference in the prevalence between the genders in Akunlemu locations

H_1 : There is a significant difference in the prevalence between the genders in Akunlemu locations

Table 3: Prevalence of Fascioliasis among sexes of sampled animals at Sawmill abattoir in Oyo Town

Sex	No. examined	No. positive (%)	No. negative (%)	F – value
Male	15	5 (33.33)	10 (66.67)	251.131**
Female	85	24 (28.23)	61 (71.77)	
Total	100	29 (29)	71 (71)	

$X^2 = 251.131$ df = 4; $\alpha = .05$, $p = .001$; Superscripts in column differ significantly ($P < 0.05$)

** - 5% level of probability

Hypothesis Testing

H_0 : There is no significant difference in the prevalence between the genders in Sawmill locations

H_1 : There is a significant difference in the prevalence between the genders in Sawmill locations

Table 4: Breed-specific prevalence of Fascioliasis of sampled animals at Akunlemu abattoirs in Oyo Town

Breed	No. Examined	No. of positive (%)	No. of negative (%)	F – value
White Fulani	120	40 (33.33)	80 (66.66)	255.050**
Sokoto Gudali	20	5 (25)	15 (75)	
Red Bororo	10	3 (30)	7 (70)	
Total	150	48 (32)	102 (68)	

$X^2 = 255.050$ df = 6; $\alpha = .05$, $p = .001$; Superscripts in column differ significantly ($P < 0.05$)

** - 5% level of probability

Hypothesis Testing

H_0 : There is no significant difference in the prevalence between the breed in Akunlemu

H_1 : There is a significant difference in the prevalence between the breed in Akunlemu

Table 5: Breed-specific prevalence of Fascioliasis of sampled animals at Sawmill abattoirs in Oyo Town

Breed	No. Examined	No. of positive (%)	No. of negative (%)	F – value
White Fulani	73	19 (26.0)	54 (73.97)	250.945**
Sokoto Gudali	16	7 (43.75)	9 (56.25)	
Red Bororo	11	3 (27.27)	8 (72.72)	
Total	100	29 (29)	71 (71)	

$X^2 = 250.945$; df = 6; $\alpha = .05$; $p = .001$; Superscripts in column differ significantly ($P < 0.05$)

** - 5% level of probability

Hypothesis Testing

H_0 : There is no significant difference in the prevalence between the breed in the sawmill

H_1 : There is a significant difference in the prevalence between the breed in the sawmill

Table 6: Prevalence of Fascioliasis based on estimated ages of sampled animals at selected abattoirs in Oyo Town

Age	No. Examined	No. of Positive	No. of Negative	% Prevalence	F – value
2 years 6 months	4	0	4	0	11.054
3 years	20	7	13	35.0	
3 years 3 months	36	10	26	27.7	
3 years 6 months	24	13	11	54.1	
3 years 9 months	76	17	59	22.3	
4 years	60	20	40	33.3	
4 years 3 months	30	10	20	33.3	
Total	250	77	173	30.8	

$X^2 = 11.054$; df = 6; $\alpha = .05$, $p = .087$

IV. DISCUSSION

Fascioliasis is an infection of cattle and humans due to consumption of meat by human beings. It was found in this study that there was 30.8% prevalence of Fascioliasis among the cattle slaughtered during the period at the selected abattoirs in Oyo, Oyo State, Nigeria. This is lower than the 48.0% reported by Iren *et al.*, (2016) [13] in Zaria, the 32.34% obtained by Yatswako and Alhaji (2017) [19] in North-central Nigeria after a ten-year retrospective study, the 64.4% reported by Nyirenda (2019) [15] in Mongu area of Zambia, the 46.54% by Hassan and Anwo (2010) [20] in Isheri-Olofin, the 54.0% by Idris *et al.*, (2004) [21] in Gwagwalada abattoir, and the 60.74% by Wulha and Banke (2001) [22] in Markurdi metropolis. However, this observation is higher than the 18.0% reported by Abolarin and Aroyehun (2005) [23] in the Minna abattoir, 27.68% by Magaji (2014) [24] in the Sokoto Metropolitan Abattoir, and 25.9% reported by Adang *et al.*, (2015) [25]. Changes in total prevalence across these studies might be attributable to differences in research times, vegetation, weather, and other climatic conditions in the studied region. Environmental characteristics like as high relative humidity, heavy rainfall, low temperature, and the availability of water and moisture, which are essential for the parasite to complete its life cycle and impact transmission efficacy, may be present in areas with high infection rates [26].

This study was conducted during the dry season (February to April), which could be responsible for lower prevalence (30.8%). The prevalence could have been higher if the study had been conducted during the rainy season, as it has been reported that higher incidence occurs during the rainy season because the rainy season provides a more favourable climate for the parasite to complete its life cycle than the dry season, when cercariae and snail intermediate hosts have low survival rates [27].

Poor herd sanitary conditions, host susceptibility to infection as a result of poor feed quality, ill-treated tributaries, careless attitude of both herdsman and health supervisors, and lack of proper control programs, as well as poor veterinary services in the study area, could all contribute to the high prevalence [23]. Both cattle and people may suffer substantial economic consequences as a result of this high incidence. Such economic loss could include; costs of antihelminthics, drenches, labour, liver condemnation during meat inspection, and production losses owing to mortality, including reduced meat, milk, and wool output, as well as reduced growth rate and fertility [22, 23].

The distribution of the illness by sex indicated that female cattle were considerably more afflicted with Fascioliasis ($P < 0.05$) than male cattle in this investigation. This is consistent with findings from research in Zambia [27], Tanzania [28], Egypt and Nigeria [29]. Female animals are more susceptible to *Fasciola* infection than males, based on the higher incidence in females. This might be because more female animals were slaughtered at the slaughterhouse, or because more females were sampled than males [25,30,31]. Another reason for the discrepancy might be because females stay in the herd longer (for reproduction, breeding, and milk production), resulting in a larger illness load [28]. According to Ibrahim *et al.*, [32], there is a hormone-controlled relaxation of immunity in female animals during pregnancy and breastfeeding, which increases vulnerability to infection. However, this finding conflicts with the findings of Adang *et al.*, (2015) [25] in Nigeria and Eze and Briggs (2018) [33] in Nigeria, who found greater prevalence in males than females.

In this investigation, it was found that White Fulani cattle were substantially more affected ($P < 0.05$) than the other two breeds. This result is consistent with Ulayi *et al.*, (2007) [31], Adang *et al.*, (2015) [25], and Ardo *et al.*, (2013) [30] results in Adamawa, and Eze and Briggs, (2018) [33]. This suggests that some breeds are more prone to infection than others. This might be due to the large quantity of these breeds murdered in abattoirs. Differences in host intrinsic variables (genetics, physiology, and immunity) as well as extrinsic factors (environmental and management methods) may also contribute to the White Fulani breed's greater prevalence [25]. It could also be because the White Fulani is the most common breed in the study area, and the extensive management system under which they are reared, combined with dwindling grazing lands due to increased crop farming, forces them to graze in areas that could be heavily infested with the intermediate host of the liver fluke during the dry season when feed is scarce [34].

Adult cattle had a larger number of instances than younger animals, according to the age distribution of the illness. However, chi-square statistical analysis for significance ($P > 0.05$) revealed that infection rate and age have no relationship. This finding is consistent with Ardo *et al.*, (2013) [30] in Adamawa, Mbaya *et al.*, (2010) [35], and Isah (2019) [36]. The increased incidence in adults compared to younger cattle may be due to the young animals' reduced exposure to the parasite and the type of feed they consume. Adults graze on grasses, leaves, and other flora, primarily in regulated pastures, especially along river banks, while young animals are given milk and chaff near the base of Fulani houses. During the dry season, they are also pushed from place to place in quest of lush pastures and water. In permanent water bodies, there is frequently a significant concentration of snail intermediate hosts, which can pollute the water and neighbouring flora with encysted metacercariae [25]. It was also discovered that the condition rose steadily with age, but that the incidence rate dropped dramatically at the age of 4 years 3 months. One age group may have stronger immunity than the others [37]. However, this conclusion conflicts with Yilma and Mesfin's (2000) [38] findings in Ethiopia, where they found a substantial variation in infection prevalence between age groups. Also, the findings of this study contradict those of Idris *et al.*, (2004) [21] and Abolarinwa and Aroyehun (2005) [23], who found a greater frequency in young adults than in adults. The statistically significant variations in sex and breed-specific prevalences might be risk factors.

V. CONCLUSION

This study confirmed the occurrence of fascioliasis in cattle offered for slaughtering in some abattoirs in Oyo, Oyo State, Nigeria. The infestation was observed to be across the gender, but more prevalent among the adult female cattle. This highlights the public's vulnerability, prompting the creation of a policy plan focused at the prevention and control of this neglected tropical disease.

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