CROSS-SECTIONAL STUDY OF BOVINE FASCIOLOSIS AT LOKOJA ABATTOIR
KOGI STATE – NIGERIA

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Summary

A cross-sectional study of fasciolosis in cattle conducted in Lokoja abattoir of Kogi State Nigeria, using bile and fecal examination for Fasciola eggs and postmortem examination of liver of slaughtered cattle for adult liver flukes showed that the disease was prevalent in slaughtered cattle. The purposes of the study were to determine the prevalence of fasciolosis in slaughtered cattle in Lokoja abattoir and to determine the breed, age and sex prevalence distributions of the infection in cattle slaughtered and sold for meat to the public. A total of 960 slaughtered cattle of White Fulani, Adamawa Gudali, Red Bororo and Sokoto Gudali breeds were sampled during slaughter during the study period of 24 weeks from November, 2012 to April, 2013. Of these, 254 and 329 liver fluke cases due to Fasciola gigantica were observed using bile and coprological examination, respectively. The overall prevalence rate was 4.3% and specifically 26.4% and 34.3% by bile and fecal examinations respectively. Sex specific prevalence rate was higher in males (63.0%) and 62.3% than in female cattle (37.0%) and 37.7% using bile and fecal examinations, respectively. Age specific prevalence rate was highest (43.3%) and 43.5% with bile and fecal examination in the animal groups that were >6 years old. This is the first prevalence study of Fasciolosis in cattle in Lokoja, Kogi State of Nigeria. The high prevalence calls for better veterinary intervention to prevent possible human transmission.

Keywords: Cattle, Fasciolosis, prevalence, Lokoja Abattoir, Nigeria.

Introduction

Fasciolosis is a parasitic liver infection of humans, wild and domestic ruminants caused by trematodes of the genus Fasciola. Fasciola gigantica and Fasciola hepatica are responsible for the disease in tropical and temperate regions respectively (33, 32). They are normally transmitted by Lymnaea snail (Lymnaea natalensis and Lymnaea truncatula) and do infect the animals at any stage of their life (9, 17). Fasciolosis constitutes an important public health problem in many parts of the world (8, 18, 19). With an estimated 2.4 million people affected (36). Human can become infected with Fasciola gigantica if they consume contaminated vegetables (19) or raw and improperly cooked liver from an infected animal. In Nigeria, there are few reports on the prevalence of fasciolosis (formerly fascioliasis) in spite of the well-known economic importance of the disease in livestock (24). The existing accounts of the disease in Nigeria are based on local survey on the incidence of fasciolosis in some areas of the country and often cover only a few months of the year (25). For instance, Ferguson (11) determined the incidence of fascioliasis in Birnin-Kebbi, Maiduguri, Kano and Kaduna. Babalola and Schillhorn van Veen (5) determined the incidence of the disease in Zaria, while Ikeme and Obioha (14); Uzoukwu and Ikeme (35) recorded the prevalence rate of fascioliasis in cattle slaughtered in some parts of eastern Nigeria. Economic losses from fascioliasis are enormous. Alonge and Fasanmi (2) reported
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that 94% of total liver condemnation in some abattoir in Northern Nigeria was due to fascioliasis. Ogunrinade (24) assessed total economic losses due to bovine fascioliasis to be 2-3% of the annual output of the livestock industry estimated at $150-250 million, [3rd National Livestock Development Report (23)].

Materials and Methods

Study Area

Lokoja in Kogi State Nigeria is located at the North-Central geopolitical Zone, in the Northern Guinea Savannah ecological zone of Nigeria, between latitude 7° 8' N and longitude 6° 7'E. Kogi State is bordered by the following states: Kwara, Niger, Nassarwa and Federal Capital Territory (FCT) to the north; Benue to the East; Edo to the west and Enugu, Anambra, Ekiti and Ondo to the south. Edo to the West and Enugu, Anambra, Ekiti and Ondo to the South. The state experiences two distinct seasons, rainy season between March and October and dry season between November and February. Lokoja the state capital is generally hot throughout the year with an average maximum temperature of 33°C and minimum temperature of 22°C. The mean annual rainfall range from 1016mm to 1524mm, and an average humidity of 68-70 per cent. It had an estimated cattle population of over 2 million (16) and consumption of beef is part food habit and preference of Lokoja people. These cattle are mostly in the custodies of nomadic and sedentary pastoralists.

The state provides transit routes for the nomadic pastoralists on seasonal movements from the northern parts of Nigeria to the southern parts and back.

Study Design and Population

The study was a cross-sectional survey carried out among cattle slaughtered at Lokoja abattoir in Kogi State between November, 2012 and April, 2013. Lokoja was chosen because most cattle are slaughtered in the metropolitan abattoir affording a good reason for prevalence study in the abattoir.

Sample Collection

Sample collection was undertaken during a period of six months, from November 2012 to April 2013 in Lokoja abattoir. A cross-sectional study of cattle being slaughtered at the abattoir which process 95% of all slaughtered cattle in the state. The target population was all slaughtered cattle (irrespective of breed, sex and age) excluding any condemned carcasses. Sampling was weighted so that the number of carcasses sampled in the abattoir was proportional to the throughput of the abattoir and stratified by calendar months. Lokoja abattoir has an average slaughter of 45 cattle per day. Two visits per week were made and twenty (20) animals were sampled per day using systematic sampling method. Thus, for every week, forty (40) animals were examined during the visit days. Twenty-four, weekly visits to the abattoir were made during the six months. Thus a total of 960 slaughtered cattle were examined out of 2,160 estimated total slaughtered during the visit days. All the sampled animals were identified according to breed, age and sex. The age of cattle was estimated after slaughtering of the animal by observing the eruption of front permanent teeth according to the method described by Carlson (7).

Sample Analysis

Intact gall bladder of sampled animals was removed with the opening tied with rubber bands. Sample of faces were collected from the sample animal. Gall bladder and fecal samples were placed in separately labeled polythene bags and transported to the laboratory for examination. Ten million each of bile and water were mixed together and passed through a tea strainer. The filtrate was erupted into centrifuge tubes and centrifuged for 10 minutes at 1,500 rmp. The supernatant was decanted and sediment placed on glass slide using a spatula and examined under the microscope using x 10 objective for the presence of eggs of flukes. The eggs were identified according to the description of Soulsby (31). Fecal examination for Fasciola gigantca eggs was carried out using sedimentation method as described by Urguhart et al; (34)). The eggs
were then identified according to the description of Soulsby (31).

Statistical Analysis
Descriptive statistical tools like tables and simple percentages were used. Data were also analyzed using statistical package for social science (SPSS) for windows 16.0 (standard Version SPSS Inc. Chicago, IL, USA) to carry out descriptive analysis of data obtained from the study. Chi-square analysis was employed to test association between prevalence of fasciolosis and sex, age and breed of cattle slaughtered.

Results

Table 1 shows the distribution of infection level in cattle slaughtered in Lokoja abattoir.

Table 1: Distribution of infection level of Fasciola gigantica in livers of slaughtered cattle in Lokoja Abattoir

<table>
<thead>
<tr>
<th>Infection level</th>
<th>No.of livers affected</th>
<th>Moderate (3.9%)</th>
<th>Severe (10.3%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slight</td>
<td>157 (62.0%)</td>
<td>86 (33.9%)</td>
<td>10 (3.9%)</td>
<td>253</td>
</tr>
</tbody>
</table>

The livers of 157 cattle representing 62.06% were slightly infected with liver flukes; eighty-six livers representing 33.95% were moderately infected while ten (10) livers representing 3.95% were severely infected and such whole livers were rejected.

Tables 2 and 3 show the breed distribution of fasciolosis in slaughtered cattle by bile and fecal examinations at Lokoja Abattoir. Breed specific prevalence rate was highest in White Fulani (32.64%) in bile examination and 40.29% in faecal examination and lowest in Sokoto Gudali which had 18.54% in bile examination and 25.8% in faecal examination. Chi-square analysis showed an association between prevalence rate and breed of cattle (Tables 2 and 3).

Table 2: Breed prevalence of fasciolosis by bile examination in slaughtered cattle in Lokoja Abattoir:

<table>
<thead>
<tr>
<th>Breed</th>
<th>No. Sampled</th>
<th>No.Positive</th>
<th>$X^2$</th>
<th>P-Value</th>
<th>Odd ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Fulani</td>
<td>340</td>
<td>111 (32.6%)*</td>
<td>67.921</td>
<td>0.001</td>
<td>2.1</td>
</tr>
<tr>
<td>Adamawa Gudali</td>
<td>295</td>
<td>74 (25.0%)</td>
<td>1.5</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Red Bororo</td>
<td>201</td>
<td>46 (22.8%)</td>
<td>1.3</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Sokoto Gudali</td>
<td>124</td>
<td>23 (18.5%)</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figures in brackets indicate prevalence rate.

Table 3: Breed Prevalence of Fasciolosis by fecal examination in slaughtered at Lokoja Abattoir.

<table>
<thead>
<tr>
<th>Breed</th>
<th>No. Sampled</th>
<th>No. Positive</th>
<th>$X^2$</th>
<th>P-Value</th>
<th>Odd ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Fulani</td>
<td>340</td>
<td>137(40.3%)*</td>
<td>75.146</td>
<td>0.001</td>
<td>1.9</td>
</tr>
<tr>
<td>Adamawa Gudali</td>
<td>295</td>
<td>98(33.2%)</td>
<td>1.4</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Red Bororo</td>
<td>201</td>
<td>62(30.8%)</td>
<td>1.3</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Sokoto Gudali</td>
<td>124</td>
<td>32(25.8%)</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Figures in brackets indicate prevalence rate.
Table 4: Age distribution of Fasciolosis by bile examination in slaughtered cattle in Lokoja Abattoir.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>No. Cattle Sampled</th>
<th>No. Cattle Positive</th>
<th>$X^2$</th>
<th>P-Value</th>
<th>Odd ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 2</td>
<td>54</td>
<td>13 (24.1%)</td>
<td>90.283</td>
<td>0.000</td>
<td>1.0</td>
</tr>
<tr>
<td>3 – 4</td>
<td>173</td>
<td>43 (24.8%)</td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>5 – 6</td>
<td>313</td>
<td>88 (28.1%)</td>
<td></td>
<td></td>
<td>1.2</td>
</tr>
<tr>
<td>&gt; 6</td>
<td>420</td>
<td>110 (26.2%)</td>
<td></td>
<td></td>
<td>1.1</td>
</tr>
</tbody>
</table>

* Figures in brackets indicate prevalence rate.

Table 5: Age distribution of Fasciolosis by fecal examination in slaughtered cattle in Lokoja Abattoir.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>No. Cattle Sampled</th>
<th>No. Cattle Positive</th>
<th>$X^2$</th>
<th>P-Value</th>
<th>Odd ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 2</td>
<td>54</td>
<td>18 (24.1%)</td>
<td>111.571</td>
<td>0.000</td>
<td>1.0</td>
</tr>
<tr>
<td>3 – 4</td>
<td>173</td>
<td>58 (33.5%)</td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>5 – 6</td>
<td>313</td>
<td>110 (35.11%)</td>
<td></td>
<td></td>
<td>1.1</td>
</tr>
<tr>
<td>&gt; 6</td>
<td>420</td>
<td>143 (34.0%)</td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
</tbody>
</table>

Table 6: Sex specific prevalence of Fasciolosis by bile examination in slaughtered cattle in Lokoja Abattoir.

<table>
<thead>
<tr>
<th>Sex</th>
<th>No. Cattle Sampled</th>
<th>No. Cattle Positive</th>
<th>$X^2$</th>
<th>P-Value</th>
<th>Odd ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>564</td>
<td>160 (56.2%)*</td>
<td>17.150</td>
<td>0.002</td>
<td>1.3</td>
</tr>
<tr>
<td>Female</td>
<td>396</td>
<td>94 (29.7%)</td>
<td></td>
<td></td>
<td>1.3</td>
</tr>
</tbody>
</table>

* Figures in brackets indicate prevalence rate.

Table 7: Sex specific prevalence of Fasciolosis by faecal examination in slaughtered cattle in Lokoja Abattoir.

<table>
<thead>
<tr>
<th>Sex</th>
<th>No. Cattle Sampled</th>
<th>No. Cattle Positive</th>
<th>$X^2$</th>
<th>P-Value</th>
<th>Odd ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>564</td>
<td>205 (62.3%)*</td>
<td>19.942</td>
<td>0.002</td>
<td>1.3</td>
</tr>
<tr>
<td>Female</td>
<td>396</td>
<td>124 (37.7%)</td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
</tbody>
</table>

* Figures in brackets indicate prevalence rate.

Tables 4 and 5 show the age distribution of Fasciolosis by bile and fecal examination, respectively in slaughtered cattle in Lokoja abattoir.

Two hundred and fifty-four (254) and 329 out Fasciola gigantica eggs by bile and faecal of 960 cattle sampled were positive for examination, respectively. The highest
numbers of positive cases were in cattle aged six years and above and lowest numbers of positive cases were in the age brackets of 0-2 years. Chi-square analysis showed an association between prevalence rate and age of cattle slaughtered ($P < 0.05$). Tables 6 and 7 show sex-specific prevalence rates of Fasciolosis by bile and faecal examinations in slaughtered cattle in Lokoja Abattoir. One hundred and sixty of 254 Fasciola gigantica positive cattle representing 63.0% were males while 94 of the positive cattle (37.0%) were females by bile examination. On the other hand, 205 of 329 Fasciola gigantica cattle (62.3%) were males and 124 of the positive cattle (37.7%) were females by fecal examination. Chi-square analysis showed an association between prevalence of infection and sex of cattle ($P < 0.05$). Odd ratio indicated that liver fluke due to Fasciola gigantica in the study is significantly higher in male than in the females.

Discussion

The commonest diagnostic method in Nigeria is the traditional/coprological/egg count method as well as the post mortem liver examination. The coprological egg count method used in our study showed an overall percentage prevalence of 34.3%. This prevalence rate is close to that of 31.7% reported by Babalola (4) in Bauchi, Nigeria. It is lower than 38.9% obtained by Adedokun et al; (1) in Ibadan, Nigeria but higher than 23.3% reported by Njoku-Tony (21) in Imo State, Nigeria. The 26.4% prevalence rate obtained in our study using bile examination for Fasciola gigantica eggs is lower than 42.2% reported by Nwosu and Strivastava (22) in Maiduguri Nigeria. Schillhorn van Veen et al (30) reported that prevalence of fasciolosis in cattle vary widely in West Africa according to the availability and distribution of the snail intermediate host.

The differences in the findings may be attributed to difference in the time and length of study, geographical location, and seasonal variation. It should be pointed out that the traditional egg count is cumbersome and labour intensive with sensitivity as low as 30% in animals shedding small number of eggs (6, 13, and 29). In addition, the method is incapable of detecting early infection as eggs do not appear in feces until between 77-84 days post infection (15, 29). The animals with low eggs counts in our study may have fallen into this category.

Our study showed that Fasciola gigantica infection was higher in male than in female cattle. Reddington et al; (28) reported that male hosts are more susceptible to Fasciolosis than the females. Adedokun et al, (1) and Asanji (3) in their studies reported higher infection rate in female than male cattle. The disparity in the susceptibility to infection could be due to differences in the intrinsic factors like genetics, physiology and immunology; and extrinsic factors like environment and management practices.

Prevalence was higher in adult cattle than the young ones in this study. Young cattle are not subjected to long distant movements along their trade routes and this might have reduced their chances of picking the disease while grazing (10). Adult cattle on the other hand may have grazed on contaminated areas while travelling through their trade routes from the north (10). Breed specific distribution fasciolosis in our study showed that there were differences in prevalence rate among the breeds of cattle slaughtered in the abattoir. White Fulani cattle had the highest prevalence rate (32.6%) and 40.3% with bile and faecal examination, respectively while Sokoto Gudali showed lowest prevalence rate of 18.5% and 25.8% with bile and faecal examination, respectively. Chi-square analysis showed statistical association between sex, age and breed of the cattle examined and prevalence of Fasciola gigantica. This is the first prevalence study of Fasciolosis in cattle in Lokoja, Kogi State. Although Fasciolosis in human has not been studied to find the linking of human beings with the disease, the high prevalence of the
disease in this study calls for research in human fasciolosis in Lokoja and other parts of Nigeria where the disease is endemic in ruminants because of the public health importance of the disease. Coprological method of examination is less sensitive for early detection of Fasciolosis and calls for more sensitive method such as the Pourgueir ELISA which often detects infections due to immature flukes when fecal output is nil.

The breed specific prevalence rate was highest in White Fulani cattle 43.7% and 9.1% and 9.7% with bile and fecal examinations, respectively, and lowest in Sokoto Gudali 9.1% and 9.7% with bile and fecal examinations, respectively.

Conclusion

This study revealed that Fasciola gigantica infection was prevalent in slaughtered cattle in Lokoja abattoir and caused slight to severe liver damage leading to liver rejection. The 26.4% and 34.3% prevalence rates of infection using bile and coprological methods of examination respectively, calls for adequate veterinary and public health enlightenment programmes for early detection (for instance using more sensitive method such as the Pourgueir ELISA, which often detects infections due to immature flukes when faecal egg output is nil) control and prevention of the disease in cattle so as to avoid possible human infection as fasciolosis is a proven zoonosis and constitutes an important public health problem in many parts of the world with an estimated 2.4 million people affected (36).

Humans can become infected with Fasciola gigantica if they consume contaminated vegetables (19), or raw and improperly cooked liver from an infected animal. In Nigeria, there are few reports on the prevalence of fasciolosis (formerly fascioliasis) in spite of the well-known economic importance of the disease in livestock (24,26). The existing accounts of the disease in Nigeria are based on local surveys on the incidence of fasciolosis in some areas of the country and often cover only a few months of the year (25).

References


