Prevalence of Fascioliasis and Histopathology of the Liver in Cattle Slaughtered in Port Harcourt Abbatoir, Rivers State Nigeria

N. C. Eze* and Alexandra A. Briggs
Department of Animal and Environmental Biology, University of Port Harcourt, P.M.B.5323, Choba, Rivers State, Nigeria
*E-mail address: chinwe.eze@uniport.edu.ng

ABSTRACT
A study was carried out to determine the prevalence of fascioliasis and histopathology of the liver in Cattle slaughtered in Port Harcourt Abbatoir, Rivers State Nigeria between October to December 2016. Faeces were collected, processed using formal ether concentration technique while tissue samples for both infected and non-infected liver were collected for proper histopathological procedures. The livers of slaughtered cattle were examined by visualization, palpation and incision. Seven hundred cattle were randomly selected from all the slaughtered cattle during the period of study. Out of the 712 sampled cattle, 38 (5.34%) were infected. Five hundred and seventy one (571) of these were males with infection rate of 32 (5.60%), while 141 were females with infection rate of 6 (4.25%). Based on breed, infection rates were 12 (4.35%), and 26 (6.02%) for breeds of Sokoto Gudali and Red Bororo respectively. No infection was recorded in White Fulani breed. There was no statistically significant association between infection and breed and between infection and sex of the animals sampled. Histopathology of non-infected and infected liver was carried out. Microscopically the non-infected liver tissue cells, sinusoids, bile duct and portal tract were all normal. There were also no abnormal changes in the nucleus and the colour of the tissue. But that of the infected liver tissue appeared pale in colour, greatly swollen indicating fibrosis. There was dilation in the central vein and accumulation of debris, large patches scattered over the parietal surface and the pipe stem appearance of the liver were noticed. The histopathological changes showed tissue damage and this results to economic losses in animals, also to the butchers as well as health problems in man. Proper abattoir inspection and care is required by veterinary workers to ensure that heavily damaged livers are not sold for public consumption to avoid serious health problems

Keywords: Prevalence, Fascioliasis, histopathology, Abbatoir
1. INTRODUCTION

Fasciolasis has been known as an important parasite of domestic animals for years till date and a cosmopolitan infection. Fasciolasis is a zoonotic plant borne trematode disease of major domestic livestock disease that can be characterized by host liver damage. (Mas-Coma, Bargues and Valero 2005). This disease is known commonly as liver rot or liver fluke disease, this is because the adult parasites resides in the liver, also in the bile duct and gall bladder of various ruminant including buffalo, oxen and even Man. Transmission of the disease and the seasoned appearance of infection in any given community are dependent upon and aggravated by some factors such as; the absence of a substantial reservoir of water and potential host and the presence of the lymneae snail intermediate host. Furthermore transmission of Fasciolasis has been said to occur during the dry season when livestock feed in small areas and drink water from the same water sources like dams, holes and snail infested areas. Most times the intensity of this infection is low on migratory herds, except when they have to feed on heavily infested vegetation during their migration. Other factors which enhance the spread of fasciolasis are climatic condition, typically the long wet season are usually associated with high rate of infection, overstocking of ruminant, snail distribution, contamination of water source by human and non-human hosts and engagement of unsafe dietary practices that includes the uncooked, poorly treated aquatic vegetation or foliage located around water reservoir. (Afrakhosravi, 2001, Keiser et al., 2007 and Valero et al., 2003). Incidence of the infection has been reported in many countries including Nigeria, Pakistan, China, United States of America and Iran. (Valero et al., 2010 and WHO, 2006). This being so, aspects of liver histopathology in cattle fasciolasis at the municipal abattoir in Rivers State is yet to be investigated. The present work is an investigation on the prevalence and histopathology of the liver in cattle fasciolasis

2. MATERIALS AND METHODS

Study Area

The area of study was in Port Harcourt south of Niger delta in Rivers State, Nigeria. (Fig. 1). It is located in tropical rain forest. Cattle are usually transported from Northern Nigeria to Rivers State, cattle are slaughtered at abattoirs located proximal to meat markets.

Collection of Samples and Liver Tissue Inspection

Investigation was conducted within the month of October and December 2016, each abattoir was visited during the weekend in the early hours of the morning between the hours of 5:30-6:00am before the cattle were slaughtered. Collection of sample was done with the help of a qualified veterinary officer around after the cattle have been slaughtered. Inspection was done first by visual and palpation of the liver tissue and for better examination, instruments like a sharp knife and hook were used. Access was made to the duct of the liver by cleaving the liver with the hook and cutting through making an incision to thoroughly check for the presence of parasite. The fluke were seen rushing out of the duct in heavily and slightly infected tissue. At an advance stage of infection, the liver becomes whitish and hard with holes on it, while healthy liver tissues were red and fluffy.
The degree of infestation was recorded and tissue samples for both infected and non-infected liver were collected for proper histopathological procedures. Samples for corresponding cattle, as well as the breed, sex, were also recorded. Samples were preserved in a refrigerator and were processed within 24 hours.

Figure 1. The area of study was in Port Harcourt south of Niger delta in Rivers State,

Collection of Samples and Liver Tissue Inspection

Investigation was conducted within the month of October and December 2016, each abattoir was visited during the weekend in the early hours of the morning between the hours of 5:30-6:00am before the cattle were slaughtered. Collection of sample was done with the help of a qualified veterinary officer around after the cattle have been slaughtered. Inspection was done first by visual and palpation of the liver tissue and for better examination, instruments like a sharp knife and hook were used. Access was made to the duct of the liver by cleaving the liver with the hook and cutting through making an incision to thoroughly check for the presence of parasite. The fluke were seen rushing out of the duct in heavily and
slightly infected tissue. At an advance stage of infection, the liver becomes whitish and hard with holes on it, while healthy liver tissues were red and fluffy. The degree of infestation was recorded and tissue samples for both infected and non-infected liver were collected for proper histopathological procedures. Samples for corresponding cattle, as well as the breed, sex, were also recorded. Samples were preserved in a refrigerator and were processed within 24 hours.

Sample Processing

Faecal Sample two grams (2 g) of faeces was collected into labeled test tubes containing 3 mLs of distilled water. The faecal samples and the distilled water were strained to give a suspension. The suspension was strained through a tea strainer into a corresponding cleaned labeled Petri dish. The filtrate was poured into corresponding test tubes. One milliliter (1 mL) of 10% formalin was added into the test tubes which were allowed to stand for 5 minutes. Diethyl-ether (1 mL) was added in the test tubes after 5 minutes, using different 18-gauge hypodermic needle and syringe. The test tubes containing the suspension were then corked, shaken to mix, and centrifuged at 2000 rpm for 8 minutes. The eggs and cysts of the parasites sediment at the bottom and the faecal debris became separated in a layer between the diethyl-ether and water. The supernatant was then decanted leaving few of it with the sediment. Drops (1-2) of the sediment were put on a glass slide, covered with cover slip, and viewed under microscope using ×100 magnification.

Histological Preparation of Liver Tissues

Infected liver of cattle were trimmed into sizes and fixed in formol saline solution for 24 hours, and washed in tap water. Fixed tissues were dehydrated in ascending grades of alcohol (70%, 95% and absolute concentration). Dehydrated tissues were cleared in zylene, infiltrated in liquid paraffin wax at 600C and embedded in clean wax to block. Blocked tissues were mounted in wood frames and cut into 5µ thick sections using rotary microtome. Cut sections were flattened on water bath at 400c and picked with clean albumenized slides. Sections were dewaxed in descending grades of alcohol (absolute concentration, 95% and 70%). Dewaxed sections were stained with haematoxylin and counter stained with eosin, dehydrated in alcohol, cleared in xylene and mounted with cover slip for examination. The photographs of the different slides of liver tissue were taken.

3. RESULTS

Seven hundred cattle were randomly selected from all the slaughtered cattle during the period of study. Out of the 712 sampled cattle, 38(5.34%) were infected. Thirty (30) of these were livers examined cattle from Trans-amadi Abbatoir which was visited in the space of three (3) months and 8 (14.74%) from Choba Abbatoir all in Rivers State (Table 1). Five hundred and seventy one (571) of these were males with infection rate of 32 (5.60%), while 141 were females with infection rate of 6 (4.25%) (Table 2). Out of 276 Sokoto Gudali breeds examined 12 (4.35%) were infected, and out of 432 of Red Bororo breeds examined 26 (6.0%) were found infected, while White Fulani breeds were all free of the disease (Table 2). Histopathology of non-infected and infected liver was carried out. Microscopically the non-
infected liver tissue cells, sinusoids, bile duct and portal tract were all normal. There were also no abnormal changes in the nucleus and the colour of the tissue. But that of the infected liver tissue appeared pale in colour, there was dilation in the central vein and accumulation of debris.

Table 1. Prevalence of liver fascioliasis in examined cattle slaughtered at the municipal abattoir in Rivers State

<table>
<thead>
<tr>
<th>Month</th>
<th>Trans-Amadi Abbatoir No Examined</th>
<th>Choba Abbatoir No Examined</th>
<th>Choba Abbatoir No Infected (%)</th>
<th>Trans-Amadi Abbatoir No Examined</th>
<th>Total No Infected (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>October</td>
<td>130</td>
<td>52</td>
<td>2 (3.84)</td>
<td>182</td>
<td>9 (4.94)</td>
</tr>
<tr>
<td>November</td>
<td>205</td>
<td>54</td>
<td>3 (5.55)</td>
<td>259</td>
<td>15 (5.79)</td>
</tr>
<tr>
<td>December</td>
<td>215</td>
<td>56</td>
<td>3 (5.35)</td>
<td>271</td>
<td>14 (5.16)</td>
</tr>
<tr>
<td>Total</td>
<td>550</td>
<td>162</td>
<td>8 (14.74)</td>
<td>712</td>
<td>38 (5.34)</td>
</tr>
</tbody>
</table>

Table 2. Prevalence of liver fascioliasis in examined cattle slaughtered at the municipal abattoir in relation to sex and breeds

<table>
<thead>
<tr>
<th>Relation to sex</th>
<th>Examined</th>
<th>Positive</th>
<th>Prevalence %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>141</td>
<td>6</td>
<td>4.25</td>
</tr>
<tr>
<td>Males</td>
<td>571</td>
<td>32</td>
<td>5.60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>712</strong></td>
<td><strong>38</strong></td>
<td><strong>5.34</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relation to breeds</th>
<th>Examined</th>
<th>Positive</th>
<th>Prevalence %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sokoto Gudali</td>
<td>276</td>
<td>12</td>
<td>4.35</td>
</tr>
<tr>
<td>Red Bororo</td>
<td>432</td>
<td>26</td>
<td>6.01</td>
</tr>
<tr>
<td>White Fulani</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>712</strong></td>
<td><strong>38</strong></td>
<td><strong>5.34</strong></td>
</tr>
</tbody>
</table>
Histopathology of liver tissue.

Plate 1. Normal liver tissue section showing normal hepatocytes, sinusoid, nuclei and cell wall Magn: ×100 Stain (H & E)

Plate 2. Infected liver tissue showing fluke migratory tract abnormal sinusoid Mag: ×100 Stain (H & E)
Plate 3. Infected liver tissue: pale color with egg of fluke
Magn: ×100 stain (H&E)

Plate 4. A Healthy liver
Plate 5. Heavily Infected liver (pipe stem appearance)

Plate 5. Infected liver with fasciola spp rushing out
4. DISCUSSION

The present study was carried out in two abattoirs in Port-Harcourt for three months respectively to assess the prevalence of fasciolasis and the histopathology of the liver in cattle. The study has revealed the prevalence of fasciolasis in cattle slaughtered in the municipal abattoirs in Rivers State. This is because the study was carried out during the dry season. According to Mas-Coma (2005) in his work ‘fascioliasis and other plant-borne trematode zoonoses’ he reported that the prevalence of helminthes parasites in cattle is highest in the tropical rainforest as well as in the sub-tropical areas where annual rainfall is very high. This high rainfall is known to favour the proliferation of snail, Lymnacea natalensis and Lymnaea truncatula, which are intermediate host of liver flukes.

The prevalence of fasciolasis in cattle may have to do with the location of the abattoir and also with the season. The period/season of this study is another factor that influence the rate of data obtained. This is because the rainy season tends to contribute to the survival of the intermediate host-water snail than the dry season and their by encouraging the parasitism of the parasite (Suarez and Busetti, 1995).

Infection will result to the condemnation of heavily infected liver which brings about great loss thereby affecting the market price of the healthy liver in other to recover the loss. Out of the 6,933 cattle examined by Danbirni et al., (2015), a prevalence rate of 1.2% from 80 livers that was condemned and recorded and the total weight of both partially and totally condemned liver tissue was 295.8kg which amount to a financial loss of ₦354,960. Disease prevalence was found to be more in males than in females.

The disparity in susceptibility to helminth infection between the two sexes could be attributed to the differences in the host intrinsic factors and extrinsic factors, also both sexes move together in search of food and water and therefore possibility for both sexes to be equally exposed to the risk of infection is high. Moreover, the infection was found to be more in Sokoto Gudali than in Red Bororo breed probably due to differences in the number of animals examined.

Histopathology of non-infected and infected liver was carried out. Microscopically the non-infected liver tissue cells, sinusoids, bile duct and portal tract were all normal. There were also no abnormal changes in the nucleus and the colour of the tissue. But that of the infected liver tissue appeared pale in colour, greatly swollen indicating fibrosis, large patches scattered over the parietal surface and the pipe stem appearance of the liver were noticed. There was dilation in the central vein and accumulation of debris, this indicates the obstruction of liver functions including protein synthesis (Talukder et al., 2010).

Gross fibrosis of bile duct was as a result of migrating fluke in the liver tissue. Damage to the hepatic cells is as a result of the method of feeding by the premature parasites and it’s most common in bovine cirrhosis (Njoku-Tony and Okoli, 2011).

Haroun et al., (1986) also reported the degenerative and necrotic changes in hepatocytes associated with haemorrhage, fibrosis, increased lobulation of the liver, mononuclear cell infiltration with haemosiderin deposition in fluke tracks and portal areas and the formation of granulomata around fluke eggs and fluke remnants in sheep naturally infected with F. gigantica. Also Odigie et al., reported gross examination of infected livers and revealed that the capsule were enlarge, this enlargement is due to the presence of fluke (both adult and young fluke) were seen in the bile duct.
5. CONCLUSION

From the study, it can be concluded that the prevalence and rate of intensity of fasciolasis in cattle greatly affects the histology of the liver tissue. Depending on the grade of intensity, histopathological changes in the livers of cattle infected with fasciolasis reflects tissue damage, which can amount to significant economic losses in animals and great health problems to the uninformed populace. Adequate attention and care is required by veterinary workers to ensure that heavily damaged livers are not sold for public consumption to avoid serious health problems.

References


