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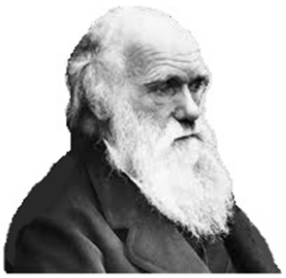

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Prevalence of Fascioliasis and Histopathology of the Liver in Cattle Slaughtered in Port Harcourt Abbatoir, Rivers State, Nigeria

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ABSTRACT

A study was carried out to determine the histopathology of the liver in cattle slaughtered in Port Harcourt Abattoir, River State, Nigeria, between October to December 2016, and to assess the prevalence of fascioliasis. In undertaking this, faeces were collected and processed using the formal ether concentration technique, while tissue samples for both, infected and non-infected livers, were collected for proper histopathological procedures. Herein, the livers of slaughtered cattle were examined through visualization, palpation, and incision. The outcome of our work showed that out of the 712 randomly sampled cattle, 38 (5.34%) were infected. Of these, 571 were males with an infection rate of 32 (5.60%), while 141 were females with infection rate of 6 (4.25%). Based on the 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 the White Fulani breed. There was no statistically significant association between infection and breed, and between infection and sex of the animals sampled. In our histopathology studies of non-infected and infected livers, microscopically, the non-infected liver tissue cells, sinusoids, bile duct and portal tract were all normal. Our results also showed that there were no abnormal changes in the nucleus and the colour of the tissue. However, infected liver tissue appeared pale in colour and greatly swollen, indicating fibrosis. In addition, there was dilation in the central vein and debris and large patches scattered over the parietal surface. Moreover, the pipe stem appearance of the liver was evident. Such histopathological changes indicate tissue damage and this results in economic losses in rearing and in butchering in animals, and in harm to human health. Proper abattoir inspection and care by veterinary workers is therefore required to ensure that heavily damaged livers are not sold for public consumption.

***Keywords*:** Prevalence, Fascioliasis, histopathology, Abbatoir

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1. INTRODUCTION

Fasciolaisis has been known as an important parasite of domestic animals for years till date and a cosmopolitan infection. Fascioliasis 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 commonly known as a liver rot or liver fluke disease, this is because the adult parasites reside 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 is 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 lymnaea snail intermediate host. Furthermore, transmission of fasciolasis has been said to occur during the dry season when livestock is 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 be fed on heavily infested vegetation during their migration. Other factors, which enhance the spread of fascioliasis are climatic conditions, typically the long wet seasons are usually associated with a 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 include the uncooked, poorly treated aquatic vegetation or foliage located around water reservoir (Afrakhosravi, 2001; Keiser *et al*., 2007; and Valero *et a*l., 2003). Incidence of the infection has been reported in many countries, including Nigeria, Parkistan, 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 the 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, then they are slaughtered at abattoirs located proximal to the meat markets.

Collection of Samples and Liver Tissue Inspection

Investigation was conducted within the months of October and December 2016, each abattoir was visited during the weekend in the early hours of the morning, between the hours of 5:30-6:00 am, 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. An 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. A fluke was seen rushing out of the duct in heavily and slightly infected tissue. At an advanced 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 livers were collected for proper histopathological procedures. Samples for corresponding cattle, as well as the breed, and sex, were also recorded. Samples were preserved in a refrigerator and were processed within 24 hours.

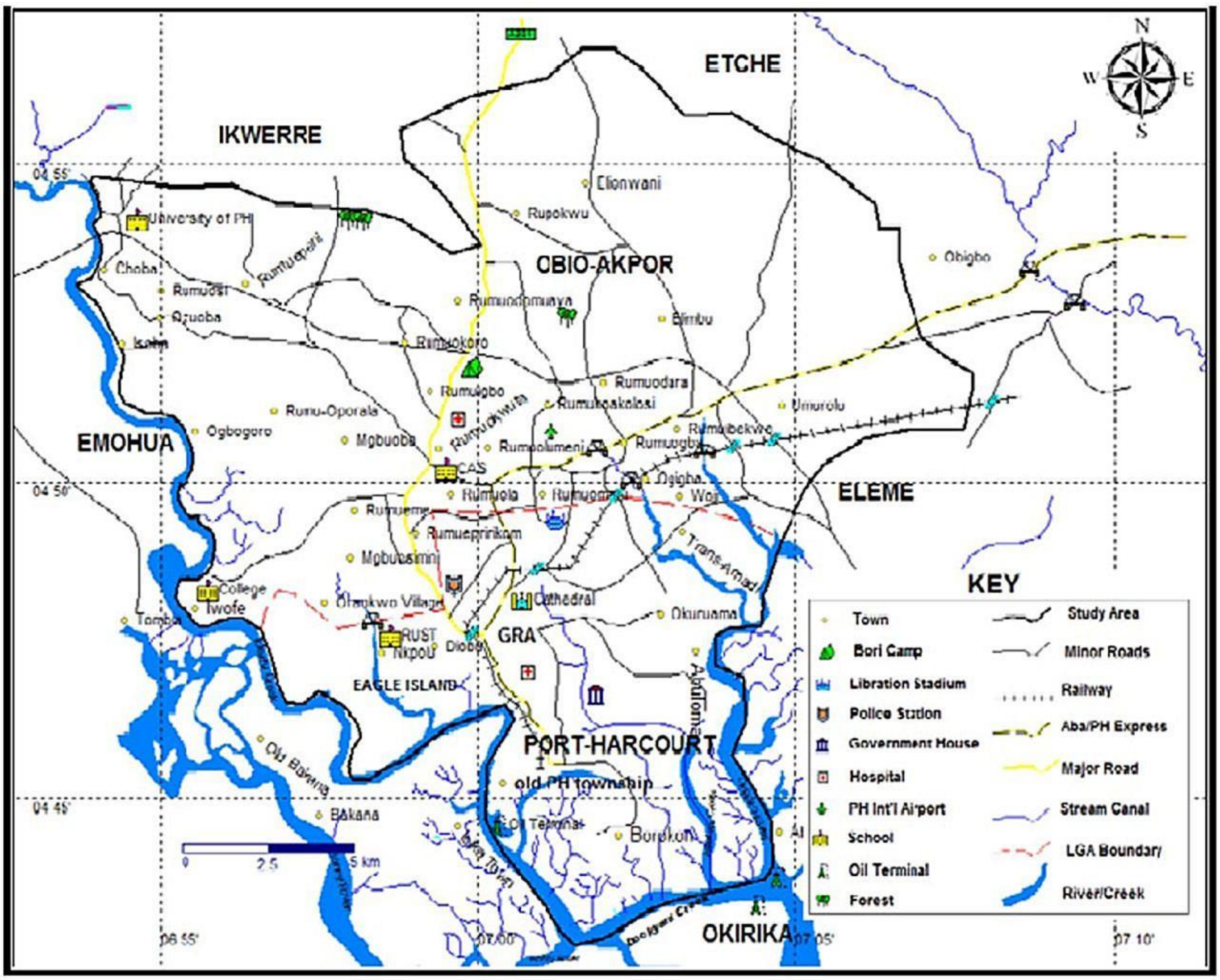

Figure 1. The area of study - Port Harcourt south of Niger delta in Rivers State

Sample Processing

Faecal sample, two grams (2 g) of faeces was collected into labeled test tubes containing 3 mL 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 the 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 livers 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 600 ºC, and embedded in clean wax to block. Blocked tissues were mounted in wood frames and cut into 5-µm thick sections using rotary microtome. Cut sections were flattened on water bath at 400 ºC, and picked with clean albumenized slides. Sections were de-waxed in descending grades of alcohol (absolute concentration, 95%, and 70%). The de-waxed 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 (see **Plates 1** through **5**).

3. RESULTS

Seven hundreds 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 period of three (3) months and 8 (14.74%) from Choba Abbatoir, all in Rivers State (**Table 1**). Five hundreds and seventy one (571) of these were males with the infection rate of 32 (5.60%), while 141 were females with the 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 nucleui and the colour of the tissue. But in that of the infected liver tissue which appeared pale in colour, there was a 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

Month	Trans-Amadi Abbatoir Number of Examined	Number of Infected (%)	Choba Abbatoir Number of Examined	Number of Infected (%)	Total Number of Examined	Number of Infected (%)
October	130	7 (5.38)	52	2 (3.84)	182	9 (4.94)

November	205	12 (5.85)	54	3 (5.55)	259	15 (5.79)
December	215	11 (5.11)	56	3 (5.35)	271	14 (5.16)
Total	550	30 (16.3)	162	8 (14.74)	712	38 (5.34)

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

Relation to sex	**Examined**	**Positive**	**Prevalence, %**
Females	141	6	4.25
Males	571	32	5.60
Total	712	38	5.34
Relation to breeds			
Sokoto Gudali	276	12	4.35
Red Bororo	432	26	6.01
White Fulani	4	0	0
Total	712	38	5.34

Histopathology of liver tissue

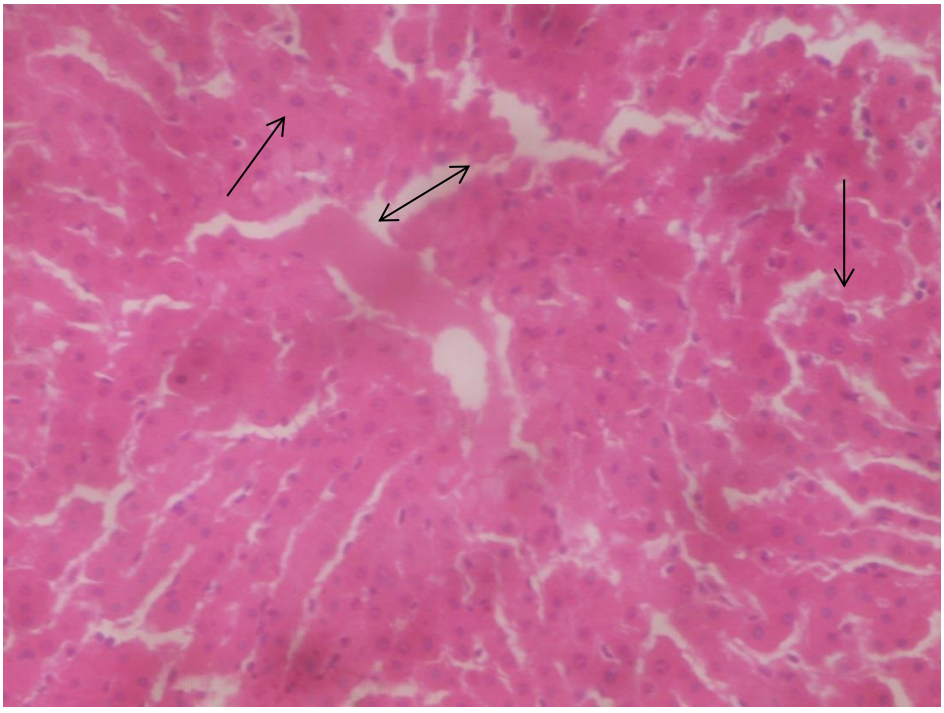

Plate 1. Normal liver tissue section showing normal hepatocytes, sinusoid, nuclei and cell wall Magn: ×100 Stain (H & E)

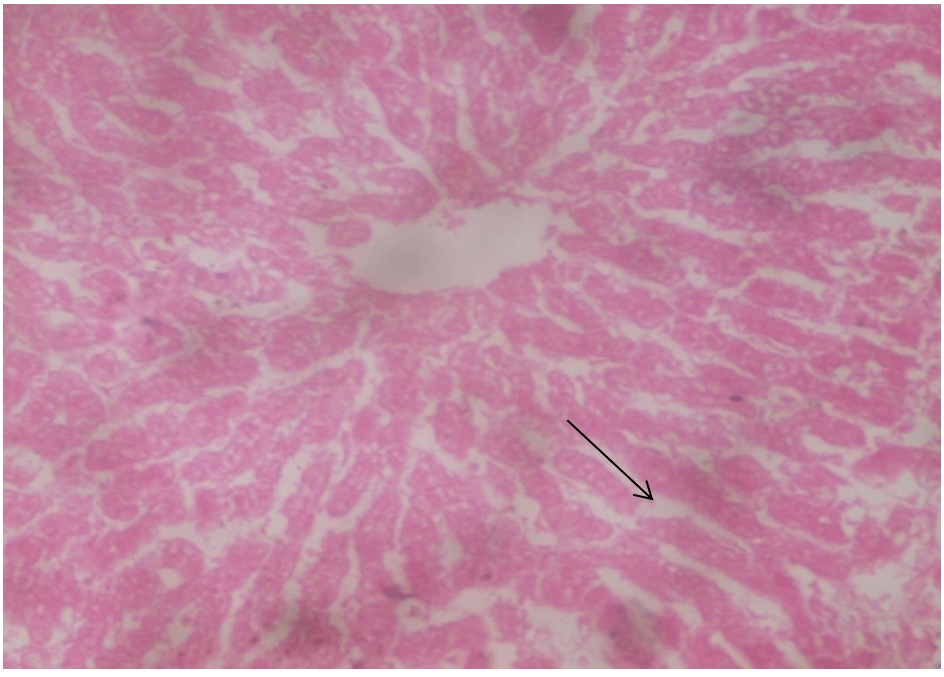

Plate 2. Infected liver tissue showing fluke migratory tract abnormal sinusoid Mag: ×100 Stain (H & E)

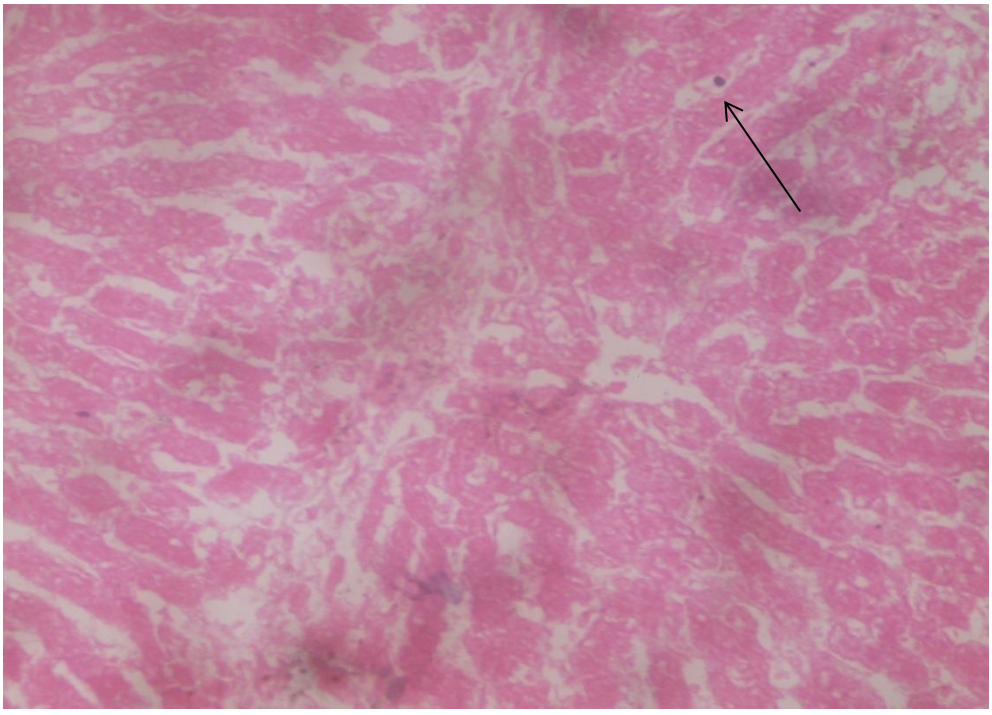

Plate 3. Infected liver tissue: pale color with egg of fluke
Magn: ×100 stain (H&E)

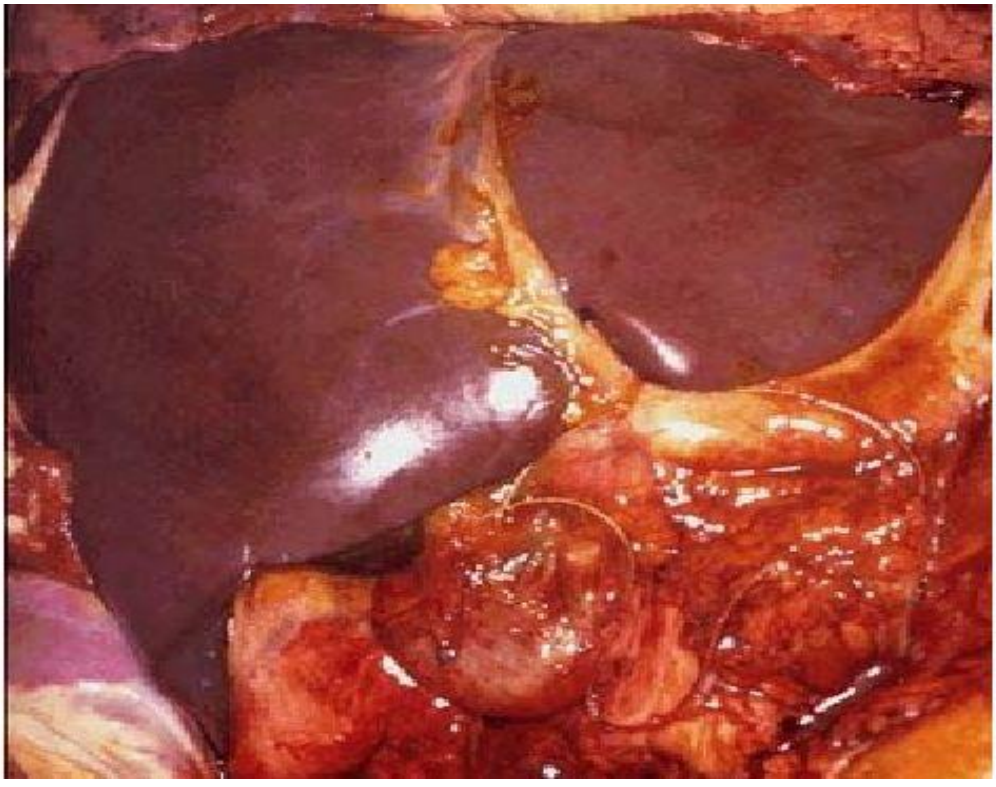

Plate 4. A Healthy liver

Plate 5. Heavily Infected liver (pipe stem appearance)

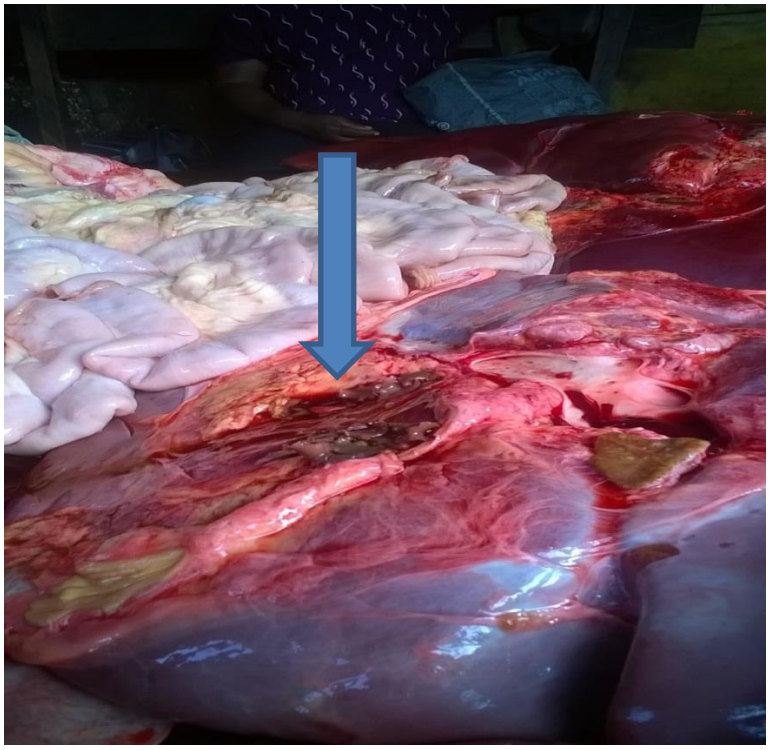

Plate 6. Infected liver with fasciola spp rushing out

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 fascioliasis 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 the 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 snails, *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 influences the rate of data obtained. This is because the rainy season tends to contribute more to the survival of the intermediate host-water snail than the dry season, and theirby encouraging the parasitism of the parasite (Suarez and Busetti, 1995).

Infection will result to the condemnation of heavily infected liver which brings about a great loss, thereby affecting the market price of the healthy liver in order 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, the total weight of both partially and totally condemned liver tissue was 295.8 kg 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 the 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 the 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 a 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 is 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 the sheep naturally infected with *F. gigantica.* Also Odigie *et al*., (2011) reported gross examination of infected livers and revealed that the capsules were enlarged; this enlargement is due to the presence of fluke (both adult and young fluke) and was 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 un-informed 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

[1] Afrakhosravi E.B. (2011). Epidemiology of *Fasciola hepatica* in Iran. *Int. J. Biol.* 4(4): 87.

[2] Danbirni, S., Ziyauhaq, H., Allam, L., Okaiyeto, S.O., and Sackey, A.K.B. (2015). Prevalence of Liver Condemnation Due to Fasciolasis in Slaughtered Cattle and its Financial Losses at Kano Old Abbatoir. *Journal of Veterinary Advances* 5(6): 1004-1009.

[3] Haroun E.M., Gadir A.H., and Gameel A.A. (1986). Studies on naturally occurring ovine fascioliasis in the Sudan *J. Helminthol*. 60(1): 47-53.

[4] Keiser, J., Utzinger, J., and Vennerstrom, J.L. (2007). Activity of Artemether and 0278 against triclabendazole resistance *Fasciola hepatica. Transaction of the Royal Society for Tropical Medicine and Hygiene*, 101 (12), 1219-1222

[5] Mas-Coma S., Barques M.D., and Valero M.A., (2005), Fascioliasis and other plant-borne trematode zoonoses. *International Journal for Parasitology*, 35 (11): 1255-1278.

[6] Njoku-Tony R.F. and Okoli G.C. (2011). Prevalence of fascioliasis among slaughtered sheep in selected abattoirs in Imo State, *Nigeria. J. Amer. Sci*. 7(2): 361-366

[7] Odigie B.E. and Odigie J.O. (2003). Fascioliasis in Cattle: A Survey of Abattoirs in Egor, Ikpoba- Okha and Oredo Local Government Areas of Edo State, Using Histochemical Techniques. *International Journal of Basic, Applied and Innovative Research* 2(1): 1-9.

[8] Suárez V.H. and Busetti M.R. (1995). Epidemiology of helminth infections of growing sheep in Argentina's Western Pampas. *Int. J. Parasitol.* 25: 489-494

[9] Talukder, S., Bhuiyan, M.J., Hossain, M.M. Viddin, M.M., Paul, S., and Howlader, M.M.R., (2010). Pathological Investigation of Liver Fluke Infection of Slaughtered Black Bengal Goat in a selected Area of Bangladesh. *Bangladesh Journal of Veterinary Medicine,* 8 (1), 35–40

[10] Valero, M.A., Santana, M., Morales, M., Hernandez, J.L., and Santiago, M. (2003). Risk of Gallstone Disease in Advanced Chronic Phase of Fascioliasis. An Experimental Study in a Rat model. *Journal of Infectious Diseases*, 188, 787-793.

[11] Fairweather, I. and Boray, J.C. (1999). *Fasciolicides*: efficacy, actions, resistance and its management. *Veterinary Journal* 158 (2): 81-112.

[12] Haroun, E.M., Gadir, A.H., and Gameel, A.A. (1986). Studies on naturally- occurring ovine fascioliasis in the Sudan. *J. Helminthol.* 60(1): 47-53.

[13] Ibarra, F., Vera, Y., and Quiroz, H. (2004). Determination of the effective dose of an experimental fasciolicide in naturally and experimentally infected cattle. *Veterinary Parasitology* 120 (1–2): 65–74.

[14] Keiser, J., Utzinger, J., and Vennerstrom, J. L. (2007). Activity of Artemether and 0278 against triclabendazoleresistance Fasciola hepatica. *Transaction of the Royal Society for Tropical Medicine and Hygiene,* 101 (12), 1219-1222

[15] Mailles, A., Capek, I., Ajana, F., Schepens, C., Ilef, D., and Vaillant, V. (2006). Commercial watercress as an emerging source of *fascioliasis* in Northern France in 2002: results from an outbreak investigation. *Epidemiology of Infection* 134, 942–945.

[16] Marcos, L.A., Tagle, M., and Terashima, A. (2008). Natural history, clinic radiologic correlates, and response to triclabendazole in acute massive *fascioliasis*. *American Journal of Tropic Medical Hygiene* 78, 222–227.

[17] Mas-Coma, S., Bargues, M.D., and Valero, M.A. (2005). *Fascioliasis* and other plant-borne trematode zoonoses. *International Journal of Parasitology* 35 (11–12): 1255–78.

[18] Mas-Coma, S., Valero, M.A., and Bargues, M.D. (2009). *Fasciola, lymnaeids* and human *fascioliasis*, with a global overview on disease transmission, epidemiology, evolutionary genetics, molecular epidemiology and control. *Advance Parasitology,* 69: 41–146.

[19] Moll, L., Gaasenbeek, C.P., Vellema, P., and Borgsteede, F.H. (2000). Resistance of Fasciola hepatica against triclabendazole in cattle and sheep in the Netherlands. *Veterinary Parasitology,* 91 (1–2): 153–8.

[20] Mulcahy, G. and Dalton, J.P. (1998).Vaccines in control of liver fluke infections in ruminants: current status and prospects. *Irish Veterinary Journal*, 51: 520–525.

[21] Njoku-Tony R.F. and Okoli G.C. (2011). Prevalence of fascioliasis among slaughtered sheep in selected abattoirs in Imo State, Nigeria. Journal of America. Science. 7(2): 361-366.

[22] O'Brien, D.J. (1998). *Fasciolosis*: a threat to livestock. *Irish Veterinary Journal* 51: 539–541.

[23] Romasanta, A., Romero, J.L., and Arias, M. (2003). Diagnosis of parasitic zoonoses by immunoenzymatic assays—analysis of cross-reactivity among the excretory/secretory antigens of *Fasciola hepatica Toxocara canis*, and *Ascaris suum. Immunological Investigation* 32: 131–142.

[24] Rossignol, J.F., Abaza, H., and Friedman, H. (1998). Successful treatment of human *fascioliasis* with nitazoxanide. *Trans. R. Social Tropical Medicine Hygiene* 92 (1): 103–4.

[25] Soliman, O.E. (2004). Evaluation of myrrh (Mirazid) therapy in *fascioliasis* and intestinal *schistosomiasis* in children: immunological and parasitological study. *Journal Egypt Social Parasitology* 34(3): 941-66

[26] Talukder, S., Bhuiyan, M.J., Hossain, M.M., Viddin, M.M., Paul, S., and Howlader, M.M.R. (2010). Pathological Investigation of Liver Fluke Infection of Slaughtered Black Bengal Goat in a selected Area of Bangladesh. *Bangladesh Journal of Veterinary Medicine,* 8 (1). 35-40

[27] Taira, N., Yoshifuji, H., and Boray, J.C. (1997). Zoonotic potential of infection with *Fasciola* spp. by consumption of freshly prepared raw liver containing immature flukes. *International Journal of Parasitology* 27 (7):775–779.

[28] Usip, L.P., Ibanga, E.S., Edoho, H.J., Amadi E.C., and Utah, E. (2014). Prevalence of fascioliasis and the economic loss of condemned liver due to Fasciola infection in cattle slaughtered at three abattoirs in Eket Urban, Akwa Ibom State of Nigeria. *Global Advance Research Journal Food Science Technology* 3(2): 54-75.

[29] Valero, M.A., Santana, M., Morales, M., Hernandez, J.L., and Santiago, M. (2003). Risk of Gallstone Disease in Advanced Chronic Phase of Fascioliasis. An Experimental Study in a Rat model. *Journal of Infectious Diseases*, 188, 787-793