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Bovine Fascioliasis: A Review

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Abstract: *Fascioliasis is a zoonotic trematodiasis of great public health importance affecting ruminant animals and man. The prevalence of bovine fascioliasis in Nigeria is high and affects the productivity of farmers. Fascioliasis is mainly detected in abattoirs during post mortem inspection as it affects the livers of these animals leading to partial or total condemnation of the liver. Since most cattle slaughtered in Nigeria originates from the northern parts of the country, the herds' men that rear these animals should be properly educated on the public health and economic significance of fascioliasis. The meat inspectors should be made to follow strict procedures while inspecting at the abattoir so that contaminated meat will not be passed for human consumption. Public awareness campaigns should be organized to educate the farm/livestock owners, butchers, other animal handlers and consumers about the implications of fascioliasis. All level of governance should also help in the prevention and control of fascioliasis in Nigeria.*
Keywords*: Bovine, Fascioliasis, Abattoir, Economic importance, Nigeria.*

I. Introduction

As meat consumption is on the increase worldwide, there are growing concerns about meat hygiene and safety since worldwide distribution of Fascioliasis is estimated at 90% in ruminants [1].

Fascioliasis is a disease that affects the liver parenchyma and bile ducts of numerous animals, including humans, which causes economic losses and threatens public health [2].

Fascioliasis is among the important parasitic diseases in tropical and subtropical countries which limit productivity of ruminants in particular cattle. Fasciola hepatica and F. gigantica are the two liver flukes commonly reported to cause fascioliasis in ruminants [3].

The development of fascioliasis involves the presence of an intermediate host (Lymnaea sp.), suitable habitats for mollusks and environmental factors such as high humidity, adequate temperature and rainfall. Furthermore, when infecting the definitive host, mature flukes lay eggs that spread in the environment and cause pasture recontamination [4].

Once ingested, parasites migrate through the liver parenchyma to reach the bile ducts. In ruminants, the liver is damaged and the subclinical and chronic disease usually results in decreased production of meat, milk and wool and secondary bacterial infections, fertility problems, loss of weight and poor carcass quality and great expenses with anthelmintics [5].

Fascioliasis is cosmopolitan infection. Incidence of the infection has been reported in many countries including Nigeria, Pakistan, China, United States of America and Iran [6, 7]. It is commonly reported in ruminants; cattle, goat and sheep [8, 9, 10].

Fascioliasis is a zoonotic disease of public health importance. Man becomes infected when metacercariae of the fluke is ingested along with water Cress Salad and vegetables grown along banks of water reservoirs inhabited by potential snail hosts. About 2.4 million people are infected world wide and 180 million are at risk of the infection [9, 7]. In Africa, the infection has been found to be a serious problem in humid and sub-humid zones [11].

II. Economic Importance

The economic losses due to fascioliasis are caused by mortality, morbidity, and reduced growth rate, condemnation of liver, increased susceptibility to secondary infections and the expense of control measures [12]. The direct economic impact of fascioliasis infection is increased condemnation of liver meat, but the far more damaging effects are decreased animal productivity, lower calf birth weight, and reduced growth in effected animals [13, 14, 15]. According to [16], the estimated economic loss caused by bovine fascioliasis in Maiduguri, Nigeria was N188, 804.00 ($1, 415.85) within 6 years. [10] Reported 7.35% and 96.65%, 18.58% and 81.42% and 5.77% and 94.23% condemned and partially condemned liver in Bovine, Caprine and Ovine species respectively. Economic impact of fascioliasis on livestock is enormous. Great loses are evident especially where farmers have little or no knowledge on the disease [10, 17]. Loses are more encountered during raining season when most stocks are exposed to fluke challenge. Reduction in milk and meat production,

condemnation of liver, lose of draught power, reproduction failure and mortality are some of the losses encountered [9, 18].

Nigerian livestock sector generates around 5% of the Nigeria's GDP and about a quarter of total agricultural output [19]. In 2004, the national GDP was $114.8 billion [20]. The average annual loss of N1,783,512.63 ($13,374.67) and a total periodic loss of N19,618,639.40 ($147,121.41) resulting from condemnation of 37,828 liver due to fascioliasis out of 1,640,095 cattle slaughtered from 1994 to 2004 were quite enormous.

All these authors agree that fascioliasis causes great economic loss to animal production, therefore resources and efforts should be directed towards the prevention and control of fascioliasis in Nigeria.

III. Epidemiology

Fascioliasis, a food- or water-borne trematodiasis due to infection by Fasciola hepatica or F. gigantica, is currently believed to affect as many as 17 million people worldwide, [21] with 91.1 million individuals at risk for infection [22]. Fasciola hepatica infects humans on all continents (except Antarctica), having the widest latitudinal, longitudinal, and altitudinal distribution of the food-borne trematodiases (FBT) and other parasitic and vector-borne diseases [23], while Fasciola gigantica infection is more geographically constricted, occurring in the tropical regions of Africa, the Middle East, and Asia, where infection due to either species may occur [24]. Contrary to early thinking, prevalence of veterinary disease is not predictive of prevalence of human disease in endemic regions [23]. Understanding the interaction between the parasite and its accidental human host at a molecular pathophysiological level is resulting from recent investigations [25]. Unlike the other Food- or water borne trematodiasis (FBT), in which consumption of raw or undercooked seafood is necessary for infection, humans most often become accidental hosts of Fasciola when they ingest aquatic vegetation on which the metacercariae have encysted. Implicated plants include (most commonly) watercress [26], water morning glory [27], other aquatic plants, salads in endemic areas [28] and alfalfa juice [29]. Another source of infection is drinking water contaminated with free-living (non-encysted) metacercariae. The least common mode of transmission is the consumption of raw or undercooked liver infected with immature or adult forms of the worm. Climatic factors such as rainfall and temperature plays a very important role in the epidemiology of Fasciola hepatica [30, 31, 32].

IV. Prevalence Of Bovine Fascioliasis In Different States Of Nigeria

LOCATION/ STATE	PREVALENCE (%)	REFERENCE
Abia	22.53	33
Adamawa (Yola)	22.08	34
Adamawa (Mubi)	22.34	
Adamawa (Numan)	19.92	
Calabar	44.8	35
Ibadan	2.58 (dry season)	36
Ibadan	2.07 (rainy season)	
Jalingo	20.95	37
Zaria	23.41	38
Zaria	13.09	39
Ikom	50.52	10

V. Diagnosis

Diagnosis of fascioliasis is important for its control. Diagnosis of fascioliasis is often limited in resource-poor settings to discovery of eggs in a patient's stool. This detection method can result in under-diagnosis, since the eggs do not appear in the stool until after the acute phase of infection. Additionally, in some cases, repeated stool ova tests occur with a negative result despite a laboratory-confirmed diagnosis of fascioliasis. If laboratory resources are available, ELISA or Western blot testing can confirm a diagnosis. There are three Different types of ELISA available for diagnosis of fascioliasis seroELISA, coproELISA and milkELISA. The MM3-SERO ELISA is a sensitive and highly specific test for the sero-diagnosis of cattle Fascioliasis and can be reliable to use with milk samples. It is an excellent method of estimating within-herd prevalence of infection when used with bulk samples [40, 41]. Results of ELISA using different antigens of F. gigantica for detecting antibodies against Fasciola in sera may be used in cattle. The diagnostic sensitivity, specificity and accuracy of the assay can be calculated according to [42, 43].

Ultrasonic detection of liver lesions can determine the extent of the tissue damage from the parasite [44]. The current trend in the diagnosis of more common bovine diseases, including Fascioliasis is to use the same samples of milk that are collected on farm for routine monitoring of animals productivity and quality of milk [45, 46], reducing the associated costs and disturbance to animals as a result of handling sampling.

VI. Prevention And Control

Because fascioliasis in humans is so poorly characterized compared to the infection in animals, control measures are difficult to devise and implement. However, as understanding of the human health impact of this disease increases, support for control measures has increased as well. This effort is buoyed by the World Health Organization's (WHO) designation of fascioliasis as an extremely neglected disease [47, 48].

Because the infection can be difficult to detect and can be transmitted in so many ways, control of fascioliasis has represented a significant challenge. The role of domestic and wild animal reservoirs, coexistence of the various Fasciola and snail species, and varying types of endemic situations have rendered the creation of a universal control strategy unrealistic [47].

A modern plan for the control of animal fascioliasis, which would ultimately forestall human infection, would include: a) preventing the consumption of metacercariae, b) strategically administering fasciolicides to the definitive hosts, and c) eliminating the intermediate hosts. Preventing the ingestion of Fasciola metacercariae involves fencing in contaminated areas, which is difficult, expensive, and not very effective. The strategic administration of fasciolicides, unlike curative treatment, is aimed at interrupting the life cycle of the parasite by treating animals according to a regimen that will prevent the initial infection, the formation of eggs, and, finally, contamination of the environment. There are now highly sophisticated methods for calculating the best time to administer such treatments [49]. For high efficacy and safety, triclabendazole is the drug of choice in human and animal fascioliasis [50, 51, 52].

References

[1]. Odigie BE and J.O. Odigie 2013. 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

[2]. Alves D.P., M.B. Carneiro , I.V.F Martins, C.C. Bernardo, D.M. Donatele, O.S. Pereira Júnior, B.R. Almeida, B.R. Avelar and A.G.C Leão. 2011. Distribution and factors associated with Fasciola hepatica infection in cattle in the south of Espírito Santo State, Brazil. The Journal of Venomous Animals and Toxins including Tropical Diseases. 17(3): 271-276.

[3]. Keyyu JD, J. Monrad, N.C. Kyvsgaard and A.A. Kassuku (2005). Epidemiology of Fasciola gigantica and Amphistomes in cattle on traditional, small-scale dairy and large scale dairy farms in the Southern Highlands of Tanzania. Trop An Health Prod; 37, 303-314.

[4]. Costa NC, I.C. Silva Santos and G.A. Botelho (1987). Myocastor coypus MOLINA, 1782 (Rodentia, Echymidae) naturalmente infectado com fasciola hepática (Linnaeus, 1758) (Trematoda, Fasciolidae). Hora Vet. 6(36):24-6.

[5]. Alcaíno, H., 1990. Epidemiology of fascioliasis in Chile.In: R.Ehrlich, A. Nieto and L. Yarzabál. Basic Research in Helminthiasis. Ediciones Logos, Montevideo, Uruguay, pp: 11-30.

[6]. Valero M. A., M. Santana, M. Morales, J.L. Hernandez and M. Santiago (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.

[7]. World Health Organization (2006). Animal Production and Health Paper NO. 78 United States of America.

[8]. Okaiyeto, SO, O.S. Salami, S.A. Dnbirni, L. Allam and I.I. Onoja (2012). Clinical, Gross and Histopathological Changes Associated with Chronic Fascioliasis Infection in a Dairy Farm. Journal of Veterinary Advances 2(8) . 444 – 448.

[9]. Talukder S., M.J. Bhuiyan, M.M. Hossain, M.M. Viddin, S. Paul and M.M.R. Howlader (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]. Ozung P.O., P.U. Owa, and K.O. Oni (2011). An Assessment of the Prevalence of Fascioliasis of Ruminants in Ikom Abattoir of Cross River State, Nigeria. Continental Journal of veterinary Sciences 5 (1): 1 – 5.

[11]. Ogunrinade A.F. and B. Ogunrinade (1980). The economic importance of fascioliasis in Nigeria. Tropical Animal Health and Production, 12. 155 – 160

[12]. Malone JB, R. Gommes, J. Hansen, J.M. Yilma, J. Slingenberg, F. Snijders F, Nachet OF, Ataman EA (1998). Geographic Information System on the potential distribution and abundance of Fasciola hepatica and F. gigantica inEast Africa based on food and agriculture organization databases, Veterinary Parasitology. 78, 87–101.

[13]. Njeruh 2004. "Prevalence and Economic Importance of Fascioliasis in Cattle, Sheep and Goats in Kenya." Kenya Veterinarian 27.

[14]. Hillver G.V. (2005). "Fasciola antigens as vaccines against Fascioliasis and Schistosomiasis." Journal of Helminthology 79.

[15]. Kaplan R. (2001). "Fasciola hepatica: A review of the economic impact in cattle and considerations for control." Veterinary Therapeutics 2(1).

[16]. Biu A.A., M.I. Ahmed and SS Mshelia 2006. Economic assessment of losses due to parasitic diseases common at the Maiduguri abattoir, Nigeria. Afr. Sci. 7(3): 143-145.

[17]. Hammond J.A., M.M.H. Sewell (1990). Diseases caused by Helminths. In M. M. H. Sewell and D. W. Brocklesdy (eds). Handbook of Animal Diseases in the Tropics, 4 th ed. (CTVM, Edinburge University). 119 – 123.

[18]. Diawet D.T., M. Seye, Y. Sarr (1998). Epidemiology of Trematodiases. In livestock in the Kolda Region Casomance. Rev. Elev. Med. Pays vet. Tropic 41. 252 – 264.

[19]. Better Business Initiative (BBI) Nigerian Economic Summit Group (NESG) Consultative Forum with Livestock Farmers in Northern Nigeria. 2004 http://www.pak-nigeria.org/pdfs/livestock_Forum_Summary.pdf

[20]. Index Mundi Nigeria Economic Profile 2004; http://www.indexmundi.com/en/facts/2004/nigeria/economy_profile.html (Accessed 6 September, 2011).

[21]. Hopkins D.R (1992). Homing in on helminths. Am J Trop Med Hyg. 46:626–634.

[22]. Keiser J and J. Utzinger (2005). Emerging foodborne trematodiasis. Emerg Infect Dis. 11:1507–1514.

[23]. Mas-Coma S (2005). Epidemiology of fascioliasis in human endemic areas. J Helminth. 79(3):207–216.

[24]. Keiser J, Utzinger J. (2009). Food-borne trematodiases. Clin Microbiol Rev. 22:466–483.

[25]. Robinson MW, R. Menon and S.M. Donnelly (2009). An integrated transcriptomics and proteomics analysis of the secretome of the helminth pathogen Fasciola hepatica: Proteins associated with invasion and infection of the mammalian host. Mol Cell Proteomics. 8:1891–1907

[26]. Tolan R.W. Jr. 2001. Fascioliasis. eMedicine from WebMD. Updated June 15, 2010.

[27]. Price T.A, C.U. Tuazon , G.L. Simon 1993. Fascioliasis: Case reports and review. Clin Infect Dis. 17:426–430.

[28]. Marcos L, V. Maco, A. Terashima (2005). Fascioliasis in relatives of patients with Fasciola hepatica infection in Peru. Rev Inst Med Trop Sao Paulo. 47:219–222.
[29]. Marcos L, Maco V, Samalvides F (2006). Risk factors for Fasciola hepatica infection in children: A case-control study. Trans R Soc Trop Med Hyg. 100:158–166.
[30]. Melendez R.D., A.F. Coronado, J.J. Dfaz and G.L. Crespo (1983). Aspectos epidemiologicos de la Fascioliasis bovina en el centroccidente venezolano con enfasis en la prevalencia deltrematode y de su hospedador intermediario. Acta Cient. Venezolana, 34: 65--71.
[31]. Smith, G. (1981). A three-year study of Lymnaea truncatula habitats, disease foci of Fascioliasis. Br. Vet. J., 137: 398--410.
[32]. Armour, J. (1973). Fascioliasis. Epidemiology, treatment and control. In: G.M. Urquhart and J. Armour (Editors), Helminth Diseases of Cattle, Sheep and Horses in Europe. Robert Mac Lehose and Company Limited, Glasgow, pp: 100-109.
[33]. Onyaebor A.I. and M.I. Wosu (2014). Prevalence of bovine fascioliasis observed in three major abattoirs in Abia state Nigeria. Journal of veterinary advances. 4(11):752-755
[34]. Ardo M. B., Y.H. Aliyara, and H. Lawal (2013). Prevalence of bovine fasciolosis in major abattoirs of Adamawa state, Nigeria. Bayero Journal of Pure and Applied Sciences, 6(1): 12 – 16
[35]. Abraham J.T and I.B. Jude 2014. Fascioliasis in Cattle and Goat Slaughtered at Calabar Abattoirs. Journal of Biology, Agriculture and Healthcare. 4 (18).
[36]. Oladele-Bukola MO and IA Odetoku (2014). Prevalence of bovine fascioliasis at the Ibadan municipal abattoir, Nigeria. African journal of food, agriculture, nutrition and development 14(4):9056-9070.
[37]. Elkannah OS. 2010. Preliminary Studies on Fascioliasis in cattle slaughtered at Jalingo Abattoir, Taraba State. Nig. J. Sci. Technol. Environ. Edu. 3(1): 143-147.
[38]. Raji MA, S.O. Salami and JA Ameh. 2010. Pathological conditions and lesions observed in slaughtered cattle in Zaria abattoir. J. Clin. Pathol. Forensic Med. 1(2): 9 – 12.
[39]. Alawa CBI, I. Etukudo-Joseph , J.N. Alawa (2011). A 6-year survey of pathological conditions of slaughtered animals at Zango abattoir in Zaria, Kaduna State, Nigeria. Trop. Anim. Hlth Prod. 43:127–131.
[40]. Mezo M., M. González-Warleta, J.A. Castro-Hermida, C. Carro and F.M. Ubeira (2009). Kinetics of anti-Fasciola IgG antibodies in serum and milk from dairy cows during lactation, and in serum from calves after feeding colostrum from infected dams. Vet. Parasitol, 168: 36–44.
[41]. Mezo M., M. González-Warleta, J.A. Castro-Hermida, L. Mui˜no and F.M. Ubeira (2010). Field evaluation of the MM3-SERO ELISA for detection of anti-Fasciola IgG antibodies in milk samples from individual cows and bulk milk tanks. Parasitol. Int, 59: 610–615.
[42]. Timmreck, T.C. (1994). An introduction to epidemiology. Jones and Bartlett Publishers, Boston, London, Singapore.
[43]. Smith, R.S. (1995). Veterinary Clinical Epidemiology – A Problem Oriented Approach, second ed. CRC press.
[44]. Shabrawi et al (1997). "Human Fascioliasis: Clinical Features and Diagnostic Difficulties in Egyptian Children." Journal of Tropical Pediatrics 43.
[45]. Hill F.I., M.P. Reichel, and D.J. Tisdall (2010). Use of molecular and milk production information for the cost-effective diagnosis of bovine viral diarrhoea infection in New Zealand dairy cattle. Vet. Microbiol, 142: 87–89.
[46]. Mars M.H., C. Van Maanen, P. Vellema, J.A. Kramps and P.A. Van Rijn (2010). Evaluation of an indirect ELISA for detection of antibodies in bulk milk against bluetongue virus infections in the Netherlands. Vet. Microbiol, 146: 209–214.
[47]. Mas-Comas (2009). "Chapter 2. Fasciola, Lymnaeids and human Fascioliasis, with a global overview on disease transmission, epidemiology, evolutionary genetics, molecular epidemiology and control." Advanced Parasitology 69.
[48]. WHO Fascioliasis Factsheet.
[49]. Yilma J, J.B. Malones (1998). A geographical information system forces model for strategic control of fasciolosis in Ethiopia. Vet. Parasitol., 78(2): 103-127.
[50]. Marcos LA, M. Tagle, A. Terashima (2008). Natural history, clinicoradiologic correlates, and response to triclabendazole in acute massive fascioliasis. Am J Trop Med Hyg. .78:222–227.
[51]. Savioli L, L. Chitsulo, A. Montresor (1999). "New opportunities for the control of fascioliasis". Bull. World Health Organ. **77** (4): 300..
[52]. Fairweather I, J.C. Boray (1999). "Fasciolicides: efficacy, actions, resistance and its management". Vet. J. **158** (2): 81–112.