

## THE PREVALENCE OF BOVINE CUTANEOUS ONCHOCERCIASIS IN RELATION TO SKIN LESIONS IN KADUNA STATE, NIGERIA

SAMBO<sup>1</sup>, S. J., IBRAHIM<sup>1</sup>, N. D. G., ESIEVO<sup>1</sup>, K. A. N., HAMBOLU<sup>2</sup>, J. O., OLADELE<sup>1</sup>, S. B.  
and NZALAK<sup>2</sup>, J. O.

<sup>1</sup>Department of Veterinary Pathology and Microbiology, <sup>2</sup>Department of Veterinary Anatomy,  
Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria, Nigeria.

Correspondence: Email: [sohnapsj@yahoo.com](mailto:sohnapsj@yahoo.com), Tel: +2348080365294

### SUMMARY

A total of five hundred and eighteen White Fulani cattle of ages 5-9 years were examined at the point of slaughter in Zaria abattoir, for gross lesions of skin diseases, from November, 2001 to October, 2002. Tick infestations in association with scabs and rough hair coat observed in 130(25.1%) were highest in occurrence, while abscesses were fewest 3(0.6%) among the cattle. Firm nodules of variable sizes (0.5 to 1.0cm in diameter) were found on 39 (7.5%) cattle and were suspected as cases of onchocerciasis. After slaughter, 195 skin specimens were collected from the neck regions. These were fixed in 10% buffered neutral formalin, later processed and stained using Haematoxylin and Eosin (H & E) technique. Histopathology revealed sections of *Onchocerca spp* in the dermis of 30 (15.4%) cattle. The prevalence of onchocerciasis was highest (22.2%) in cattle from Anchau, while those from Sheme had the lowest (9.1%). There was no significant difference ( $p>0.05$ ) between the prevalence of onchocerciasis in cows and in bulls. There was also no significant difference ( $p>0.05$ ) between the prevalence of the disease in cattle in dry and rainy seasons. It was

---

**KEYWORDS:** Onchocerciasis, Prevalence, Cattle, Kaduna State, Nigeria

### INTRODUCTION

Microfilariasis is caused by worms of the Filarioidea superfamily, while onchocerciasis refers to the same disease where only members of the genus *Onchocerca* are involved and clearly identified (Soulsby, 1982; Georgi and Georgi, 1990). *Onchocerca species* are found in the skin, living in the connective tissues of their hosts, often giving rise to firm nodules in which they lie coiled up. They may be found in subcutaneous tissues of the hump, back, neck, ear, or ventral abdomen, depending on the feeding habits of the Simuliid intermediate hosts in different geographic areas (Soulsby, 1982). *Onchocerca gutturosa* may also be encountered in the nuchal ligament and *O. lienalis* in the connective tissues between the rumen and

spleen (Georgi and Georgi, 1990). The predilection of *O. ochengi* is in the subcutaneous and intradermal nodules of the ventral regions of the abdomen, including the udder or scrotum (Bwangamoi, 1968), while *O. dukei* inhabits subcutaneous and perimuscular tissues of the thorax, abdomen and thighs (Soulsby, 1982).

Animal onchocerciasis is endemic in Africa, Australia and North America (Soulsby, 1982; Georgi and Georgi, 1990; Achikwi *et al.*, 2004). It has the same vectors with the human blinding onchocerciasis (Anosike and Onwuliri, 1995; Mario *et al.*, 1995; Achikwi *et al.*, 2004). The prevalence of the disease could be reduced by mass treatment with ivermectin (Gilbert, 1995) and the control of vector populations (Bissan *et al.*, 1995).

A study of aortic onchocerciasis due to *O. armillata* in cattle slaughtered at Zaria abattoir revealed a high prevalence of 84.5% in the rainy season and 79.2% in the dry season (Schillhorn and Robl, 1975). Some few years later, Ogunrinade (1980) reported a lower prevalence (27.5%) of bovine onchocerciasis in Nigeria. The present study investigated the prevalence of onchocerciasis using skin sections of cattle sampled at the point of slaughter within Kaduna State, to determine whether the prevalence of onchocerciasis has changed since it was last studied more than three decades ago by Schillhorn and Robl (1975).

### MATERIALS AND METHODS

Five hundred and eighteen adult White Fulani cattle (293 males and 225 females) presented for slaughter at Zaria abattoir, and slaughter slabs at Anchau, Giwa and Soba were examined for skin lesions. The study was between November, 2001 and October, 2002. The period of the experiment (May to October and November to April) corresponds to the rainy and dry seasons, respectively in the Northern Guinea Savannah zone of Nigeria.

Out of the total number of cattle examined, skin samples were collected from the neck regions of 195 cattle (83 males and 112 females; 53 apparently

normal and 142 clinically sick) at postmortem and fixed in 10% buffered neutral formalin. The samples were processed, sectioned at 5µm thickness and stained with Haematoxylin and Eosin as described by Luna (1968). The sections were then examined for *Onchocerca spp.*

Data were summarized as percentages of population samples and differences between the percentages were assessed by Chi-square test. Values of  $p < 0.05$  were considered significant. The percentages of *Onchocerca* positive cases were calculated based on the 195 cattle skin samples examined microscopically.

### RESULTS

The post mortem examinations of skins revealed that gross lesions, such as thick scabs with purulent exudates 40(7.7%), nodules with cheesy exudates 37(7.1%) and the wrinkling of skin 8 (1.5%) were found among the cattle examined (Tables I).

Under the light microscope, sections of *Onchocerca spp* were found in the dermis of 30(15.4%) cattle. The prevalence of cutaneous onchocerciasis was found to be highest in cattle from Anchau (22.2%) and lowest among those from SHEME (9.1%) (Table II).

**TABLE 1: Prevalence of gross skin lesions in cattle slaughtered at Zaria abattoir (November, 2001 October, 2002).**

Skin lesions	Number	%
Rough hair coat	103	19.9
Thick scabs with purulent exudates	40	7.7
Firm nodules	39	7.5
Nodules with cheesy exudates	37	7.1
Tick infestation, thick scabs and rough hair coat	130	25.1
Open wounds (traumatic)	38	7.3
Tick infestations alone	20	3.9
Wrinkling	8	1.5
Subcutaneous abscess	3	0.6
<b>Skin lesions (total)</b>	<b>418</b>	<b>80.7</b>
Normal	100	19.3
<b>Total</b>	<b>518</b>	<b>100.0</b>

**TABLE II: The prevalence of intradermal onchocerciasis in cattle according to location**

Locations	Number sampled	Number positive	%
Anchau	45	10	22.2
Charanchi	16	2	12.5
Kafur	23	4	17.4
Kano	8	1	12.5
Katsina	19	4	21.0
Makarfi	22	4	18.2
Sheme	11	1	9.1
Soba	7	1	14.3
Zaria	28	3	10.7
Birnin-Gwari	15	0	0
<b>Total</b>	<b>195</b>	<b>30</b>	<b>15.4</b>

There was no significant difference ( $p > 0.05$ ) in prevalence between the cows and the bulls (Table III). Similarly, there was no significant difference ( $p > 0.05$ ) between the dry and rainy seasons' prevalence of onchocerciasis during the study (Table IV). It was observed that the presence of the *Onchocerca spp* did not stimulate infiltration of any inflammatory cells into the dermis of cattle (Fig. 1).

**TABLE III: The prevalence of intradermal onchocerciasis in cattle according to sex**

Sex	Number sampled	Number positive	%
Males	83	10	12.0
Females	112	20	17.9
	<b>195</b>	<b>30</b>	<b>15.4</b>

$\chi^2 = 1.24$  ( $P > 0.05$ )

**TABLE IV: The seasonal prevalence of intradermal onchocerciasis in cattle**

Season	Number sampled	Number positive	%
Dry	172	27	15.7
Rainy	23	3	13.0
<b>Total</b>	<b>195</b>	<b>30</b>	<b>15.4</b>

$\chi^2 = 0.1098$  ( $P > 0.05$ )

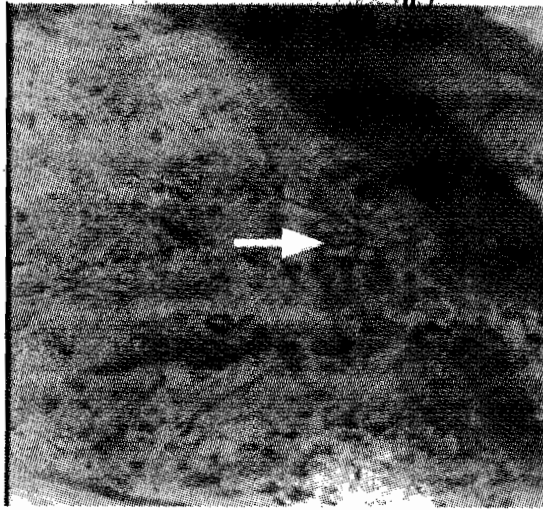


Fig. 1: Scanned colored photomicrograph of a skin section from a bull. Note the coiled *Onchocerca* spp (arrow) in the dermis. H & E stain. X250

The gross skin lesions such as firm nodules associated with onchocerciasis were found in 39(7.5%) cattle. Of these 20(10.3%) cattle were found positive for *Onchocerca*, but there were also 10(5.1%) positive cases among the 53 cattle with apparently normal skins.

## DISCUSSION

During the investigation, 20(10.3%) of the cattle found with firm nodules in their skins were confirmed to have had *Onchocerca* spp within the dermis. The observed gross lesion associated with the disease was similar to what was earlier described by Bwangamoi (1968). However, *Onchocerca* spp were also found in skin sections of apparently normal cattle. This variation in gross manifestation of the disease may be as a result of differences in the duration of infection or host reaction to the presence of *Onchocerca* spp.

The present finding of 15.4% prevalence of bovine onchocerciasis in Kaduna State was significantly lower than the results recorded in earlier studies (Schillhorn and Robl, 1975; Ogunrinade, 1980). The lower prevalence observed in this study contradicts the pattern recorded in Australia, in which Ottley and Moorhouse (1978) reported 100% infection rate by *O.gutturosa* among cattle, and later a range of 59-79% prevalence of the

disease was found (Ladds et al., 1979). The decline in prevalence of onchocerciasis in Kaduna state, in the present report, may be due to frequent clinical use of ivermectin. Ivermectin treatment in humans is known to decrease the severity of *Onchocerca* lesions (Gilbert, 1995), and thereby reduce the transmission of *Onchocerca* species and prevalence of onchocerciasis (Tripis et al., 1990; Mario et al., 1995) by preventing embryogenesis and steady attrition of the adult worms (Brian et al., 1992; Rao et al., 1992; Kassa et al., 1994). The variation in prevalence may have also resulted from the difference in predilections of the *Onchocerca* spp involved, and the methods of examination. Our sampling protocol was different, since we preferred the neck skin.

The previous investigators (Ottley and Moorhouse, 1978; Ladds et al., 1979) observed that *Onchocerca gutturosa* infestations were predominantly in the nuchael ligament, while *O. gibsoni* affected the brisket, stifle and hips and *O. lienalis* invaded the gastrosplenic ligament (Ottley and Moorhouse, 1978), but *O. armillata* (Chodnik, 1957) and *O. ochengi* (Achukwi et al., 2004) affected the aorta and cutaneous tissues, respectively. Bwangamoi (1968) also reported *O. armillata* in the skin sections of cattle. The currently lower prevalence of onchocerciasis may also be due to the fact that all of the cattle examined in our study were adults. This is in line with the results of Ladds et al. (1979) who found that the occurrence of onchocerciasis tended to decline as animals reached maturity.

Prevalence of bovine onchocerciasis may indicate the occurrence of the disease in humans who live in the environment where the cattle are reared. For example, in Ningi area, Bauchi state of Nigeria, there was a high prevalence (71.0%) of onchocerciasis among cattle rearers, while farmers and other herdsmen had 49.8% and 40.0%, respectively (Anosike and Onwuliri, 1995). Such high prevalence of onchocerciasis in the population was referable to the presence of the vector (*Simulium* species) in the environment (Bissan et al., 1995; Achukwi et al., 2004) and indicates the need for the treatment of the population with ivermectin. The

finding of 15.4% prevalence of bovine onchocerciasis in this study may similarly indicate that the human population is at the risk of being infected in Kaduna State.

The observed sex and seasonal prevalence of cutaneous onchocerciasis had no significant difference. These results were in agreement with the previous report by Schillhorn and Robl (1975). The observations were also similar to the report of Ladds *et al.* (1979), in which the observed difference was not significant in Australian cattle. Therefore, it seems reasonable to speculate that differences in sex may not affect the occurrence of cutaneous onchocerciasis in cattle.

### CONCLUSION

It was concluded that the prevalence of onchocerciasis has reduced drastically in cattle reared in Kaduna State when compared with the previous findings (Schillhorn and Robl, 1975). The lower prevalence may be due to increasing use of ivermectin among humans and animals in the state.

### REFERENCES

- ACHUKWI, M.D., HARNETT, W., BRADLEY, J. and RENZ, A. (2004): *Onchocerca ochengi* acquisition in Zebu Gudali cattle exposed to natural transmission: parasite population dynamics and IgG antibody subclass responses to Ov 10/Ov11 recombinant antigens. *Vet. Parasit.*, **122**: 35-49.
- ANOSIKE, J.C. and ONWULIRI O.E. (1995): Studies in filariasis in Bauchi state, Nigeria. I. Endemicity of human onchocerciasis in Ningi Local Government Area. *Ann. Trop. Med. Parasit.*, **89**: 31-38.
- BISSAN, Y., HOUGARD, J.M., DOUCOURE, K., AKPOBOUA, A., BACK, C., POUDIOUGO, P., SIB, A.P., COULIBALY, Y., GUILLET, P., SESAY, I. and QUILLEVERE, D. (1995): Drastic reduction of populations of *Simulium sirbanum* (Diptera: Simuliidae) in central Sierra Leone after 5 years of larviciding operations by the onchocerciasis control programme. *Ann. Trop. Med. Parasit.*, **89**: 63-72.
- BRIAN, O.C.D., GUILLERMO, Z., JULIO, C., EDDIE, W.C. and BREATRIZ, M. (1992): Effects of three month doses of ivermectin on adult *Onchocerca volvulus*. *Amer. J. Trop. Med. Hyg.*, **46**: 189-194.
- BWANGAMOI, O. (1968): The incidence of skin diseases of cattle in Uganda. *Bull. Epiz. Dis. Afric.*, **16**: 115-119.
- BWANGAMOI, O. (1970): A survey of skin diseases of domestic animals and defects which down grade hides and skins in East Africa. III. Sheep. *Bull. Epiz. Dis. Afric.*, **18**: 243-246.
- CHODNIK, K.S. (1957): Aortic onchocerciasis due to *Onchocerca armillata* in cattle in Ghana, with special reference to the morphology of the parasite. *Ann. Trop. Med. Parasit.*, **51**: 216.
- GILBERT, B. (1995): Ivermectin treatment of Onchocercal skin lesions: observations from a placebo controlled, double blind trial in Malawi. *Amer. J. Trop. Med. Hyg.*, **52**: 270-276.
- GEORGI, J. R. and GEORGI, M.E. (1990). Parasitology for Veterinarians. 5<sup>th</sup> Ed. W.B. Saunders Company, Philadelphia; 204-206.
- KASSA, D., JOCHEN, T., CHRISTOPHER, E., MICHEAL, L., MATHIAS, N., KIVABLAH, A., and DIETRICH W.B. (1994): Evaluations of ultra-sonography for the detection of drug induced changes in onchocercal nodules. *Amer. J. Trop. Med. Hyg.*, **51**: 800-808.
- LADDS, P.W., COPEMAN, D.B. and GODDARD, M.E. (1979): The occurrence of *Onchocerca gutturosa* infection in the nuchael ligament in relation to breed, sex and age of slaughtered cattle. *Aust. Vet. J.*, **55**: 445-446.

*SAMBO et al: Bovine onchocerciasis in Kaduna State, Nigeria*

- LUNA, L.G (1968): Manual of Histologic Staining Methods of the Armed Forces Institute of Pathology. 3<sup>rd</sup> Ed. McGraw-Hill Book Company. New York; 34-36.
- MARIO, A.R., MARIO, H.R., HECTOR, M., MARGELI, P. and ADRIAN R.R. (1995): Effects of semi-annual treatments of Ivermectin on the prevalence and intensity of *Onchocerca volvulus* skin infection, ocular lesions, and infectivity of *Simulium ochraceum* populations in Southern Mexico. *Amer. J. Trop. Med. Hyg.*, **52**: 429-434.
- OGUNRINADE, A.F. (1980): Bovine Onchocerciasis in Nigeria. *Ann. Trop. Med. Parasit.*, **74**: 367-368.
- OTTLEY, M.L. and MOORHOUSE, D.E. (1978): Bovine onchocerciasis: aspect of carcass infection. *Aust. Vet. J.*, **54**: 528-530.
- RAO, U.R., VICKERY, A.C., HWA, B.H. AND NAYAR, J.K. (1992): Brugia Malawi: Ivermectin inhibits the exsheathment of microfilaria. *Amer. J. Trop. Med. and Hyg.* **46**: 183-188.
- SCHILLHORN, V.V. and ROBL, M.G. (1975): Aortic onchocerciasis in cattle in Zaria (Nigeria). *Rev. d' Elev. Vet. Med. Trop.*, **8**: 305-310.
- SOULSBY, E. J. L. (1982): Helminths, Arthropods and Protozoa of Domestic Animal. 6<sup>th</sup> Ed. Bailliere Tindall, London; 323-327.
- TRIPIS, M. CHILDS, J.E., FRYAUFF, D.J., GREENE, B.M., WILLIAMS, P.N., MUNOZ, B.E., PACQUE, M.C., and TAYLOR H.R. (1990): Effect of mass treatment of a human population with ivermectin on transmission of *Onchocerca volvulus* by *Simulium yahense* in Liberia, West Africa. *Amer. J. Trop. Med. and Hyg.*, **42**: 148 156.