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TAENIA SAGINATA(GOEZE,1782) IN CATTLE SLAUGHTERED IN IDAH METROPOLIS, KOGI STATE, NIGERIA.

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Abstract
An abattoir-based survey of taeniaisis due to *Taenia saginata* was carried out among the cattle slaughtered for human consumption in Idah LGA, Kogi State, Nigeria. A total of 264 cattle were examined for five consecutive weeks in the months of June and July (i.e. the peak rainy season in the region), and 43 (16.3%) of them were infected with *T. saginata.* An overall geometric mean intensity of 2,765.8 eggs per gram of faeces (epg) obtained showed a relatively high intensity of infection. Female cattle had a higher prevalence of infection (26.5%) than the males (10.2%) ($P<0.75$). The intensity of infection was also higher in females (3,567.4 epg) than in males (1,827.8 epg) ($P<0.05$). Seven live *Taenia saginata* were extracted from the males and the mean of their maximum length ranged from 44.2 – 91.2cm ($\bar{x} \pm SD$: 67.7 ± 23.5cm) while their maximum width ranged from 1.3 to 1.5 cm ($\bar{x} \pm SD$: 1.4±0.1). A total of 20 live worms were collected from females with the mean maximum length ranging from 37.8 – 145.6cm ($\bar{x} \pm SD$: 91.7±53.9), and mean maximum width ranged from 1.1 – 1.7cm ($\bar{x} \pm SD$: 1.4 ± 0.3). The mean size of the parasite in both sexes differed significantly ($P<0.05$) being higher in females (91.7cm) than in males (67.7cm). The relatively high prevalence of taeniasis among the cattle hosts and its zoonotic implication are discussed.

Key words: Teaniasis, *T. saginata*, bulls, cows, prevalence, intensity of infections.

Introduction

Taeniasis is an infection caused principally by two species of tapeworm (Order: Cyclophyllidea; family:Taeniidae) namely, *Taenia saginata* (beef tapeworm) and *T. solium* (pork-tapeworm) (Smith, 2003). Although many species exist, these two species cause pathology in humans and they are worldwide in distribution. Approximately, 100 million cases of taeniasis are reported annually (CDC, 2004). Of this figure, 50 million cases are due to *T. saginata* while the other 50 million are *T. solium* related (CDC, 2004).

Taeniasis saginata is food-borne zoonosis in man caused by Cyssticercus bovis and is distributed worldwide (Nithuithai *et al.*, 2004) .Human taeniasis due to adult worms is mostly asymptomatic but the severe form of the disease, cysticercosis, is caused by the larval forms (metacestodes) of *T. solium* (Cysticercus cellulosae) in particular, and that of *T.saginata* (Cysticercus bovis) (CDC, 2004). The eggs of *T. saginata* passed out in human excreta are ingested by grazing ruminants with contaminated vegetation or drinking water. The most commonly infected sites of the animals are muscles of the shoulder, masseter, tongue and heart, and the work of Oryan *et al.* (1995) had shown that 34.6% of infected carcasses were condemned.

Taeniasis saginata is acquired by eating raw or undercooked meat (beef) of

infected cattle. The larvae from the infected meat develop in the human intestine into the adult tapeworms (Smith, 2003). Seizures or major epilepsies have rendered human cysticercosis an important public health problem in underdeveloped countries where the status of the disease in terms of true incidence is unknown (Schenone *et al.*, 1973, 1982; Mahajan, 1982; Davis, 1983). Cysticercosis which accounts for about 50% of seizures or epilepsies in victims especially during their adult lives, in endemic areas (Dumas *et al.*, 1990; Medana *et al.*, 1990; Shorvon, 1990; Garcia *et al.*, 1991), led to recognising the disease as a public health problem in Latin America, Africa and Asia, where in the last two decades, different control measures have been evaluated (Gemmell *et al.*,. 1983; Flisser *et al.*, 1998). Authorities in tropical Africa have not ascertained whether or not taeniasis and cysticercosis can lower the productivity of the victims since this has not been extensively investigated (Ukoli, 1990). However, economic losses due to bovine cysticercosis through condemned carcasses, cost of refrigeration of lightly infected carcasses and the decreased value of the meat as well as indirect costs of setting up facilities needed for meat inspection and processing infected meat are well documented (Ukoli, 1990). It is estimated that developing countries lose about $25.00 per animal and developed industrialized countries $75.00 per animal (Pawlowski & Schultz, 1972). Lack of basic education of the population, poor nutrition and breeding of cattle under primitive conditions that characterize endemic areas (Mateos *et al.*, 1972; Davis, 1983; Franco *et al.*, 1986; Flisser, 1988, Silva-Vergara *et al.*, 1995), have made the control of taeniasis and cysticercosis difficult. However, the use of efficacious drugs such as praziquantel or miclosamide in recent times, for targeted treatment of tapeworm carriers and vaccination of the animals (Cruz *et al.*, 1989; Molinari *et al.*, 1993; Sarti *et al.*, 2000) mainly in rural habitats, have been quite impressive in bringing the disease under control.

In India, the work of Ahmed *et al* (1988) had shown overall prevalence of 1.5% of human taeniasis saginata. The disease was widespread throughout China with prevalence ranging from 2 – 70% (Xiaopeng, 1991). Also, in Sierra-Leone (Froyd, 1960) and in Abidjan (Cote D' Ivoire), Mishra and N'Depo (1978) recorded overall prevalence of bovis cysticercosis of 34.8% and 0.8% respectively. In Kano, Nigeria, Dada and Belino (1978) and Okafor in Imo State, Nigeria (1988) recorded prevalence of 1.9% and 26.14% respectively.

Published data on animal and human taeniasis and cysticercosis are lacking in Idah Local Government Area (LGA). The present preliminary study was aimed at determining the prevalence and intensity of *Teania saginata* infection in cattle slaughtered for human consumption in Idah metropolis. The baseline information derived from this study would be useful for control measures against the zoonotic disease.

Material and Methods

Sample Collection

Samples were collected daily between the hours of 6.30am and 8.50am at the Idah Local Government abattoir. The environment of the abattoir as well as the ranch in which the cattle were usually kept before bringing to the slaughter house were generally littered with cattle dung and human faeces. The exercise was conducted for five consecutive weeks between June and July, 2006 (i.e. the peak of the rainy season in the region). The faecal samples were collected from the

small intestine into properly labelled containers and brought to the laboratory for analysis. Live *Taenia saginata* was also collected from the small intestine of some of the cattles examined and preserved in 10% formalin.

The external measurements (maximum length and maximum width) of the parasites were taken using thread which was later stretched on a metre rule to read the actual maximum length and width to the nearest 0.1cm. The distance between the apex of the scolex and end of the last proglottid at the posterior region represented the maximum length while the maximum width was taken at the broadest proglottid of each live *T. saginata* collected.

Analysis of the Faecal Samples

From each of the specimen containers, 3g of faecal samples was weighed and emulcified in 33.9ml formalin (Smyth, 1994; Cheesbrough, 1999). The mixture was strained through double layers of fine mesh cheesecloth and then the strained mixture was transferred to a 15ml centrifuge tube, centrifuged at 1500 to 2000 rpm for 2 minutes. The supernatant was discarded and the sediment was re-suspended in 33.9ml of formalin and subjected to further centrifugation at 2000rpm for 1 minute. This procedure was repeated four times and clear supernatant was obtained. The sediment was re-suspended in 33.9ml of formalin and 11.3ml of ethyl acetate was added. A stopper was inserted and the preparation was shaken vigorously for 30 seconds. The stopper was removed and the mixture was centrifuged for 1minute, at 2000rpm. The supernatant was then decanted again and the sediment transferred to a microscope slide by pipetting 0.15ml and covered with cover slip and viewed under x 10 objective of the microscope. The ova of *Taenia saginata* eggs were systematically sought for and counted. The number of *Taenia saginata* eggs was estimated as described by Cheesbrough (1999).

Statistical Analysis

The prevalence of *T.saginata* infection among bulls and cows were compared by using Chi-square (χ^2) while geometric mean intensity of infection between the sexes was evaluated by using Wilcoxon paired sample T – test (Wilcoxon, 1945).

Results

Table 1 shows the prevalence and geometric mean intensity (GMI) of eggs per gram of faeces (epg) of *Taenia saginata* infection in Idah LGA, Kogi state. A total of 264 cattle were examined and 43 (16.3%) were infected and overall GMI of 2,765.8 (epg) of faeces was recorded. Adult *T. saginata* were also extracted from the cattle. Seven live worms which were collected from the bulls ranged in size (maximum length) from 44.2 – 91.2cm (x ± SD: 67.7±23.5) while their maximum width ranged from 1.3 – 1.5 (x ±SD: 1.4±0.1).Whereas the 20 live worms that were collected from the female cattle ranged in size (max. length) from 37.8 – 145.6cm (x ±SD: 91.7±53.9) and maximum width ranged from 1.1 – 1.7cm (x ±SD: 1.4±0.3). The mean size of the parasite in both sexes differed significantly too, being larger in females (91.7cm) than in bulls (67.7cm) ($P<0.05$).

Discussion

The overall prevalence of *T. saginata* infection (16.3%) recorded among cattle in Idah metropolis was relatively high when compared to overall prevalence rates of 1.5% recorded by Ahmed *et al* (1988) in India; 2-70% by

Xiaopeng (1991) in China; 0.8% by Mishra and N'Depo (1978) in Abidjan (Cote D'Ivoire), and 1.9% recorded by Dada and Belino (1978) in Kano, Nigeria. In contrast, the overall prevalence of 34.8% recorded by Fryod (1960) in Sierra Leone and that of Okafor, 26.14% (1988) in Imo State, Nigeria were comparatively higher. The disparity in prevalence of *T. saginata* infection in different regions could be attributed to variations in prevailing factors such as standard of living and poor sanitary conditions (Schenone *et al.*, 1973; Davis, 1983). Active transmission of the disease from humans to animals and vice versa, was obviously going on in Idah metropolis judging from high contaminatory behaviour observed within and around the ranch and the abattoir. Prevalence of *T saginata* infection may increase in the area unless an awareness campaign about the source of this infection is instituted and certain rules of sanitation be enforced.

The study showed that female cattle (cows) had a higher prevalence of infection (26.5%) than the males (10.2%) ($P<0.75$). The intensity of infection was also higher in females (3,567.4 epg) than in bulls (1,827.8 epg) ($P<0.05$). The higher prevalence and intensity of infection in cows than bulls may be due to difference in their feeding habits require more calories of food due to parturition and breast feeding of their young ones and therefore graze more voraciously on all kinds of vegetations that may be highly contaminated with infected faecal samples. More so, cows are more restricted in movement especially when they give birth to their young ones in order to breast feed them and the confined area (ranch) where they are kept during this period may be contaminated with infected faecal sample, leading to reinfection as observed in the present study area. An overall intensity of infection of 2765.8 eggs per gram of faeces (epg) recorded in this work was considered relatively high when compared to other intestinal worms. Mas-coma *et al.* (1999) categorized intensity of infection of intestinal trematode (*Fasciola* sp.) as light infection, < 100 epg; moderate as 101 – 400 epg, and heavy as > 400 epg.

The mean maximum length of 44.2-145cm and mean maximum width of 1.3-1.7cm recorded for the live worms collected in this work suggest that they were all young ones or the gravid proglottides at the posterior regions of the parasite might have been detached prior to collection of the specimens. Ukoli (1990) observed that *Taenia Saginata* usually measures 3-4 metres in length and maximum breath of about 1.4 metres.

Conclusion and Recommendation

The study showed relatively high prevalence of Taeniasis due to *Taenia saginata* (16.3%) and high intensity of infection (GMI, 2,765.8 epg) in Idah LGA. It also revealed that cows had higher prevalence (26.5%) than the bulls (10.2%), and corresponding higher intensity (3,567.4 epg) was recorded for cows than the bulls (1,827.8 epg) ($p<o.05$). *Taenia saginata* seems to thrive better in cows than in the bulls, judging from the relative abundance and larger size of the parasite in the former than in the latter.

Table 1: Percentage prevalence and Geometric/Arithmetic mean intensity (epg) *Taenia saginata* infection by sex (Bulls and Cows) in Idah LGA, Kogi State

	MALE					FEMALE					GRAND TOTAL				
Week	No of Bulls Exam	No of Bull Infect.	Prev %	95% CI	GMI (Am epg)	No of Cows Exam	No of cows infect.	Prev %	95% CI	GMI (AM) epg	Bulls & Cows Exam	Bulls & Cows Infect.	Prev%	95% CI	GMI (AM) epg
1	50	2	4.0	-0.01-0.09	282.8(300.0)	20	4	20.0	0.03-0.38	670.1(700.0)	70	6	8.6	0.02-0.15	502.6(566.7)
2	36	7	19.4	0.10-0.28	266.7(285.7)	20	7	35.0	0.14-0.56	369.2(1257.1)	56	14	25.0	0.14-0.36	318.8(771.4)
3	38	3	7.9	-0.01-0.17	373.2(566.7)	19	4	21.1	0.03-0.39	966.8(1475.0)	57	7	12.3	0.04-0.21	642.9(1085.7)
4	29	3	10.3	-0.01-0.21	457.9(533.3)	32	8	25.0	0.10-0.40	1060.0(1388.0)	61	11	18.0	0.08-0.28	843.6(1154.5)
5	13	2	15.4	-0.04-0.35	447.2(600.0)	7	3	42.8	0.06-0.80	501.3(867.0)	20	5	25.0	0.06-0.44	457.9(760.0)
Total	166	17	10.2	0.06-0.15	1827.8(2285.7)	98	26	26.5	0.18-0.35	3567.4(5687.1)	264	43	16.3	0.12-0.21	2765.8(4338.3)

Having established the relatively high prevalence and intensity of taeniasis among the cattle studied in Idah metropolis, the following recommendations are pertinent for prompt intervention in order to check cross transmission between the animal hosts and humans:

- Basic health education on the aetiology of taeniasis infections to be instituted by the government
- Improvement in standard of sanitation (i.e. proper disposal of faeces to avoid contamination of food, soil and water, hand washing with soap after using the toilet or before handling food etc).
- Proper cooking of meat (at temperature of 60^0C for 5min. or freezing meat below -5^0C for ≥4 days) destroys the tapeworm larvae and routine inspection of meat before consumption.
- Routine serological surveil-lance of cysticercosis and prevention of cattle grazing in contaminated areas will help curtail worm spread.

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