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Research Article

Preliminary Survey of the Intestinal Helminths of Grasscutter and Antelope (Bush Meat) in Omagwa Rivers State

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Abstract

The preliminary investigation on the prevalence of intestinal helminths in two popularly consumed wild games (bushmeat) *Thryonomys swinderianus* (grasscutter) and *Alcelaphinaespp.* (antelope) from Omagwa district in River State, Nigeria was carried out using the concentration technique (formalin ether method) and fecal egg count/larvae count technique. A total of 110 slaughtered animals were used, 45 males (40.9%) and 65 females (59.1%), of this total number of the test samples, 60 (54.5%) were grasscutters consisting of 25 (41.7%) males and 35 (58.3%) females and antelopes were 50 (45.5%) consisting of 20 (40.0%) males and 30 (60.0%) females. In general, out of the total number of grasscutters examined, 15 (37.5%) males and 25 (62.5%) females were infected with the intestinal helminths. Also, from the total number of antelopes examined, 10 (38.5%) males and 16 (61.5%) females were infected. And the result from t-Test showed that there were no significant difference ($P > 0.05$) from the number of samples examined, as both test samples were infected by different intestinal helminths, irrespective of the highest rate of infection shown by the females at 41 (62.1%) as against males at 25 (37.9%). In addition, this result revealed the presence of seven different species of intestinal helminths (*Ascarisspp,Strongyloidesspp, Trichurisspp, Fasciolaspp, Taeniaspp, Moniliformisspp, and Hookworm*) of which *Ascaris spp., Strongyloides spp., Taenia spp., and Hookworm* were present in both and *Trichuris spp.,* with*Moniliformis spp.* being presentin grasscutters, while *Fasciola spp.* was only foundin antelope. The females from both test samples has the highest count of ova/worm of the intestinal helminthic as at 162 (antelopes) and 81 (grasscutters) against the males at 79 (antelopes) and 40 (grasscutters). But the result from ANOVA shows that there were no statistical significant difference ($P > 0.05$) in the prevalence of intestinal helminthic ova's/worm's between the male and female of both test sample. It is believed that this study will spark further research into the other types of consumable bushmeats and at the same time draw the attention of necessary bodies into the monitoring of the activities of various eateries and outlets where these meats are served, so as to ensure that good hygiene is maintained.

Keywords: Intestinal Helminths; Grasscutters; Antelopes (Bushmeat)

Introduction

The term "Bush meat" also known as wild meat or game meat refers to meat that comes from the wild (non-domesticated) animals captured or hunted for food in tropical forests of the developing regions of the world such as Africa[1,2,3]. These bush meat comes from a variety of wild animals including mammals like bats, monkeys, Apes, Duikers (small Antelopes) porcupines, cane rats (Grass-cutters), reptiles, amphibians, Birds and African giant snails[4]. Bush meat is often preserved by smoking or salting. They have less saturated fat, which makes them healthier than other fatty meats, low calories when compared with beef and pork, high level of Eicosapentaenoic acid, an essential omega-3 fatty acid that has several health benefits due to the fact that they grow in natural environments, they are also rich in vitamins and minerals[5]. Thus, bush-meat is a good source of animal protein in Central African countries, and an important part of food security and livelihoods in rural household living in extreme poverty[6] as well as poor-to-middle income earners[7]. Bush meats also contribute greatly to the economies of West and Central African countries where hunting is concentrated due to the availability of various kinds of forest that harbors variety of wild meats[8]. Hence, despite these benefits, great caution must be taken when handling or consuming bush-meat as they can be portable sources of food-born contaminants and parasitic diseases[9]. These animals are usually caught in traps, killed by hunters with various hunting gears, and in some cases, found dead in the bush and sold into the market straight away, without any meat inspection procedures carried out on the carcass by a professional to examine and guarantee that their flesh and organs are free of diseases.

The majority of infectious diseases that have emerged worldwide are considered to be zoonotic, and of these emerging diseases, 70 % are believed to have originated among wildlife[10]. The percentage of wild animals that are carriers for zoonotic diseases is increasing, resulting in a growing concern for human safety and control. Commonly consumed wild life serve as food for man and as reservoir hosts of parasites, viruses, and bacterial that cause diseases to man[11]. Informal and unregulated bush-meat supply chain offers a realm of opportunities for human exposure to wildlife that potentially harbor a diversity of zoonotic pathogens. Therefore, possibility of transmission of parasites like intestine helminthes from these bush-meat to human cannot be overemphasized.

Grasscutter (*thryonomys swinderianus*) commonly called *"nchi"* and Deer-like Antelope especially Royal Antelope commonly called "elele or ngbada" are the commonest species of wild animals hunted for and eaten by man as bush meat in many countries of Africa including Nigeria[12]. These animals are widely recognized as a major source of protein in Africa and Nigeria in particular and there is a large market for their meat in many states of Nigeria. Among the various bush meat species, they are constantly the consumers first choice[13].

Apart from their excellent tastes, like most bush meat, they are nationally superior to some domestic animal meat because of their high protein content[14]. Bush meat resulting from grasscutter and antelope are the most preferred and most expensive meat in West Africa including Nigeria[15]. Hence the meat contributes to both local and export earning of most WestAfrican Countries[16] and are therefore hunted for aggressively. It has been recorded that grasscutters and antelopes are parasitized by various parasitichelminthes and this could be as a result of environmental pollution, leading to contamination of their habitat[17]. Hence leading to concomitant infections. Several investigations have been reported on intestinal helminthes of grasscutter and antelope in some parts of Nigeria, but there is paucity of information on those found in Rivers State and Omagwa in particular. There is there an urgent need for detailed information on the helminthic fauna of these animals since their meat is gradually becoming popular in our country Nigeria and in Omagwa area where numerous joints and eateries mainly for bush meat has been concentrated.

Materials and Methods:

The study area

The study was conducted in Omagwa in Ikwere Local Government Area of Rivers State, Nigeria. This Area shares common boundary with Ishiokpo, Iguritali. It covers an area of approximately 958-010 km with an estimated population size of 800,904 and lies in the geographical coordinate of $5^{0}18^{1}21^{11}$N and

$6^{0}56^{1}$ 44^{11}E with a longitude of 6.69016 and Latitude of 4.69016.The vegetation type is tropical rainforest with highly fertile land for the cultivation of crops. The grass land which spans several kilometers offers good habitation for rearing of various kinds of animals such as sheep, goat, etc. owingto itsvegetation, the major occupation of Omagwapeople are. Hunting, animal husbandry, farming, fishing, palm oil processing, petty trading, with a good number of them are in public service, others own private business enterprise such as fast foods, restaurants, hotels and bars, were bush meat and most farm produces are consumed.

The study location

This study took place at Grand Royal Research laboratory, IkenegbuOwerri, Imo State.

Sample Collection

Killed Grass cutters and antelopes supplied by hunters operating in the forested areas of the communities were used. Their sexes were determined by careful observation for the presence of mammary glands or genital projections, while their ages where difficult to ascertain. Bothfaecal and intestinal materials were collected at the point of cleaning (dissection) in the kitchen of the bush meat bars and used for this present study and put each in a different clean sterile sample bottles, 5mls of 20% normal saline was added into each sample bottle and labelled appropriately before transporting to the laboratory for further analysis.

Parasitological Analysis

All the samples were processed for microscopic examination of helminthic eggs and larvae.The concentration techniques/formalin ether method as described by[18] was used to recover the ova and larvae of the parasites in the faecal samples, according to the following procedures;

- From each labeled specimen, 1 gram of faeces is collected dissolved in 10 mL of 10% formalin, and stirred with applicator stick until a cloudy suspension is obtained. Using a funnel and guaze filter, the cloudy suspension is filtered and then centrifuged, after which the lumpy residue discarded.
- Add 3 mL of ether/ethyl acetate to the filtrate and mixed for one minute.
- The mixture is transferred back to centrifuge tube for 1 minute centrifugation. Four layers (ether Debris, formalin and sediment)of the mixture are observed after the find centrifugation.
- Thedebris is loosen with an applicator stick. The supernatant is poured away quickly.
- The sediment is then mixed well and a drop of it was transferred onto a grease-free microscopic slide for examination under microscope at ×10 and × 40.
- Iodine stained preparation is also made.

Faecal egg count/larvae count

This was done by applying salt floatation method and modified stoll's ova dilution techniques to determine eggs per gram offaeces as described by[19].

Results and Discussion

Table 1: Sex Influence on the Prevalence of Intestinal Helminthes of Grasscutter and Antelopes in Omagwa Rivers State.

SEX	Grasscutter			
	No. Examined	**% Examined**	**No Infected**	**% Infected**
Male	25	41.7	15	37.5
Female	35	58.3	25	62.5
Total	60	-	40	-
	Antelope			
Male	20	40.0	10	38.5
Female	30	60.0	16	61.5
Total	50	-	26	-
	Grasscutter + Antelopes			
Male	25 + 20 = **45**	40.9	15 + 10 = **25**	37.9
Female	35 + 30 = **65**	59.1	25 + 16 = **41**	62.1
Total	110	-	66	-

Table 1 above revealed that a total of 60 grasscutters were examined, of which 25 (41.7%) are male with 15 (37.5%) infection. While 35 (58.3%) are female with 25 (62.5%) infection. Similarly, a total of 50 antelopes were examined, of which 20 (40.0%) are male with 10 (38.5%) being infected, while 30 (60.0%) are female, with 16 (61.5%) being infected with intestinal helminthes. Furthermore a total of 110 test samples were surveyed comprising of 45 (40.9%) males with an infection of 25 (37.9%) and 65 (59.1%) females with 41 (62.1%) infections.

Table 2: The Types of Helminthes as Identifiedfrom theTest Samples Surveyed

Helminthes parasites	Grasscutter	Antelope
Ascarisspp	+	+
Strongyloidesspp	+	+
Trichurisspp	+	-
Fasciolaspp	-	+
Taeniaspp	+	+
Moniliformisspp	+	-
Hookworm	+	+

Key: *+ = presence and* ***-*** *= absence*

Table 3: Sex Influence on the Prevalence of the Ova of Helminthic Parasites of Grasscutter and Antelopes in Omagwa Rivers State.

Helminthes Parasite	NWMG (%)	NWGF (%)	NWMA (%)	NWFA (%)	TWL (%)
Ascarisspp	13 (32.50)	18 (22.22)	25 (31.65)	50 (30.86)	106 (29.28)
Strogyloidesspp	7 (17.50)	17 (20.99)	22 (27.85)	46 (28.40)	92 (25.41)
Trichurisspp	2 (5.00)	8 (9.88)	-	-	10 (2.76)
Facisolaspp	-	-	8 (10.13)	12 (7.41)	20 (5.52)
Taeniaspp	4 (10.00)	9 (11.11)	10 (12.66)	24 (14.81)	47 (12.98)
Moniliformesspp	8 (20.00)	18 (22.22)	-	-	26 (7.18)
Hookworm	6 (15.00)	11 (13.58)	14 (17.72)	30 (18.52)	61 (16.85)
Grand total	**40 (11.05)**	**81 (22.38)**	**79 (21.82)**	**162 (44.75)**	**362**

Key: NWMG = Number of worm in male grasscutters;; NWFG = Number of worm in female grass cutters; ; NWMA = Number of worm in male antelopes;; NWFA = Number of worm in female antelopes; and TWL = Total worm load.

Table 3 above, shows the effect of sex on the prevalence of intestinal helminthes parasites of two bushmeat (grasscutters and antelopes) in Omagwa district Rivers State. Of the total of 362 worms harvested from these test samples, 162 were present in the female antelopes, 81 in male antelope, 79 in female grasscutters and 40 in male grasscutters. Also, *Ascarisspp*showed the highest count at 106, followed by *Strongyloides spp*. at 92, *Hookworm* at 61, *Taenia spp.* at 47, *Monoliform spp.* at 26, *Fasciolaspp*iat 20 and *Trichuristrichuria*at 10 as the least harvested. Overall, more females were infected in both test sample, giving a prevalence rate of 158 from antelope and 81 from grasscutter while the male recorded 79 and 40 from antelope and grasscutter respectively. However, the result of ANOVA showed that there was no sex significant difference ($P > 0.05$) in the prevalence of the intestinal helminthes.

Several studies have revealed that diseases can be transferred from animal primates to human primates as most diseases causing organisms are harbored by these animal primates before being transferred to their main host. The result from this work has shown that the following intestinal helminths; *Ascarisspp, Strongyloidspp, Taeniaspp,* and *Hookworm* were present in grasscutters and antelopes, while *Trichurisspp*, and *Fasciolaspp*, are found only in grasscutters and *Moniliformisspp* in only antelopes. This is in line with the work of Ukaga *et al*[20] on Wildlife Species as Potential Sources of Human Exposure to Parasitic Pathogens in Accra, Ghana and the work of Wolfe *et al*[21] on Intestinal parasitic fauna and zoonotic potentials of commonly consumed wildlife as both works revealed the presence of different kinds of intestinal parasites.

This study reported a high prevalence of intestinal helminths the infection rate among the female animals than the male animals, as 25 (62.5%) was recorded against female grasscutters and 16 (61.5%) for female antelopes. This result does not agree with the Opara and Fagbemi, (2008), who reported a high prevalence of gastrointestinal helminths infections among the male than the female while working on the occurrence and prevalence of gastrointestinal helminths in the wild grasscutters (*Thryonomysswinderianus, Temminck*) from Southeast Nigeria. The reason for this difference may be due to some physiological changes taking place in the female such as pregnancy and lactation which tender to lower their immune system. Also, prolong browsing time during pregnancies exposes them more often with these helminths. Furthermore, the infection rate was slightly high for grasscutters at 40(66.7%) than the antelopes 26(52%). These slight discrepancies might result from the total numbers of grasscutters assayed as against antelopes, as a total number of grasscutters assayed as against antelopes or probably, because grasscutters are rats and they come closer to human habitation than the antelopes to feed on various anthropogenic wastes.

Furthermore, this study also surveyed the overall prevalence of intestinal helminths of grasscutters in Omagwa Rivers State and reported an infection rate of 66.7%. This finding compares favorably with WHO[22], who reported a prevalence of 78.8% while working with Gastrointestinal Parasites of Domesticated Grasscutters (Thryonomys swinderianus) in South-western Nigeria. This result agreed slightly with Nasi[9], who reported a prevalence infection rate of 84.0% in Anambra but disagreed with Kümpel *et al*[8], who reported a prevalence

infection rate of 100% from Oyo State while working with wild cane rat and also with Bowen-Jones *et al*[5], who reported a prevalence infection rate of 98.0%, while working with wild grasscutters in Imo State. These differences noticed in the prevalence infection rates may be attributable to geographical locations, cultural practices (like the taste for raw or semi-cooked bush meat) hygiene, infrastructure, and level of education obtainable in these areas. Equally seasonal variations and levels of awareness in disease transmission may have their contribution.

The result from the worm burden showed that *Ascarisspp,* a total worm load of 106, followed by *Strogyloid spp*, with a total worm load of 92 as the most predominate intestinal helminths of grasscutter and antelope and *Trichurisspp* as the least with a worm load is 10. This may be a reflection of the work of Bowen-Jones *et al*[5] working on the epidemiology of parasitic helminths in children attending Gwagwalada Clinic in FCT. In his work, *Ascaris spp.*, had the highest prevalence rate followed by *E. histolytica* and *Strongyloides spp*. This implies that there is an interaction between the level of infection in animals and man. Hence, bush meats predispose man to many parasitic helminths that parasitize man as surveyed by this present study conducted with the intestinal contents of grasscutters and antelopes samples collected from Omagwa in River State and analyzed at Grand Royal Research laboratory, Ikenegbu Owerri, Imo State.

Conclusion

In recent years Grasscutter and Antelope are becoming increasingly popular as an alternative source of animal protein which is seriously needed by Nigerians. These animals tend to harbor lots of intestinal helminths without showing any visible clinical manifestations, suggesting that they may be serving as reservoir hosts of some parasitic agents infecting man and his Animals. They are equally capable of transmitting some of these parasites which are zoonotic if the bushmeat is not improperly cooked. Hence these intestinal parasitic helminths and their public health importance especially in rural areas of tropical Rainforest of south-south Nigeria like Omagwa is worthy of note.

Recommendation

It is therefore recommended that grasscutter and antelope consumers should adopt proper cooking methods and reduced taste for semi-cooked meat or raw meat. Also good sanitary hygiene and socio-economic factors should be consider as they are among the risk factors that predisposes one to parasitic and other infections. Finally, all bushmeat should be processed and properly cooked especially their intestinal contents, which acts as reservoir for numerous parasitic worms including their ova.

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Conflict of interest

The authors declare no conflict of interest

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