THE PREVALENCE OF *ANGIOSTRONGYLUS CANTONENSIS* (Chen) IN *ARCHACHATINA MARGINATA* (Swainson) IN ILE-IFE, NIGERIA

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Abstract

The study was carried out between April 1997 and May 1998 to provide information on the prevalence of helminth infection in the giant land snail, *A.marginata*. Specimens of *Archachatina marginata* collected from Ile-Ife were examined for infection with parasitic helminths. The length and weight of the snails were taken. The snails were caught in the wild and dissected and examined in the laboratory. Various organs which include the oesophagus, crop, stomach, intestine, hepatopancreas, lung, heart, rectum, and common hermaphroditic duct were examined for helminth parasites. Out of 218 specimens of *A. marginata* examined, 86.7% were infected with the larvae of a nematode *Angiostrongylus cantonensis*. The mean intensity of infection was 22.68 + 3.5. Seasonal variation in the intensity level of *A. cantonensis* during the year was more pronounced. This is probably due mainly to the moderately high rainfall recorded in September, which probably favour higher infestation of *A. marginata*. The prevalence however exhibited much less seasonal variation, although a trend towards higher value in September was also noticeable. This study has revealed that *A. marginata* serves as intermediate host of the rat lungworm *Angiostrongylus cantonensis*.

Keywords: *Archachatina marginata*, prevalence, *Angiostrongylus cantonensis*.

1. Introduction

Snails serve as sources of protein and a number of gastropod species are used for food by people in many parts of the world (Barnes, 1987). Snail meat is highly relished and considered a delicacy for the peasant population living in the rural rainforest zone of West Africa, especially in Nigeria. Snail meat have been reported to be high in protein (14.32%) (Mead, 1961) and also that some organs of the snails are rich in vitamins (Raffy and Ricant, 1943). Snails have also become an important source of income for some farmers who dwell in the rainforest areas.

Archachatina marginata, the African giant land snail is the largest among the terrestrial gastropods living in Africa (Segun, 1998). In south West of Nigeria, *A. marginata* is very important as food and this giant land snail forms an important source of animal protein and they are served as delicacies on the table (Segun, 1975). In addition to its nutritive value, it is also used for medicinal purposes. Agbelusi and Ejidike (1992) reported that the fluid from *A. marginata* could be used to cure headache and malaria. They further reported that the shells of the giant land snail when burnt to a colourless condition are ground and mixed with other ingredients could be used in preparing a concoction for pregnant women during labour or as fertility drug for women experiencing difficulty with conception. However, in spite of the wide usage of this snail species for food, information on the parasitic fauna of the giant land snail *A. marginata* is generally lacking. The present study was carried out to provide information on the prevalence of helminth infection in this snail species.

2. Materials and Methods

218 specimens of *A. marginata* examined in this study were bought from markets in and around Ile-Ife. The examination of the snail was carried out between April 1997 and May 1998. The snails were brought into the laboratory in well aerated cages and examined for helminth parasites. Each snail was given an identification number. The length and weight of the snails were taken. The snail was dissected and the various organs removed into saline solution (0.85%) in separate Petri-dishes and then examined for helminth parasites. The shell was broken and the heamolymph collected into a clean beaker was later examined for parasites under the microscope. Various organs which include the oesophagus, crop, stomach, intestine hepatopancreas, common hermaphroditic duct, lung (vascularised mantle), heart and the rectum were also examined for helminth parasites. Each organ was carefully opened by a longitudinal cut and the content expressed in saline (0.85%). The content was then examined on a dark background under the dissecting microscope.

The foot of the snail was chopped, macerated in saline (0.85%) and left for 24 hours at room temperature. The chopped pieces were then removed and the liquid centrifuged at 1,500rpm for 3mins. After decanting the supernatant, the sediment was collected and examined under a dissecting microscope for helminth parasites. The

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nematodes were counted and their numbers recorded. Some of the worms were fixed in A.F.A. (alcohol formo acetic), cleared and mounted in Lactophenol on clean glass slides and covered with cover slips. The parasite was later identified using the method of Bhaibulaya (1968).

3. Results

Among the 218 specimens of *A. marginata* investigated, 189 (86.7%) snails were found to be infected with a nematode larva. The nematode larva was identified to be *Angiostrongylus cantonensis*. A total of 4286 larvae were recovered representing mean of 22.68±3.5 larvae per infected snail. Table 1 shows the distribution and number of *A. cantonensis* recovered from various organs of *A. marginata.*

The specimens of *A. marginata* examined in this study varied in length from 10.4 – 17.0cm. As shown in Fig. 1a prevalence is high across different size classes starting from 50% in the 10.0cm size class. This shows snails acquire infection early in life. The rate rose to 100% in the next length class of 10.6cm after which the rate varied between 75% and 100%. However, this pattern in the intensity appears different. Smaller snails carry less worm burden with the intensity rising to a peak in the medium size snails of 12.6 - 13.0cm length size. The intensity fell progressively thereafter (Fig. 1b).

The prevalence and intensity of *A. cantonensis* in *A. marginata* in different months for a period of one year are shown in Table 2. The lowest prevalent rate was recorded in August 1997 while the highest was recorded in September 1997. The period when the prevalence was lowest corresponds to the period of lower rainfall while the period of higher prevalence corresponds to the period when the rainfall is moderately high (Fig. 2). The pattern of intensity was similar with the highest intensity recorded in September 1997 and the lowest in May 1997.

4. Discussion

This study has confirmed the findings of earlier workers that the snail *Archachatina marginata* is one of the intermediate hosts of *Angiostrongylus cantonensis* (Alicata, 1965). Mackerras and Sandars (1955) reported that the first-stage larvae of *A. cantonensis* may enter the body of the mollusc effectively either through the digestive tract or by active penetration of its cuticle. They further revealed that the first -stage larvae escape from the faeces of infected rats (definitive host) thereby contaminating the soil. From the present study, the foot of the snail was found to harbour the greatest number of the larvae of *A. cantonensis*. The preference for the foot of the snails by the larvae of *A. cantonensis* apparently suggests that the foot being in constant touch with the soil may be the entry route for the larvae. Field studies have shown clearly that the prevalence of infection with parasites varies among different age classes within snail population (Sturrock *et al.*, 1975). Anderson *et al.* (1982) reported that snail susceptibility to parasitic infection declines as host size and age increased and that this has important implications for the interpretation of age-prevalence patterns observed in natural snail population. Further they reported a decline in the prevalence of infection of *Biomphalaria glabrata* with *Schistosoma mansoni* in older age classes of snails (when compared with snails of intermediate age) in a variety of natural habitat. The case was however different in this study where the prevalence of *A. cantonensis* was higher in snails of larger sizes. However, it was observed that the mean intensity of *A. cantonensis* rose to a peak value in medium size snail decreasing in the large size snail. This is in agreement with the findings of Anderson and Gordon (1982) who also observed that the maximum mean parasite burden occurs in host of intermediary age classes (medium size), as a result of the more rapid death of heavily infected host. They further emphasized that the decrease in mean intensity in older hosts may be as a result of either changes in feeding habit, changes in habitat utilization or the development of acquired immunity.

There was a pronounced seasonal variation in the intensity of *A. cantonensis* during the middle of the rainy season with a maximum intensity recorded in September 1997. There was a higher infestation of *A. cantonensis* in *A. marginata* observed during this season. This may be due to the rain, which favours the survival of the nematode in the soil during this season. It was observed that lower infection rate was recorded in the middle of the dry season and this may be as a result of the dry condition. Such inhibits the survival of the larvae, and also during this period, the snails were in a state of aestivation. Dinnik and Dinnik (1963) reported that high proportion of *Lymnaea natalensis* were infected with *Fasciola gigantica* during the wet season but there was a decline in the infection rate during the dry season. They suggested that dry conditions are detrimental to the hatching of eggs of the parasite (which plays an important role of lowering the infection rate) during the dry season. The seasonal variation in the level of prevalence is much less pronounced than the seasonal variation in intensity level. Nevertheless a small peak was also observed in September 1997 which corresponded with the peak in intensity level. This minor increase may be also due in part to the higher rainfall recorded during this month and could also be as a result of the migratory activities of this snail which is at the peak during the rainy season.

5. Conclusion

It can therefore be concluded that this study has revealed that at Ile-Ife and its environs, the giant land snail *A. marginata* is parasitised by the nematode *Angiostrongylus cantonensis.* The discovery of this parasite however suggests that people eating this snail in this area stand the risk of contracting Angiostrongyliasis. *(Eosinophilic meningitis)*. However, since the disease is contracted by eating uncooked snail the chances of people contracting the infection in this area are thereby reduced because snails are well cooked before they are consumed. Other sources of infection as reported include eating uncooked vegetables, prawns and also drinking water from open sources (Alicata, 1991). These findings therefore suggest that to avoid infection with this parasite snails, prawns and crabs should be cooked properly before they are consumed. People should avoid drinking

Table 1: The distribution and number of *A. cantonensis* recovered from various organs of *A. marginata*

Organs	Number of worm larvae recovered
Foot	2190
Lung	1835
Rectum	209
Intestine	37
Heart	15
TOTAL	4286

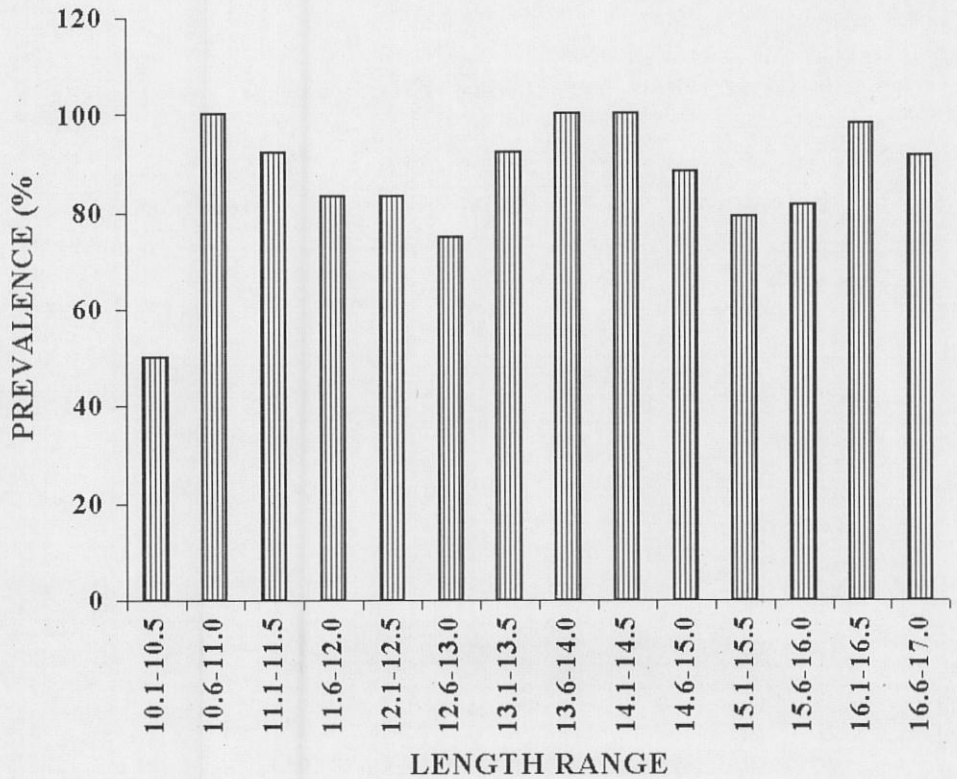

Fig. 1a: Prevalence of *Angiostrongylus cantonensis* infection relative to host length in the snail *Archachatina marginata*

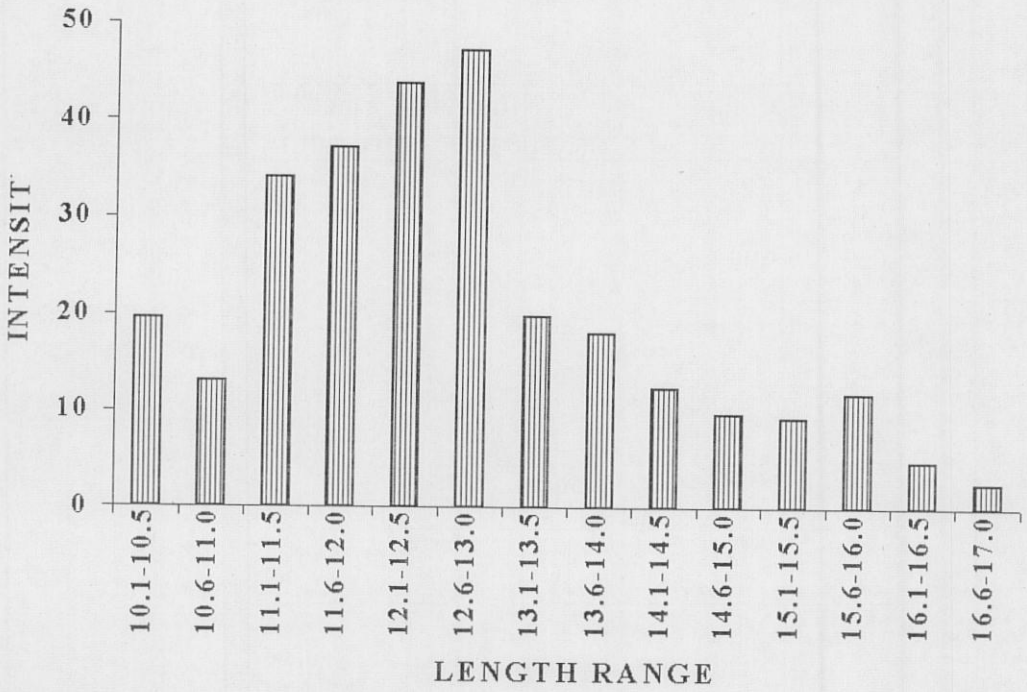

Fig. 1b: Intensity of infection with *Angiostrongylus cantonensis* relative to host length in the snail *Archachatina marginata*

Table 2: Seasonal variation in the prevalence and intensity of *Angiostrongylus cantonensis* in *Archachatina marginata*

Months	No. Examined	% Infected	Mean Intensity
MAY '97	15	80.0	5.7
JUN. '97	20	85.0	10.0
JUL. '97	20	90.0	7.9
AUG. '97	23	78.3	9.4
SEP. '97	10	100.0	53.6
OCT. '97	23	86.9	22.6
NOV. '97	16	93.7	24.4
DEC. '97	18	83.3	37.5.
JAN. '98	18	94.4	45.4
FEB. '98	20	90.0	26.3
MAR. '98	15	86.7	26.4
APR. '98	20	80.0	14.2
TOTAL	218	86.7	22.7

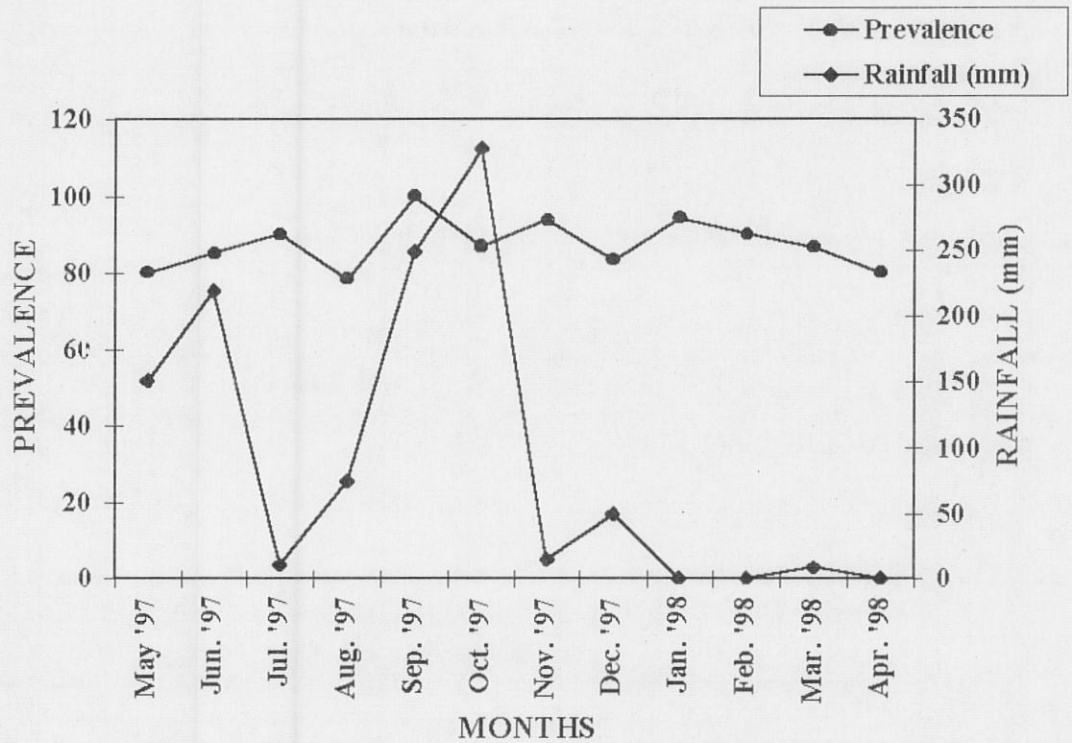

Fig.2: The Prevalence and total rainfall against the different seasons of the year.

water from open sources and finally children should be protected from playing with snails.

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