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Distribution and Seasonal Variation of Snail Vector of Medical and Veterinary Importance in Communities Around Challawa Dam, Karaye Local Government Area, Kano State

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ABSTRACT
Snail are generally aquatic upon found in almost all fresh water bodies ranging from rivers, lakes, streams, irrigation channels, lakes, streams, Ponds and marshes attached to the water plants. The epidemiology of schistosomiasis involves a mollucs (snail) as an intermediate host, various species of fresh water snails are known to act as intermediate host of schistosomiasis. This study aims to determine the distribution and seasonal variation of snail vector species of medical and veterinary importance in communities around Challawa Dam, Karaye Local Government Area, Kano State. Three communities, Challawa, Kauyan Mata and Magasawa were selected based on their proximity to Dam and the Challawa River. Snails are collected on monthly basis for twelve consecutive months, using forceps technique. A total of six hundred and seventy-four (674) freshwater snails were collected from the three selected sampling sites, based on morphological appearance of the snail shells, three species were identified in all the sampling sites namely; *Bulinus globosus* 433 (64.24%), *Bulinus forskalii* 41 (6.08%) and *Biomphalaria spp* 200 (29.67%). All snail species were identify in all sampling site with *Bulinus globosus* the most abundant. Snails were more abundant during rainy season (Wet, n = 603. 89.47%, Dry, n = 71. 10.53%). In conclusion, Challawa Dam is a dwelling site for freshwater snails. Therefore, there is a great need for regular vector control such as use of molluscicides.

Keywords: Snail Vector, Intermediate Hosts, *Bulinus forskalii*, *Bulinus globosus*, *Biomphalaria spp*

INTRODUCTION

Snails are generally aquatic and hermaphrodites, upon found in almost all fresh water bodies ranging from rivers, lakes, streams and ponds. Man-made water bodies (constructed Dams and irrigation channel) are excellent habitats for the snail. Similarly, these vectors (snails) are mostly found in shallow water near the shores of dams, irrigation channels, lakes, streams, Ponds and marshes attached to the water plants, rocks and stones covered with algae or mud that is rich in organic matter. They are most common in water moderately polluted with faeces and urine (Brown, 1980; Okpara *et al*., 2007; Idris and Ajanusi, 2001; WHO, 2010). Snails are not found in environments with high tidal fluctuations (Preston, 1910). They are also not found in salty or acidic water.

Snails can also be found in isolated areas with water (such as drainage systems), living independently. This, however, indicates that the snails or their eggs could possibly be transferred to a new habitat by some agents like man or other animals. The Biomphalaria snails live in shallow water at the edges of their habitats. This is their natural environment, which provides the food that these snails need (green algae, decaying organic matter) and is characterized by high levels of light and the presence of aquatic plants (Bello, 2003).

It was shown that the survival and population dynamics of snails depends on different environmental parameters such as water current, food availability, land contours, soil composition, hydrography and climate of the area (Bello, 2003). Jan 1997 also showed that in most areas, changes in rainfall, water level and temperature cause marked fluctuations in snail population densities and rate of schistosomiasis transmission. Other factors affecting the distribution and abundance of the snails include the biotic and abiotic environment, its behaviour, reproduction, genome, interactions within and between species, and human influences. According to Shove (2010), snail intermediate hosts of schistosomiasis vary in their adaptive capability to adjust to the biotic and abiotic factors determining their population and distribution in a specified area. The same authors also pointed out that the existing spatial variation among such snails may be attributed to change in different water parameters such as conductivity, total dissolved solid, dissolved oxygen, and seasonal influence (wet and dry season). Another earlier report showed that temperature, food supply, predators, parasites, rainfall and water composition had influence on the population density of the snails (Ayanda, 2009).

The two (2) genera that are found to be implicated in the transmission of schistosomiasis in this country (Nigeria) are *Bulinus* and *Biomphalaria* species.

MATERIAL AND METHOD

Study Area

The study area comprises of villages around Challawa Dam (Challawa, Kauyan Mata and Magasawa) in Karaye Local Government Area, Kano State. The Local Government location is between the coordinate's latitude 11º 47'N and longitude 11.783º 12'E. Karaye Local Government in the south share boundary with Rogo to the northeast, Kabo to the southeast, Kezawa to the West and to the North with Shanono. Challawa Dam was a project built by Julius Berger in 1990-1992, its 42 m high and 7.8 km in length. The Dam has a full storage capacity of 904million m^3. Challawa Dam is located

along challawa village in Karaye Local Government Area, Kano State. And the Dam is surrounded by many communities, to the west of the Dam is Challawa, Magasawa is a village along the river axis that supply water to the Dam and to the south of the Dam is Kauyan Mata.

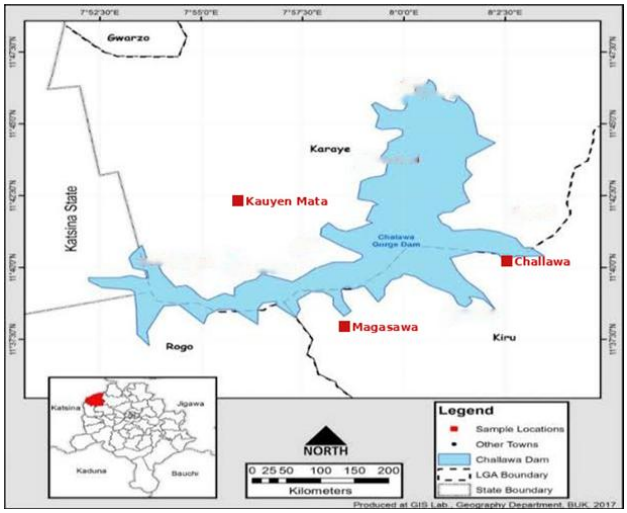

Figure 1: Map of Study Area

Sample Collection

Manual search of snail from various locations in the study area around the water bodies including canal for irrigation, streams etc. was carried out and picked with the aid of forceps where found. The time for collection is between 10:00 am to 12:00noon and the duration is twelve consecutive months.

Sample Analysis

Snail Examination

On the process of examination, the snails were identified using their morphological characteristics and separated using standard keys described by Brown and Christensen (1993). Each species was counted and recorded.

Statistical Analysis

The data obtained from this research was analysed using SPSS Statistical software package (version 16.0) and used chi-square tests and ANOVA to compare the differences and for the determination of associations, at 0.05% level of significance.

RESULTS AND DISCUSSION

Result

Snail Survey

A total of 674 freshwater snails were collected from the three sampling sites in twelve months. On the basis of shell morphology, 433 (64.24%) of the snails collected were identified as *Bulinus globosus* (vectors of urinary schistosomiasis), 41 (6.08%) were identified as *Bulinus forskalii* and 200 (29.67%) were identify as *Biomphalaria species* (vector of intestinal schistosomiasis). Thus, monthly collections show slight to high variations in the distribution and abundance of the snail species. However, there was no significance difference between the number of snails sampled and the sampling month (*P=0.5178*). The highest number of snails 161 (23.89) was collected in the month of July, while the least 2 (0.30) was collected in the month of January. No snail species were found during collection in the months of March. This showed the Snail is abundance in the rainy season and decreased with decreased in rainfall (Table 1).

Table 1: Distribution of Freshwater Snail Species Collected During Survey Period in Sampling Site Around Challawa Dam Karaye Local Government Kano State

Sampling month	Identity and number of snails collected			Total
	B. globosus	***B. forskalii***	***Biomphalaria spp***	
March*	0 (0.00)	0 (0.00)	0	(0.00)
April*	38 (8.78)	20 (33.90)	17 (9.34)	75 (11.13)
May+	49 (11.32)	2 (3.39)	15 (8.24)	66 (9.79)
June+	87 (20.09)	7 (11.86)	26 (14.29)	120 (17.80)
July+	128 (29.56)	5 (8.47)	28 (15.38)	161 (23.89)
August+	69 (15.93)	2 (3.39)	40 (21.98)	111 (16.47)
September+	36 (8.31)	0 (0.00)	34 (18.68)	70 (10.39)
October+	11 (2.54)	0 (0.00)	6 (3.30)	17 (2.52)
November*	9 (2.08)	13 (22.03)	4 (2.20)	26 (3.86)
December*	6 (1.39)	10 (16.95)	7 (3.85)	23 (3.41)
January*	0 (0.00)	0 (0.00)	2 (1.10)	2 (0.30)
February*	0 (0.00)	0 (0.00)	3 (1.65)	3 (0.45)
TOTAL	433 (100)	59 (100)	182(100)	**674 (100.00)**

Key: + Rainy Season, * Dry Season

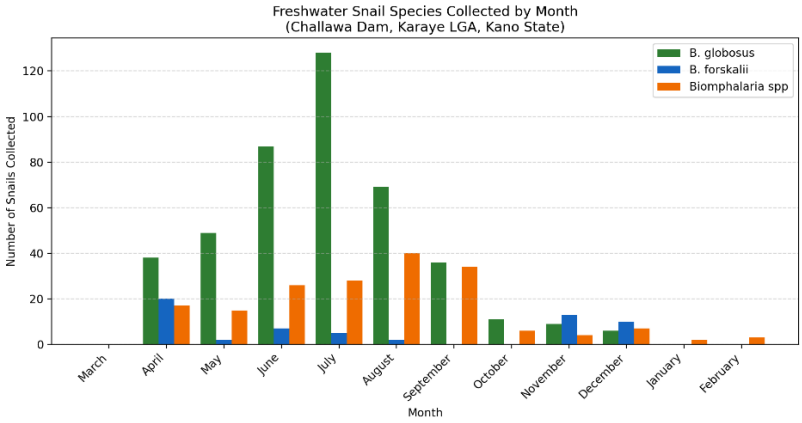

Figure 2: Distribution of Freshwater Snail Species Collected During Survey Period in Sampling Site Around Challawa Dam Karaye Local Government Kano State

Distribution of Snail Species in Relation to Sampling Sites

The distribution and abundance of the snail species in relation to sampling sites showed highest number of 301 (63.50%) in Magasawa area, followed by Challawa area 92 (19.41%) and the least number of 81 (17.09%) were collected at Kauyan Mata area (Table 2). statistical analysis showed significant difference between the snail sampled and the sampling site (χ^2*=61.386 P=0.0013 df=2*).

Table 2: Identity and Distribution of Snail Species in Relation to Sampling Sites

Sampling site	**Identity and number of snails collected**			**Total**
	B. globosus	***B. forskalii***	***Biomphalaria spp***	
Challawa	87 (12.91)	30 (4.45)	70 (10.39)	187 (27.74)
Kauyan Mata	79 (11.72)	18 (2.67)	48 (7.12)	145 (21.51)
Magasawa	267 (39.6)	11 (1.63)	64 (9.50)	342 (50.74)
Total	433 (64.24)	59 (8.75)	182(27.00)	674 (100.00)

(χ^2*=61.386 P=0.0013 df=2*)

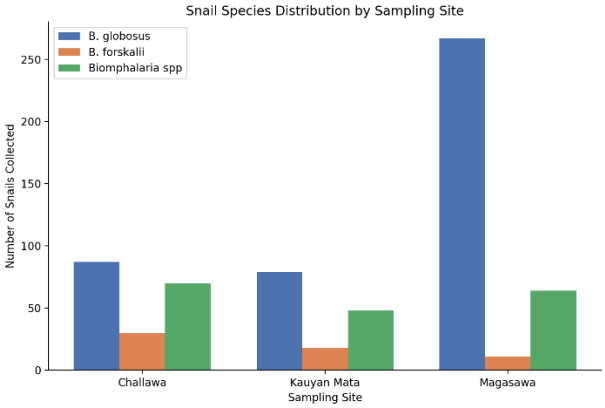

Figure 3: Identity and Distribution of Snail Species in Relation to Sampling Sites

Discussion

The result of snail sampling carried out in twelve consecutive months showed that freshwater snails are present in the study area. And also, monthly variations in the number of snails were observed. Angaye and Izah (2016) had earlier reported in a review paper, that environmental parameters had influence on the density and population dynamics of freshwater snails. It was also observed from this study that seasonal change and fluctuation of rainfall have affected the number of snail species in the area. Most snail species cannot survive without water and too much water also reduces snail population (Simoonga *et al.*, 2009). More snail species were collected between the months of June and July. Ngele *et al.* (2012) also made similar observation in their study carried out in Abia State, Nigeria, which showed the highest number of snails collected at the beginning of wet season when there was no heavy rainfall. On the other hand, a fall in population of the snails was observed from the month of August onward. A similar observation was made by Taofiq *et al.* (2017). The two snail species identified in all sampling sites, *globosus* and *forskalii*. turns out to be the intermediate host of *haematobium* (urinary schistosomiasis). This species (*Bulinus globosus*) was previously confirmed in different parts of Nigeria as an important vector of *Schistosoma* species (Betterton *et al.*, 1998; Owojori *et al.*, 2006; Ejehu *et al.*, 2017).

CONCLUSION

It is evident from this study that, Challawa Dam is a residing site for freshwater snails (*Bulinus globosus*, *Bulinus forskalii*

and Biomphalaria spp). The snails are more abundant between the months of June-september.

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