Survey of Medically Important Fresh Water Snails in Numan and Mayo-Belwa Local Government Areas of Adamawa State, Nigeria.

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ABSTRACT

A survey of medically important fresh water snails in Numan and Mayo- Belwa Local Government Areas, of Adamawa state was carried out. Snails from each site were collected in specimen containers from the field to the laboratory for speciation using morphological characteristics. The result showed a significance ($p<O.05$) variation in the snail population in wet and dry seasons. Populations of snails were more in Numan than Mayo Belwa Local Government Areas and are found all year round. Contrary to expectations, snail population was observed to be higher in the dry season than in the wet seasons. Five different species of snails were identified in the two Local Government Areas which include: *Biomphlalaria pfeifferi, Bulinus forskali, Bulinus globosus, Bulinus truruatus* and *Lymnaea natalensis.* Among the species found, *Bulinus forskali* (42%) was the most abundant while *Lymnaea natalensis* had the least (2.7%) in the study areas. The presence of these species suggest that the disease is prevalent and also Fasciolasis. The study recommends that for effective health care delivery, a control program geared towards the management of the snails must be instituted.

KEYWORDS: Survey, Snails, Schistosomiasis Abundance, Infectivity.

Introduction

The need to meet the challenges posed by parasites is more important now than ever. Humans and animals suffer because of the damages caused by parasites. In the developing countries like Nigeria, though a serious campaign against many infectious diseases are being carried out by way of immunization and subsidies on drugs, yet a significant number of deaths is being recorded (WHO, 2009).

Fresh water snails are said to be of medical importance because they transmit *Schistosomes*, known to cause schistosomiasis common among agricultural communities with low living standards and poor sanitation. (Onwulari, 1992). Schistosomiasis is a major problem caused by blood and intestinal flukes and stands second to malaria in terms of its prevalence in riverine communities (CDC, 2008). The most important epidemiological factor in Schistosomiasis is the activities of humans in water containing intermediate host of the Schistosomiasis worm (Smyth, 1976). The disease continues to pose serious challenge to health planners in endemic areas. WHO (1999) estimated that about 200 million people are infected in 74 countries while 600 million in the world. The threat to human health caused by this *schistosomes* parasite is because of their ability to survive in human polluted water due to urine and faeces (WHO 1993). This study therefore examined the problem

caused to human health in the study area and it intends to assess the situation through identifying species, assessing abundance and determining the infectivity rate of the different snail species.

In the poor agricultural countries, food productivity in some communities is strangulated when people contract this disease and in school aged children, it causes absentism. Anosike, *et al.,* (2001). Numan and Mayo Belwa are among the rural communities who have been reported to have suffered untold schistosomiasis infection. (Akogun, 1990).

Materials and Methods

The survey was carried out in Numan and Mayo-Belwa within a period of twelve (12) months, from (August 2006-July 2007). Reconnaissance visits to study areas were carried out to identify sites. At site selection, preference was given to areas where there are high human and domestic activities. Each of the identified sites was searched for snails once every month using a long handled sieve Brown (1985). About 15 scoops were made at each site to eliminate skill variation and same person searched the sites at regular intervals throughout the survey period (WHO, 1993).

Snails caught from each site were put in specimen containers and were transported to the laboratory where they were separated into species using the morphological characteristics as was described by Brown (1980). The different species were counted and the density calculated. A randomly selected proportion of the snails were observed for *cercariae* using the method described by WHO (1998). The number of infected snails and types of *cercariae* were recorded. Snails were identified by using the Danish Bilharziasis laboratory manual (WHO, 1993).

Detection of infection in snails

Infection was detected by transferring the snails in a beaker containing fresh water, 20 snails per 200mls of water was used. The snails were kept between the temperatures of 20-27^{o}C. A strong artificial white light was applied to beakers containing the snails for two hours after which *cercariae* were activated by the light and could come out from the foot of the snails depending upon the level of infection. Snails producing fork tailed *cercariae* were transferred individually into smaller beakers for infectivity test. Snails which failed to produce *cercariea* were then crushed in water and examined *cercariea* found were immobilized using glacial-acetic acid and counted with the aid of a microscope. The numbers of *cercarea* observed were recorded. Their densities were also determined according to the methods of (Hira and Muller, 1966).

Comparative Analysis

The Chi-Square (X^2) method of statistical analysis was employed for the analysis of the data collected, to determine if there is any significant relationship between snail abundance and infectivity rate.

Results

A total of 314 snails were randomly collected from the two sites, the study under further investigation found that five species which are of public health significance in the two local government areas are, *Biomphlalaria pfeifferi, Bulinus forskali, Bulinus globosus, Bulinus trunc uus* and *Lymnaea natalensis*. The result of the investigation revealed that, Numan Local Government area had the highest number of snails of public health significance 74.5% representing 234 individual snails. While Mayo-Belwa L.G.A had 25.5% representing 80 individual snails and there was significant difference ($P<0.05$) between Numan and M/Belwa local government areas.

Snails were found with varying densities at various sites. *Bulinus forskali* was the most abundant 115 (49.2%) while *B. pfeiferi* is least with 6 (2.7%) in Numan L.G.A, and in Mayo-Belwa L.G.A, *B. globosus* had 40 (50%) while *Lymnaea natalensis* was the least, 2 (2.5%) Based on monthly distribution, The months of January,March and April in 2007, recorded the highest number of snails 30, 28 and 27, respectively. in Numan L.G.A, while in M/Belwa L.G.A, however, the months of April, March, (2007) and September (2006) had 14, 13 and 10 snails, respectively (Fig. 3).

The distribution of snails by season showed that more snails were captured, 125 (53.4%) in dry period and 109 (46.6%) in wet season in Numan Local Government Area. In Mayo Belwa, 52 (65%) of the snails were captured in dry season while only 28 (35%) in the wet season (Fig. 2).

The species of *Bulinus forkali* had the highest distribution, 115 (49.1 %) in Numan L.G.A, followed by *B. globosus* 56 (23.9%) and the least was *B. pfeifferi*. In Mayo Belwa Local Government, *B. globosus* had 40 (50%) of the total snails followed by *Biomphalaria forskali* which had 30 (12.8%) and the least was *Lymnea natalensis*, 2 (2.6%). It therefore indicated that *B. forskali* had a wider range of distribution followed by *B. globosus* then followed by *B. truncatus.*

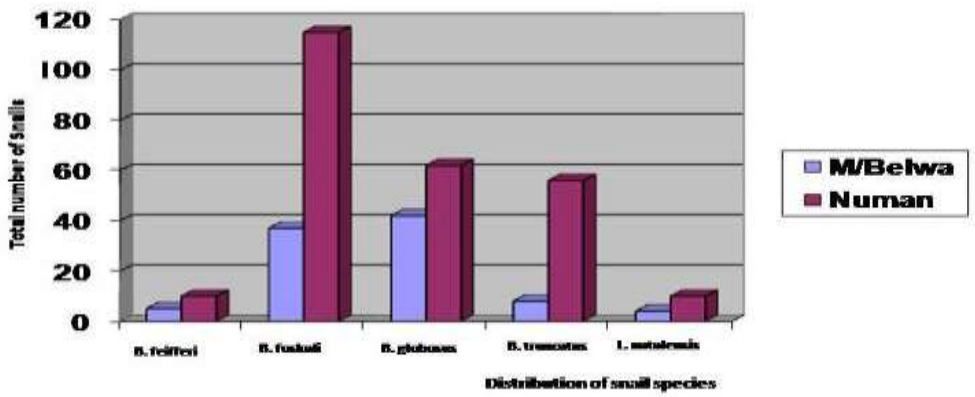

Figure 1: Distribution of snails by species in Numan and Mayo-Belwa Local Government Areas.

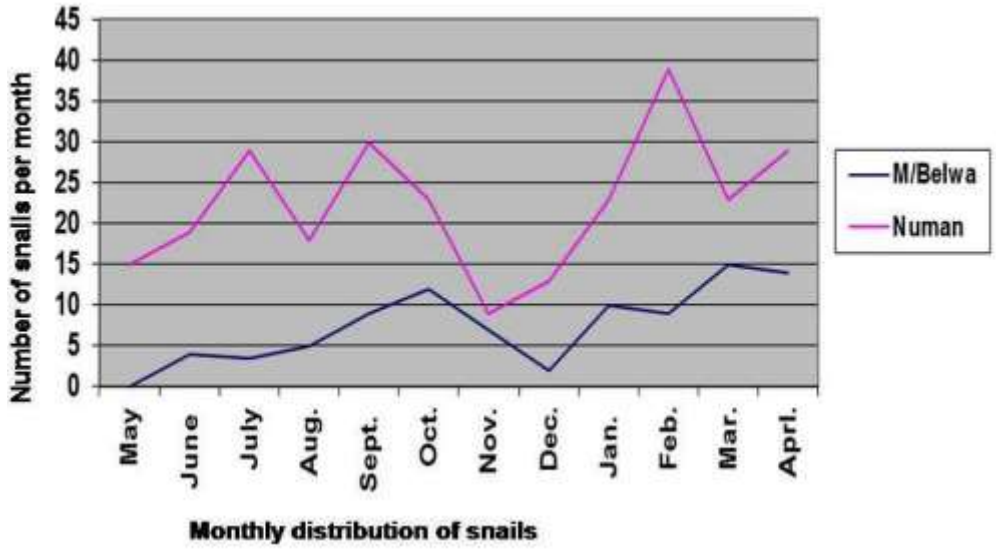

Figure 2: Monthly distribution of snails in Numan and Mayo-Belwa LGAs.

Snail Infectivity Rates

The infectivity rate for Numan LGA was found to be 42(~, 20%, 13%,4% and 3% for *B. forskali, B. globosus, B. truuncatus, L. natalensis and Biomphalaria J feifferi,* respectively. While for M/Belwa had *B. globosus* had 12%, *B. forskali,* 7%; *B. truncatus,* 2%, *B. pfeifJeri* and *L. natalensis* had 1 % each. Infected snails were found throughout the year except the month of May and September.

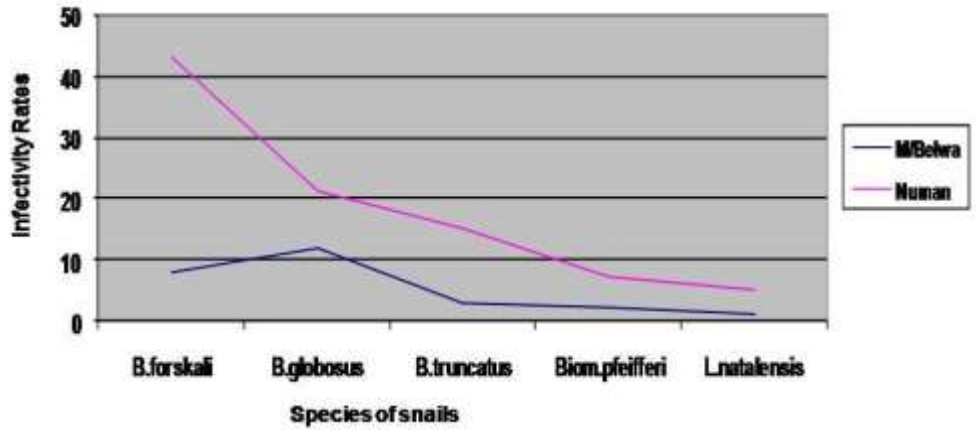

Figure 3: Snails infectivity different snails species in Numan and Mayo-Belwa LGAs.

Discussion

The availability of the different species of snails especially *Biomphalaria* and *Bulinus* in both Local Government Areas is indicative that these communities are vulnerable to schistosomosis caused by both *Schistosoma mansoni* and S. *haematobium* or those cases of established disease existed. This may be true of Numan Local Govt Area (NLGA) where this study recorded 74.5% of the total number of snails captured with *Bulinus forskali* been the most abundant (,·9.2%) compared to *Biomphalaria pfeifferi,* which had 2.7%, Table 1. The presence of *Lymnaea na, alensis* (2.5%) within the same study area provides a clue to possible Fascioliasis in animals since 1 here was one main source of water for the animals.

Seasonal distribution, contrary to ecological thoughts, then was significant ($P<0.05$) variation between the dry and wet seasons, more snails in dry than in wet season (Fig 1). Seasonal fluctuations in snail abundance were well marked. The densities of most species were lowest at the onset of the rainy season, between the months of May and June. *Bulinus forskali* was found to breed more rapidly (Okukwuosa, 1978) and extensively in Numan than in Mayo-Belwa during the dry season. Betterton *et al., (1988)* reported that increase in water velocity after heavy rain: dislodged snails and those not hidden in substratum are exposed to greater velocities which could le ad to death or change of environment. They further reported that low temperature due to raise in water level had suppressive effect on the reproductively of schistosomes in snails. Snail fecundity also depended on the available of detritus which are often washed off by heavy rains resulting in cea th of snail or reduction in their growth rate. Betterson *et al.,* (1983) had earlier reported that infectivity rates of the snails followed the same pattern of distribution.

Fig 2 showed two peaks between the months of September, and January which suggest that; September is a transitional month where snails were lodged by floods and there was the unlikely wood of being carried to another new environment, thus snails breed. In January, most waters are shallow and snails have become adaptive to these conditions earlier and therefore increase in number becomes the order of the day. The high rate of infection in dry season agrees "it} the earlier report by Betterton *et al., (1983)* that low water volume and flow in the dry season created greater chance of snail-miracidial contact.

Although Dawes (1970) had earlier reported that *B. forskali* has a very low infectivity rate, and therefore, the existence of schistosomiasis was maintained by the large number of this snails. However, in this study *B. forskali* was found to have the highest inactivity rate recorded in Numan LGA, 42% when compared with that of *M/Belwa* with *B. forskali* wit 1 7% Whereas, in *M/Belwa B. globosus* had 12%, being the highest rate of infectivity (Fig 3). *B. forska,* i can survive and multiply in artificially man made shallow ponds, thus the large number (Betterton *et al.. 1988),*

Infected snails were found throughout the year in Mayo-Belwa local government area except in the months of May and September. This implies that transmission of the disease could be throughout the year with the exception for two months above. With the abundance of *Bulinus globosus,* this suggests that the urinary form of schistosomiasis would be more prevalent. Despite the availability of rain during the months of June to September in this local government area, only 10 snails were captured out of which 3 were infected, this may not unrelated to the heavy rain downpour which leads to increase in high water current flow and flood during these

months. The heavy downpour might may have washed snails away. *Lymnaea natalensis* had the lowest infection rate, but could be indicative of presence of fasciolasis.

In conclusion, this study showed that *Bulinus forskali* species was the more abundant, widespread and with high infectivity rate implying that urinary form OJ' the disease is common in the two local government areas. The presence of other species becomes indicative that the other forms of the disease are prevalent, this include animal fasciolasis. For any agricultural development project to be effective in these local government areas, the programme for the eradcation or reduction in the incidences of the diseases should be considered first, especially if the youth: would be involved.

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