FRESHWATER SNAILS OF MEDICAL IMPORTANCE IN VANDEIKYA LOCAL GOVERNMENT AREA OF BENUE STATE, NIGERIA

Comment [HS1]: The topic should be refine to "**SURVEY OF FRESHWATER SNAILS FOUND IN VANDEIKYA LOCAL GOVERNMENT AREA OF BENUE STATE, NIGERIA**

ABSTRACT

A survey was carried out in Vandeikya Local Government Area of Benue State, Nigeria to determine availability, abundance and distribution of freshwater snails of medical importance and environmental factors affecting their availability. A total of 289 fresh water snails of four different genera were collected across 27 streams in the 7 zones in Vandeikya LGA. *Lenistis libycus* was found to be the most abundant freshwater snails species accounting for 40.83% of the total freshwater snails. M*elanoides tuberculata* was the second most abundant accounting for 29.41%, *Biomphalaria pfeifferi* accounted for 17.99% while *Bulinus globosus* was significantly lower in abundance than the other snails, accounting for only 11.77% of the total sampled snails. The effect of the nature of the substratum on the availability of freshwater snails revealed that habitats with rocky substratum favoured the presence of snails having accounting for 62.7% freshwater snail availability ($p<0.05$). *Biomphalaria pfeifferi* and *Bulinus globosus* were the snails of medical importance identified in the study area. Freshwater snails are abundant and vastly distributed across Vandeikya LGA, Benue State.

Comment [HS2]: REMOVE THIS because you have not determine the abundance in your study

Comment [HS3]: You have not carry any analysis indicating how environmental factors affect snail distribution

Comment [HS4]: Your results only indicate sample collect from one source only not 27 streams.

Comment [HS5]: Please revisit your result because a lot of things are missing.

Comment [HS6]: delete

Comment [HS7]: remove this

Comment [HS8]: This statement is not scientific. What data or analysis have you done to show that these snails have medicinal value?

Comment [HS9]: remove this and replace it with the strength of the research

INTRODUCTION

A research was carried out to determine the availability, abundance and distribution of freshwater snails in natural water bodies in Vandeikya. Some freshwater snails are of medical importance as they serve as intermediate host to

Comment [HS10]: The introduction is very scanty and does not clear explain the research problem

Comment [HS11]: Rephrase this sentence. An introduction cannot start with the aim of the research

trematodes in humans. Most of the diseases are prevalent in the tropics and are termed neglected tropical diseases because their economic and medical burdens affects poorer/neglected people and because their effect is often ignored/neglected because it can seldom be linked directly to deaths (Abe *et al*., 2018). Schistosomiasis is a neglected tropical disease of medical importance. 93% of the current schistosomiasis burden resides in Sub Saharan Africa (Hotez and Kamath, 2009). The distribution of schistosomiasis is dependent on the intermediate snail host's distribution. Studies show that the successful schistosomiasis control programs of the past century relied on an integrated approach which included reducing the fresh water snail host (Sokolow *et al*., 2016). However, after the introduction of praziquantel 40-45 years ago, snail control was relegated to the back ground in control strategies as it was believed that with mass drug administration (MDA) with praziquantel control and elimination of the disease could be achieved. In places without high reinfection rates, MDA has led to a significant reduction in prevalence and infection rates but maintenance of low transmission and a complete elimination of the disease would require an integrated approach which includes control of the fresh water snails of medical importance which serve as intermediate host to the parasite during its life cycle. Therefore knowledge of factors affecting the availability, abundance and distribution of *Bulinus* species and *Biomphalaria* species(the intermediate hosts for schistosomiasis) is necessary for successful control and the elimination of the disease in Africa line with vision 2020.

Comment [HS12]: This statement is not scientific. How the state of being a host give a snail medicinal value?

Comment [HS13]: Which disease??

Comment [HS14]: Choose one statement and avoid the use of "/".

Comment [HS15]: This is a very weak sentence, consider re-writing it the sentence

Comment [HS16]: Where are the studies and their references?

Comment [HS17]: This sentence is not clear. Please re-write it

Comment [HS18]: In your introduction, add few related research from the literature

Comment [HS19]: How can this knowledge help in controlling the spread of this disease. Please I will advise you to state some related work conducted by other researchers not MDA vision, before you state Your research gap

MATERIALS AND METHODS

Study area

The study was carried out in Vandeikya Local Government Area. Vandeikya is situated in the South Eastern part of Benue State.

Comment [HS20]: How many sampling stations did you choose for your experiment? How many replicate did you use

Comment [HS21]: Where is the method for the determination of physicochemical parameters.

Comment [HS22]: What is the latitude and longitude of the sample collection site? Is

Comment [HS23]: Please it will be good if you can provide the map of the area

Snail collection

Freshwater snails were collected in the early morning (6am-8am) and evenings (5pm-7pm) with the aid of a handheld scoop net. As the snails come out at cool hours of the day to avoid excess heat from sun rays. The snails were picked with forceps and placed singly in glass tubes for identification.The nature of the substratum weather rocky or sandy was also observed and recorded. Students T-test was used to determine significant difference between variables.

RESULTS

Location	No of snails	Nature of substratum	Percentage
Mbaduku	84	Rocky	29.1
Mbayongo	56	Rocky	19.4
Mbagbera	18	Sandy	6.2
Ninger	8	Sandy	2.7
Ute	20	Sandy	6.9
Mbaka-Ange	41	Rocky	14.2
Mbera	62	Sandy	21.5

P<0.05

KEY:

Zones in Vandeikya	Name of 27 local streams visited in the zone
Mbaduku	Be, Afengi
Mbayongo	Mnya, Utyavereshi, Atitim, Ugbeede, Akanyi, Apirnyi, Used, Ukenge, Gigigbe
Mbagbera	Uwyaka
Ninger	Arum
Ute	Dura, Utyem
Mbaka-Ange	Nyamshe, Ugyo, Aya, Aforkper, Ukyargu
Mbera:	Uvasar, Twe, Wagh-Shu, Asuu, Wagh-Shu, Sambe, Tsambe

Comment [HS24]: Add citation to all your methods

Comment [HS25]: remove

Comment [HS26]: Please check this equipment very well. What do you mean by "glass tubes?

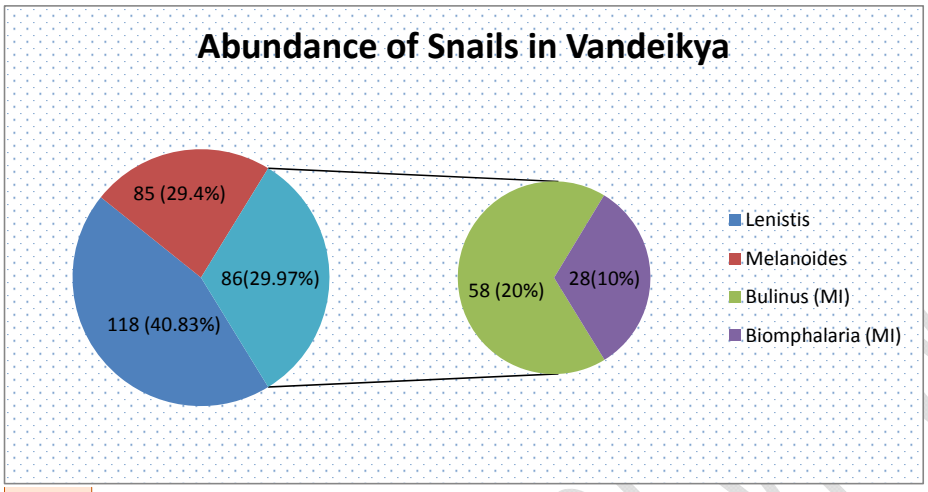
Comment [HS27]: Please explain how did you achieved identification of the snails? With which method? Insert references

Comment [HS28]: Which variables are you referring to?

Comment [HS30]: I s that the average results? You are supposed to take your sample more than one time

Comment [HS29]: Percentage of what??

Comment [HS32]: Did you take sample in all the streams listed here? If not delete it and consider only what you have done



P<0.05

MI =Snails of Medical Importance for the disease schistosomiasis

Comment [HS33]: remove

Comment [HS34]: Where is the legent of this figure?? And the content of the graph is not clear

DISCUSSION

16 out of 27 streams in Vandeikya local government had rocky substratum. In two of three locations; Mbaduku and Mbayongo, rocky substratum had significantly high number of freshwater snails than sandy substratum. This showed that rocky substratum favours the abundance of freshwater snails. This could be as a result of the fact that snails get to be protected by the rocks from being washed off by high velocity of running river/stream water. Our results were in agreement with (Oloyede *et al*., 2016) who carried out a study in Ibadan, Nigeria in which the nature of substratum was found to significantly affect abundance and distribution of freshwater snails. Our results however did not agree with (Smoothey, 2013) who opined that abundance and distribution of snails is species specific and all snails do not have the same general substratum preference, their habitat preferences are unique.

Comment [HS35]: In the whole of the manuscript, you state only one table, showing only one results and here you are talking about 27 stream. Where are the results of the other streams???

Comment [HS36]: Call out the table that show this results. Where is the result of the significant difference among the area??

Comment [HS37]: Add reference

Melanoides tuberculata snails were significantly more abundant than the other snail species in Vandeikya lga. Melanoides snails are highly invasive snail capable of outcompeting with native snails within months of introduction to a new habitat. They serve as intermediate hosts of the liver fluke *Paragonimus westermani* however this disease has not been reported in the area. Our results were in consonance with reports by (Duwa, 2017) who also reported *Melanoides tuberculata* to be the most abundant freshwater snails in all 3 different parts of Jakara dam in Kano State, Nigeria.

Comment [HS38]: How did you know that this species of snail are highly invasive? If it is from the literature cite the reference

Comment [HS39]: Which months? You only presented the result of one month alone. Where are the result of the other months?

Comment [HS40]: Always use simple English for the benefit of the readers

*Bulinusglobosus*and *Biomphalaria pfeifferi* are responsible for urinary schistosomiasis and intestinal schistosomiasis respectively. Both snails were present in Vandeikya lga accounting for 86 of the 289 (29.97%) freshwater snails collected in the course of this study. No matter how few, these snails could cause significant public health problems because within each snail, the *Schistosoma*parasite undergoes asexual reproduction. Typically just 1 snail could potentially serve as host to 1000's of cercariae because, within the snail, sporocysts give rise to daughter sporocysts, until thousands of new forms cercariae (singular cercaria) brake out of the snails into the water bodiesin active search of a human host.

Bulinus globosus was significantly more abundant than *Biophalaria pfeifferi* in Vandeikya. In Nigeria as a whole, urinary schistosomiasis is more prevalent than intestinal schistosomiasis. In our study, we found both *Bulinus*species and *Biomphalaria* species in the same location. This shows that the habitat's ecology in Vandeikya supports the thriving of both snail species and both diseases could be of potential public health importance in Vandeikya lga. Our results were in consonance with (Abdulkadit *et al*., 2017); (Abe *et al*., 2016) both of whom found both *Bulinus globosus* and *Biomphalaria pfeifferi* in the in the same location in Kaduna, Nigeria and Nasarawa, Nigeria respectively. Our results however did not agree with (Ikpeze and Obikwelu, 2016) who among other freshwater snails found only Bulinus species but not Biomphalaria species along the shorelines of Agulu lake in Anambra State, Nigeria.

CONCLUSION

Melanoides tuberculata,Lenistis libycus,Bulinus globosus, and Biomphalaria pfeifferi are four (4) species of freshwater snail in Vandeikya.*Biomphalaria Pfeifferi* and *Bulinus globosus* are species of medical importance for schistosomiasis. More research should be done on freshwater snails of medical importance and their environment as our understanding of freshwater snails is necessary for effective control of both the snails and the diseases to which they serve as intermediate host.

References

Abdulkadir, F. M., Maikaje, D. B., Umar, Y. A. (2017). Ecology and Distribution of Freshwater Snails in Gimbawa Dam, Kaduna State, Nigeria. *Nigerian Journal of Chemical Research* 22(2):98-106

Comment [HS41]: Insert reference

Comment [HS42]: There is no results showing the snail species and their location in this paper. Please provide us with the results and then explain

Comment [HS43]: Correct this reference to be "(Abdulkadit *et al*., 2017; (Abe *et al*., 2016)

Comment [HS44]: This is an indication that the novelty of this research is extremely weak. Because you have not stated what you achieve so far and what are you recommending others to do

Comment [HS45]: A lot of in-text references are missing in the reference list and vice versa

Abe, E. M., Ombugadu, A., Oluwole, A. S., Njila, H. L., Mogaji, H. O., Adeniran, A. A., Guo, Y. H., Li, S. Z., Zhou, X. N and Ekpo, U. F. (2017). Population abundance and Bionomics of Snail Intermediate Hosts of Trematode Parasites in Nasarawa State, Nigeria. *Research Journal of Parasitology* 12(1):8-18 doi:10.3923/jp.2017.818

Abe, E. M., Guan, W., Guo, Y., Kassegne, K., Qin, Z., Xu, J., Chen, J., Ekpo, U. F., Li, S., Zhou, X. (2018). Differentiating snail intermediate hosts of Schistosoma spp. using molecular approaches: fundamental to successful integrated control mechanism in Africa. *Infectious Diseases of Poverty* 7:29 doi.org/10.1186/s40249-018-0401-z

Dawaki, S., Al-Mekhlafi, H., Ithoi, I., Ibrahim, J., Abdulsalam, A. M., Ahmed, A., Sady, H., Atroosh, W. M., Al-Areeqi, M. A., Elyana, F. N., Nasr, N. A. and Surin, J. (2016). Prevalence and risk factors of urinary schistosomiasis among Hausa communities in Kano State, Nigeria. *Revista do Instituto de Medicina Tropical de São Paulo.* 58:54. DOI 10.1590/S1678-9946201658054

Hotez, P. J. and Kamath A. (2009). Neglected Tropical Diseases in Sub-Saharan Africa: review of their prevalence, distribution and disease burden. *PLOS Neglected Tropical Disease* 3:e412

Ikpeze, O. O. and Obikwelu, M. E. (2016). Factors affecting seasonal abundance of gastropod of public health importance found at Agulu Lake shorelines in Nigeria. International *Journal of Pure and Applied Bioscience* 4(2):91-102 DOI; http://dx.doi.org/10.18782/2320-7051.2264

Michael, E., Spear, R., Remais, J. Modelling parasite transmission and control Vol. 673 New York: Springer; 2010. Modelling environmentally-mediated infectious diseases of humans: transmission dynamics of Schistosomiasis in China; pp. 79-98

Monde, C., Syampungani, S., van den Brink, P. (2015). Exploring the potential of host-environment relationship in the control of schistosomiasis in Africa. *African Journal of Aquatic Science* 40: 47-55. Doi: 10.2989/16085914.2014.986643

Oyebayo, O. O., Otarigho, B., Olajumoke, A. M. (2016). Diversity, distribution and abundance of freshwater snails in Eleyele dam, Ibadan, south-west Nigeria. *Zoology and Ecology*. 4(1):1-9 doi.10.1080/21658005.2016.1245934

Sokolow, S. H., Wood, C. L., Jones, I. J., Swartz, S. J., Lopez, M., Hsieh, M. H., Lafferty, K. D., Kuris, A. M., Rickards, C., De Leo, G. A. (2016). Globals Assessment of Schistosomiasis Control Over the Past Century Shows Targeting the

Snail Intermediate Host Works Best. *PLOS Neglected Tropical Diseases* 10(7): e0004794 DOI: 10.1371/journal.pntd.0004794.
Smoothey, A. F. (2013). Habitat Association of Turban Snails on Intertidal and Subtidal Rocky Reefs. *PLOS ONE* 8(5):e61257 doi:10.1371/journal.pone.0061257