



Dry Season Composition and Abundance of the Anopheles, Culex and Aedes Genera in Makurdi Benue State

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Authors' contributions

This work was carried out in collaboration among all authors. Authors VUO and EUA designed the study. Authors AGO and VUO performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AGO, VUO and EUA managed the analyses of the study. Author AGO managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Mosquitoes are very important vectors of malaria, yellow fever, dengue and other diseases. Their unmitigated availability is key to the spread of parasites spread by their bites. This research was designed to find out the abundance of mosquitoes of the Anopheles, Culex and Aedes Genera in Makurdi Local Government of Benue state. Larva was collected from different water bodies in three (3) different locations that cover Makurdi representatively with the aid of a scoop spoon. Collected larva was stored in transparent plastic plates and transported to the insectarium, filtered into cleaner water by decantation, fed with baker's yeast and grown into adult Mosquitoes in premade 16x16x16 inches cages. Adults were fed with sugar solution in cotton balls. Dead mosquitoes were stored in vials containing 70% ethanol. Using the Photographic Guide to common mosquitoes of Florida, Mosquitoes were identified by microscopy. 537 Mosquitoes were identified of different Genera. *Aedes*genera recorded the highest abundance of 34.64%, while *Anopheles*genera has the

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least abundance with 31.10%. *Culex* genera recorded an abundance of 34.26% in Makurdi. NorthBank with 40.78%, recorded the highest number of mosquitoes of the three Genera under consideration. Logo II/Kanshio follows with 32.22% and Karmen, 27.00%, showed the least abundance. Based on this research, Mosquitoes showed relatively high abundance in Makurdi in the dry and windy harmattan season. This could be one reason malaria persists even in the dry seasons in Makurdi.

Keywords: Mosquitoes; malaria; yellow fever; dengue.

1. INTRODUCTION

The transmission of mosquito-borne diseases depends largely on the availability of competent mosquito vectors. Various efforts have been made; and are still being made to, prevent mosquitoes from biting man, hence braking the disease cycle.

Mosquitoes are one of the most disturbing blood suckers afflicting man. Mosquitoes are very important primary hosts in the spread of malaria, yellow fever, filariasis and several arboviral infections; because females are anautogenous-requiring blood meal, before oviposition [1].

2. MATERIALS AND METHODS

2.1 Study Area

This study was carried out in Makurdi local government area of Benue state, Nigeria, latitude:

Larva collection was done in the months of December 2017-January 2018. As described by Obisike et al. [2] with the aid of a scoop spoon, mosquito larvae of *Aedes*, *Culex* and *Anopheles* genera, were carefully collected from different breeding sites, from the wild, around Makurdi. (Along UniAgriculture-Gbajimba Road, New Otukpo Road and behind Federal Low-cost Housing Estate, Naka road).

Larva was scooped into transparent containers; containers were covered, and transported to the laboratory to be grown into adults.

Containers were continually opened and aerated on transit to the laboratory to prevent larval death. In the laboratory, water containing larva was carefully decanted into transparent disposable containers, to remove debris. Clean water was added to each container to improve aeration [3].

Larva was then fed with baker's yeast, by sprinkling sparsely over the surface of the water

containing larva [3]. The container of larva was put into premade cages measuring 16x16x16 inches, with mosquito nets, to retain emerging adults.

After 24 hrs of feeding once a day with yeast, very active and fast moving pupa and a few adults began to emerge. As in Tamilselvan et al. [3]. With modifications, humidity was maintained by pouring water, everyday upon a thin layer of foam, laid on the floor of the laboratory, with all windows closed except one partially open. Foams soaked in water were also draped upon each cage to maintain optimum humidity.

After 2 days, adults begin to emerge in large numbers. Sugar solution was provided different points in each cage. Adults could be seen, feeding on sugar solution daubed in cotton wool [1,2]. Cotton balls daubed in sugar solution was changed daily to prevent microbial contamination.

2.2 Morphological Identification

After each test, the knock-dead mosquitoes were stored in vials containing premade 70% Ethanol [4]. The labels and concentrations used during the test were maintained.

Microscopic examination for the identification of the Mosquito Genera under consideration was done according to the Photographic Guide to Common mosquitoes of Florida [5] University of Florida, Florida Medical Entomology Laboratory, since the use of a hand lens did not suffice. A total of 537 were identified morphologically.

Results were then computed and analysed using simple percentages.

3. RESULTS

Table 1 shows specific, total number of the research genera (*Anopheles*, *Aedes* and *Culex*) and their respective percentages, including their corresponding locations. A total of 537 mosquitoes of the aforementioned Genera were identified out of 1620 used for this research.

Table 1. Percentage abundance of the identified mosquito genera

Genera	Anopheles sp	Aedes sp	Culex sp	Total
Locations				
North Bank	51(39.94%)	67(36.02%)	101(54.89%)	219(40.78%)
LOGO II / Kanshio	53(31.74%)	67(36.02%)	53(28.80%)	173(32.22%)
Karmen Village	63(37.72%)	52(27.96%)	30(16.30%)	145(27.00%)
TOTAL	167(31.10%)	186(34.64%)	184(34.26%)	537(100%)

4. MOSQUITOES ABUNDANCE

From the results of this research, it was observed that there was high abundance of mosquitoes in makurdi; even in the middle of the dry harmattan season. Those of the *Aedes* genera were found to have the highest abundance with 186 mosquitoes, amounting to 34.64% after identification. *Anopheles* genera 167(31.10%) had the least abundance; the three genera identified in this study were generally high in abundance, north bank had the highest mosquito abundance compared to logo II / Kanshio and Karmen village, Makurdi.

The plausible reasons for the high mosquitos' abundance in North Bank, can be attributed to the generally and constantly poor sanitary conditions, the topography's susceptibility to floods, enhancing collection and retention of water in the abundant clogged drains in North Bank (www.mosquitoworld.net/about-mosquitoes/habitats/). Retrieved 5th may 2019.

Mosquitoes of the *Culex* genera were found to have the highest abundance in North Bank; 101(54.89%) compared to Logo II / Kanshio; 53(28.80%) and Karmen village; 30(16.30%). The reasons for the high abundance of *Culex* genera in North Bank is because of their preference for stagnant or polluted water which abounds in North Bank than the other locations.

(www.mosquitoworld.net/about-mosquitoes/habitats/). Retrieved 5th may 2019.

For the same reasons above, North bank and Logo II / Kanshio areas had equal abundance of *Aedes* genera both 67(36.02%).

Members of the *Anopheles* genera had their highest abundance 63(37.72%) behind Federal low-cost Naka Road because of the all-year round availability of water after the floods of the rainy season. They are permanent water mosquitoes. (www.mosquitoworld.net/about-mosquitoes/habitats/).

Retrieved 5th may 2019. The abundance of the mosquito genera in the study area is an indication that the area is prone to parasitic infections such as malaria, wuchereria, yellow fever and several other arboviral infections; because females mosquitoes are anautogenous- requiring blood meal, before oviposition [1].

5. CONCLUSION

This research highlights the abundance of mosquitoes of the *Anopheles*, *Culex* and *Aedes* Genera in Makurdi Local Government of Benue state. Based on this research, Mosquitoes showed relatively high abundance in Makurdi in the dry and windy harmattan season. This could be one reason malaria persists even in the dry seasons in makurdi.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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