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RELATIVE ABUNDANCE OF ADULT +MOSQUITOES IN IMO STATE POLYTECHNIC (OMUMA CAMPUS), OMUMA, ORU-EAST, IMO STATE, NIGERIA

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Abstract
Most Mosquitoes are of public health importance because they serve as vectors for the transmission of parasitic diseases. A study on the relative abundance of mosquitoes in some selected area of Imo State Polytechnic Omuma was conducted between the months of February and May 2023. Mosquitoes were collected from two sampling sites: Male hostel and female hostel. Mosquitoes were collected indoors between 05:30pm and 06:00 am using the pyrethrum-base aerosol spray (Raid) method. Mosquitoes were picked with forceps, dropped on a clean slide and then observed under a light microscope with X40 objective. Features such as size of antennae, size of maxillary palps, length of proboscis etc were observed, compared and recorded. Percentage prevalence was used to determine the relative abundance of mosquitoes. A total of 200 adult mosquitoes comprising of 107(53.5%) females and 93(46.5%) males were collected belonging to three Genera: Anopheles, Aedes and Culex mosquitoes. Out of the three Genera, Anopheles mosquitoes were the most abundant with 123(61.5%), followed by Culex mosquitoes, with 45(22.5%) and Aedes mosquitoes with 32(16.0%). Collection from the different sites revealed 106(53.0%) from female hostel, followed by 94 (47.0%) from male hostel. Mosquito species abundance revealed that Anopheles species was higher in terms of abundance. Anopheles species are very important vectors of malaria in Nigeria. These results revealed that vectors of mosquito-borne diseases are breeding in the study area. Concerted efforts should be made by stake-holders to reduce the abundance of mosquitoes to prevent outbreak of mosquito-borne diseases.

Keywords: Relative abundance, adult mosquitoes, Anopheles, Aedes and Culex

Introduction

Mosquitoes belong to the family Culicidae, Order Diptera, there are about 3,500 species distributed within the Genera *Anopheles, Aedes, Culex* and *Mansonia,* which have been described to be of medical importance (WHO, 2019). Mosquitoes are long legged slender insect with a long proboscis and clothing of scales on most part of their body parts (Patel, 2016). Mosquitoes are found in almost all types of aquatic habitats which they use for breeding (Irukanu et al., 2021., Hamza & El-Rayem, 2016). The habitats both natural and artificial habitats, include drains, pools of water, plastic cans and tins, tree holes, leaf axils and soak-away pits (Onodua *et al.,* 2020). A few species of Mosquito are harmless, but most are considered a nuisance (Simon-Oke & Ayeni, 2015). The females species are blood feeders through which they transmit harmful pathogens like *Plasmodium* parasites transmitted by *Anopheles* mosquitoes to humans and livestock, causing diseases such as, Malaria Yellow fever, Dengue fever, Lymphatic filariasis amongst others, (WHO, 2019). About 2.4 billion people globally are at the risk of malaria infection with transmission occurring in 97 countries which

is heavily concentrated in the tropical and sub-tropical regions of the world. Africa holds the highest disease burden with 81% infection rate and about 655,000 to 1.2 million deaths occurring annually from malaria caused by Anopheles mosquito, (WHO, 2019). In Nigeria, malaria is a major public health problem where it accounts for more cases and deaths which equivalent of 30% of the population were tested positive for the disease in 2015, which accounts for 60% of hospital outpatient visits and maternal mortality annually (Nigeria Malaria Fact Sheet, 2017). According to Nigeria Federal Ministry of Health, (FMOH, 2009), Nigeria is ranked the second highest with Lymphatic Filariasis in the global statistics. Many households and families in the country spend a part of their income on direct and indirect prevention and treatment of malaria, (Olayemi & Ande, 2008). Imo state is endemic for malaria and it is the commonest reason for hospital outpatient attendance in most health facilities across the state (Malaria Consortium Reports, 2017). Due to the high incidence of mosquitoes and the disease burden associated with it, the world health organization recommended a good number of prevention approaches, including insecticide treated nets, spraying indoor walls with insecticides and preventive medicines for the most vulnerable groups: pregnant women, under-fives and infants (WHO, 2017). These, therefore suggests that an effective and integrated control measures such as investigating the composition and mosquito species controlling the mosquitoes as effective vectors is necessary in preventing and controlling the disease burden. In other to achieve this, Mgbemena & Ebe (2012), recommended that correct identification of these local vectors was necessary so that effective control could be employed. This study was therefore designed to investigate the abundance Mosquito and its possible public health implication on the students of Imopoly and Omuma communities in Imo State, Nigeria.

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Materials and Method

Study Area

The study was carried out in two selected sites/locations in Imopoly, Omuma campus. These sites/locations are female hostel and Male hostel, Omuma is one of the oldest towns in Imo State. Omuma is located at latitude 5.560° N and longitude 6.972° E. Its boundary to the west is Mgbidi, to the east by Akatta, to the north by Nempi and to the south by Amiri and Otulu. Omuma has four communities: Abia-Omuma, Ozuh-Omuma, Umuhu-Omuma, and Etiti-Omuma. The climate of the Omuma town is typically tropical. There are two seasons within this zone; the dry seasons that last for about four months and rainy season that last for about eight months. It is hot and warm during dry season and cold/warm during rainy season. The rainy season, which is the season Mosquitoes are on the increase usually occur from the month of March/April to the month of October/November usually interrupted by a short dry period in the month of August (August-break). The Imo State Polytechnic runs a multi-campus institution with different campuses hosting different schools. The campuses are Omuma campus, Mbano campus and Orlu campus. Omuma campus is the main campus of Imopoly, also housing the school of Science Technology.

Informed Consent and Permission to Carry out Study

Prior to the study, advocacy visits to the students in the male and female hostel and proper explanation of the project intent were used to obtain permission to carry out the study in the school. Oral consent was obtained from all participants involved in sample collect

Sample Collection

Mosquitoes were collected indoors between 05:30pm and 06:00 am using the pyrethrum-base aerosol spray (Raid) collection method (PKC) (Service, 2019). Before the spraying exercise, all students were requested to leave the room; the doors and windows were closed, and white clothes were laid from wall to wall covering furniture and other immovable items in the room. Food items and cooking utensils were evacuated from the rooms to avoid contamination. All food items and water in the room were properly covered. The insecticide was quickly sprayed towards the ceiling and corners of the room until the room was filled with insecticide. The room was left undisturbed for about 15 minutes. Mosquitoes were collected on white clothes spread on the floors of the selected sites. The mosquito samples collected were then conveyed to the Science laboratory, Imo State Polytechnic Omuma, for morphological identification as described by Russell *et al*. (2022)

Sample Identification

Mosquitoes were picked with forceps, dropped on a clean slide and then observed under a light microscope with X40 objective. Features such as size of antennae, size of maxillary palps, length of proboscis terminal abdominal segment and colour of the hind tarsi were observed, compared and recorded using an entomological key described by Zettler *et al.* (2016) and Adesoye *et al.* (2014).

Data Analysis

The abundance of the individual mosquitoes was determined as percentage of the total mosquitoes collected at each study station.

Results

A total of 200 adult mosquitoes comprising of 107(53.5%) females and 93(46.5%) males were collected belonging to three Genera: Anopheles, Aedes and Culex mosquitoes. Out of the three Genera, Anopheles mosquitoes were the most abundant with 123(61.5%), followed by Culex mosquitoes, with 45(22.5%) and Aedes mosquitoes with 32(16.0%) (Table 1). Collection from the different sites revealed 106(53.0%) from female hostel, followed by 94 (47.0%) from male hostel. Mosquito (Table 2).

Table 1: **Relative abundance of mosquitoes collected from two selected sites in Imopoly. n= 200**

Mosquito species	Male Mosquitoes	Female Mosquitoes	Total
Anopheles spp	54(27.0%)	69(34.5%)	123(61.5%)
Culex spp	24(12.0%)	21(27.0%)	45(10.5%)
Aedes spp	15(7.50%)	17(8.50%)	32(16.0%).
Total	93(46.5%)	107(53.5%)	200(100%)

Table 2: Dispersion/distribution of adult mosquitoes in selected locations in IMOPOLY

Sites surveyed	***Anopheles*** n= 123	***Culex*** n= 45	***Aedes*** n=32	Total

	Male	Female	Male	female	Male	Female	
Female Hostel	33	36	10	11	7	9	106(53.0%)
Male Hostel	21	33	14	10	8	8	94(47.0%)
Total	54(27.0%)	69(34.5%)	24(12.0%)	21(27.0%)	15(7.50%)	17(8.50%)	200(100%)

Discussion

Pyrethrum-base aerosol spray collection method employed in this study was described by Eshetu *et al.* (2023) as a common means of trapping mosquitoes that are resting inside buildings and animal houses , It is usually an efficient procedure, although its effectiveness is dependent on the type of house in which it is used (Russell, 2022). The abundance and diversity of mosquitoes detected in the male and female students' hostel of the Imo State Polytechnic Omuma, Nigeria, demonstrates the effectiveness of this procedure. The presence of various mosquito species in human habitation as we observed in the male and female hostel of the Polytechnic can have serious consequences for public health, the economy, and the overall well-being of the community especially the school environment (Walker & Lynch, 2017). According to WHO (2023) and Obinna *et al*. (2014), Mosquito bites are unpleasant and irritating, causing discomfort and limiting outdoor activity. They can cause serious allergic reactions in severe circumstances. Mosquito-borne diseases can be extremely expensive. They can raise healthcare expenditures, diminish workforce productivity, and reduce tourism in impacted areas (Dahmana & Mediannikov, 2020). It has also been reported that the treatment and prevention of mosquito-borne diseases take 25% of the income of poor families in Nigeria (Obinna *et al*. 2014). Academic and other important businesses carried out by the students may also suffer as a result of diminished economic activity in areas with high mosquito populations and illness transmission. Mosquitoes have been linked to the transmission of a number of diseases, including malaria which is a parasitic disease caused by *Plasmodium* parasites and spread by *Anopheles* mosquitoes (Walker & Lynch, 2017) identified in the study of area. Also, *Aedes* mosquitoes transmit dengue fever and so on (Liu, 2015). *Anopheles* mosquitoes were the most dominant species collected in this study. This is in line with the findings of Aju-Ameh *et al*. (2016) in Benue state and that of Oduola *et al*. (2016) in Kwara State and Anosike *et al*. (2007) in Imo state. The abundance of these species of mosquitoes is attributed to the fact that these mosquito species are associated with human dwellings with indoor resting habits and the species are mainly anthropophilic (Oyewole *et al*., 2005). On the contrary, the study by Simon-Oke and Ayeni (2015) revealed *Aedes* species to be *predominant* over other mosquito species in schools and its environs. Omoregie *et al*. (2019) also had a contrary view they had *Culex* species as the most abundant in their study in a school environment. These variations may be due to the geographical locations of the schools. The presence of these mosquitoes in human habitation raises the danger of disease transmission, which can lead to outbreaks and public health concerns. The outbreak of diseases such as Malaria, Dengue, Yellow fever and Filariasis are a possibility due to the presence of their vectors. *Anopheles* species are

known to transmit plasmodium which causes Malaria while *Aedes aegypti* transmits Dengue and Yellow fever. *Culex quinquefasciatus* and *Aedes aegypti* transmits Filarial worms (Adeleke *et al*. 2008). Efforts to manage and control mosquito populations, as well as education and prevention, are critical to mitigating these consequences and lowering the risk of mosquito-borne diseases in the Polytechnic and other academic environment

Conclusion.

The three mosquito genera (*Anopheles, Culex and Aedes*) encountered in Imo State Polytechnic Omuma, Imo state, Nigeria are well-known vectors of parasites involved in transmission of diseases such as malaria, yellow fever and filariasis. All these diseases are associated with high morbidity and mortality. Their occurrence is an indication of vector- borne diseases risk in the area. Therefore, there is need for proper environmental planning and surveillance, public health campaign on vector management and control in the institution, community and the Nigeria.

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