RELATIVE ABUNDANCE AND COMPOSITION OF ENDOPHILIC MOSQUITOES IN FEDERAL UNIVERSITY OF TECHNOLOGY AKURE HOSTELS, ONDO STATE, NIGERIA

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Abstract

A study was conducted to investigate the relative abundance and composition on endophilic adult mosquitoes in seven different hostels of the university from June to September, 2014. A total of 710 adult mosquitoes comprising of four genera: *Anopheles, Culiseta, Culex* and *Aedes* species were identified. Out of the four genera, *Aedes* was the most abundant with 275 (38.73%), followed by *Anopheles* with 205(28.87%), *Culex* with 180(25.35%) and *Culiseta* with 50(7.04%). There was a significant difference in the relative abundance of mosquitoes in the study area according to species ($p< 0.05$).According to species, *Anopheles gambiae* had highest abundance of 107(52.19%) while *An. freeborni* had the least of 19(9.27%), *Aedes aegypti* had 89(32..36%) while *Ae .furcifer* had 20(7.27%), *Culex tarsalis* had 74(41.11%) while *Cx.fatigans* had 28(15.56%) and *Culiseta inornata* had 31(62.00%) while *Cu. incidens* had 19(38.00%) abundance. On the infectivity status of the dissected *Anopheles* mosquitoes, *Anopheles gambiae* had the highest parasite infectivity of 50(46.73%), followed by *An.punctulatus* with 23(43.47%), *An. maculatus* 8(38.10%) while the least infectivity was found in *An. funestus* 10(28.57%).The result of the physiological status (fed or unfed) of the mosquito genera showed that the majority of them were fed; *Anopheles* (68.29%), *Aedes* (61.09%), *Culex* (54.44%) and *Culiseta* (56.00%). These results indicated that vectors of mosquito borne diseases are breeding in the study area, most of which are encouraged by human activities.

Keywords: *Anopheles, Culiseta,* fed abundance, endophilic, mosquito

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Introduction

Mosquitoes are a family of small, midge-like flies: the Culicidae. A few species are harmless, but most are considered a nuisance because they use their saliva to coat the surface of the skin of living mammals, including humans to consume their blood which causes itchy, often times painful red bumps also appear (Harbach, 2008). Some of the females of many species are blood feeders through which they transmit extremely harmful human and livestock diseases such as malaria, yellow fever and filariasis (Jaeger, 2013). An endophilic mosquito rests indoors, inside a human dwelling during the period of between the end of blood feeding and the onset of searching for an oviposition site (Devin, 2010).

Mosquito, like all insects has six legs, external articulating mouthparts and three distinct body regions called Tagma; the head, the thorax and the abdomen. Most mosquito species feed on plant nectar and animal blood. Only females feed on blood, which provide additional nutrition for their eggs. Mosquitoes are readily distinguish from other insects by their conspicuous projecting proboscis and scales on their wings and veins (Robbert, 2004). They apparently attached to human and animals by moisture, lactic acid, CO_2 and body heat (Gillies, 1980).

Mosquitoes are active in the evening or in cloudy days. During the day, they remain on vegetation or any slide object taking flight only when a suitable host passes by (Foss and Dearborn. 2002). Mosquitoes that prefer humans even if a non human host is available are called anthropophilic while those that prefers non- human host are called zoophilic mosquitoes. Some mosquitoes obtain their blood meal inside man- made shelter are called endophagic while others that obtain theirs outside are exophagic.

Mosquitoes are cosmopolitan in distribution and found mostly in warm humid tropical countries of West and East Africa, Southeast Asia, the Caribbean and South America and Europe (Service, 1993). There are three genera of mosquitoes; *Anopheles*; which is the known carrier of malaria and they also transmit filariasis. They are easily recognized by the position held when at rest in which the proboscis, head and body are held on a straight line to each other at an angle to the surface it is resting (WHO, 1984). The *Culex* is a carrier of viral encephalitis and filarial worm. It holds its body parallel to the surface of its resting and its proboscis bend down towards the surface. The *Aedes* mosquitoes are carriers of yellow fever virus, dengue fever and encephalitis. Like the *Culex, Aedes* holds its body parallel to the surface with the proboscis bend down wards (WHO,1984).

Surveillance of the adult mosquitoes had been observed as an important tool in epidemiology and control of mosquito-borne diseases (Adeleke *et al*, 2010). Monitoring the population structure and the level of infectivity of mosquitoes would help in determining the level of disease transmission and assessment of control measures in the localities (Adeoye *et al*, 2012). The objectives of this study were to provide information on species composition, relative abundance and parasite infectivity of indoor sampled mosquitoes in the study area.

Materials and Methods

Study Area

This study was carried out in the Federal University of Technology, Akure male and female hostels (Jibowu, Abiola, Annex, Jadesola, Akindeko and its environment). Federal University of Technology, Akure lies between latitude 3^{o} 40^{1}N- $4^{o}20^{1}$N and longitude $7^{o}38^{1}$ – 8^{o} 19^{1}E. Around the hostels are open drains, septic tanks and collection of rain water within and around the hostel buildings.

Collection of Mosquitoes

Mosquitoes were collected indoor on a weekly basis from randomly selected rooms between18.00 and 21.00 hours GMT using indoor residual spray according to WHO (1975).

Indoor residual spray: Each room was covered with a white sheet of cloth about 3.4 x 3.4m and held to the wall by a masking tape. The rooms were sprayed with insecticide and left for 30 minutes with doors and windows shut. After, mosquitoes found on the sheet were gathered with an aspirator and stored in a labeled specimen bottles.

Preservation and Identification

The collected mosquitoes were preserved in the specimen bottles with 70% ethanol. During the process of identification, mosquitoes were identified using morphological keys as described by Gillett (1972) and Gilles and De meillon (1968) and analysed with the aid of microscope within 24 hours.

Parasite infectivity

Mosquitoes were placed on a slide containing normal saline and dissected under dissecting microscope which was later viewed under light microscope at x10 andx40 objectives.

Analysis

The data were subjected to Chi square test and regression analysis in SPSS to compare counts of mosquito species.

Results

A total of 710 mosquitoes were collected during this study, out of which the abundance of the mosquito species were; *Anopheles* 205 (28.87%), *Aedes* 275 (38.73%), *Culex* 180 (25.35%) and *Culiseta* 50 (7.04%) (Table1). The differences in abundance and composition of the mosquitoes were significant ($p<0.05$). The highest parasite infectivity (*Plasmodium falciparum)* was found in *Anopheles gambiae* (46.73%), followed by An. *punctulatus* (43.47%), *An. maculatus* (38.10%), *An. freeborni* (31.58%) and the least was found in *An. funestus* (28.57%) (Table2).

The result of the physiological status of mosquitoes showed that most of the *Anopheles* species were well fed (68.29%) while (31.71%) were unfed. In *Aedes* species, (61.09%) were fed while (38.91%) were unfed. For *Culex and Culiseta* species, (54.44% and 56.00%) were fed while (45.56% and 44.00%) were unfed (Figure 3). Among the anopheline species, *An. gambiae* had the highest abundance (52.19%) with the least in *An. freeborni* (9.27%). From *Aedes* species, *Ae. aegypti* had the highest abundance of (32.36%) while *Ae. furcifer* had the least (7.27%). *Cx.tarsalis* recorded highest abundance of (41.11%) with *Cx.tigripes* the least with (15.56%), *Culiseta inornata* recorded the highest abundance of (60 .0%) while *Cu. incidens* had the least (38.0%) (Table 3).

Table 1: Abundance of mosquitoes collected indoor in FUTA and its environment

Species	Number of adult collected	percentage of occurrence
Anopheles	205	28.87
Aedes	275	38.73
Culex	180	25.35
Culiseta	50	7.04
Total	710	

Table 2: Infectivity status of dissected Anopheles mosquito in the study area

Species	Number examined	Parasite infectivity	Percentage occurrence
Anopheles gambiae	107	50	46.73
Anopheles funestus	35	10	28.57
Anopheles freeborni	19	06	31.58
Anopheles maculatus	21	08	38.10
Anopheles punctulatus	23	10	43.47
Total	205	84	40.98

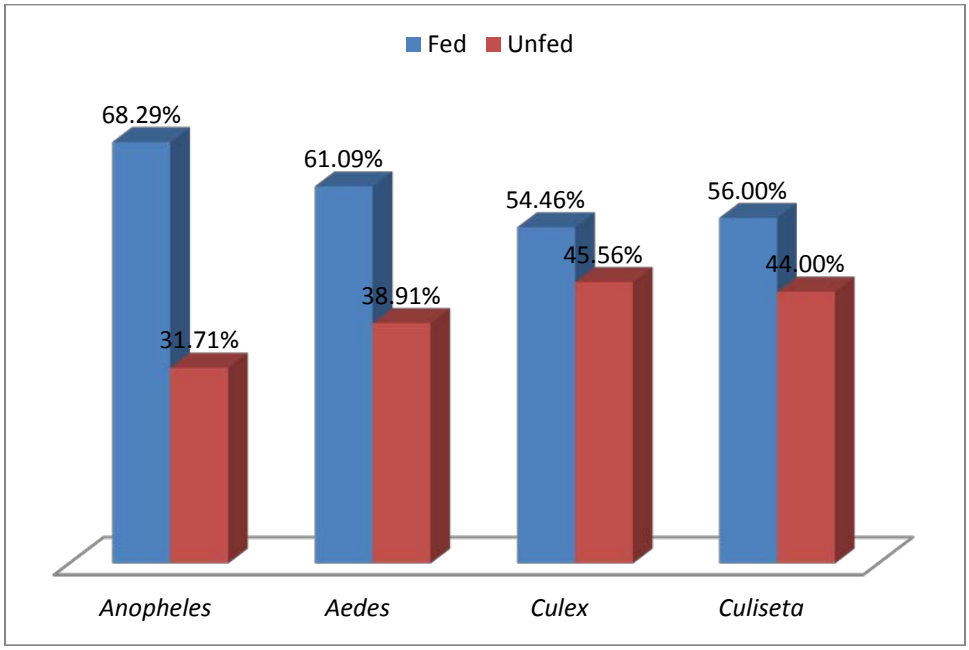

Figure 3: The physiological Status of mosquito in the Study Area.

Table 3: Relative Abundance of mosquito species collected in the study area

Species	Number of occurrence	Percentage occurrence
Anopheles gambiae	107	52.19
Anopheles funestus	35	17.07
Anopheles punctulatus	23	11.22
Anopheles maculatus	21	10.24
Anopheles freeborni	19	9.27
Total	205	
Aedes aegypti	89	32.36
Aedes africanus	65	23.63
Aedes albopictus	71	25.82
Aedes dorsalis	30	10.91
Aedes furcifer	20	7.27
Total	275	
Culex tarsalis	74	41.11
Culex pipiens	43	23.89
Culex tigripes	28	15.56
Culex quinquefasciatus	35	19.44
Total	180	
Culiseta incidens	19	38.00
Culiseta inornata	31	62.00
Total	50	

Discussion

The results of this research work showed the relative abundance and composition, infectivity and physiological status of the four genera of mosquito species found in the Federal University of Technology, Akure and its environment. The high abundance of malaria and filariasis vector (*An.*

gambiae) encountered in this study should be a source of as this could mean that there is a risk of malaria in the University and its environment.

The abundance of culicine and anopheline mosquito species may be as a result of their ability to survive in diverse environment as previously reported by Dondorp *et al*, (2009). The species richness of some of the mosquitoes suggest that the environment conditions in these ecosystems were complex and favourable to support the continual breeding and survival of these vectors as also observed by Adeleke *et al*, (2010). It was observed that adult of *Aedes* mosquitoes hide in the culverts and on the vegetation around the hostels sampled, this is similar to the report of Gouge *et al*, (2001). *Aedes aegypti* was reported to prefer man-made habitats such as clogged drainages, discarded cans, open cracked cesspits and storage containers as breeding sites (Adeleke, (2003; Soniran *et al*, 2006). These attributes account for its high abundance in one of the hostels. The presence of *Ae. aegypti* virtually in all the hostels confirms the consensus that it is an indiscriminate breeder (Okorie, (1970); Anyawu *et al*, (1999); Soniran *et al*, (2006). *Ae. aegypti* is known vector of Yellow fever and also has been incriminated in harbouring Filarial worms and as such transmit the infective stage to potential host (Adeleke *et al*, 2010). The low population of *Anopheles* species caught indoors compared to *Aedes* species in each of the hostels may be due to the preference of the females to clear water for oviposition. Larvae of *Anopheles gambiae* preferred clear, fresh seepage water in sunlit or partially shaded pools (Gouge *et al*, (2001). However, this result is in contrast to the findings of Mgbemena and Ebe (2005) who reported high incidence of *Anopheles gambiae* in polluted waters in Imo State, Nigeria.

The difference in physiological status of the mosquitoes could have been influenced by many factors. The fed mosquitoes would have been caught while resting on the wall to digest the blood taken from the host in preparation for oviposition (Adeoye *et al*, 2012). Most of the unfed mosquitoes would have been caught while searching for hosts (Hayes et al, 1973; Adeleke *et al*, 2010).

The composition and abundance of mosquito species was significantly different ($p<0.05$). *Aedes aegypti*, *Ae. albopictus, An. gambiae, Cx. freeborni and Cx. tarsalis* were evenly distributed in all hostels sampled. This significant difference may be due to differences in social and human activities within the environment. The occurrence of culicine and anopheline mosquitoes in the study area is an indication of vector- borne diseases risk in the area. The breeding of mosquitoes outdoor in the study area showed the danger associated with the indiscriminate disposal of unwanted containers and may be the dense vegetation in the environment. Therefore, there is need for public health education on the dangers or outcomes of indiscriminate disposal of wastes that can serve as habitats and storage of water inside the house which also serves as a potential breeding site for the vectors.

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