Identification and Frequency Distribution of Mosquito Species in Port Sudan, Eastern Sudan

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ABSTRACT

Background and Objective: This descriptive study aimed to evaluate the presence and frequency distribution of mosquito species in the city of Port Sudan, Sudan.

Methods: After collection of 500 adult mosquitoes from different sectors of the city Port Sudan, they were classified using the morphological keys for identification of mosquitoes.

Results: Overall, 230 *Culex quinquefasciatus* (46%) were detected in the eastern, central and southern sectors of the city. *Culex sitiens* (14.2%) were detected only in the central sector. *Aedes aegypti* (32.2%) were detected in all three sectors. *Anopheles funestus* (6.6%) were detected in the central and southern sectors.

Conclusion: *Cx. quinquefasciatus* and *Ae. aegypi* are prevalent in all sectors of the city, while *Cx. sitiens* is prevalent only in the central sector. *An. funestus* is abundant in the central and southern sectors.

Keywords: Culicidae, Morphological and Microscopic Findings, Eastern Sudan.

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INTRODUCTION

Mosquitoes are the most wide spread medically important insects, belonging to the family *Culicidae* (1). There are some 3300 species of mosquitoes belonging to 41 genera, all contained in the family *Culicidae.* Adult mosquitoes of both sexes feed on sugar for general activities, while only females require blood meals (heamatophagy) that is necessary for egg production (2). Breeding sites and oviposition vary from large permanent bodies of water to smaller collections of temporary water such as small pools or tree holes (3). Mosquitoes go through four stages in their life cycle: egg, larva, pupa and adult. Since adult females lay eggs in water, the first three stages are aquatic (4). These animals are of medical importance since they can transmit several diseases including malaria, filariasis and numerous viral diseases such as dengue fever, yellow fever and Japanese encephalitis (5). In addition, their bites can be nuisance and cause painful reactions (6).

MATERIAL AND METHODS

This descriptive study was conducted during February-June 2011 at the parasitology laboratory of Port Sudan Ahlia College, Sudan. Adult mosquitoes were collected by knockdown. White sheets were spread on the floor of rooms or houses, insecticide was sprayed in the room and 15 minutes later, dead and dying mosquitoes on the white sheets were collected in Petri dish for examination and identification using a dissecting microscope (7). Identification of species was done using the morphological keys for *Aedes, Culex* and common adult *Anophelines* in Sudan (8, 9). The data collected were analyzed by SPSS statistical software.

RESULTS

Identification of the mosquitoes collected revealed the presence of three genera *Culex* (60.2%), *Aedes* (33.2%), and *Anopheles* (6.6%) (Table 1).

The two most frequent species detected were *Culex quinquefasciatus* (46%) and *Aedes aegypti* (33.2%). Other two species detected were *Culex sitiens* (14.2%) and *Anopheles funestus* (6.6%) (Table 2).

Of the 230 *Cx. quinquefasciatus* identified, 83 were collected from the eastern sector, 47 from the central sector and 100 from the southern sector. All *Cx. sitiens* collected belonged to the central sector. Of 166 *Ae. aegypti* identified in the study, 65 were collected from the eastern sector, 59 (11.8%) from the central sector and 42 from the southern sector. In addition, 25 *An. funestus* were collected from the central sector and eight from the southern sector (Table 3). The difference in the frequency of the mosquito species in the three different parts of the city was statistically significant (P = 0.00).

Table 1- Genera of mosquitoes detected in Port Sudan

Type	Number	Percentage
Culex	**301**	**60.2%**
Aedes	**166**	**33.2%**
Anopheles	**33**	**6.6%**
Total	**500**	**100%**

Table 2- Frequency of the mosquito species detected in Port Sudan

Species	Number	Percentage
Cx. quinquefasciatus	**230**	**46%**
Cx. sitiens	**71**	**14.2%**
Ae. aegypti	**166**	**32.2%**
An. funestus	**33**	**6.6%**
Total	**500**	**100%**

Table 3- Frequency of mosquito species collected from different parts of Port Sudan

			Sector			Total
			Eastern sector	Central sector	Southern sector	
Mosquito species	*Cx. quinquefasciatus*	Count	83	47	100	230
		% of Total	16.6%	9.4%	20.0%	46.0%
	Cx. sitiens	Count	0	71	0	71
		% of Total	.0%	14.2%	.0%	14.2%
	Ae. aegypti	Count	65	59	42	166
		% of Total	13.0%	11.8%	8.4%	33.2%
	An. funestus	Count	0	25	8	33
		% of Total	.0%	5.0%	1.6%	6.6%
Total		Count	148	202	150	500
		% of Total	29.6%	40.4%	30.0%	100.0%
P-value	0.000					

DISCUSSION

The results obtained during this study revealed that *Cx. quinquefasciatus* has the highest range of distribution. This might be due to the presence of generator water tanks all over the city, high humidity and suitable temperature beside the established siphon system, which is a favorable breeding site for the specie. *Cx. quinquefasciatus* is able to live in different environments and polluted areas, and infest open draining sewage and manholes or manmade areas. These findings are in line with study of White (10).

Based on the findings, the second most abundant mosquito specie was *Ae. aegypti*. This could be due to the Port Sudan's water supply problems and the way of water storage in the city, which directly affects the abundance and density of this mosquito specie. The high frequency of *A*e. *aegypti* may explain the spread of dengue and hemorrhagic fever in Eastern Sudan. A study conducted by Abdelmajed and Alhusein in states of Kassala and Al Qadarif confirmed the high prevalence of *Ae. aegypti* in Kassala. They attributed this to the storage of water in large amounts (11).

Cx. sitiens was reported only in the central sector of the city. Port Sudan is a coastal city that has favorable climate conditions for breeding of this mosquito specie. This finding is in line with the finding of Siam (12), Lewis (13) and Hopkins (9), who reported the presence of *Cx. sitiens* in the coastal areas, especially in the Red Sea coast. *An. funestus* was the least abundant specie detected in the study. This might be due to the short rainy season in this region. Consistent with this finding, study of Siam (12) reported the presence of *A*n. *dthali* in Khor Alsead in the southern sector during the rainy season. *An. funestus* was found in the central sector and in water leaks around Alwihda dam and small pools around the trees in Hai Aljanain in the southern sector. This justifies the spread of malaria in these areas reported by the Epidemiological Department of Red Sea state (14).

CONCLUSION

The data obtained from this study indicate that mosquitoes are relatively common in the city of Port Sudan, Red Sea state. The frequency of *Cx. quinquefasciatus* and *Ae. aegypi* is high in all sectors of the city, while *Cx. sitiens* is prevalent only in the central sector. In addition, *An. funestus* is prevalent in the central and southern sectors. Our findings may explain the presence of diseases transmitted by these species among the population under study.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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