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# Insights of Mosquito: A Dire Creature – A Review

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**ABSTRACT:** Vector-borne diseases are infections transmitted by the bite of infected arthropod species, such as mosquitoes, ticks, triatomine bugs, sandflies, and blackflies. Arthropod vectors are cold-blooded (ectothermic) and thus especially sensitive to climatic factors. Among these diseases mosquito vectored diseases are mainly found in India such as Malaria, Chikungunya, dengue, Japanese encephalitis, leishmaniasis etc. which affects to the large number of human populations from moderate to lethal level. In India sometimes due to less awareness in citizens it gets spread out and create endemic situation. Vector-borne diseases are widespread in India and are the best studied diseases associated with basic information of mosquito, its different species, Diseases which are transmitted by mosquito, its parasites, mosquito control, which is reflected in this Review.

## I. INTRODUCTION MOSQUITOES: IN GENERAL.

Mosquitoes are members of a group of small flies within the family Culicidae. The word "mosquito" is Spanish and Portuguese for "little fly." Approximately 3,500 species of familiar insects belong to fly order, Diptera, that are important in public health because of the bloodsucking habits of the females. Mosquitoes are known to transmit serious diseases, including yellow fever, Zika fever, malaria, filariasis, and dengue <sup>[1]</sup>.

Mosquitoes have a slender segmented body, one pair of wings, one pair of halteres, three pairs of long hair-like legs, and elongated mouthparts. <sup>[1]</sup> Usually both male and female mosquitoes feed on nectar and plant juices. In many species the mouthparts of the females are adapted for piercing the skin of animal hosts and sucking their blood as ectoparasites. In many species, the female needs to get proteins from a blood meal before she can produce eggs. In many other species, she can produce more eggs after a blood meal <sup>[2]</sup>.

They lay their eggs in pools of water. The larvae move around near the surface of the water, breathing through air tubes that stick out of the water. They get their food from the water, usually eating algae and other tiny creatures. They like to wiggle around near the surface, which is why some people call them wigglers. The larvae usually enter the pupa stage within a few days or weeks of hatching, depending on the water temperature and the species <sup>[3]</sup>.

The pupae are called tumblers because they tumble in the water if the water is touched. Tumblers do not eat, but they move around in the water a lot, and like larvae, they breathe from tubes that stick out of the water. The pupa stage is short (only for a few days), and then the mosquito becomes an adult.

## II. MOSQUITO SPECIES OF INDIAN ORIGIN

In India there are three main types of mosquitoes which transmit diseases as a vector; culex, anopheles and aedes that can spread dire diseases that can cure by primary inspection but one without any diagnosis can lead to the death as well. Apart from these three species there are other species also viz., Culiseta, Mansonia, Psorophora, Toxorhynchites, Wyeomyia.

Aedes Found in tropical areas, these mosquitoes are known to be the most notorious when it comes to spreading diseases. Aedes mosquito bite can cause Yellow Fever, Dengue, West Nile, and Chikungunya and has added Zika to its list recently. They are usually found in floodwater pools, wetlands, and inside natural or artificial containers. Though these mosquito species found outside in abundance, they can readily enter homes at any time of the day.

**Anopheles** They are popularly known as the marsh mosquitoes and this genus consist of about 460 different mosquito species. They are the primary vector of malaria, a disease in which endoparasite plasmodium feeds upon RBC'S globin part. Female mosquito of this genus is always ready to feed on human blood.

**Culex** mosquitoes are most active after sunset but they are also found to be the daytime biters. Species of this genus can be found breeding in freshwater resources as pools, ponds and even in sewage treatment plants. They are responsible for the spread of West Nile Virus, filariasis and St. Louis Encephalitis.

**Culiseta** Adapted to the cold climate, these mosquitoes do not feed on human beings and hence cannot transmit the disease. They found inside the roots of fallen trees and wooded swamps.

**Mansonia** Found in black or brown colour with sparkling wings and legs, these mosquitoes are mostly bigger than others. Transmitting encephalitis found in most parts of the world. They are active in the evening.

**Psorophora** Commonly known to feed on large mammals, including humans. Mosquitoes of this genus are considered to be intensely aggressive. This genus is known to travel long distances in search of blood meals. They have their breeding grounds at roadside ditches, woodland pools, and pastures.

**Toxorhynchites** have their breeding grounds inside tree holes and artificial containers. Mosquitoes of this genus don't pose any risk to humans and they feed on plant nectar. Interestingly, larvae of these mosquitoes prey on the larvae of other mosquitoes in their region.

**Wyeomyia** Mosquitoes of this genus are closely associated with pitcher plants and bromeliads. They are not the carrier of any kind of virus and hence they aren't of any risk to humans unless they travel into their area <sup>[4]</sup>.

### III. MOSQUITO BORNE DISEASES AND VECTORS

Malaria is a potentially life threatening parasitic disease caused by parasites known as *Plasmodium vivax* (P.vivax), *Plasmodium falciparum* (P.falciparum), *Plasmodium malariae* (P.malariae) and *Plasmodium ovale* (P.ovale). It is transmitted by the infective bite of Anopheles mosquito. Human develops disease after 10 to 14 days of being bitten by an infective mosquito. There are two types of parasites of human malaria, *Plasmodium vivax*, *P. falciparum*, which are commonly reported from India. Inside the human host, the parasite undergoes a series of changes as part of its complex life cycle (Plasmodium is a protozoan parasite). The parasite completes life cycle in liver cells (pre-erythrocytic schizogony) and red blood cells (erythrocytic schizogony). Infection with Falciparum is the deadliest form of malaria.

Dengue is a viral disease. It is transmitted by the infective bite of *Aedes Aegypti* mosquito. Human develops disease after 5-6 days of being bitten by an infective mosquito. It occurs in two forms: Dengue Fever and Dengue Haemorrhagic Fever (DHF). Dengue Fever is a severe, flu-like illness. Dengue Haemorrhagic Fever (DHF) is a more severe form of disease, which may cause death. Person suspected of having dengue fever or DHF must consult physician.

Filariasis is caused by several round, coiled and thread-like parasitic worms belonging to the family filaridea. The disease is caused by the nematode worm, either *Wuchereria bancrofti* or *Brugia malayi* and transmitted by ubiquitous mosquito species *Culex quinquefasciatus* and *Mansonia annulifera*/M.uniformis respectively. The disease manifests often in bizarre swelling of legs, and hydrocele and is the cause of a great deal of social stigma. Filariasis is caused by several round, coiled and thread-like parasitic worms belonging to the family filaridea. These parasites after getting deposited on skin penetrate on their own or through the opening created by mosquito bites to reach the lymphatic system.

Kala-azar is a slow progressing indigenous disease caused by a protozoan parasite of genus Leishmania. In India *Leishmania donovani* is the only parasite causing this disease. The parasite primarily infects reticuloendothelial system and may be found abundantly in bone marrow, spleen and liver. Post Kala-azar Dermal Leishmaniasis (PKDL) is a condition when *Leishmania donovani* invades skin cells, resides and develops there and manifests as dermal lesions. Some of the kala-azar cases manifests PKDL after a few years of treatment. Recently it is believed that PKDL may

appear without passing through visceral stage. However, adequate data is yet to be generated on course of PKDL manifestation.

Japanese Encephalitis is a viral disease. It is transmitted by infective bites of female mosquitoes mainly belonging to *Culex tritaeniorhynchus*, *Culex vishnui* and *Culex pseudovishnui* group. However, some other mosquito species also play a role in transmission under specific conditions. JE virus is primarily zoonotic in its natural cycle and man is an accidental host. JE virus is neurotropic and arbovirus and primarily affects central nervous system.

Chikungunya virus disease or chikungunya fever, is a viral illness that is spread by the bite of infected mosquitoes. The disease resembles dengue fever, and is characterized by severe, sometimes persistent, joint pain (arthritis), as well as fever and rash. It is rarely life-threatening. Chikungunya occurs in Africa, India and Southeast Asia. It is primarily found in urban /peri-urban areas. There is no specific treatment for chikungunya. Prevention centers on avoiding mosquito bites in areas where chikungunya virus may be present, and by eliminating mosquito breeding sites<sup>[5]</sup>.

Vector		Disease caused	Type of pathogen
Mosquito	<i>Aedes</i>	Chikungunya	Virus
		Dengue	Virus
		Lymphatic filariasis	Parasite
		Rift Valley fever	Virus
		Yellow Fever	Virus
		Zika	Virus
	<i>Anopheles</i>	Lymphatic filariasis	Parasite
		Malaria	Parasite
	<i>Culex</i>	Japanese encephalitis	Virus
		Lymphatic filariasis	Parasite
		West Nile fever	Virus

[8]

#### IV. MOSQUITO CONTROL

Methods used to prevent the spread of disease, or to protect individuals in areas where disease is endemic include; Vector control aimed at mosquito eradication, Habitat change: removing stagnant water and other breeding areas; pesticides; natural predators; and trapping, Disease prevention, using prophylactic drugs and vaccines; and preventing mosquito bites, with insecticides, nets and repellents.

Water Standing water, as in a pond or lake, is the main breeding ground. It may or may not be practical to eliminate this water. The water in bird baths can be changed once a week, but one can hardly do that with larger bodies of water. The method used to be: spray water with DDT, but that does a lot of damage, and in any event the mosquito is now highly resistant to the chemical that's why it is banned in India.

Organic repellents with increasing reports of the harmful effects DEET (Diethyltoluamide) and pyrethroids on humans, there has been a move to repellents which are organic. These are of the kind that have had traditional household purposes before their being used as mosquito repellents<sup>[6]</sup>.

Natural predators, the dragonfly nymph eats mosquitoes at all stages of development and is quite effective in controlling populations. Some bats can eat as many as 500 mosquitoes per hour. Some copepods are predators on first instar larvae, killing up to 40 *Aedes* larvae per day. A number of fish eat mosquito larvae, including goldfish, catfish, piranhas, and minnows<sup>[7]</sup>.





## V. CONCLUSION

Mosquitoes have been a dire creature in the world since so long time and still people of tropical and neo tropical origin are still facing several severe issues regarding vector borne diseases. As western countries nip out almost the malaria but due to several reason these poor countries are not be able to precure such disease.

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