

# Biodiversity of Mosquitos of Jabalpur City With Special Reference To Anopheles, Culex And Aedes Species

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**Abstract-** This study was carried out from January 2018 to march 2018. Jabalpur is the main city of central India and traditionally known as Mahakoushal. A total of 240 mosquitoes from outdoor were collected in the urban environment of Jabalpur .A total of 334 mosquitoes that belongs 7 species were collected at different sites in the city during January to march 2018. Among the 7 species, the most dominant species was Anopheles Stephensi (60.12%) Aedes aegypti (73.48%) Aedesalbopictus (12.91%), Culexquinquefasciatus (19.58%) followed by and Anopheles culcifascies (3.3%). The results showed maximum diversity of mosquitoes during the study period which may due to the availability of permanent and temporary breeding places, resting places, suitable rainfall, temperature and humidity.

**Key Words –** Mosquitos ,Anopheles, Culex And Aedes

## INTRODUCTION

Mosquitoes are small, midge-like flies that constitute the family Culicidae. Females of most species are ectoparasites, whose tube-like mouthparts (called a proboscis)

Thousands of species feed on the blood of various kinds of hosts, mainly vertebrates, including mammals, birds, reptiles, amphibians, and even some kinds of fish. Some mosquitoes also attack invertebrates. some transmit extremely harmful infections such as malaria, yellow fever, Chikungunya, West Nile virus, dengue fever, Zika virus and other arboviruses, rendering it the deadliest animal family in the world.

The family Culicidae (Diptera) has approximately 3600 valid described species, which are widely distributed in most environments on the planet. In India, about 410 species have

already been reported These include *Anopheles stephensi*, an important vector of malaria, *Aedes aegypti*, a vector of dengue, and *Culex quinquefasciatus*, a vector of bancraftian . Mosquitoes breed in various habitats such as ponds, marshes, ditches, pools, drains, water containers and other similar water collections like tree holes. different genera of mosquitoes having specific breeding preference The abundance of mosquitoes is strongly influenced by density-dependent patterns and seasonal climate variations. Changes in climate may accelerate delay in the development, availability of breeding sites and food resources. Dengue is considered as an important public health problem in India. Major epidemics have been reported from different parts.

Mosquitoes being the commonest insects of the earth, are known to transmit dangerous pathogens to man. Hematophagic behavior of the mosquito is the main reason for the transmission of the pathogens. Human behavior is also reported to be playing an important role in the emergence of pathogens through the mosquitoes. Interference of humans in the ecosystem for home and agriculture etc. are some of the major factors by which they encounter the bites of pathogen infected mosquitoes when they reach the enzootic foci of the pathogens. The rapid increase of global human population tends the people to concentrate and live in places without adequate infrastructure especially without provision of safer and regular drinking water supply and proper drainage system. Unplanned urbanization often affects the ecosystem by creating new breeding habitats such as tyres and used containers for the mosquitoes to breed enormously. The information on the biodiversity of mosquitoes in an area is essential in order to assess the risk of introduction and spread of pathogens by the occurrence of the vector mosquitoes.

The important objectives of the present study are as follows

1. To study the medically important mosquito fauna of Janbalpur District of central , India.
2. To identify the predominant mosquito species of the study area.
3. To study the potential of mosquito vectors in transmitting the diseases.

4. To know the environmental factors which monitor the population density of these species.
5. To formulate appropriate control measures of these mosquitoes in the study area.

WHO (1966) Biodiversity of mosquitoes is an important aspect of medical science and is destined to emerge as a new significant and integral aspect of human life. Among the insects, mosquitoes are most important since they are related to health and survival of man. The diversity of mosquito species varies among different geographical Mosquito biodiversity has been studied by several workers. Taylor and Francis, London, 1933, 1-371 Due to rapid urbanization and industrialization, large numbers of people migrate from rural to urban areas. This leads to the development of slums with no proper sanitary works, poor maintenance and water bodies conducive for the breeding of mosquitoes thus increasing the incidence of vector borne diseases in an urban environment. Including Ceylon and Burma, V, Taylor and Francis, London, 1934; 1-463. The present study was carried out to study the distribution of mosquitoes in different habitats of Warangal urban environment. Dept. Agric., Hand Book No. 152, 1959; 58. Diversity of insects is of great importance to the environmentalist as they are bio indicators. Among the insects, mosquitoes are medically important group of insects and they transmit diseases like malaria, dengue, filariasis and JE in India. In the recent years, the distribution range of both mosquitoes and mosquito borne diseases are proliferating in large number everywhere due to rapid urbanization, excessive deforestation, and resistance among mosquitoes to pesticides, construction of dams and development of new agro ecosystem. Despite several attempts to control them, these remarkably adapted insects continue to coexist with man, feeding on him and his domesticated animals. Hence it is essential to make an inventory of the diversity of mosquitoes in different places periodically to prevent the outbreak of mosquito born diseases. Madhya pradesh (Tewari 1984) Elsevier Applied science, 1976 The immunologic tests on the Egyptian mummies confirmed the high prevalence of *P. falciparum* malaria in ancient Egypt. Malaria was endemic in almost all parts of the country but prevalence has shown a steady decrease by 1990, and regressed in

most of the Governorates. Then by the end of 1998 till now all reported cases are imported mainly from Sudan. However, some locally acquired cases were reported in El Faiyoumand Cairo. Moreover, the recent outbreak of falciparum (1 case) and vivax (23 cases) that occurred (May 2014) in Aswan Governorate strongly indicates that malaria is reemerging in the country. World Health Organization. 1992; P114. 9. Nagpal BN, Sharma VP. Indian Anopheles, Oxford and I.B.H, This article reviews and discusses the status of Anopheles mosquitoes and malaria in ancient and modern Egypt based on the available and scattered reports. Eleven Anopheles species are present in Egypt of which An. pharoensis and An. sergentii are the proven vectors. The two vectors with their characteristics of zoophilic tendency, low infectivity rates and relatively short longevity convey the unstable type of malaria prevailed in Egypt. Taylor and Francis, London, 1933, 1-371 The taxonomy, classification and phylogeny of family Culicidae are reviewed. The application of explicit methods of phylogenetic analysis has revealed weaknesses in the traditional classification of mosquitoes, but little progress has been made to achieve a robust, stable classification that reflects evolutionary relationships. PLOS Negl Trop Dis 2013; 7(10):e2507. If the classification is to reflect evolutionary history, changes to the nomenclature of mosquitoes are inevitable. Jaroensutasinee K. Dengue Bulletin 2005; 29:169-75. There is strong morphological and molecular evidence that subfamily Anophelinae and tribes Aedini, Culicini and Sabethini of subfamily Culicinae are monophyletic, but the other taxonomic groupings are not demonstrably monophyletic or have not been subjected to phylogenetic analyses.

## MATERIALS AND METHODS

### Study area:

This study was carried out from January 2018 to March 2018. Jabalpur is the main city of central India and traditionally known as Mahakoushal. It is situated almost in the centre of India (between coordinates of 23°10' latitude and 79°57'E longitude and with a general elevation of about 393 meters above MSL). Climate- Jabalpur has a humid subtropical climate



typical of north-central India (Madhya Pradesh and southern Uttar Pradesh). Summer begins in late March, lasting until June. May is the hottest month, with the average temperature exceeding 45 °C (113 °F). Summer is followed by the southwest monsoon, which lasts until early October and produces 35 inches (889 mm) of rain from July to September. Average annual precipitation is nearly 55 in (1386 mm). Winter begins in late November, and lasts until early March. January is the coldest month, with an average daily temperature near 15 °C (59 °F). Only outdoor collections were made in the present study. collected randomly at different sites in the city. Resting and biting adult mosquitoes were collected in the evening between 6.00 to 8.00 pm near cattle shed and human dwellings using human landing method.

The collected specimens were preserved in plastic vials for later identification. adults were collected and stored in vials and all the the collected mosquitoes were identified in department of zoology St Aloysius college Jabalpur and identified with the standard keys Barraud (1985) and malaria research institute ,published by delhi "pictorial identification key for indian anopheles.

<b>SAMPLING SITES</b>	<b>Date</b>	<b>Time</b>
1.Vijaynagar	28/01/2018	8;00pm
2.Ghamapur	5/02/2018	8;00pm
3.Tagoregarden	15/02/2018	7;00pm
4.Mahaveer compound	20/02/2018	6;00pm
5.Panagar	26/02/2018	9;00pm
6.Ghana	05/03/2018	9;00pm
7.St.aloysius college	10/03/2018	5;00pm
8.Ranital	17/03/2018	6;00pm
9.Bhavertaal garden	23/03/2018	7;00pm

### **COLLECTION OF MOSQUITO**

Only outdoor collections were made in the present study. collected randomly at different sites in the city. Resting and biting adult mosquitoes were collected in the evening between 6.00 to 8.00 pm near cattle shed and human dwellings using human landing method.

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## Result and discussion

A total of 240 mosquitoes from outdoor were collected in the urban environment of Jabalpur .A total of 334 mosquitoes that belongs 7 species were collected at different sites in the city during January to march 2018. (Table.1) Among the 7 species, the most dominant species was Anopheles Stephensi (60.12%) Aedes aegypti (73.48%) Aedesalbopictus (12.91%), Culexquinquefasciatus (19.58%) followed by and Anopheles culcifascies (3.3%). The results showed maximum diversity of mosquitoes during the study period which may due to the availability of permanent and temporary breeding places, resting places, suitable rainfall, temperature and humidity. The lack of adequate waste water disposal and poor sanitation. The next predominant species was Aedesalbopictus and Aedesaegypti. The larvae were collected in coconut shell, plastic cups; cement tanks, tyre and grinding stones and the adults were collected in early evening hours near human dwellings. The Asian tiger mosquito Aedes (Stegomyia) albopictus and Aedes (Stegomyia) aegypti are to date the main vectors of dengue and dengue haemorrhagic fever in the tropical and subtropical regions. Chen et al. observed mixed breeding of Ae. aegypti and Ae. albopictus in the same container both in outdoors and indoors in Selangor. In the present study also similar observation was made in grinding stones near the houses. Aedesalbopictus generally inhabits forest area and breeds in tree holes in mountainous area but in rural and urban areas they breed in artificial outside containers. The Culextriteaniorhynchus, Culexvishnui, Culexpseudovishnui, Anopheles vagus and Anopheles subpictus larvae were collected more number in paddy fields, and the adults were collected in and the around cattle shed and human dwellings. The agro ecosystem favors high degree of diversity of mosquitoes. These mosquitoes are regarded as JE vectors in India . Anopheles are most dangerous amongst the four genera and are

responsible for spreading of malaria. Among Anopheles, *Anopheles fluviatilis* and *Anopheles culicifascies* adults were collected near cattle shed and these two species are major rural malarial vectors in India. There is acute need of action to reduce the breeding sites of mosquitoes and public awareness regarding mosquitoes and the diseases caused by them.

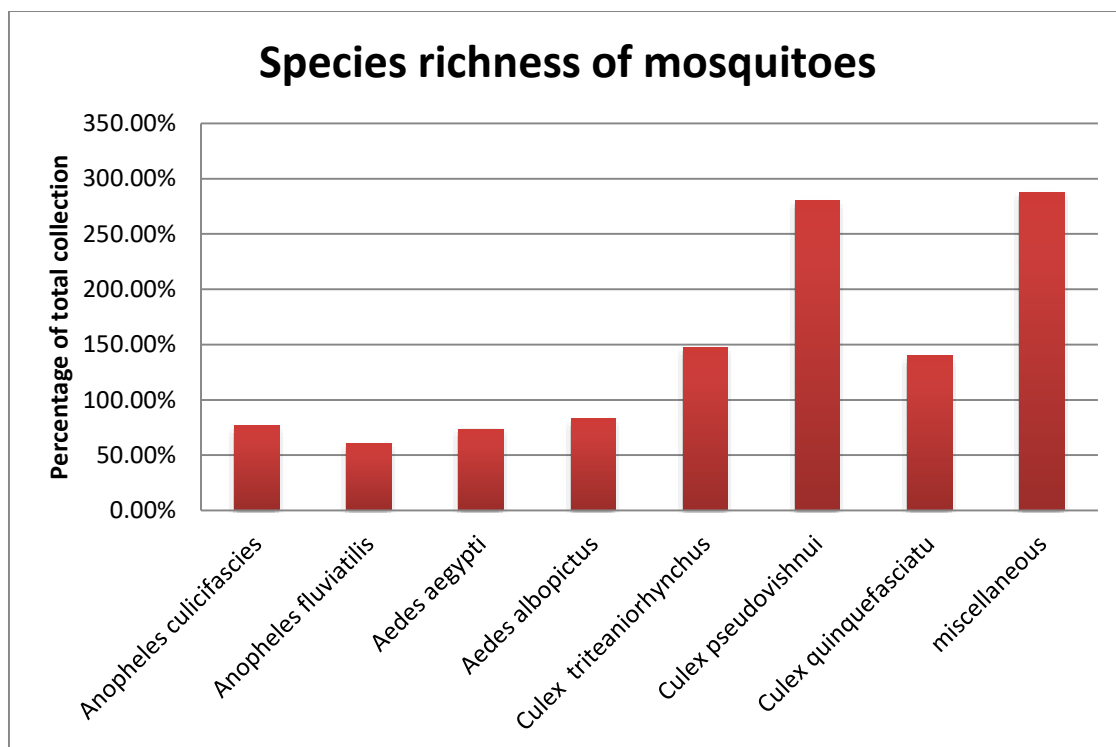
**Table 1. Occurrence of mosquito species in various regions of the study area during the study period January to march 2018**

S.no	Name of the species	Vijaynagar	Ghampur	Tagorgardn	Panagar	Ghana	Sadar	Ranital	Bhawar tal garden
1	<i>Anophelesculicifascies</i>	+	+	+	-	-	+++	+	+
2	<i>Anophelesfluviatilis</i>	+	+	+	-	-	+	+	+
3	<i>Aedesaegypti</i>	+	+	+	-	+	+	+	+
4	<i>Aedesalbopictus</i> )	+	+	+	+	-	+	++	+
5	<i>Culextriteaniorhynchus</i>	+	+	+++	-	-	+	+	+
6	<i>Culexpseudovishnui</i>	+	+	+	-	-	+	+	+
7	<i>Culexquinquefasciatu</i>	+	+	+	-	-	+	+	+

**Table 2. Species richness of mosquitoes collected in Jabalpur district during January to march 2018**

s.no	Name of the species	Total number of mosquitoes collected	Percentage of total collection
2.	<i>Anopheles stephensi</i>	18	60.12%
3	<i>Aedesaegypti</i>	22	73.48%

4	<i>Aedes albopictus</i>	25	12.91%
5	<i>Culex tritaeniorhynchus</i>	44	120.96%
7	<i>Culex quinquefasciatus</i>	42	19.48%
8	<u>miscellaneous</u>	86	187.24%
	<b>Total</b>	237	353.23%



Anopheles species are the vectors of malaria. These mosquitoes prefer to live in shady vegetation and cool water at outdoor habitat in urban ecosystems. Similar results have been reported by Nagpal and Dash et al. Aedes species the vectors of chikungunya and dengue fever showed preference to live in plastic containers, cement tank, tires, and flower pots at outdoor. Similar observations have been recorded by Wangkoon et al., Culex species are vectors for filariasis and Japanese encephalitis and prefer to live-in sewage canals, ditches, cattle sheds, rice fields and open drainage system at outdoor habitats. This has been in accordance with the reports of Derraik and Slaney, Thongsripong et al., The mosquitoes at outdoor habitats, thus prefer to rest in drainage, sewage and shady vegetation and plastic containers etc.



## CONCLUSION

The factors related to climate and geography are suitable in Jabalpur for Mosquito breeding. According to this study various factors like developmental activities human interference climatic changes and availability of parasitic load in the community and socio-cultural practices have contributed to increased mosquito menace and prevalence of mosquito borne diseases. Recently mosquito borne diseases have become a very serious public health issue in Jabalpur which required emergency actions and which have raised several questions regarding the vector capacities of mosquitoes and transmission of new viral infections in different regions of the affected districts. These situations require adequate information on the profile of mosquito species.

## CHAPTER – 7

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