



Diversity of Mosquito Fauna in different Habitats of District Surguja Chhattisgarh India

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Abstract

The present investigation was carried out to evaluate the diversity of mosquito fauna in Surguja district during June 2022 to May 2023. Larvae and adult mosquitoes were also studied to know the species of mosquito currently. In this study, 16 mosquito species belonging to a total of 3 genera were found which are as follows *Aedes*, *Culex* and, *Anopheles* (61.30%) which was a highly hegemonic genera which was followed by *Culex* (24.07%) and *Aedes* (9.52%) respectively. *Aedes albopictus*, and *Culex quinquefasciatus* were found completely study period. Vectors of dengue, chikungunya, and malaria were also investigated during the study period.

Keywords: *Aedes*, *Anopheles*, *Culex*, Vector, Surguja

1. Introduction

India has rich biological diversity and one of the 12 mega diverse countries of the world (the biological diversity act, 2003). 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 many vector borne disease (VBDs) like Malaria, Dengue, Chikungunya, Filariasis and Japanese Encephalitis (JE) in India. In the recent years, the distribution range of both mosquitoes and mosquito borne diseases are great significance due to their biological indicator qualities.

Taxonomically mosquitoes are included under the order Diptera, suborder Nematocera and family culicidae and anophelidae. *Culex* and *Aedes* genus are included under culicidae while *Aedes* included anophelidae with three and half thousand insect species [1] The diptera order of insects is a largest order of arthropods in to which more than 8500 species found which includes a large numbers of vectors of various diseases [2]. Around 3150 species of mosquito found have been found around the world in various researches, mosquitoes are found almost all over the world except in snowy places [3]. That is to say that the zoogeographical distribution of mosquitoes is almost everywhere except Antarctica [4]. Mosquitoes such as *Aedes* basically found in tropical and subtropical regions but have now successfully adapted to live in colder regions. Eggs from some strains of mosquitoes in temperate regions are more tolerant to colder areas than eggs from warmer regions [5] Its capable of withstanding the low temperature and snowfall of the snow as well as able to tolerate freezing temperatures, adults can survive the whole winter in suitable microhabitats [6]. Mosquitoes are found in different geographical area of the world. Greater diversity of mosquito species is found in the Neotropical region which is 31% of the total mosquito species. After that 30%, 22%, 22, mosquito species is found in Oriental, Afrotropical, and Australian region respectively, while the lowest only 5% species diversity has been recorded in the nearctic region [7] Mosquitoes are found in all types of environment specially related with water in India such as stagnant water, sewage water, septic tank etc. By the uses of appropriate vector control methods to reduce the spread of vector borne diseases. It's essential to monitor the spread of vector-borne mosquito population [8]. To proper adequate knowledge of species diversity and its zoogeographical distribution pattern in a particular area is essential to manage mosquito population to control the diseases. Mosquitoes are such only family of all types of insects that effect human health everywhere [9]. A large population of the world is affected by malaria diseases every year, so there is essential to identify different species of mosquito such type of studies are conducted from time to time in different areas of our country, but there has been a lack of such study in Surguja district hence in the present study has been made to investigate the mosquito species in Surguja district Chhattisgarh

II Material and methods

Study area

The present entomological investigation was carried out at Surguja district which is tribal dominated district located in the northeast of the state of Chhattisgarh the total area of the district about 5732 sq. km., the latitudinal extension is 23°37'25" to 24°6'17" north latitude and the longitudinal extension is 81°34'40" to 84°4'40" east longitude. Surguja district is surrounded by tropical dry deciduous forest. The composition of forest are basically Haldu (*Haldina cordifolia*) Mahua (*Madhuca longifolia*) Semal (*Bombax ceiba*) Salai (*Boswellia serrata*) Amla (*Emblica officinalis*) Dhaora (*Anogeisus latifolia*) Ber (*Ziziphus zujuba*) Amaltas (*Casia fistula*) Teak (*Tectona grandis*) Sal (*Shorea robusta*) Khair (*Acacia catechu*) Harra (*Terminalia chebula*) Bamboo (*Dendrocalamus stricus*) and Tendu (*Diospyros melanoxylon*)

Collection and identification

The present investigation was carried out during June 2022 to May 2023 at Surguja district Chhattisgarh. The site for sample collection of larva and adults of mosquitoes was selected on the basis of geographical location in all the six blocks of Surguja. Total ten sites were selected A fixed collection site selected in the selected place for sample collection in addition to the above samples were also collected randomly from the selected site the following methods were used to collect mosquito samples [1]. Mechanical and oral aspirator [2] Mosquito collection by spray seat in which white cloth is spread throughout the room and mosquitoes are collected by spraying pyrethrum all the corners of room [3]. Early morning and evening mosquitoes are taped through CDC light. Mosquitoes are collected from indoor by spraying 0.6% solution of pyrethrum and aerosol. Mosquitoes are caught with the help of forceps and transferred to a test tube then covered with a mesh cloth. Adult mosquitoes biting resting stage were collected between 6.30 pm and 8.00 pm. Near human dwellings and cow sheds with the help of human landing and aspirator method. And these collected mosquitoes are preserved in plastic vials for further specific identification. Dipper method were used for undeveloped mosquitoes [10]. And the adult mosquitoes developed from these are stored in vials and identified.

Data analysis

The diversity of species richness represented by Species richness (S), Shannon-wiener index (H) and Shannon vennes index (E) by the following formulae: Species richness (S) = Total number of species Shanon index (H) $s = \sum - (Pi * \ln Pi) i=1$

Where H = the Shanon diversity index Pi = entire population fraction made up of a species I S = numbers of encountered species Σ = Total of species 1 to species S

Shanon Eveness Index (E) = $H/\ln(S)$

Where H= Shanon diversity index

(S) = Natural logarithm of species richness (S)

III Results and discussion

A total of 1632 mosquito samples were taken in this study, in to which a total of 16 mosquito species of 3 genera i.e *Anopheles*, *Culex*, and *Aedes* found. Higher rank indicates species abundance first rank means that the species concerned is very high abundance while decreasing order of rank indicates low abundance it depicts on (Table 1) During the present investigation the dominancy were found in *Anopheles* i.e 61,30%, *Culex* 24.07% and *Aedes* 9.52% respectively. According to the genus the diversity of species depicted by Richness of species (S), Index of Shanon Weiner (H) and Index of Shanon Evernes Index (E) In (Table 2). The richness of species (S), richness of Evenes (E) resulted viz. 03,062; 03, 0.54 and 09, 0,73 *Aedes*, *Culex*, and *Anopheles* species increasingly In *Anopheles* maximum Shanon index was found (1.854) its which was found in *Culex* (1.351) and *Aedes* (1.121) respectively. Monthly the value of Shannon Wiener index was ranges from 1.0121 to 1.9345 and 1.0121 to 1.9154 from 2021 and 2022 simultaneously. Highest value (1.9345) found in September and the lowest value was found in December (1.9345) from 2021 to 2022 the higher value (1.9154) was noted in September and lower value (1.0121) was noted in January. The Shanon index shows maximum parity for both study years. Evenes index value was ranged from 0.9016 to 0.9761, 0.9064 to 0.9746 for 2021 and 2022 respectively. Higher value was found in March while its downed or minimum in September. (Table 3). The maximum species richness showed by *Anopheles* genus then *Culex* and *Aedes* species respectively. In the context of above such type study are limited in Surguja district Fifteen species of mosquitoes has been noted from the 3 genus. The studies by some remarkable workers in the composition of *Anopheles* species notable difference found [11]. Observation of the present investigation found differ from the studied by [11]. The findings of the present investigation agreed with [12] and [14]. During the present investigation 15 mosquito species noted. The reason for this change its may be due to climatic factors, urbanization, pollution and some other notable factors. Findings of the present investigation agreement with [15, 16, 17]. Dominancy of species was noted *Culex quinquefasciatus*, *Ades albopictus*, *Anopheles subpictus*. by all the workers. The biodiversity indices in terms of Shanon and eveness index in the context of biodiversity index were resemblance with some repters [18, 19]. On the basis of findings obtained from the present investigation, it can be said that most of the species are common, reason for this may be major climatic changes, modified agricultural practices, increased industrialization. The present investigation may help in the future planning of control measures of vector borne diseases.

IV References

1. Wagner R, *et al.* Global diversity of dipteran families (Insecta Diptera) in freshwater (Excluding Simuliidae, Culicidae, Chironomidae, Tipulidae and Tabanidae). *Hydrobiologia*. 2008;595(1):489-519.
2. Harrus S, Baneth G. Drivers for the emergence and reemergence of vector-borne protozoal and bacterial diseases. *International journal for parasitology*. 2005;35(11-12):1309-1318.
3. McCallum J. Why do landowners restore wetlands? A case study from east central Ontario. Trent University (Canada), 2015.
4. Valkiūnas G, *et al.* Complete sporogony of *Plasmodium relictum* (lineage pGRW4) in mosquitoes *Culex pipiens pipiens*, with implications on avian malaria epidemiology. *Parasitology research*. 2015;114(8):3075- 3085.
5. Sutherst RW. Climate change and invasive species: a conceptual framework. *Invasive species in a changing world*, 2000, 211-240.
6. Bale J. Insect cold hardiness: freezing and super cooling an eco-physiological perspective. *Journal of Insect Physiology*. 1987;33(12):899-908.
7. Rueda LM. Global diversity of mosquitoes (Insecta: Diptera: Culicidae) in freshwater, in *Freshwater Animal Diversity Assessment*. Springer, 2007, 477-487.
8. Rozendaal JA. Vector control: methods for use by individuals and communities. World Health Organization
9. Guttmacher AE, Porteous ME, McInerney JD, Scienc society: Educating health-care professionals about genetics and genomics. *Nature Reviews Genetics*, 2007;8(2):151.
10. WHO. Manual on practical entomology in malaria vector bionomics and organization of antimalarial activities. Part I and part II, Offset Publication, No.13, Geneva. 1975.
11. Kalra NL, Wattal BL. An entomological survey of Dehradun valley (Uttar Pradesh) Part III. Addition to the records of mosquitoes of Doon valley. *Bull Ind Soc Mal Com Dis*. 1965;2:314-317.
12. Suhasini G, Sammaiah Ch. Diversity of mosquitoes (Diptera: Culicidae) in different habitats of Warrangal urban environment. *J Ent and Zoology Studies* 2014;2(4):7-10.
13. Jauhari RK, Srivastava N, Singh RP, Singh S. A note on the collection of mosquitoes from different habitations in peri-urban areas of Doon valley. *Bioved*. 1992;3:237- 238.
14. Mahesh RK, Jauhari RK. Resurgence of sylvatic mosquitoes in Doon valley. *J Parasit Appl Anim Biol*. 000;9:9-16.
15. Ul Haq Iftikhar, Singh Sundar. Diversity of Mosquito Fauna in different Habitats of District Dehradun, Uttarakhand Int. *J Curr. Microbiol. App. Sci*. 2021;10(04): 583-589
16. Kumar KR, Nattuthurai N, Annamalai M. Diversity of mosquito fauna in three selected sites of usilampatti taluk, Madurai district, Tamil Nadu. *Elixir Bio Diver*. 2011;36A:4064-4066.

