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INFLUENCE OF CLIMATIC CONDITION ON DENGUE FEVER IN DISTRICT NASHIK, M.S., INDIA

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Abstract – Mosquitoes have a worldwide distribution, mostly through tropical and temperate regions. They can be found in a variety of habitats with fresh or impure water. Infectious vector-borne diseases like malaria and dengue fever infect half of the world population. Dengue is a serious health issue in India and other parts of the world. As the outbreak of dengue fever, it is very important to know details about the cause of dengue. Prevalence of microorganisms in the viral strain, disease severity pattern, early detection of the virus, and early management of the disease are essential. The study carried out the correlation with the Dengue fever and Environmental factors for the current year, i.e. from January 2019 to October 2019. The study shows the exact Correlation between dengue fever patients and environmental conditions. The study is still going on and it will help in the management program to carry out vector control and source reduction in the present study during study period data of a total of 4143 patient's data were collected from which 1043 are dengue patients, Elisa positive which is confirmatory with very low platelets, high fever, and nausea vomiting, raised Creatinine SGPT, SGOT. The climatic condition is always correlated with dengue fever. The monsoon is prolonged till November accordingly dengue cases increase. *Aedes* mosquito source of development must be reduced. The program manages to apply the control measures along with source reduction.

INTRODUCTION

Mosquitoes have almost worldwide distribution being found throughout the tropic and temperate regions. They are absent on a few islands and Antarctica. They can develop vigorously in a variety of habitats with freshwater or any water (clear turbid or polluted) except in marine habitat because of high salt concentration. *Aedes aegypti* and *A albopictus* are the main vectors responsible for the transmission of many viral pathogens possesses a serious threat to human health and has proven to be very difficult to control due to their remarkable ability to adapt to various environments. Their close contact with human and their reproductive biology.

Dengue is a serious health issue in India and other parts of the world. As the mention of dengue fever, it is important to know the details about the causes of dengue Prevalence of microorganisms in the viral strain, disease severity and detection pattern of viruses with early management of the disease is essential. Environmental conditions such as temperature humidity and precipitation also play an important role in dengue resurgence. High level of precipitation and the suitable local temperature is strongly associated with rain and humidity and they are related to the poor urban area and urban area are always associated with higher risk. Climatic changes resulting in heavy and prolonged rainfall and may be due to global warming and increased dengue incidence and outbreak risk (www.sciencedirect.com/science/ar). The World Health Organization considers dengue to be the most important vector-borne viral disease, potentially affecting 2.5 billion people in tropical and subtropical countries throughout the world (WHO, 1999; Rigau-Pérez *et al.,* 1998) (www.medbox.org/dengue).

Prevention and control of dengue depend on controlling the vector *Aedes aegypti* is closely

associated with humans to their water-holding containers in and around homes are used by mosquitoes to complete their development (Kristie L. Ebi Joshua Nealon, 2016) while people provide blood meal to the female mosquito to complete the egg development. *Aedes aegypti* probably leaves in cool and dark areas such as close and behind the curtains always bites mostly indoors (Kristie L. Ebi Joshua Nealon, 2016). Eggs are laid on the open water containers and hatch into larvae after rain or flooding they transform into pupae and then adult mosquitoes. Under favourable conditions, a female mosquito infected with dengue and bites a human. It takes 15 days in favourable temperature and conditions to multiply and mature and migrate through salivary glands before the human bite. It is very difficult to control a Mosquito because they become established in favourable Climatic conditions the *Aedes* eggs can remain drying and survive without water for several months on the inner wall of the container and hatched immediately after being submerged following rainfall this population speed cover within weeks after a vector control campaign successfully eliminates

Climate changes affect the *Aedes* temperature is the most important factor of biting rate, eggs, and immature mosquito development time and survival time at all stages of the mosquito lifecycle. Survival temperature through all the life stages is 20-30 ºC. If the temperature increases the mortality of mosquitoes and lowers decreases the risk of dengue. Changing climate may affect the geographic range and incidence of dengue through the effect of human and natural systems such as water storage land use and irrigation population movement can affect vector ecology (Kristie L. Ebi Joshua Nealon, 2016).

Study Design

This is the descriptive study carried out in Nasik Dist. It shows the exact correlation between Temperature, Rainfall, and dengue cases and the months of the year 2019 this study is initially carried out in the nearest Talukas such as Dindori, Wani, Ozar, and Nasik City area.

(https://www.mapsofindia.com/maps/maharashtra/tehsil/nashik.html)

MATERIALS AND METHODS

The study was carried out from different areas of Nashik District (MS) India. The study area lies between $19^0.99^1$ N and $73^0.47^1$ E, is spread on an area of 15.503 sq. The main river in the Nasik is the Godavari. Nasik experienced extreme climate Maximum 42 ºC and lowest 0.6 ºC and average rainfall between 2600 -3000 mm annually monsoon is from June to September but in the year 2019 year prolonged up to mid-November.

Samples were collected from fifteen talukas and visited the hospitals for collecting the samples and also visited the civil hospital and public health Department for collection of samples with data of infected person's monthly and also metrological data.

These samples are collected and tested for the Dengue Elisa test means Enzyme-Linked immuno sorbent assay this is the test that detects and measures, detects the antibodies in blood for particular infection This is the confirmatory test for Dengue and we are taken only IgM positive samples means ELISA positive samples Elisa for IgG IgM, which gives confirmatory results. Extremely low platelets count high fever, nausea, and vomiting and where the patient shows the raised Creatinine levels SGPT SGOT levels. In the dengue patient, we have to analyze the Liver function test as well as the Kidney function test which helps in the Diagnosis of Dengue Further move results for the prevalence of mosquito-borne diseases were calculated along with their control measures.

RESULTS AND DISCUSSION

The data of dengue analysis from the year 2014 to 2019. The highest transmission rate is reported in the year 2019 and somewhat low in the year 2015. The cases are reported positive in January and February. There is too much variation in the climatic effect on the increased incidence of dengue.

Nashik is a growing city and small talukas are situated in the nearby areas so, the treatment facilities are easily available in the city so economic avenues are present in the city. Patients who may acquire disease come to the city. So the cases may vary in rural and urban places differently or there may be variation in the cases.

There is a high correlation between rainfall and dengue cases since it is observed from the last two months, because of the weather condition there may be an effect on the Aedes population and virus replication.

In the year 2019, there is a correlation serologically between positive cases and negative

cases respectively. These positive cases are in increased effect monsoon season, i.e. in October and November that are on the highest peak because the rainy season was prolonged up to 6th November and there was heavy rainfall in my study area. It was the first time in history that there was such a flood situation, which was nearly ¾ times up to the end of November 2019. So the situation is very fragile and vector-borne outbreaks are very high.

Humidity is one of the major factors that affect outbreaks alone. The observation period of transmission starts from January- February. Whereat actual in the low-temperature mosquito does not live longer and so the virus cannot develop properly but the change in climate affects the situation. In the higher temperature virus replication reduces the extrinsic period of mosquito and may magnify epidemics.

Because of global warming temperature, rainfall and humidity are varied too much across the monsoon, pre-monsoon, and post-monsoon periods. It has the best correlation between climate and dengue occurrence (Naish, *et al*., 2014). In this study, the rainfall, as well as humidity, also favors the lifespan of Aedes so the life span increased along with the increased extrinsic period of the virus in the mosquito. However rainfall is always along with humidity, thus this provides habitual climate conditions for the transmission of dengue disease.

The correlation between dengue cases and rainfall shows a clear correlation. As the rainfall increases dengue cases increases accordingly. The

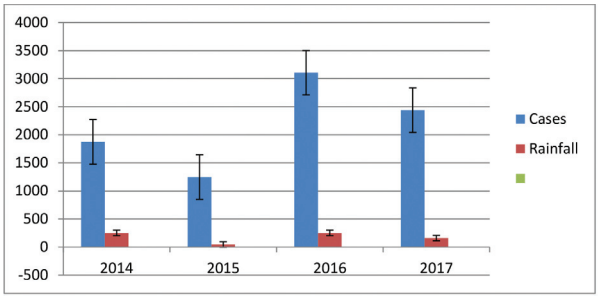

Fig. 1. Correlation between rainfall and dengue cases

Table 1. Correlation between rainfall and dengue cases

Year	Cases	Rainfall
2014	1875	251.5
2015	1247	47.3
2016	3107	251.5
2017	2438	160.6
2018	3796	812
2019	4143	812

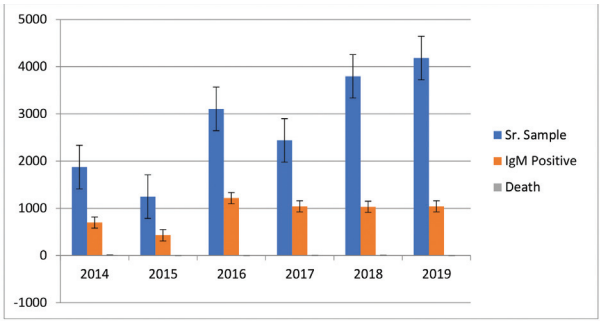

Fig. 2. Year-wise dengue cases and deaths in Nashik District

Table 2. Year-wise dengue cases and deaths in Nashik District

Year	Sr. Sample	IgM Positive	Death
2014	1875	698	9
2015	1247	429	0
2016	3107	1216	0
2017	2438	1043	1
2018	3796	1031	4
2019	4184	1043	0

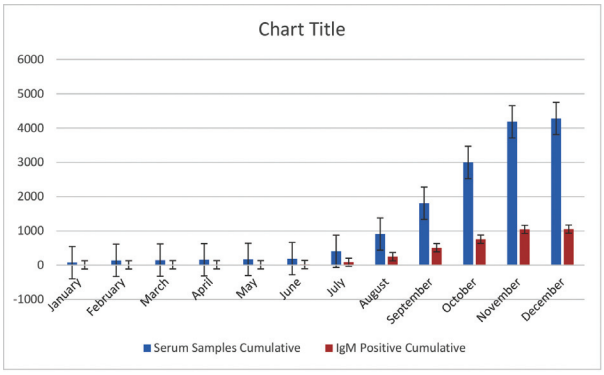

Fig. 3. Month wise seropositive dengue cases and rainfall

table clearly shows that the in the year 2019 rainfall is 817mm and dengue outbreak is 4, 143 total patient and from them 1043 are sero positive but no death occurs this year because of previous experience the awareness is increased among people and preventive measures are also taken by the government so actively.

CONCLUSION

It is concluded that the variation in rainfall patterns is always difficult to control the dengue virus. *Aedes* mosquitoes breed in summer and followed throughout the year. They are highly transmitted during the rainy season because of the humidity in

Table 3. Wise seropositive dengue cases and rainfall

Month	Serum Samples Cumulative	IgM Positive Cumulative	Serum Samples	IgMPositive
January	74	9	74	9
February	66	0	140	9
March	7	4	147	13
April	10	1	157	14
May	12	0	169	14
June	20	3	189	17
July	215	69	404	86
August	502	163	906	249
September	902	260	1808	509
October	1188	248	2996	757
November	1186	286	4182	1043
December	97	8	4279	1051

the air. In the summer season breeding is higher or at the peak, during summer it is mostly indoors and in the rainy season, it is outdoor. It only reduces during winter because of the lowered life span of *Aedes* and followed by lowered development of viruses, so not a single container found positive during winter. This shows the correlation between climatic change and dengue positive causes.

Aedes has adapted to many climatic conditions so it can survive and becomes difficult to control. Favorable temperature, ecological conditions, freshwater helps in hatching eggs, and the emergence of the adult. This resulted in sudden increases in the density of mosquitoes along with an increase in dengue.

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