



CORRELATION BETWEEN DENGUE INCIDENCES AND POPULATION OF *A. aegypti* AND *A. albopictus*

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Author DS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of manuscript. Author GM managed the analysis of the study and managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

This research aim to determine the correlation between dengue incidence and population dynamics of dengue vector (*A. aegypti* and *A. albopictus*) to explore the possibilities of using our findings to improve control of dengue. The most effective way to characterize the dengue risk - vector population association was to carry out prospective monthly field survey, i.e. mosquito density, dengue incidences and severity of diseases. The study design was limited to reported cases in Agra region only. Data of dengue cases collected from various hospitals where techniques for actively identifying diseases were available. To determine the correlation between dengue incidences and population of *Aedes* mosquitoes, Pearson's Correlation Analysis was performed with the help of SPSS software. The value of Pearson's Correlation $R = 0.091$ with high level of significance that is $P = 0.779$. A low Pearson's Correlation indicates a biological relationship between dengue incidence and population variation of *Aedes* species. It also shows that there are other factors also those influence the process. Similarly, the incidences of dengue were also highly related to the presence of *A. albopictus*. In this case the value of $R = 0.685$ and $P = 0.014$ which is also highly valuable. Results from study stated that the presence of *Aedes aegypti* was linearly related to incidences of dengue cases.

Keywords: Dengue; incidence; population; vector.

1. INTRODUCTION

Dengue case has gradually increased during the last decade in the various parts of India. The disease is driven by a complex interaction among viruses, vector population, and socioeconomic conditions. In the

present study, we focused on population dynamics of *Aedes* species and incidence of the dengue. Pearson Correlation has been analyzed and is worked out. Agra city is located in semi arid climate that borders on a humid subtropical area which is a favorable condition for dengue endemism.

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Dengue fever is a very serious public health problem in Agra region as indicated by a gradual increase in the number of cases in last ten years or so [1]. Several dengue control programs have been launched in this city. The concern of dengue endemism became more serious due to the rapid increase in dengue vector population during the rainy season. No consistent work has been done to understand this complex problem of dengue incidence. The present study is aimed to propose the Pearson Correlation. So that an effective control strategy can be proposed.

2. METHODOLOGY

The data of dengue fever was collected from Medical College, District Hospital, and private hospitals. The vector population was estimated by obtaining regular monthly field collection of *Aedes* mosquitoes. The collection was made with the help of Aspirators, camel hair brush, castor oil spreading on the sheets etc. All the collected mosquitoes were kept and transferred into the vials half filled with 70% alcohol and brought into the laboratory for identification. The identification was done by following pictorial keys formulated by Rueda (2004) [2].

2.1 Statistical Analysis

Pearson's Correlation Analysis was performed to evaluate the relationship between dengue incidences and vector population by using the software SPSS 16.0 [3].

3. RESULTS

In spite of great effort in mosquito control implemented in this region, several outbreaks had, and intensity with large outbreaks occurred during the last decade. (Fig. 1) [4] In August dengue cases number is normally below 10. However, during September number was over 60. The maximum monthly population of *A. aegypti* vector was 489 in August and minimum 2 in March. However for *A. albopictus* maximum number was 176 in August and minimum 2 in March.

The Pearson's Correlations were calculated to find a relationship between dengue incidences and vector population. The value of Pearson's Correlation $R = 0.091$ with high level of significance that is $P = 0.779$ for *A. aegypti* which is linearly correlated. A low Pearson's Correlation indicates a biological relationship between dengue incidence and population variation of *Aedes* species. It also shows that there are some other factors those influence the process.

Similarly, the incidences of dengue were also highly related to the presence of *A. albopictus*. In this case the value of $R = 0.685$ and $P = 0.014$ which is also highly valuable. Therefore, results were showing the positive correlation between dengue incidences and vectors of dengue.

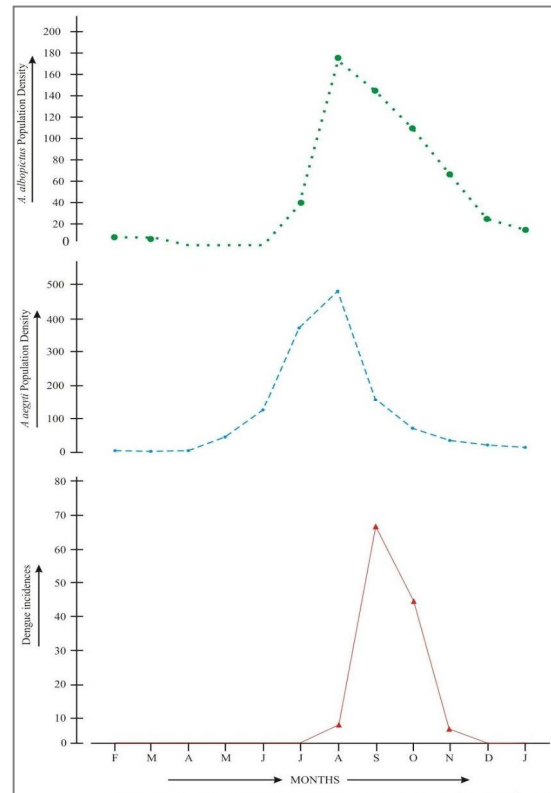


Fig. 1. Correlation of dengue incidences and population density of dengue vector (*A. aegypti* and *A. albopictus*)

4. DISCUSSION

Aedes aegypti and *Aedes albopictus* are the mosquitoes widely distributed in various freshwater habitats of rural as well as urban areas. As suitable breeding sites are readily available in the urban areas throughout the year. Mosquitoes need rain for breeding sites which are more influenced by rainfall but too much rain may wash out premature mosquitoes [5,6]. populated area and demographically is suitable for mosquito inhibit. Under this condition, dengue virus can spread significantly and high transmission of dengue virus is occur when higher rainfall, lower temperature and higher humidity [7]. Agra has approximately 7-8 dry months in one year. Thus, there is rainfall for only 3-4 months to provide the breeding of *Aedes* mosquitoes in Agra region.

5. CONCLUSIONS

Major findings from the above study are as: The result will be helpful to understand the risk based on *Aedes* abundance in the proposed area. Development of this understanding is a prerequisite for researches related to mosquito-borne diseases with special reference to dengue. If these informations are included in the predictive model, the programme maker of health related problems, would have quantitative measures that could be used in the formulation of control strategies. Therefore, further studies are required to develop seasonal forecasting of dengue incidence. Socioeconomic and host population density and migration may be the important factor to further understand this complex fast spreading disease.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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