ORIGINAL RESEARCH

Dengue viral infection: A recent trend with seasonal variation in tertiary care centre, central India

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Revised date: 23 December, 2023 Acceptance date: 15 January, 2024

ABSTRACT

Background and objective: One of the most well-known issues with public health is dengue illness linked to considerable morbidity in both the tropics and the subtropics. This study aimed to investigate the dengue trend and identify the dengue seasonal pattern. **Material method:** The present prospective cross-sectional study was conducted for a period of one year in the department of microbiology at MGM Medical College, Indore, Madhya Pradesh, from 2020 to 2021. Blood samples were received from 450 suspected dengue patients for ELISA testing to detect the NS1 antigen. **Result** Serum samples from 450 patients who had fevers thought to be caused by dengue infections were collected. In the current study, 45(10%) patients tested positive for dengue using NS1 ELISA. 45 samples were found to be positive. Six cases tested positive from January to April, and seven cases tested positive from May to August. However, majority of the instances between September and November were found to be positive. **Conclusion**: This study emphasises the need for continuous surveillance coupled with a vector control programme and awareness among the public in combating future dengue epidemics.

Key words: Dengue virus, NS 1 Antigen ELISA, Seropositivity

INTRODUCTION

Acute dengue fever is an arboviral illness that can have deadly consequences. Dengue is a global endemic disease [1]. Around two-fifths of people on Earth live in tropical and subtropical regions, where they are constantly at risk of acquiring this disease, according to estimates from the World Health Organisation (WHO) [2]. Dengue has become a much bigger hazard to health, finances, and health services over the last ten years. Within the family Flaviviridae, genus Flavivirus, the dengue virus is a single positive-stranded RNA virus [3]. People with dengue fever can experience a variety of symptoms, including headaches, vomiting, muscle aches, mild fever, severe fever, and no symptoms at all [4]. Heavy bleeding, shock, and even death is possible in severe situations. Based on the clinical syndromes, dengue fever (DF), dengue hemorrhagic fever (DHF), and dengue shock syndrome (DSS) can be distinguished by three categories of dengue symptoms, ranging from moderate to severe. There are four distinct dengue virus serotypes (DENV 1-4) that can infect people [5]. Dengue, a mosquito-borne illness with a seasonal distribution, may spread significantly due to environmental conditions, such as weather variations. The three main factors affecting dengue incidence are temperature, rainfall, and relative humidity [6,7,8]. According to researcher, there are an estimated 390 million viral infections worldwide each year, of which 96 million cause DF symptoms [9]. Despite the possibility of moderate symptoms, dengue hemorrhagic fever or dengue shock syndromes, which are deadly conditions most frequently associated with recurrent infections, can develop from them [10]. Aedes genus mosquitoes, of which Aedes aegypti is the most prevalent species, are the vectors of DENV.
The objective of this research was to comprehend the dengue infection epidemiological pattern, assess seasonal and trend patterns in dengue incidence, and perhaps utilise the findings to forecast future dengue outbreaks.

MATERIAL AND METHODS

Clinically suspected dengue cases reported to various inpatient and outpatient departments of the Maharaja Yashwant Rao hospital between 2020 and May 2021

were used in this cross-sectional study, which was carried out in the Department of Microbiology at a tertiary care facility, MGM, Medical College, Indore, Madhya Pradesh.

Inclusion Criteria: All blood samples from suspected cases of dengue infection were included in this study

Exclusion Criteria: Haemolysed blood samples, insufficient blood sample and Improper labelling. About 2 ml to 3 ml of blood was received in laboratory. Serum was separated by centrifuging samples at 3000 rpm for five minutes and tested immediately. In case of delay in processing, sera were stored at a temperature of 2°C-8°C. A total of 450 samples were collected and serologically tested, for demonstration of NS1 antigen. NS1 antigen detection was done using DENV NS1 ELISA kit (Med source ozone biomedicals PVT.LTD). The procedures were performed as per the kit literature as follows: Take required no. of coated microwell stripe and fit properly in the strip holder, Add 50 µl of negative control in A -1 well and B-1 well, Add 50 µl of positive control in C1 well and D 1well, Add 50 µl of sample in E 1 microwell onwards, Then add 50 µl of working conjugate solution in each microwell, Apply plate sealer and incubate at 37 degrees centigrade for 75 mins, Wash the microwell for 5 times with prepared working wash buffer, Add 100 µl of substrate /chromogen solution in each well, Apply plate sealer and incubate at 37 degrees centigrade for 15 mins under dark, Add 50µl of stop solution in each well, Read microwell using ELISA plate reader at 450 nm.

Interpretation and Calculation

Calculate mean of the negative control
Cut off value =mean od of NC +0.2
Negative –OD is lesser than means OD negative control plus factor of 0.2
Positive - OD is greater than mean OD negative control plus factor of 0.2

RESULT

Serum samples from 450 patients who had fevers thought to be caused by dengue infections were collected. In the current study, 45(10%) patients tested positive for dengue using NS1 ELISA.
Out of total fever patients majority of them (59.5%) were 16-30 years age group, whereas among dengue positive cases 18% belong to 31-45 years age group [table:1].

Table 1 Age distribution of Dengue cases

Age group	Total cases	Positive cases	Percentage
1-15	65	5	7.6
16-30	268	23	8.5
31-45	85	16	18
46-60	32	1	3
Total	**450**	**45**	**10**

Table 2 displays the gender distribution of dengue patients that tested positive, showing that 21(46.66%) of the positive samples were from females and 24(53.33%) from males.

Table 2 Gender distribution of Dengue

Gender	Suspected	Positive	Rate of positivity
Male	250	24	9.6%
Female	200	21	10.5%
TOTAL	450	45	10%

Table 3 shows that ELISA positivity was highest in the 16–30 age group in males, followed by 31–45, 1–15, and the lowest in the 46–60 age group, whereas in females, the highest was similarly seen in the 16–30 age group, followed by 31–45, 1–15, and the lowest in the 46–60 age group. The study found a statistically significant association between gender-wise Seropositivity and age group (p-value 0.049).

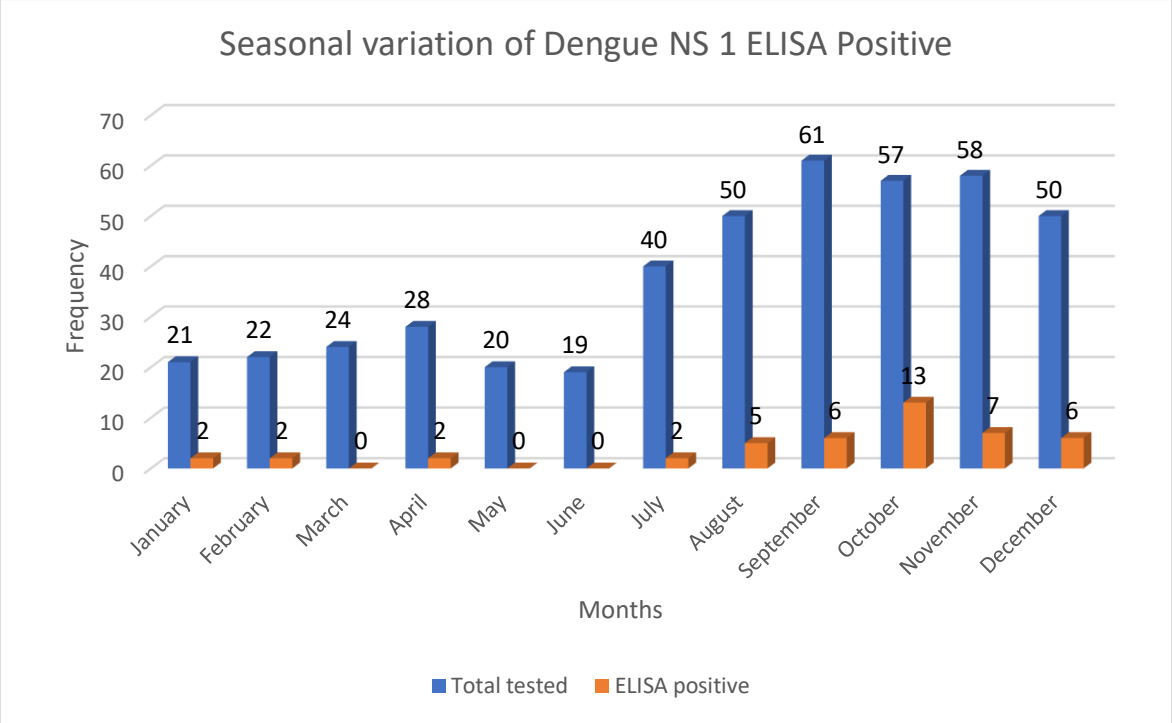
Table 3 Dengue ELISA positivity with age and gender

MALE				FEMALE			
Age group	**Elisa positive**	**Elisa negative**	**Total**	**Elisa positive**	**Elisa negative**	**Total**	**Total tested**
1-15	3	45	48	2	15	17	65
16-30	13	126	139	10	119	129	268
31-45	8	43	51	8	26	34	85
46-60	0	12	12	1	19	20	32
p-value	0.253			0.049			

Table 4 shows that a total of 450 suspected cases of dengue were tested from January 2022 to December 2022, out of which 45 samples were found positive. In January to April, 6 cases were found positive, and in May to

August, 7 cases were found positive. But between September and November, most of the cases were found positive (32).

Table 4 Seasonal variation of Dengue ELISA



DISCUSSION

Currently, dengue is a significant developing illness in tropical and subtropical areas. It is evident that dengue has been occurring often with sporadic spikes in many cases over the previous decade.[11] Infection with dengue is widespread throughout much of India.[14]Dengue fever epidemics are growing more common in cycles, and the WHO has proclaimed the disease to be hyperendemic in India.[12] To help policy makers and public health managers prepare for and control outbreaks, as well as to encourage international collaboration in the development and evaluation of prevention, control, and management measures and technologies to control further epidemics, it is imperative to have a thorough understanding of the economic and disease burden associated with dengue in India [13].A total of 450 samples were used in this study, and 45 (10%) of those samples tested positive for dengue infection using ELISA.18.99% seroprevalence of dengue was observed in Rajasthan, India, according to a study by Sood S. [14]. Out of the 45 positive samples, 24 patients (or 53.33%) were male, and 21 patients (or 46.66%) were female. Our findings correlated with the research conducted by Maheshkumar and colleagues. Males who have higher sero-positivity may be more exposed to Day biting mosquitoes because to increased exposure at work or during outdoor activities [15]. Halstead SB et al. had proposed that females have more competent immune responses than males, which leads to higher cytokine production and makes them more resistant to dengue infection [16].

According to this study, ELISA positivity was highest in the 16–30 age group in males, whereas in females, the highest was similarly seen in the 16–30 age group. The study found a statistically significant association between gender-wise seropositivity and age group in females (p-value 0.049).

According to the results of the study, the highest number of suspected dengue cases were reported in September, October, and November. Similar positive trends have been observed in the research conducted by Gunasekaran P et al. and Deshkar ST et al. [17,18]. The dengue virus showed seasonal fluctuation, as seen by a steady rise in incidence beginning in August and reaching a peak in October. Rainfall, temperature variations, and occasionally humidity are the climatic elements that cause epidemics, either separately or in together.[19] There is a higher likelihood of viral transmission and a longer mosquito life span during the wet season. Additionally, the post-monsoon stagnant water pool serves as a breeding ground, which encourages an increase in the prevalence of disease [20].

CONCLUSION

Dengue infection is a public health issue that is commonly spread in rainy sessions at the end of October and starting in November. This study emphasises the need for continuous surveillance coupled with a vector control programme and awareness among the public in combating future dengue epidemics.

Source of funding: none

Conflicts of interest: none declared

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