

## Retrospective Study to Determine the Prevalence of Dengue and its Complications

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### Abstract

**Aim:** To estimate the prevalence of dengue and its complications

**Methodology:** This is a type of retrospective study carried out at Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India during the monsoon. 130 patients diagnosed with Dengue were included in the study. Details of the age and gender distribution, signs and symptoms were recorded. Laboratory investigation reports of the patients at the time of admission were obtained. Details of treatment, hospital stay, organ involvement, complications and the outcomes were also recorded and analyzed.

**Results:** Out of 130 patients, 82 (63.08%) were males and 48 (36.92%) were females. Majority of the patients i.e., 89 (68.46%) belonged to the age group between 18-40 years while 41 (31.54%) were more than 40 years of age. All the patients (100%) had fever on the day of admission. The other predominant symptoms were headache in 74 (56.92%), myalgia in 65 (50%), nausea in 47 (36.15%) and vomiting in 33 (25.38%), and abdominal pain in 28 (21.54%) patients.

The laboratory parameters of the patients on admission had been recorded. The 21 (16.15%) patients had >16 gm/dl of hemoglobin. The 43 (33.08%) patients had leukopenia (4000/microliter) on admission. About 95 (73.08%) patients had thrombocytopenia (<100000/microliter) on admission. Among these, 24 (18.46%) of patients had <20000/microliter of platelets. About 58 (44.62%) patients had >45% of hematocrit on admission

**Conclusion:** In patients with dengue, fever, headache and myalgia are the most common clinical findings. The most common laboratory findings are thrombocytopenia and leucopenia. Dengue infections are usually at peak during the monsoon season due to collection of standing water. The proximity of mosquito vector breeding sites to human habitation is a significant risk factor for dengue as well as for other diseases that *Aedes* mosquito transmit, that is why it is more prevalent in the rural regions.

**Keywords:** Thrombocytopenia, leucopenia, hematocrit.

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## Introduction

Dengue is a mosquito-borne infectious disease spread by *Aedes aegypti* and *Aedes albopictus* mosquitoes. It is caused by a virus of the Flaviviridae family and there are four distinct, but closely related, serotypes of the virus that cause dengue (DENV-1, DENV-2, DENV-3 and DENV-4). Dengue has distinct epidemiological patterns, associated with the four serotypes of the virus. Dengue is widespread throughout the tropics, with local variations in risk influenced by rainfall, temperature, relative humidity and unplanned rapid urbanization. Presentation of dengue fever can vary from malaise, fatigability as a part viral prodrome to shock and multiorgan dysfunction syndrome as a part of severe illness. [1] Population growth and breeding of mosquitoes in tropical and subtropical countries has led to increased transmission of dengue. [2]

The incidence of dengue has grown dramatically around the world in recent decades. A vast majority of cases are asymptomatic or mild and self-managed, and hence the actual numbers of dengue cases are under-reported. Many cases are also misdiagnosed as other febrile illnesses [3]. Dengue is becoming serious health problem worldwide. One modelling estimate indicates 390 million dengue virus infections per year (95% credible interval 284–528 million), of which 96 million (67–136 million) manifest clinically (with any severity of disease) [4]. Another study on the prevalence of dengue estimates that 3.9 billion people are at risk of infection with dengue viruses. Despite a risk of infection existing in 129 countries [5], 70% of the actual burden is in Asia [4].

The virus is transmitted to humans through the bites of infected female mosquitoes. In India, dengue cases increase in number during monsoon season due to collection of water in many places and standing water acts as breeding ground for mosquitoes. Dengue has more frequent outbreaks and transmission leading to increased

proportion of severe cases and deaths in India. After feeding on DENV-infected person, the virus replicates in the mosquito midgut, before it disseminates to secondary tissues, including the salivary glands. The time it takes from ingesting the virus to actual transmission to a new host is termed the extrinsic incubation period (EIP), i.e. 8-12 days when the ambient temperature is between 25-28°C [6, 7]. Variations in the extrinsic incubation period are not only influenced by ambient temperature; a number of factors such as the magnitude of daily temperature fluctuations [8], virus genotype [9], and initial viral concentration [10] can also alter the time it takes for a mosquito to transmit virus. Once infectious, the mosquito is capable of transmitting virus for the rest of its life.

## Methodology:

This is a type of retrospective study carried out at Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India during the monsoon period. 130 patients diagnosed with Dengue were included in the study.

## Inclusion criteria

Patients with age more than 18 years, positive for rapid (NS1 antigen) test or dengue IgM Elisa without any other systemic co-morbidities were included in this study.

## Exclusion criteria

Dengue positive patients less than 18 years of age or with any systemic co-morbidity were not included in this study.

## Methodology

Data was collected from the medical records. Details of the age and gender distribution, signs and symptoms were recorded. Laboratory investigation reports of the patients at the time of admission were obtained. Details of treatment, hospital stay, organ involvement, complications and the outcomes were also recorded and analyzed.

## Results

130 patients with dengue fever were admitted into the tertiary care hospital with varying symptoms. Out of 130 patients, 82 (63.08%) were males and 48 (36.92%) were females. Majority of the patients i.e. 89 (68.46%) belonged to the age group

between 18-40 years while 41 (31.54%) were more than 40 years of age.

All the patients (100%) had fever on the day of admission. The other predominant symptoms were headache in 74 (56.92%), myalgia in 65 (50%), nausea in 47 (36.15%) and vomiting in 33 (25.38%), and abdominal pain in 28 (21.54%) patients.

**Table 1: Demographic, clinical, and laboratory parameters of the patients.**

			Number (n=130)	Percentage
<b>Demographic Parameters</b>	Gender	Male	82	63.08 %
		Female	48	36.92 %
	Age	18-40 years	89	68.46 %
		>40 years	41	31.54 %
<b>Clinical Parameters</b>	Fever		130	100.00 %
	Headache		74	56.92 %
	Myalgia		65	50.00 %
	Nausea		47	36.15 %
	Vomiting		33	25.38 %
	Abdominal pain		28	21.54 %
<b>Laboratory Parameters</b>	Hemoglobin	>16 gm%	21	16.15 %
		<16 gm%	109	83.85 %
	Hematocrit (PCV)	>45%	58	44.62 %
		<45%	72	55.38 %
	Total leucocyte count	<4000/cmm	43	33.08 %
		>4000/cmm	87	66.92 %
	Platelet count	<1,00,000	95	73.08 %
		<20,000	24	18.46 %
	AST	>45 U/L	85	65.38 %
		<45 U/L	45	34.61 %

The laboratory parameters of the patients on admission had been recorded. The 21 (16.15%) patients had >16 gm/dl of hemoglobin. The 43 (33.08%) patients had leukopenia (4000/microliter) on admission. About 95 (73.08%) patients had thrombocytopenia (<100000/microliter) on admission. Among these, 24 (18.46%) of patients had <20000/microliter of platelets. About 58 (44.62%) patients had >45% of hematocrit on admission

At the time of admission, 92 (70.77%) patients had dengue with no warning signs, 30 (23.08%) patients had dengue with warning signs and 8 (6.15%) were having severe dengue based on WHO classification [15]. Out of these 130 patients, 14 (10.77%)

patients required intensive care unit admission. The number of days spent by the patients in the hospital varies from 2 to 14 days. Average days of hospitalization is  $6.24 \pm 4.45$  days. One mortality (0.77%) was also noted out of all the 130 cases due to multi organ failure.

## Discussion

The *Aedes aegypti* mosquito is considered the primary vector of DENV. It lives in urban habitats and breeds mostly in man-made containers. *Ae. aegypti* is a day-time feeder; its peak biting periods are early in the morning and in the evening before sunset [11]. Female *Ae. aegypti* frequently feed multiple times between each egg-laying period [12]. Once a female has laid

her eggs, these eggs can remain viable for several months, and will hatch when they in contact with water. Dengue infections are usually at peak during the monsoon season. Most of the studies showed similar peak of dengue infection during this time [13, 14]. This is because this period is suitable for growth of vector *Aedes aegypti* [13].

Leukopenia is an established feature of dengue fever and is due to bone marrow suppression by the dengue virus. [17] In this study 33.08% patients had leukopenia (4000/microliter) on admission. In the study by Daniel et al done at Kerala (South India) leukopenia is seen in 40% patient. [18] Study by Singh et al reported 36.11% patients with leukopenia and study by Dinkar et al leukopenia was found to be in 26.68% of patients. [13, 19]. This study revealed that young adults belonged to the age group between 16-35 years were more affected. Previous studies also shown similar observation. [16, 13]

Thrombocytopenia is a common feature in dengue infection and is a predictive biomarker for the severity of dengue. [20] Thrombocytopenia occurs due to bone marrow suppression. The present study reported thrombocytopenia of less than 1 lakh/microliter in 73.08% of patients on presentation. Study by Singh et al reported 89.35% of patients with thrombocytopenia while study by Dinkar et al reported 99.13% of patients with thrombocytopenia. [13, 19].

### Conclusion

In patients with dengue, fever, headache and myalgia are the most common clinical findings. The most common laboratory findings are thrombocytopenia and leucopenia. The proximity of mosquito vector breeding sites to human habitation is a significant risk factor for dengue as well as for other diseases that *Aedes* mosquito transmit. Dengue infections are usually at peak during the monsoon season due to collection of standing water. At present, the main and the most effective method to control or prevent the transmission of

dengue virus is to combat the mosquito vectors. Identifying the warning signs and prompt supportive management will help in preventing the further complications and in reducing the mortality.

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