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Prevalence Of Dengue Serotypes And Its Correlation With Clinical Profile: A Tertiary Care Hospital Based Cross Sectional Study In Puducherry

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ABSTRACT

Background: *Dengue fever, transmitted by Aedes mosquitoes, remains a significant public health challenge in India. Dengue virus (DENV) has four distinct serotypes, with shifting circulation patterns and varied clinical presentations.*

Objectives: *To identify DENV serotypes in clinically suspected dengue cases, determine their prevalence, and assess associations between serotype and clinical severity in a Tertiary Care Centre at Puducherry.*

Methods: *A hospital-based cross-sectional study was conducted on 100 adult, RT-PCR confirmed dengue inpatients. Demographic, clinical, and laboratory data were collected. NS1 antigen, IgM, and IgG ELISA and RT-PCR were used for diagnosis and serotyping. Associations between serotypes, severity, and clinical/laboratory variables were analyzed using Chi-square and ANOVA.*

Results: *Although DENV2 was the most prevalent serotype (60%) DENV3 was the most strongly associated with severe dengue, with 100% of cases exhibiting severe symptoms such as DHF Grades 1 and 2 and low platelet counts. Both DENV1 and DENV4 showed a benign clinical picture, with moderate sickness and no serious consequences. The majority of infections (IgM+ in 77%) were primary, while DENV3 was more frequently associated with secondary infections, which are typically more serious. Clinical characteristics, platelet count, disease severity, and serotype were all found to be significantly correlated. DENV3 individuals, in contrast to other serotypes, exhibited characteristic severe dengue but lacked DUF. For the purpose of forecasting outbreak severity and directing response, routine serotyping and focused surveillance are essential.*

Key words: *Dengue, Serotype, DENV2, DENV3, Clinical Profile, Puducherry, Disease Severity*

INTRODUCTION

There are four different serotypes of the Dengue virus (DENV), which primarily spreads by Aedes aegypti mosquitoes and infects billions of people in tropical countries. Primary infections are frequently moderate or asymptomatic, but severe instances can result in vascular complications that can cause dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS), both of which can be fatal.(1–4) NS1 antigen tests, which are useful in diagnosing dengue up to nine days after the onset of symptoms in primary infections but less so in secondary cases, are frequently used in this process. There may be cross-reactivity with other flaviviruses in serological assays (IgG/IgM). RT-PCR is a sensitive and economical substitute for conventional techniques because it provides quick, precise detection during the acute phase and may detect serotypes even in subsequent infections.(5)

Secondary infection with a different serotype raises the likelihood of severe forms such dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) because of antibody-dependent enhancement, whereas original infection with any serotype often results in a self-limiting febrile illness.(6) Changes in circulating serotypes have been connected to variations in outbreak patterns and clinical severity, and the distribution of these serotypes can fluctuate over time and space.(7)

Tests for NS1, IgM, and IgG help diagnose dengue and determine the infection phase, but they cannot identify the serotype, which is crucial for assessing the illness's severity. DENV-2 and DENV-3 are commonly linked to severe outcomes, especially in secondary infections, due to antibody-dependent enhancement (ADE). RT-PCR

provides precise serotyping that informs clinical decisions and public health actions.
In their study of 3,800 dengue cases in India between 2010 and 2022, Verma et al. (2023) found that the preponderance of DENV-2 had shifted to DENV-3. 91% of cases had NS1 antigen positive, while 63% of cases had RT-PCR confirmation of dengue. Thrombocytopenia (82%), increased liver enzymes, rash, and high fever were typical symptoms, and concurrent serotype infections were seen. Because of changing serotype trends and therapeutic implications, the study emphasizes the necessity of continuous surveillance.(8)
According to a 2019–2022 study conducted in Puducherry on 416 dengue patients, 56% of cases were in young adults (18–29 years old). The most prevalent symptom was fever (85%), followed by hemorrhagic fever (10.6%) and shock syndrome (4.4%). 6.5% of patients had thrombocytopenia and hemorrhage. From DENV-3 (October 2019–March 2021) to DENV-2 (April 2021–September 2022), a serotype shift was noted.(9)
DENV-3 was prevalent in Puducherry (2003–2004), where it was linked to severe illness, with 17.7% of cases progressing to DHF and 10.1% to DSS. DENV-1 was most common in pediatric cases in Tamil Nadu (2017), followed by DENV-4, which had raised liver enzymes but no obvious connection to serious consequences.(10,11)
DENV-4 became the predominant serotype for the first time during the 2017 outbreak in Tamil Nadu, occurring in 33 out of 76 confirmed cases. A mixed Th1/Th17 cytokine profile was seen, which was associated with a more severe illness.(12)
While DENV-2 infections were associated with joint pain, low platelet counts, and a lower risk of DHF, DENV-1 infections were associated with red eyes, a higher risk of DHF, and severe dengue. In Jaipur, DENV-2 and DENV-3 were most prevalent, with severe dengue cases highest in DENV-2 and DENV-4 infections.(13,14)
Early serotyping is essential for efficient clinical care since dengue serotype distribution and severity differ by geography. RT-PCR confirmation aids in monitoring epidemiological trends, predicting the severity of diseases, and directing prompt actions. Serotype identification at diagnosis improves patient outcomes and public health response, particularly in co-infections and high-risk strain locations.(14)
Updated, region-specific data on dengue serotypes and their clinical impact are desperately needed, notwithstanding the body of previous research. Effective public health planning is hampered in Pondicherry by the lack of clarity surrounding current patterns in serotype circulation and severity. This study aims to bridge existing data gaps and provide valuable insights that are both locally relevant and applicable to broader dengue management strategies.

MATERIALS AND METHODS

This is a Cross-sectional study for a period of 18 months obtaining approval SRC and IEC (Ref No: 45/SVMCH/IEC-Cert/May23) in a Tertiary Care Hospital at Puducherry with a sample size of 100 inpatients with RT-PCR-confirmed dengue was studied. Patients above 18 years of age clinically suspected to have signs and symptoms of dengue fever. Patients admitted with acute febrile illness having positive NS1 antigen / IgM, IgG ELISA. Cases treated on an outpatient basis, patients below 18 years of age, patients with known malignancy, patients with known hematological disorders, and patients using any drug that may cause thrombocytopenia like NSAIDS, Penicillin, Furosemide, Ranitidine, Sulfonamides, Heparin etc. were excluded from the study.

Methodology

Patients admitted to the medicine department with acute febrile illness having positive NS1 antigen/IgM, IgG ELISA for dengue will be included. A questionnaire was used to collect details on; Demographic data, presence of comorbid conditions, clinical presentation, laboratory investigations**,** including, Complete blood count, renal profile, liver function test, chest X-ray **for** pleural effusion, ultrasound for ascites, severity assessment, (Dengue hemorrhagic fever, dengue shock syndrome, and organ failure) and dengue serotype assessment was made.

Data Collection Methods

Baseline investigations were performed at admission, dengue serotypes was confirmed using RT-PCR for RNA amplification. Patients classified as non-severe dengue without warning signs and severe dengue (based on WHO classification). All findings were documented and stored confidentially for 5 years.

STATISTICAL ANALYSIS

Categorical variables were expressed using numbers and percentages. Continuous variables were expressed as

means with standard deviations. Chi Square test was performed for Categorical variables. One-way ANOVA was used for continuous variables. A p-value of <0.05 was considered statistically significant. Statistical analysis was performed using IBM SPSS.

RESULTS

Table 1: Distribution of patients based on Gender

Gender	Frequency	Percent	Cumulative Percent
Male	58	58.0	58.0
Female	42	42.0	100.0
Total	100	100.0	

Distribution of patients based on gender; males outnumbered females 58% to 42%.(Table 1, Figure 1)

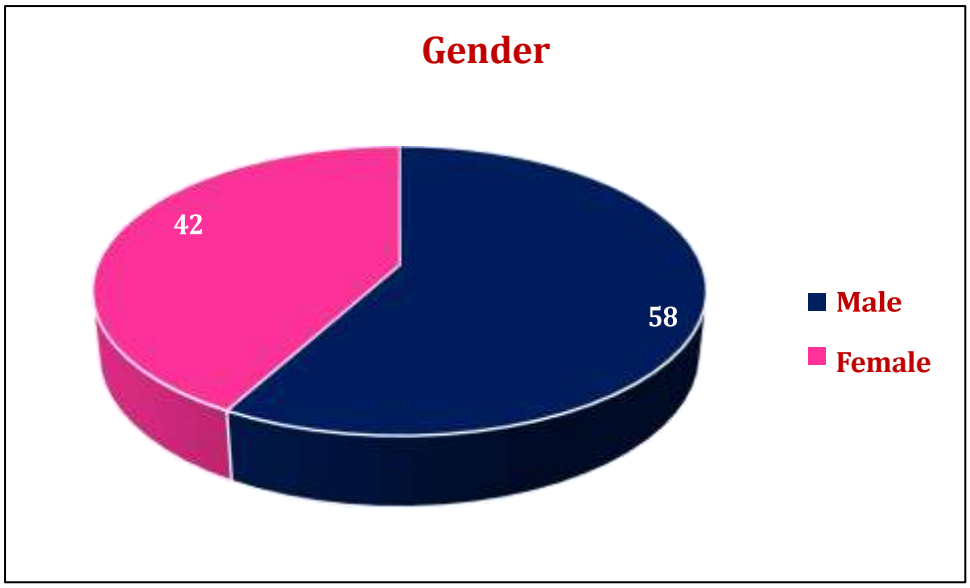

Figure 1: Distribution of patients based on Gender

Table 2: Distribution of patients based on Age

Age in years	Frequency	Percent	Cumulative Percent
<=30	36	36.0	36.0
31-40	28	28.0	64.0
41-50	14	14.0	78.0
51-60	13	13.0	91.0
>60	9	9.0	100.0
Total	100	100.0	

Table 2 presents the distribution of patients based on age. The age-wise distribution of patients in this study reveals that the majority of dengue cases occurred in individuals aged 30 years or younger, comprising 36% of the total sample. This was followed by the 31–40 age group at 28%, while the 41–50 and 51–60 age groups

accounted for 14% and 13% respectively. Only 9% of the cases were reported in individuals over 60 years of age.(Figure 2)

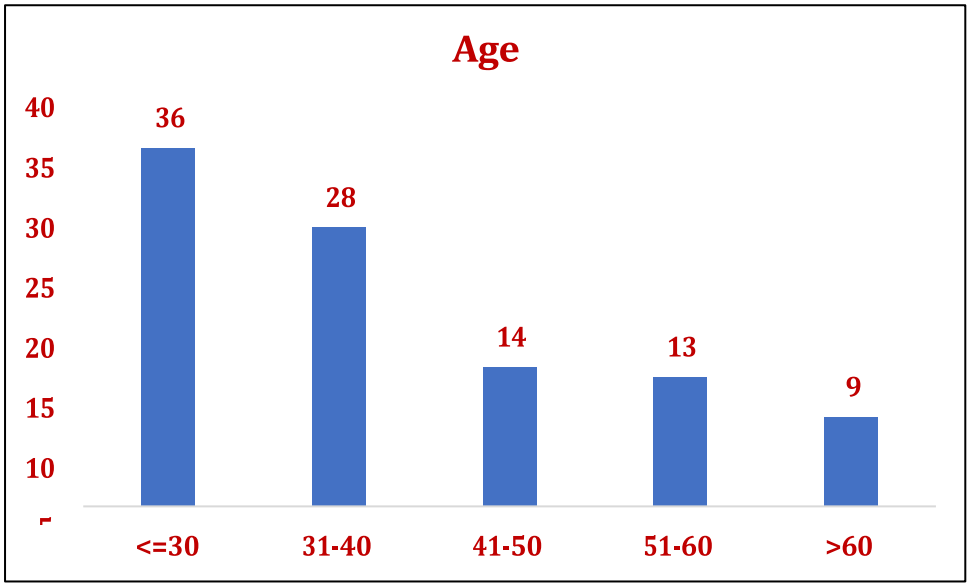

Figure 2: Distribution of patients based on Age

Table 3: Distribution of patients based on prevalence of risk factors

Risk Factors	Frequency	Percent	Cumulative Percent
Diabetes Mellitus	36	36.0	36.0
Hypertension	28	28.0	64.0
Diabetes Mellitus, Hypertension	14	14.0	78.0
CAD	13	13.0	91.0
None	9	9.0	100.0
Total	100	100.0	

The distribution of patients by risk factor prevalence is shown in Table 3. Diabetes Mellitus was the most common comorbidity, affecting 36% of the patients, according to the patient distribution based on risk factor prevalence. Twenty-eight percent had hypertension after this, and fourteen percent had both diabetes and hypertension. Moreover, coronary artery disease (CAD) struck 13% of the patients. It's interesting to note that only 9% of research participants lacked known risk factors.(Figure 3)

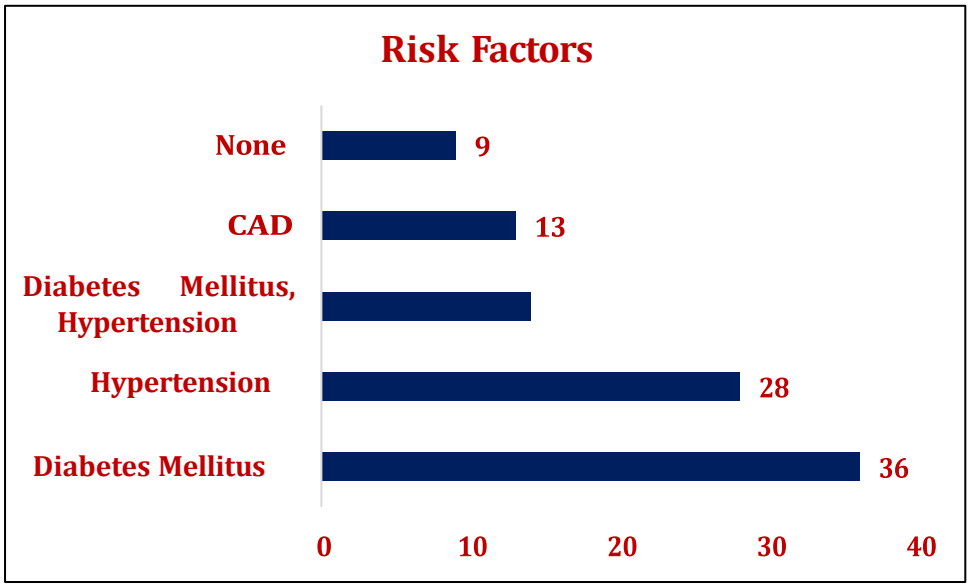

Figure 3: Distribution of patients based on prevalence of risk factors

Table 4: Distribution of patients based on presence of NS1 Antigen

Ns1	Frequency	Percent	Cumulative Percent
Positive	50	50.0	50.0
Negative	50	50.0	100.0
Total	100	100.0	

The distribution of patients according to NS1 antigen presence is shown in Table 4. Half of the patients tested positive, while the other half tested negative, according to the distribution of patients based on the presence of the NS1 antigen. Given that the NS1 antigen is often in the bloodstream during the initial days of illness, this equal distribution implies that half of the cases were discovered during the early viraemic phase of dengue infection.(Figure 4)

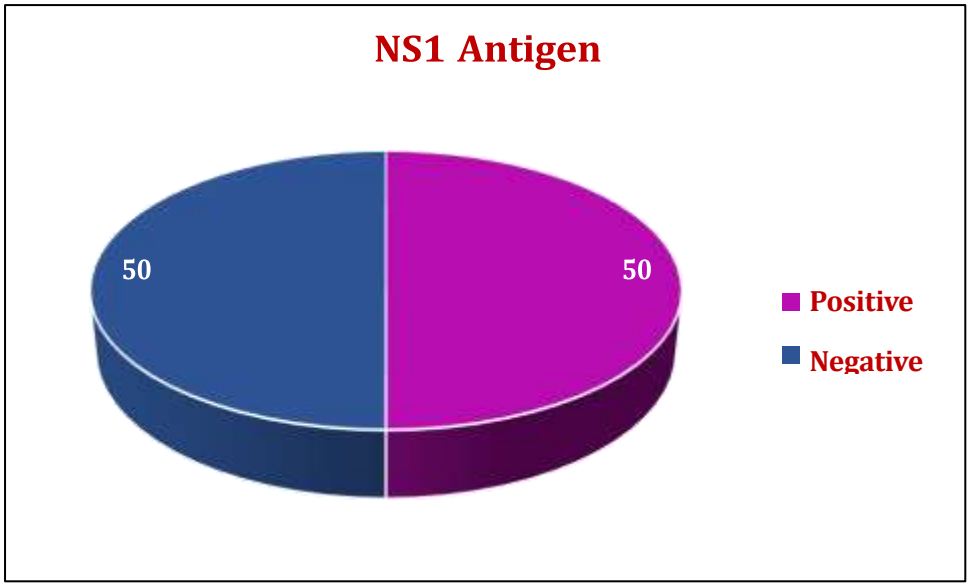

Figure 4: Distribution of patients based on presence of NS1 Antigen

Table 5: Distribution of patients based on presence of IgM

IgM	Frequency	Percent	Cumulative Percent
Positive	77	77.0	77.0
Negative	23	23.0	100.0
Total	100	100.0	

Table 5 depicts the distribution of patients based on presence of IgM. The distribution of patients based on the presence of IgM antibodies shows that 77% tested positive and 23% tested negative. This suggests that the majority of patients were in the acute phase of dengue infection, as IgM antibodies usually develop 4-5 days after the onset of symptoms and signal a new infection. The 23% who tested negative for IgM may have been in the early viraemic phase (before IgM production begins) or had a secondary infection in which IgG levels predominated. (Figure 5)

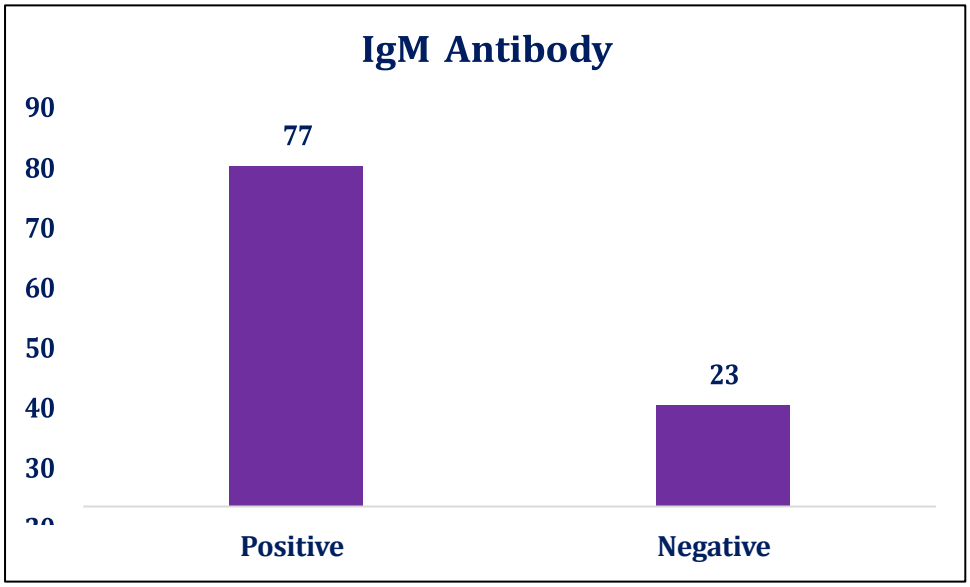

Figure 5: Distribution of patients based on presence of IgM

Table 6: Distribution of patients based on presence of IgG

IgG	Frequency	Percent	Cumulative Percent
Positive	16	16.0	16.0
Negative	84	84.0	100.0
Total	100	100.0	

Table 6 presents the distribution of patients based on presence of IgG. The distribution of patients based on the existence of IgG antibodies reveals that only 16% tested positive, with the remaining 84% negative.(Figure 6)

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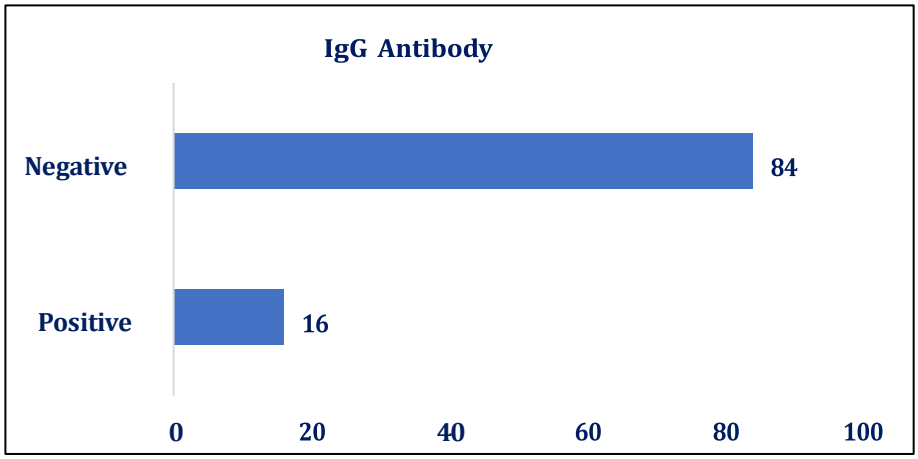

Figure 6: Distribution of patients based on presence of IgG Table

Table 7: Distribution of patients based on type of dengue infection

Type of Dengue Infection	Frequency	Percent	Cumulative Percent
Primary	84	84.0	84.0
Secondary	16	16.0	100.0
Total	100	100.0	

Distribution of patients based on type of dengue infection was given in table 7. The distribution of patients by type of dengue infection shows that the majority (84%) had a primary dengue infection, whereas 16% had a secondary infection. (Figure 7)

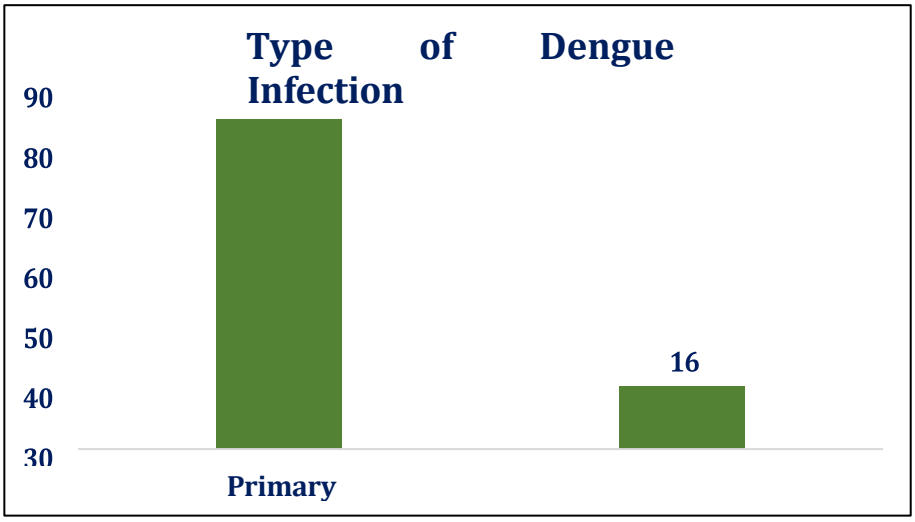

Figure 7: Distribution of patients based on type of dengue infection

Table 8: Distribution of patients based on Serotype

Serotype	Frequency	Percent	Cumulative Percent
DENV1	28	28.0	28.0
DENV2	59	59.0	87.0
DENV3	8	8.0	95.0
DENV4	5	5.0	100.0
Total	100	100.0	

Table 8 presents the distribution of patients based on Serotype. The study's patient distribution by dengue serotype showed that DENV2 was the most common serotype, accounting for 59% of all cases. This was followed by DENV1 (28%), DENV3 (8%), and DENV4 (5%). DENV2 has a considerable prevalence because it is frequently associated with more severe clinical symptoms and greater rates of secondary infections, which can result in complications such as Dengue Hemorrhagic Fever (DHF) or Dengue Shock Syndrome (DSS). (Figure 8)

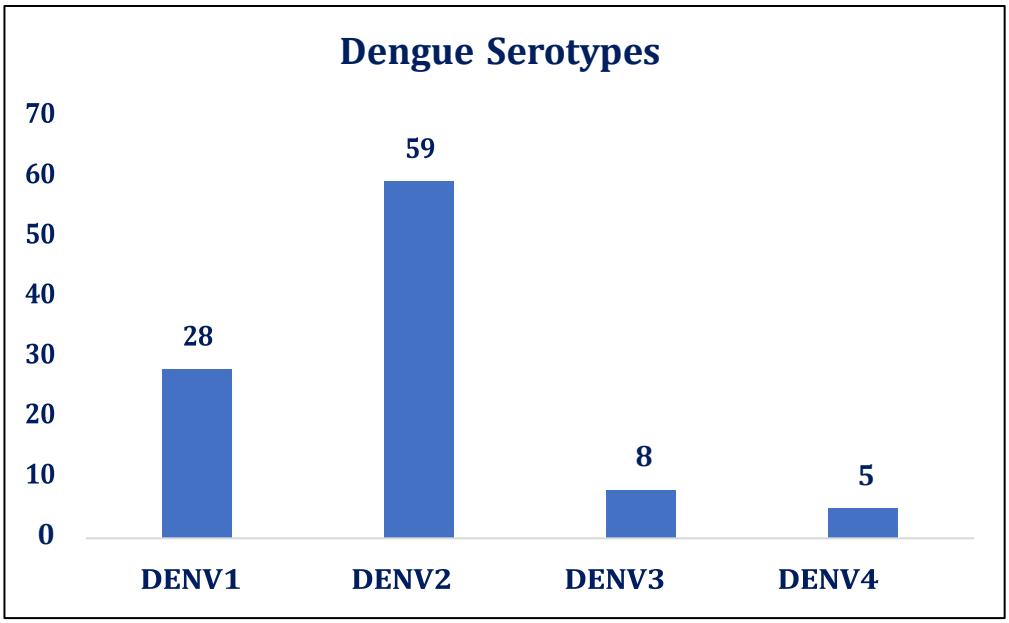

Figure 8: Distribution of patients based on Serotype Table 4.9: Distribution of patients based on severity of Dengue

Table 9: Distribution of patients based on Severity of Dengue

Dengue Severity	Frequency	Percent	Cumulative Percent
Mild	63	63.0	63.0
Moderate	26	26.0	89.0
Severe	11	11.0	100.0
Total	100	100.0	

Table 9 presents the distribution of patients based on Severity of Dengue. The distribution of patients depending on dengue severity shows that the majority of cases were mild, accounting for 63% of all patients. Moderate cases accounted for 26% of the total, with severe dengue affecting 11% of patients. (Figure 9)

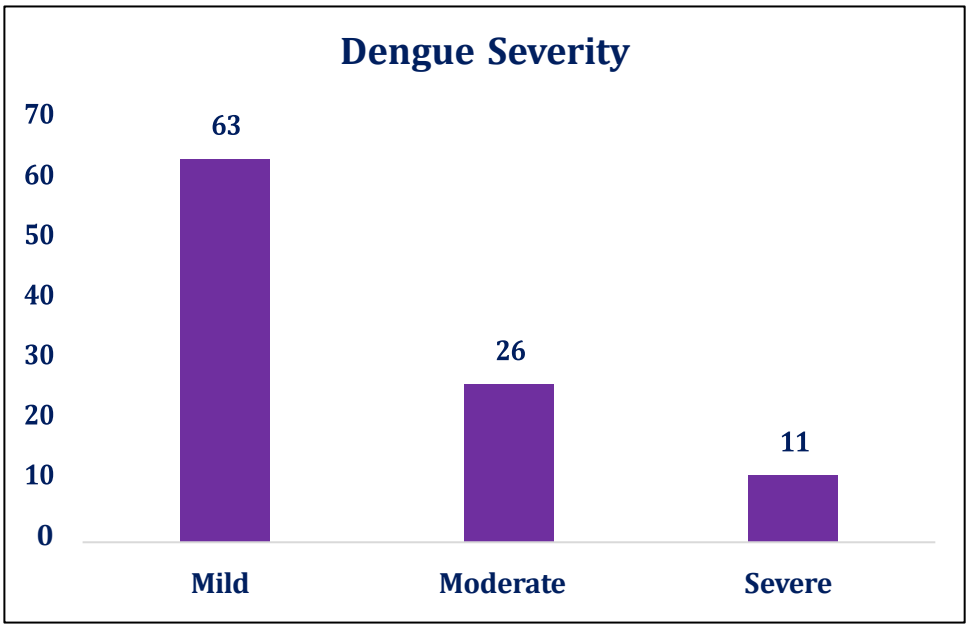

Figure 9: Distribution of patients based on severity of Dengue

Table 10: Distribution of patients based on prevalence of DUF

DUF	Frequency	Percent	Cumulative Percent
Yes	89	89.0	89.0
No	11	11.0	100.0
Total	100	100.0	

Table 10 presents the distribution of patients based on prevalence of DUF. The distribution of patients based on the prevalence of Dengue Undifferentiated Fever (DUF) reveals that 89% had DUF, whereas only 11% did not have DUF.

Table 11: Distribution of patients based on prevalence of DHF1

DHF1	Frequency	Percent	Cumulative Percent
Yes	7	7.0	7.0
No	93	93.0	100.0
Total	100	100.0	

Table 11 presents the distribution of patients based on prevalence of DHF1. The distribution of patients based on the prevalence of Dengue Hemorrhagic Fever Grade 1 (DHF1) shows that only 7% of them had clinical characteristics compatible with DHF1, while the other 93% did not.

Table 12: Distribution of patients based on prevalence of DHF2

DHF2	Frequency	Percent	Cumulative Percent
Yes	4	4.0	4.0

No	96	96.0	100.0
Total	100	100.0	

Table 12 presents the distribution of patients based on prevalence of DHF2. The distribution of patients based on the prevalence of Dengue Hemorrhagic Fever Grade 2 (DHF2) reveals that only 4% of the patients were diagnosed with DHF2, while the vast majority (96%) showed no indications of this illness.

Table 13: Association between Serotype and Dengue Severity

Serotype		Dengue Severity			Total	Chi Square
		Mild	Moderate	Severe		
DENV1	Frequency	16	12	0	28	76.578 p<0.01 Highly Significant
	%	57.1%	42.9%	0.0%	100.0%	
DENV2	Frequency	42	14	3	59	
	%	71.2%	23.7%	5.1%	100.0%	
DENV3	Frequency	0	0	8	8	
	%	0.0%	0.0%	100.0%	100.0%	
DENV4	Frequency	5	0	0	5	
	%	100.0%	0.0%	0.0%	100.0%	
Total	Frequency	63	26	11	100	
	%	63.0%	26.0%	11.0%	100.0%	

Table 13 depicts the distribution of patients based on Dengue Serotype and Dengue Severity. The association between dengue virus serotypes and dengue infection severity was shown to be highly significant (Chi-square = 76.578, $p < 0.01$). The majority of patients infected with DENV1 developed mild (57.1%) or moderate (42.9%) illness, with no cases of severe dengue observed. DENV2 was most commonly linked with mild severity (71.2%), followed by moderate (23.7%) and a tiny fraction of severe cases (5.1%). Notably, DENV3 was exclusively associated with severe dengue (100%), implying a significant relationship between this serotype and severe clinical consequences. In contrast, all instances of DENV4 presented with only minor symptoms (100%). These data show that DENV1 and DENV4 cause milder forms of the disease, whereas DENV3 is a major contributor to severe dengue symptoms. This serotype-specific severity pattern emphasizes the necessity of early detection and surveillance of circulating serotypes for better clinical care and outbreak response. (Figure 10)

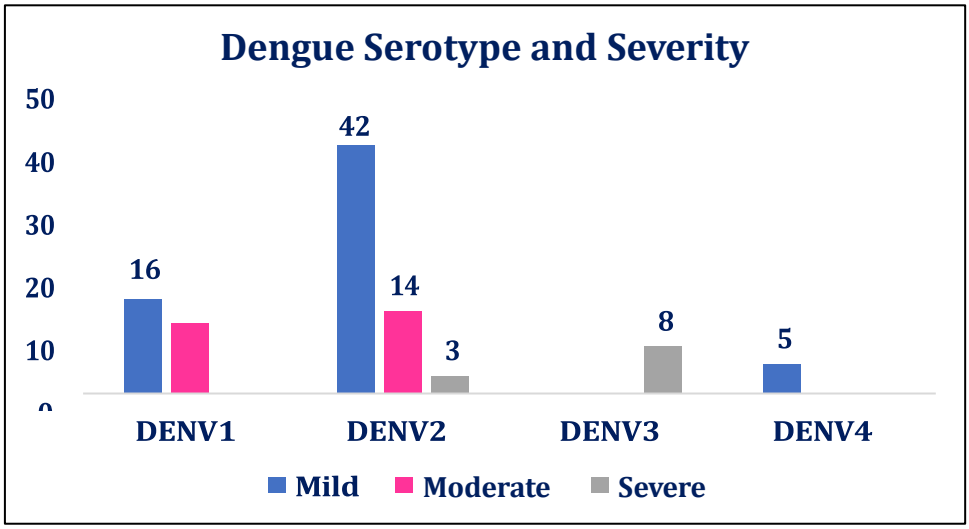

Figure 10: Association between Serotype and Dengue Severity

Table 14: Platelet Count based on Serotype

Serotype	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum	ANOVA 'F' value
DENV1	28	124357.14	61638.260	11648.536	52000	342000	7.661 p<0.01 Highly Significant
DENV2	59	129350.85	59736.292	7777.003	23000	344000	
DENV3	8	36500.00	12059.377	4263.634	13000	48000	
DENV4	5	178800.00	60516.114	27063.629	109000	261000	
Total	100	122997.00	63807.894	6380.789	13000	344000	

The platelet count according to dengue severity is shown in Table 14. The results of an ANOVA study of platelet counts among dengue virus serotypes showed a significant difference ($F = 7.661$, $p < 0.01$), indicating that the infecting serotype has a significant impact on platelet levels. The lowest mean platelet count (36,500/mm2), with minimal fluctuation, was seen in DENV3-infected patients, suggesting a strong correlation between DENV3 and severe thrombocytopenia. With the highest mean platelet count (178,800/mm^3), DENV4 was followed by DENV2 (129,351/mm^3) and DENV1 (124,357/mm^3), suggesting that these serotypes had less hematological involvement.

Table 15: Association between Dengue Serotype and type of infection

Serotype		Type of Dengue Infection		Total	Chi Square
		Primary	Secondary		
DENV1	Frequency	23	5	28	4.037 p>0.05 Not Significant
	%	82.1%	17.9%	100.0%	
DENV2	Frequency	51	8	59	
	%	86.4%	13.6%	100.0%	
DENV3	Frequency	5	3	8	
	%	62.5%	37.5%	100.0%	
DENV4	Frequency	5	0	5	
	%	100.0%	0.0%	100.0%	
Total	Frequency	84	16	100	
	%	84.0%	16.0%	100.0%	

Table 15 presents Association between Dengue Serotype and type of infection. The Chi- square test was used to assess the relationship between dengue serotype and infection type (primary or secondary). The study found no significant correlation ($\chi^2 = 4.037$, $p > 0.05$) between serotype and primary or secondary infection status. However, the distribution reveals some fascinating trends. DENV2 had the highest proportion of primary infections (86.4%), followed by DENV1 (82.1%) and DENV4, which had solely primary infections (100%). In contrast, DENV3 exhibited the largest frequency of secondary infections (37.5%), indicating that people infected with DENV3 were more likely to have had a previous dengue infection.

Table 16: Association between Dengue Serotype and DUF

Serotype		DUF		Total	Chi Square
		Yes	No		
DENV1	Frequency	28	0	28	

	%	100.0%	0.0%	100.0%	
DENV2	**Frequency**	56	3	59	
	%	94.9%	5.1%	100.0%	70.915
DENV3	**Frequency**	0	8	8	p<0.01
	%	0.0%	100.0%	100.0%	Highly Significant
DENV4	**Frequency**	5	0	5	
	%	100.0%	0.0%	100.0%	
Total	**Frequency**	89	11	100	
	%	89.0%	11.0%	100.0%	

The relationship between Dengue Serotype and DUF is seen in Table 16. The presence of Dengue with Unusual Features (DUF) was significantly correlated with the serotype of dengue (Chi-square = 70.915, $p < 0.01$). This implies a strong relationship between the likelihood of exhibiting DUF and the particular dengue serotype. Serotypes DENV1, DENV2, and DENV4 were most frequently linked to DUF. DUF was present in 94.9% of patients with DENV2 and 100% of patients with DENV1 and DENV4 infections. On the other hand, DUF was absent in 100% of DENV3 cases, meaning that none of the patients possessed it.

Table 17: Association between Dengue Serotype and DHF1

Serotype		DHF1		Total	Chi Square
		Yes	**No**		
DENV 1	**Frequency**	0	28	28	
	%	0.0%	100.0 %	100.0 %	
DENV 2	**Frequency**	1	58	59	
	%	1.7%	98.3%	100.0 %	
DENV 3	**Frequency**	6	2	8	61.858
	%	75.0 %	25.0%	100.0 %	Highly Significant
DENV 4	**Frequency**	0	5	5	
	%	0.0%	100.0 %	100.0 %	
Total	**Frequency**	7	93	100	
	%	7.0%	93.0%	100.0 %	

The relationship between Dengue Serotype and DHF1 is seen in Table 17. The study found a strong correlation between dengue serotypes and the onset of Dengue Hemorrhagic Fever Grade 1 (DHF1) (Chi-square = 61.858, $p < 0.01$). Notably, DHF1 was the serotype most significantly associated with DENV3 infection, occurring in 75% of infected patients. Only 1.7% of DENV2 patients had DHF1, but DENV1 and DENV4 exhibited no occurrences of DHF1 (0%).

Table 18: Association between Dengue Serotype and DHF2

Serotype		DHF2		Total	Chi Square
		Yes	No		
DENV1	Frequency	0	28	28	10.620 p<0.05 Significant
	%	0.0%	100.0%	100.0%	
DENV2	Frequency	2	57	59	
	%	3.4%	96.6%	100.0%	
DENV3	Frequency	2	6	8	
	%	25.0%	75.0%	100.0%	
DENV4	Frequency	0	5	5	
	%	0.0%	100.0%	100.0%	
Total	Frequency	4	96	100	
	%	4.0%	96.0%	100.0%	

Table 18 shows the relationship between dengue serotypes and the incidence of DHF2 (Dengue Hemorrhagic Fever Grade 2). The correlation was identified to be statistically significant, with a Chi-square value of 10.620 and a p-value less than 0.05. Among the different serotypes, DENV3 had the largest proportion of DHF2 cases, accounting for 25% (2 of 8 patients). DENV2 had a lower prevalence, with 3.4% (2 out of 59 patients), whereas DENV1 and DENV4 had no recorded instances of DHF2.

DISCUSSION

Dengue fever is a substantial global public health threat, particularly in tropical and subtropical areas where vector transmission is strong. The disease's intricacy is exacerbated by the presence of four distinct dengue virus (DENV) serotypes, DENV1, DENV2, DENV3, and DENV4 each of which has a unique clinical manifestation and result.

Gender:

In the present study, Males outnumbered females 58% to 42%. Similarly, in a study by Manthalkar et al., 53.03% were male and 46.96% were female. (15) In contrast, in a study by Balamurugan et al., there were 58 males and 40 females. (16)

Age:

The age-wise distribution of patients in this study reveals that the majority of dengue cases occurred in individuals aged 30 years or younger, comprising 36% of the total sample. This was followed by the 31–40 age group at 28%, while the 41–50 and 51–60 age groups accounted for 14% and 13% respectively. Only 9% of the cases were reported in individuals over 60 years of age. In line with this finding, majority of the cases were observed in the 21–30 years of age group (34.9%) in a study by Kalita et al., but in the study by Balamurugan et al., seroprevalence was high among the age group of 31-45 years. (16,17,18)

Type of Antigen:

In the study, 50% tested positive for NS1, 77% tested positive for IgM and 16% tested positive for IgG. Similarly, all the cases were positive for either NS-1, IgM, or IgG in a study by Manthalkar et al.(15)

Serotype:

DENV2 was the most common serotype, accounting for 59% of all cases which was consistent from the previous study by Gupta et al., where Dengue virus serotype-2 was the most common serotype with 34% prevalence.(14)

Similarly, in the study by Jadeja et al., Dengue virus serotype-2 was the most common serotype (89%) followed by DENV3 7(6%) and DENV4 2(2%), but in our study, the next most prevalent was DENV1 (28%), DENV3 (8%), and DENV4 (5%).(19) DENV 3 has a considerable prevalence because it is frequently associated with more severe clinical symptoms and greater rates of secondary infections, which can result in complications such as Dengue Hemorrhagic Fever (DHF) or Dengue Shock Syndrome (DSS).

Serotype and Platelet Count:

Patients infected with DENV3 had the lowest mean platelet count (36,500/mm³), with little variability, indicating a significant association between DENV3 and severe thrombocytopenia. DENV4 had the greatest mean platelet count (178,800/mm³), followed by DENV2 (129,351/mm³) and DENV1 (124,357/mm³), indicating lesser hematological involvement in these serotypes. In the study irrespective of the Serotype, thrombocytopenia was observed in all cases which was evidenced in previous studies by Gupta et al., and Jadeja et al.(14,19)

Serotype and DHF1:

The present study demonstrated a significant association (Chi-square = 61.858, $p < 0.01$) between dengue serotypes and the development of Dengue Hemorrhagic Fever Grade 1 (DHF1). A noteworthy finding is that 75% of individuals infected with DENV3 developed DHF1, making it the serotype most strongly linked to this condition. DENV1 and DENV4 showed no cases of DHF1 (0%), while only 1.7% of DENV2 individuals had DHF1. In contrast, a higher prevalence of DHF was observed in Serotype 2 in a study by Jadeja et al.(19)

The present study findings highlight the necessity of ongoing surveillance and serotyping in endemic locations, not only for understanding epidemiological patterns but also for predicting disease severity based on the circulating serotype. Early detection of high-risk serotypes such as DENV3 can help doctors prioritize surveillance and resource allocation, resulting in better patient outcomes.

CONCLUSION

The study provides insights on the distribution of dengue virus serotypes and their relationship with clinical symptoms in patients. The data show that DENV2 accounts for about 60% of all cases, followed by DENV1, DENV3, and DENV4. While DENV2 was the most prevalent serotype, the clinical presentation ranged from mild to severe. Importantly, DENV3, despite being less common, appeared as the serotype most strongly related with severe clinical outcomes, including a 100% incidence of severe dengue, low platelet counts, and the highest frequency of DHF Grades 1 and 2. This clearly identifies DENV3 as a crucial serotype that requires strict clinical attention due to its ability to produce life-threatening consequences. In contrast, DENV1 and DENV4 were primarily related with moderate dengue symptoms and were not linked to any cases of DHF or severe disease, indicating a rather benign clinical outcome. The study also found that the majority of infections were primary, with IgM positive in 77% and NS1 antigen positivity in 50%, indicating detection in the early and acute stages. DENV3 was more typically connected with secondary infections, which is noteworthy because secondary infections are frequently more severe due to immunological strengthening. There was a statistically significant association between serotype and disease severity, platelet count, and the presence of uncommon characteristics (DUF). Patients infected with DENV1, DENV2, and DENV4 had a high frequency of DUF, whereas DENV3 patients had none and instead displayed symptoms of more conventional severe dengue. These connections highlight the varied clinical characteristics that different dengue serotypes can create, with significant implications for diagnosis, triage, and therapy, particularly during outbreaks. Finally, our study emphasizes the importance of routine dengue serotyping during outbreaks, not only to understand epidemiological trends, but also to predict disease severity and appropriately allocate healthcare resources. Management of DENV3 infections necessitates extra caution, since they have consistently been linked to more severe illness. Enhanced serotype-specific surveillance and early detection can enhance clinical outcomes and inform public health initiatives in dengue-endemic areas.

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