Original Research

Polyserositis in Dengue Fever: Its prevalence and Association with Clinical and Laboratory Parameters in a Tertiary Care Hospital

R.S.Ahlawat[1], Shailly Singhania[2], Neelabh Pratap[3], Apoorva Shetty[4], Tanvi Seth[5], Manuj Shukla[6]

[1]Professor, Department of Medicine, SMS&R, Sharda University Greater Noida, [2]Post Graduate Resident 2nd year, Department of Medicine, SMS&R, Sharda University, Greater Noida, [3]Assistant Professor, Department of Medicine, SMS&R, Sharda University, Greater Noida, [4]Assistant Professor, Department of Medicine, SMS&R, Sharda University, Greater Noida, [5]Assistant Professor, Department of Medicine, SMS&R Sharda University, Greater Noida, [6]Post Graduate Resident 2nd year, Department of Medicine, SMS & R Sharda University, Greater, Noida.

How to cite this article: R.S.Ahlawat, Shailly Singhania, Neelabh Pratap et. al. Polyserositis in Dengue Fever: Its prevalence and Association with Clinical and Laboratory Parameters in a Tertiary Care Hospital. Indian Journal of Public Health Research and Development / Vol. 16 No. 3, July-September 2025.

Abstract

Dengue fever is an emerging public health problem in a large endemic population in tropical and sub-tropical areas of the world. This study was aimed at analyzing the prevalence and association of clinical and laboratory parameters in dengue fever. Total 439 fever cases were screened out of which 176 were detected to have dengue infection. The mean age of the study participants was 32.9 ± 12.5 years. In our study we detected serous cavity involvement in 152 patients and in this group 110 (62.5%) patients had single serous cavity involvement which was either pleural cavity or peritoneal cavity and 42 (23.9%) had polyserositis. 24 patients had no involvement of the serous cavity. We observed that haemoglobin level, blood urea and Packed cell volume was notably higher and platelets were low in patients with polyserositis. While fever was the predominant symptom, there were atypical presentations, such as diarrhoea. This study helps in comprehensive understanding of the normal and atypical clinical symptoms, as well as the potential consequences of dengue and its significance on serositis, which is crucial for prompt diagnosis and effective treatment.

Key words: Dengue fever, polyserositis, atypical presentations in dengue

Introduction

Dengue fever remains a significant public health concern, with millions of cases reported annually, particularly in tropical and subtropical regions[1].While hallmark symptoms of dengue typically involve fever, headache, rash, and severe muscle and joint pain, the clinical presentation of dengue fever vary

Corresponding Author: Apoorva Shetty, Assistant Professor, Department of Medicine, SMS&R, Sharda University, Greater Noida.

E-mail: drhanitha@gmail.com

Submission date: September 15, 2024 **Revision date:** November 19, 2024 **Published date: June 7, 2025**

widely, ranging from mild flu-like symptoms to severe manifestations such as dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS)[2]. Polyserositis is inflammation ,with effusion of two or more different serous membranes such as pleura, pericardium and peritoneum, where as monoserositis is inflammation of any one of these serous cavities, it has emerged as an intriguing yet poorly understood phenomenon with myriad complications associated with dengue [3].

The prevalence of dengue has significantly escalated worldwide in past several years, in 2023 a record-breaking total of over 6.5 million reported cases and more than 7300 deaths connected to dengue fever [4].

Understanding the correlation between polyserositis and dengue fever is paramount for clinicians to recognize, diagnose, and manage this complication effectively. Moreover, elucidating the association between polyserositis and various clinical and laboratory parameters can predict the prognosis of dengue-associated polyserositis.

This study has been conducted to determine the prevalence of serositis in dengue fever cases and to evaluate its association with clinical and laboratory findings among patients with dengue fever admitted to Sharda Hospital, a tertiary care hospital in Uttar Pradesh, India.

The clinical data of these dengue patients with polyserositis was analyzed, and an attempt has been made to identify potential risk factors and prognostic indicators of these complicated cases. This study will enhance our understanding of the complex interplay between dengue infection and polyserositis and may enable us to develop an optimal management of this challenging complication.

Methodology

A cross-sectional analytical study was conducted in the Department of Medicine, School of Medical Sciences and Research, Sharda Hospital, Greater Noida among patients of different age group over a period of 6 months from July 2023 to 31st December. 2023.

All the patients admitted in medical wards of Sharda Hospital, Department of Medicine with acute febrile illness were screened for the Dengue virus infection by rapid a diagnostic test i.e. NS1 antigen for Dengue virus and or IgM, IgG antibodies against dengue virus antigen. Patients were also screened for Malaria and typhoid.

Patients were selected using purposive sampling techniques i.e. by selecting all the patients who were admitted to the hospital with the history of fever of ≥38.5˚ C and rapid diagnostic test positive for *NS1 Antigen for Dengue virus.*

Inclusion Criteria

1. Patients admitted in Sharda Hospital having fever (≥38.5˚C) who were detected to have *NS1 Antigen for Dengue virus* by ELISA based rapid diagnostic test
2. Patients willing to give written consent.

Exclusion criteria

1. History of chronic HBV and/or HCV infection.
2. Patients with advanced stage of HIV or AIDS.
3. Patient with history of hepatotoxic drug, toxic herbal medicine, alcohol consumption.
4. Chronic liver disease / renal failure patients, malignancy.

Procedure:

Patients with acute febrile illness presenting in Department of General Medicine who were having acute febrile illness were screened for the dengue infection. Patients detected to be positive for *NS1 Antigen on* serological based rapid diagnostic testing were taken for the study after considering inclusion and exclusion criteria. A detailed history was taken along with thorough clinical examination including vital parameters, icterus, rashes, conjunctival suffusion, joint pain, shock and haemorrhage. Patient data such as age, sex, occupation, socioeconomic status, chief complaints were recorded in a case sheet. There after a complete blood count, liver function test, kidney function test, and coagulation profile were done in all these patients.

Serological based rapid diagnostic testing for IgM, and IgG antibodies for associated with Dengue virus was carried out. Simultaneously, blood sample of the patients were subjected to peripheral blood smear for the detection of co-infection with Malarial parasite and WIDAL test for Salmonella typhi. CXR

PA view and Ultrasonography of whole abdomen was carried out to detect any organomegaly or free fluid in serous cavities.

HEPACARD for HBsAg and HCV TRI-DOT to rule out acute viral hepatitis, HIV TRI-DOT.

Statistical analysis

The patient data was collected in the patient data collection form and entered in Microsoft excel sheet. The data was analysed using the SPSS version 21 operating on windows 10. All the data represented in tables as frequency, percentage, mean with standard deviation, median with range. Chi-square test was used to check the association between categorical variables while Kruskal Wallis test was used to check the association between continuous variables as the data was skewed. Logistic regression was used to predict the outcome variable. The p value less than 0.05 were considered as significant.

Results / Observations

A total of 439 cases of acute febrile illness were screened for the dengue viral infection. And 176 ot of 439 cases were detected have dengue infection. The mean age of the study participants was 32.9 ± 12.5 years. Majority of the participants were in the age group of 19-60 years, while, 9.7% were aged up to 18 years and 4% were more than 60 years of age. More than half (55.7%) of the patients were female, while 44.3% of them were male. As the data was not skewed, hence we present the data as median with range.

The median duration of illness was lower in patients with polyserositis was lowest which ranged from 2 to 9 days. [Figure 1, Table 1]

Table 1: Distribution of the patients based on age and gender in groups based on serous cavity involvement (N=176)

Variables		No serositis (n=24)	Mono serositis (n=110)	Poly serositis (n=42)	Test value (p-value)
Age (in years)	Up to 18	3 (12.5%)	9 (8.2%)	5 (11.9%)	2.424 (0.658)*
	19-60	20 (83.3%)	98 (89.1%)	34 (81.0%)	
	> 60	1 (4.2%)	3 (2.7%)	3 (7.1%)	
	Mean ± SD	30.38 ± 11.1	33.45 ± 12.3	32.76 ± 13.9	0.598 (0.551)#
Gender	Female	12 (50.0%)	66 (60.0%)	20 (47.6%)	2.252 (0.324)*
	Male	12 (50.0%)	44 (40.0%)	22 (52.4%)	

**Chi-square test; # Analysis of Variance (ANOVA)*

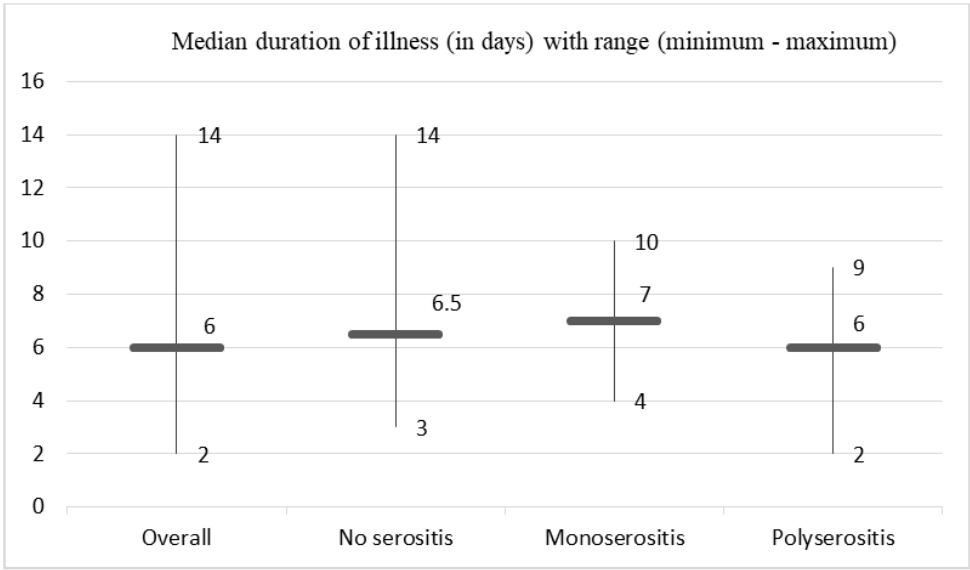

Figure 1: Duration of illness

Hemorrhagic manifestations were notably higher in polyserositis group (33.3%) as compared those with monoserositis group (17.3%) and was lowest among those with no serous cavity involvement (8.3%). A significantly large proportion of patients with skin rash (21.4%), and shock (33.3%) had polyserositis. We observed significant difference between the groups for day of illness which is 6th day for mono and polyserositis and 7th day for no serous cavity involvement. However, fever, myalgia, headache, loose stool, cough, joint pain, sore throat, conjunctival suffusion and jaundice had similar distribution between the groups. [Table 2]

Table 2: Association of serous cavity involvement with clinical profile of the patients (N=176)

Variables	Total	No serositis (n=24)	Mono serositis (n=110)	Poly serositis (n=42)	Test value (p-value)*
Fever	173 (98.3%)	24 (100.0%)	108 (98.2%)	41 (97.6%)	0.539 (0.764)
Myalgia	90 (51.1%)	16 (66.7%)	51 (46.4%)	23 (54.8%)	3.540 (0.170)
Headache	56 (31.8%)	9 (37.5%)	35 (31.8%)	12 (28.6%)	0.561 (0.755)
Loose stool	44 (25.0%)	5 (20.8%)	28 (25.5%)	11 (26.2%)	0.266 (0.875)
Hemorrhagic manifestation	35 (19.9%)	2 (8.3%)	19 (17.3%)	14 (33.3%)	7.249 (0.027)
Cough	24 (13.6%)	7 (29.2%)	13 (11.8%)	4 (9.5%)	5.827 (0.054)
Skin rash	20 (11.4%)	1 (4.2%)	10 (9.1%)	9 (21.4%)	6.022 (0.049)
Joint pain	15 (8.5%)	2 (8.3%)	11 (10.0%)	2 (4.8%)	1.708 (0.789)
Sore throat	11 (6.3%)	3 (12.5%)	6 (5.5%)	2 (4.8%)	1.878 (0.391)
Conjunctival Suffusion	5 (2.8%)	0 (0.0%)	4 (3.6%)	1 (2.4%)	0.986 (0.611)
Shock	5 (2.8%)	2 (8.3%)	21 (19.1%)	14 (33.3%)	6.409 (0.041)

Patients presenting with skin rash (21.47%), hemorrhagic manifestation and shock had higher chances of getting polyserositis than those without hemorrhagic manifestation and shock.

As the data was not skewed, hence we present the data as median with range. We observed that patients with polyserositis had notably higher haemoglobin concentration (12.9 gm/dl), blood urea (30 mg/dl), Packed cell volume (40.2%) and Dengue IgM/IgG positivity and full field red blood cells (33.3%) on urine analysis. While platelets were significantly low in patients with polyserositis (45000/mm cube of blood). Rest of the laboratory parameters were comparable between the groups. [Table 3]

Table 3: Association of serous cavity involvement with hematological and urinary parameters of the patients (N=176)

Variables	Total	No serositis (n=24)	Mono serositis (n=110)	Poly serositis (n=42)	p-value#
Hemoglobin (g/dL)	11 {6.2-16.6}	10.88 {6.7-14.2}	10.65 {6.2-14.6}	12.9 {8.4-16.6}	<0.001
TLC (per cubic mm of blood)	4800 {1100-17250}	5710 {3200-6200}	4800 [1100-11500}	4405 {1610-17250}	0.238
Leukopenia	47 (26.7%)	1 (4.2%)	30 (27.3%)	16 (38.1%)	<0.001
Normal leucocyte count	119 (67.6%)	23 (95.8%)	79 (71.8%)	17 (40.5%)	
Leukocytosis	10 (5.7%)	0 (0.0%)	1 (0.9%)	9 (21.4%)	
Platelet count (per cubic mm of blood)	56000 {10000-192000}	122000 {10000-150000}	60000 {12000-192000}	45000 {10000-130000}	0.001

Continue.....

Thrombocytopenia		161 (91.5%)	18 (75%)	101 (91.8%)	42 (100.0%)	0.002
Normal platelet counts		15 (8.5%)	6 (25.0%)	9 (8.2%)	0 (0.0%)	
PCV (%)		39 {27.5-54.0}	36.0 {29.0-44.8}	40.0 {27.5-54.0}	40.2 {30.0-50.9}	0.002
Creatinine (mg/dL)		0.89 {0.10-7.80}	0.90 {0.10-1.20}	0.8 {0.34-7.80}	0.89 {0.34-7.82}	0.179
Urea (mg/dL)		29 {16-56}	27.0 {16.0-40.0}	29.5 {16.0-56.0}	30.0 {22.0-40.0}	0.049
Bilirubin (mg/dL)		0.80 {0.17-2.50}	0.80 {0.20-1.80}	0.80 {0.17-1.96}	0.81 {0.17-2.50}	0.429
SGOT (U/L)		327 {100-3345}	327.0 {134.0-3326.0}	327.0 {102.0-3330.0}	330.0 {100.0-3345.0}	0.621
SGPT (U/L)		167 {40-1776}	170.0 {48.0-1384.0}	167.0 {42.0-1776.0}	159.0 {40.0-1734.0}	0.999
APTT (seconds)		12 {1.2-14.0}	12.0 {1.2-14.0}	12.0 {1.4-14.0}	12.0 {11.0-14.0}	0.894
INR		1.02 {0.70-1.09}	0.92 {0.70-1.09}	1.02 {0.70-1.09}	1.02 {0.80-1.10}	0.938
Dengue IgM/IgG +		10 (17.6%)	1 (4.2%)	3 (2.7%)	6 (14.3%)	7.696 (0.021)**
Urine Glucose ++		8 (4.5%)	2 (8.3%)	4 (3.6%)	2 (4.8%)	1.008 (0.604)**
Urine Urobilinogen +		4 (2.3%)	2 (8.3%)	1 (0.9%)	1 (2.4%)	4.892 (0.087)**
Urine Protein	Absent	149 (84.7%)	18 (75.0%)	96 (87.3%)	35 (83.3%)	3.358 (0.500)**
	+	8 (4.5%)	1 (4.2%)	5 (4.5%)	2 (4.8%)	
	++	19 (10.8%)	5 (20.8%)	9 (8.2%)	5 (11.9%)	
Urine RBC	Absent	115 (65.3%)	22 (91.7%)	67 (60.9%)	26 (61.9%)	10.421 (0.034)**
	15-20 cells/HPF	14 (8.0%)	0 (0.0%)	12 (10.9%)	2 (4.8%)	
	Full Field	47 (26.7%)	2 (8.3%)	31 (28.2%)	14 (33.3%)	

**Kruskal Wallis test, ** Chi-square test, Frequency (percentage%), Median {range}*

Number of patients presenting with single cavity involvement was more 110 (62.5%) when compared with those with polyserositis 42 (23.9%).[Table 4]

Table 4: Distribution of patients based on serous cavity involvement detected on ultrasound whole abdomen and chest x-ray (N=176)

Variables	Frequency	Percentage
No involvement of serous cavity	24	13.6%
Involvement of single cavity involvement (pleural or peritoneal)	110	62.5%
Involvement of both cavities' involvement (pleural and peritoneal)	42	23.9%

Jaundice	3 (1.7%)	0 (0.0%)	2 (1.8%)	1 (2.4%)	0.539 (0.764)
Day of illness@	6 (2-14)	7 (3-14)	6 (2-10)	6 (3-9)	(0.033)**

**Chi-square test; ** Kruskal Wallis Test; HPF: High Power Field, @ median (range)*

Multinomial logistic regression for three categories namely no serositis, mono serositis, poly serositis to predict the occurrence of polyserositis or monoserositis based on laboratory parameters. We found that one unit increase in urea level of blood increases the chance of one serous cavity involvement by 0.093 unit. Similarly, one percent change in PCV increases the chance of one serous cavity involvement by 0.102 unit.

We also observed that, one gram per decilitre increase in haemoglobin level increases the chance of polyserositis by 0.574 unit. One unit decrease in platelet count increases the chance of polyserositis by 0.027 unit. One unit increase in urea level increases the chance of polyserositis by 0.140 unit. Similarly, unit increase in urine RBC count increases the chance of polyserositis by 1.172 units.[table 5]

Table 5: Predictors of polyserositis based on clinical, haematological and urinary parameters of patients

Variables	Mono serositis		Polyserositis	
	β (Beta)	p-value (95% CI)	β (Beta)	p-value (95% CI)
Intercept	-4.756	0.165	-16.622	0.000
Haemoglobin	0.031	0.829 (0.781–1.362)	0.574	**0.002** (1.240–2.544)
Platelets	-0.012	0.087 (0.975–1.002)	-0.027	**0.003** (0.957–0.991)
TLC	-0.023	0.842 (0.778–1.227)	0.200	0.122 (0.948–1.575)
Creatinine	0.042	0.939 (0.353–3.079)	-0.109	0.839 (0.313–2.568)
Urea	0.093	**0.043** (1.003–1.202)	0.140	**0.011** (1.033–1.282)
PCV	0.102	**0.043** (1.003–1.222)	0.108	0.086 (0.985–1.259)
Bilirubin	0.053	0.946 (0.226–4.925)	0.363	0.691 (0.239–8.641)
SGOT	0.000	0.910 (0.999–1.001)	0.000	0.962 (0.999–1.001)
SGPT	-0.001	0.605 (0.997–1.002)	-0.001	0.463 (0.996–1.002)
APTT	0.157	0.345 (0.845–1.618)	0.209	0.290 (0.837–1.815)
INR	-0.688	0.718 (0.012–21.115)	-0.952	0.682 (0.004–36.857)
Dengue IgM/IgG	-0.716	0.611 (0.031–7.675)	1.093	0.452 (0.173–51.415)
Urine RBC	0.974	0.059 (0.965–7.271)	1.172	**0.036** (1.080–9.646)
Urine Glucose	-1.007	0.643 (0.005–25.842)	-1.983	0.440 (0.001–21.099)
Urine protein	-0.542	0.299 (0.209–1.618)	-0.610	0.340 (0.156–1.900)
Urine urobilinogen	-2.084	0.119 (0.009–1.709)	-0.668	0.645 (0.030–8.756)

Multinomial logistic regression for three categories revealed that occurrence of fever and cough increases the chance of monoserositis, while, presence of fever, skin rash and cough increase the occurrence of polyserositis. While day of illness is also a significant predictor of serositis, with each early day presentation of patient for evaluation increase the chance of detecting monoserositis by 0.573 units and detecting polyserositis by 0.674 units [table 6]

Table 6: Predictors of polyserositis based on clinical parameters of patients

Variables	Mono serositis		Polyserositis	
	β (Beta)	p-value (95% CI)	β (Beta)	p-value (95% CI)
Fever	-14.004	**<0.001** (0.0001–0.00002)	-15.697	**<0.0001** (0.0001–0.00001)
Myalgia	-0.809	0.132 (0.155–1.276)	-0.407	0.513 (0.196–2.257)
Headache	0.323	0.577 (0.443–4.309)	0.266	0.697 (0.341–4.995)
Skin rash	2.217	0.089 (0.714–118.176)	3.416	**0.012** (2.091–443.222)
Conjunctival suffusion	14.257	0.983 (0.001–0.00001)	13.866	0.983 (0.000–0.00001)
Shock	1.016	0.261 (0.470–16.224)	1.694	0.073 (0.852–34.730)
Haemorrhagic manifestation	0.829	0.349 (0.405–12.972)	1.792	0.057 (0.946–38.060)
Jaundice	12.786	0.986 (0.001–0.0001)	11.488	0.987 (0.001–0.0001)
Sore throat	-0.329	0.734 (0.108–4.808)	-0.203	0.870 (0.072–9.204)
Loose stool	0.253	0.687 (0.376–4.403)	0.274	0.706 (0.316–5.473)
Cough	-1.965	**0.008** (0.033–0.598)	-2.566	**0.007** (0.012–0.494)
Joint pain	-0.230	0.632 (0.310–2.037)	-0.932	0.204 (0.093–1.660)
Day of illness	-0.573	**0.001** (0.396–0.803)	-0.674	**0.001** (0.344–0.755)

Discussion

This study included 176 patients who tested positive for the NS1 antigen for dengue and were hospitalized for the management. Our study detected serous cavity involvement in 152 patients and in this group 110 (62.5%) patients had single serous cavity involvement which was either pleural cavity or peritoneal cavity and 42 (23.9%) had involvement of both the serous cavities i.e., pleural and peritoneal cavity. 24 patients had no involvement of any serous cavities.

We observed a higher prevalence of polyserositis (23.9%) when compared to another study conducted by Jisamerin et al. who reported polyserositis in the form of ascites and pleural effusion in 15.3% of their patients.(ref), they reported that serositis was significantly associated with severe dengue[5]. Proportion of elderly patients (>60 years) is more in polyserositis group (7.1%) compared to other groups. The patients had an average age within 30-33 years. However, the groups were comparable for age and gender. The middle age group 21-40 years were found to be commonly affected also it affects both the gender equally[5].

In the present study, fever was the most prevalent symptom, accounting for 8.3% of cases. Fever has been consistently identified as a prevalent symptom in prior investigations[6,7,9,10]. The next subsequent symptom was myalgia (51.1%), Padmaprakash et al[7] demonstrated that 77.6% of the cases had myalgia, while Lee et al. reported a lower percentage of 36.2% for myalgia patients. The study population exhibited a headache prevalence of 31.8%, in contrast to the findings of Padmaprakash et al., who found an incidence of 67.2%[7]. Haemorrhagic manifestation was observed in 19.9% of the patients. This finding is in agreement with prior research[9]. A meagre number of patients had diarrhoea, which confirm the findings of the study conducted by Mohan et al[10].

A notable difference was observed between the groups for day of illness which is 6th day for mono and poly serositis and 7th day for no serous cavity involvement. Jisamerin et al. showed that most of their patients had six to twelve days of hospitalization (78.7%)[7].

We observed that haemoglobin level, blood urea and Packed cell volume was notably higher in patients with polyserositis. While platelets were comparatively low in patients with polyserositis. Patients with polyserositis higher proportion Dengue IgM/IgG positivity. Similarly, patients with polyserositis had significantly higher proportion of patients having full field red blood cells (33.3%) on urine analysis. Lam et al. showed that declining trend platelet count was effective in predicting dengue shock[11].

Logistic regression analysis for laboratory parameters revealed increase in PCV and decrease in platelet count increases the chance of serositis, and an increase in blood urea level and presence of RBC in urine and decrease in platelet count were significantly associated with polyserositis.

For clinical parameters, we observed that occurrence of fever and cough increases the chance of serositis, while, presence of fever, skin rash and cough increase the occurrence of polyserositis. Delayed presentation (>6 days) increase the chance of detecting serositis and polyserositis. Detection of polyserositis in a patient with dengue fever is found to be the indicator of severity of disease. Therefore , a careful monitoring of such patients is required during the management of these patients and needs special attention while administering fluid and other blood products. A higher prevalence of polyserositis has been observed in this study as compared to previous studies. Whether it was related to any change in strain of the dengue virus is not clear as we did not have the facilities to conduct viral study in such patients and this needs exploration in such future studies.

Conclusion

This study highlighted the significance of dengue, a severely overlooked disease transmitted by vectors, in India. It particularly impacts individuals between the ages of 21 and 40, who are in their most productive years. While fever was the predominant symptom, there were some instances of unusual presentations, such as diarrhoea. Patients diagnosed with dengue having serositis exhibited thrombocytopenia and an increase in packed cell volume (PCV). A comprehensive understanding of the normal and atypical clinical symptoms, as well as the potential

consequences of dengue, is crucial for prompt diagnosis and effective treatment. The presence of gall bladder wall edema and polyserositis in a feverish patient with a rash should lead to suspicion of DF/DHF. Sonographic monitoring is essential in addition to clinical and laboratory investigation due to the elevated likelihood of dengue fever progressing to polyserositis.

- Ethical clearance taken from Sharda hospital Ethical clearance committee, Greater Noida.

  There was no conflict of interest.

- No funding was sourced from anywhere.

References

1. World Health Organization: WHO, World Health Organization: WHO. Dengue and severe dengue 2024. https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue.
2. Dengue Clinical Presentation | CDC. Centers for Disease Control and Prevention. 2023.https://www.cdc.gov/dengue/healthcare-providers/clinical-presentation.html
3. Kabra R, Talwar D, Kumar S, Acharya S, Jaiswal P. Serositis as a presenting feature of dengue fever in a young female: Forecast of upcoming Dengue shock syndrome. Journal of Clinical and Diagnostic Research. 2022 Jan 1; https://doi.org/10.7860/jcdr/2022/51965.16421
4. World Health Organization: WHO and World Health Organization: WHO. "Dengue and Severe Dengue," April 23, 2024. https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue.
5. Jisamerin J, Mohamedkalifa A, Gaur A. Dengue: a neglected disease of concern. Curēus [Internet]. 2021 Oct 5;https://www.cureus.com/articles/60512-dengue-a-neglected-disease-of-concern#!/
6. Kumar A, Rongpharpi SR, Duggal SD, Gur R, Choudhary S, Khare P: Clinical, epidemiological and microbiological profile of dengue fever at a tertiary care hospital in Delhi, India. J Infect Dis Med. 2017, 2:1000110. 10.4172/2576-1420.1000110
7. Padmaprakash KV, Jha VK, Bhushan S, Deepkamal, Sowmya KC: Demographic and clinical profile of dengue fever in a tertiary care hospital of south India. J Assoc Physicians India. 2020, 68:24-7.
8. Lee IK, Huang CH, Huang WC: Prognostic factors in adult patients with dengue: developing risk scoring models and emphasizing factors associated with death ≤7 days after illness onset and ≤3 days after presentation. J Clin Med. 2018, 7:396. 10.3390/jcm7110396
9. Mutheneni SR, Morse AP, Caminade C: Dengue burden in India: recent trends and importance of climatic parameters. Emerg Microbes Infect. 2017, 6:e70. 10.1038/emi.2017.57
10. Mohan K, Malaiyan J, Nasimuddin S, et al.: Clinical profile and atypical manifestation of dengue fever cases between 2011 and 2018 in Chennai, India. J Family Med Prim Care. 2020, 9:1119-23. 10.4103/jfmpc.jfmpc_926_19
11. Lam PK, Ngoc TV, Thu Thuy TT, et al.: The value of daily platelet counts for predicting dengue shock syndrome: results from a prospective observational study of 2301 Vietnamese children with dengue. PLoS Negl Trop Dis. 2017, 11:e0005498. 10.1371/journal.pntd.0005498.