A Study on Clinical Profile of Dengue Fever and its Complications in a Rural Tertiary Care Center

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Abstract: *Background: Among the seven identified countries in South - East Asia region, India is one of the country which is regularly reporting dengue fever (DF) /dengue hemorrhagic fever (DHF) outbreaks. The present study was carried out to study the ever changing patterns of presentation of dengue fever and its complications in a rural tertiary care center. Methods: In this study from January 2021 to June 2022, after ethical clearance, serologically confirmed 140 cases of dengue were analysed with regards to their clinical and laboratory profile. The categorical data was analysed using percentages and the continuous data was analysed using mean and standard deviation. Inferential statistics was analysed by using Chi - square test. A probability value of <0.05 was considered statistically significant. Results: Out of 140 patients, most number of cases were recorded from June to October with maximum in September.72.1% cases had dengue fever, 15% cases had Dengue Hemorrhagic Fever (DHF) and 12.9% cases had Dengue Shock Syndrome (DSS). All the patients had fever, followed by headache, myalgia, arthralgia, lowbackache in majority of cases. Hypotension was noted in 16.4% patients. Petechiae over skin and sub conjunctival hemorrhage were found in one third patients. Leucopenia and thrombocytopenia were found in majority of patients. The mean platelet count was 39, 500/mm^3. MODS was seen in 21.4% patients. Mortality rate is 1.4%. Conclusions: In this study, classical dengue fever was the most common presentation. The most common presenting complaints were fever, headache, myalgia, arthralgia, low backache. Bleeding, shock, hepatitis, polyserositis, pneumonia are the complications seen in severe forms of dengue fever. Mortality was low and was seen mainly in acute secondary infection of dengue.*

Keywords: Dengue, Dengue Hemorrhagic Fever, Dengue Shock Syndrome, MODS

1. Introduction

Dengue fever is the most common arthropod - borne virus (arboviral) infection in humans. Aedes aegypti[1] is the mosquito that spreads dengue fever. Dengue fever is transmitted to 2.5 - 3 billion people worldwide in 112 countries[2]. Presently, 40 % of the entire population is at risk and 50 - 100 million cases every year[3]. Annually, an estimated 5, 00, 000 persons with severe dengue hospitalisation, with 2.5 % of those infected dying [4]. In India, Dengue is widespread and endemic in most major cities[5]. Initial Dengue infection can be asymptomatic (50 - 90%) [6], cause a nonspecific febrile illness or result in the symptom complex of classic dengue fever (DF). When infected with another dengue serotype, a small percentage of people who have previously been infected with one dengue serotype can have a bleeding and endothelial leak. Dengue haemorrhagic syndrome (DHF) [7] is used for this condition. Expanded dengue syndrome is a new entity and encompasses various unusual dengue infection manifestations affecting various organ systems, including the heart[8]. Dengue fever is a major global economic burden in low - income countries such as India. Between 2002 and 2010, the total annual cost of Dengue fever was $ 46.45 million[9]. This study was done to inquire about the ever changing patterns of demonstration of dengue fever and its complications.

Patients and Methods
This was an observational study conducted in rural tertiary care center during January 2021 to June 2022. It is an 800 bedded tertiary care hospital equipped with modern diagnostic and treatment facilitie.140 patients who are positive for dengue fever (positive either for Dengue NS - 1 or IgM) and who had consented were included in the study. Detailed history and thorough clinical examination was performed. Routine biochemical and hematological investigations (hemoglobin, total leucocyte count (TLC), platelet count,, hematocrit, liver function tests, blood urea, serum creatinine, malarial antigen, slide test for malarial parasite, widal test for typhoid, IgM antibodies for leptospira and scrub typhus, chest x ray and usg abdomen and pelvis were also done in all patients. Based on clinical profile other investigations also done. Patients aged 18 years or more and those who are tested positive for dengue serology (NS - 1 positive or IgM positive) are included. Patients with co - infection with malaria, leptospira, scrub typhus, enteric fever and with preexisting renal disease, cardiac disease and pulmonary disease are excluded.

Analysis: The data were entered into MS excel 2013 version and further analysed using SPSS version 21. Descriptive statistics were analysed as follows: The categorical data were analysed using percentages, and the continuous data were analysed using mean and standard deviation. Inferential statistics were analysed by using the Chi - square test was used. A probability value of <0.05 was considered statistically significant.

2. Results

In this study, serologically confirmed 140 cases of dengue, meeting the inclusion and exclusion criteria, were analysed with regards to their clinical profile and complications.

The mean age of the study population was 30 years; 74 (52.9 %) persons belonged to the age group of 18 - 30 years.

Table 1: Demographic data showing Age, Diagnosis, Clinical Features

Demographic Data	No. of Patients	Percentage
Age		
18 - 30years	74	52.9%
31 - 45years	60	42.9%
46 - 60years	6	4.3%
Diagnosis		
Dengue Fever	101	72.1%
DHF	21	15.0%
DSS	18	12.9%
Clinical Features		
Fever	140	100%
Headache	106	70.7%
Myalgia	97	64.7%
Arthralgia	94	62.7%
Low Backache	83	55.3%
Retro Orbital Pain	71	47.3%
Rashes	65	43.3%
Vomiting	57	38%
Pain Abdomen	41	27.3%
Bleeding	39	26%
Yellowish Discolouration of Eyes	32	21.3%
Cough	30	20%
Diarrhoea	25	16.7%
Sore Throat	16	10.7%
Breathlessness	6	4.0%
Seizures	5	3.6%

DHF - Dengue Hemorrhagic Fever DSS - Dengue Shock Syndrome

Table 2: Clinical Findings among Study Subjects

General Physical Examination		
ICTERUS	32	21.3%
PALLOR	6	4%
EDEMA	5	3.3 %
LYMPHADENOPATHY	4	2.7%
Pulse Rate (Beats Per Min)		
<60	22	16.7 %
>100	18	12.8 %
Systolic Blood Pressure (mm of Hg)		
<90	23	16.4%
Diastolic Blood Pressure (mm of Hg)		
<60	12	8.5 %
Respiratory Rate (Cycles Per Minute)		
<20	117	83.5 %
>20	23	16.4 %
ABDOMEN FINDINGS		
SPLENOMEGALY	29	20.7%
HEPATOMEGALY	22	15.7%
ASCITES	9	6.4%
RESPIRATORY FINDINGS		
PLEURAL EFFUSION	8	5.7%
CREPITATIONS	19	13.6%

DHF - Dengue Hemorrhagic Fever DSS - Dengue Shock Syndrome

Table 3: Lab Investigations

Dengue Serology		
NS - 1 or IgM	84	60 %
NS1 Ag + IgM antibody	36	25.7%
NS1 Ag + IgM+ IgG antibody	20	14.3%
T LC		
<4000	88	62.9%
>10000	4	2.8%
SERUM CREATININE (mg/dl)		
0 - 1.1	88	62.8%
>1.1	52	37.1%
SERUM TOTAL BILIRUBIN (mg/dl)		
0 - 1.2	93	66.4%
>1.2	47	33.6%
SGOT (UNITS /L)		
<50	42	30.1 %
51 - 300	80	57.1 %
>300	18	12.8 %
SGPT (UNITS /L)		
<50	55	39.2 %
51 - 300	68	48.5 %
>300	17	12.1 %
OUTCOME		
RECOVERED	138	98.6%
DEATH	2	1.4%

Table 4: Lowest platelet count in the type of fever:

Lowest platelet count/cu. mm	DIAGNOSIS			Total n (%)	X^2	p - value
	DF n (%)	DHF n (%)	DSS n (%)			
<10000	19 (18.8)	18 (85.7)	17 (94.4)	54 (38.5)		
10001 - 50000	53 (52.4)	3 (14.3)	1 (5.5)	57 (40.7)		
50001 - 75000	15 (14.8)	0 (0)	0 (0)	15 (10.7)	60.58	<0.001*
75001 - 100000	11 (10.8)	0 (0)	0 (0)	11 (7.8)		
>100000	3 (2.9)	0 (0)	0 (0)	3 (2.1)		
TOTAL	101 (100)	21 (100)	18 (100)	140 (100)		

Figures in parentheses are percentage values (p<0.05 * statistically significant)

3. Discussion

Dengue fever is an arthropod - borne viral disease that has had a more common presentation in the last three decades[10]. It is a considerable public health concern worldwide in subtropical and tropical regions. According to WHO, 51 - 101 million new infections with dengue occur every year in more than a hundred endemic countries[11].

In India, Dengue is widespread and endemic in most major cities. Dengue outbursts and mortality have been reported in all states of India over the last decade. The case fatality rate is greater than 1% [12]

This study was done in rural area in Andhra Pradesh, where Dengue infection is more prevalent. One hundred forty cases of serologically confirmed Dengue fever who were admitted between January2021 to June 2022 were included in the study.

Duration of hospital stay:
Duration of hospital stay ranged from 1 - 15 days, and the average stay was seven days.

Age distribution:
The age group 18 - 30 years had the highest number of patients (52.9 %), followed by the age group 31 - 45 years (42.9 %). The patients' mean age was 30 years. This was comparable to the study of Sing NP[13], where the mean age of the patients was 26 +/ - 10 years. Similar study done by Joshi PT[14], revealed that all age groups and both the genders were affected equally 33.3%. However other studies of Gore MM[15] and Dash PK et al[16] revealed a high number of cases in the pediatric age group. This indicates that the virus had been introduced to a non - exposed population and disease was not endemic.

Diagnosis:
The cases were classified according to the 2009 WHO Diagnostic criteria[13] for dengue. Of the 140 patients, Dengue Fever (DF) occurred in 101 (72%) patients. Dengue Hemorrhagic Fever (DHF) occurred in 21 (15%) patients and DengueShock Syndrome (DSS) in 18 (12.9%) patients.

Month - wise distribution of Dengue cases:
The highest number of cases were observed in September (24%), August (22%), and October (16%), which corresponds to the post - monsoon season, which provides favourable environmental conditions for vector breeding during these months.

Presenting symptoms:
Fever was documented in all the study patients. The mean duration of fever was six days. Fever was the most common presenting symptom (100%) among the patients, followed by headache (70%), myalgia (64%), arthralgia (62%), vomiting/diarrhoea (55%) and abdominal pain (27%).

Abdominal pain was seen in 27 % of the patients. Seizures were noted in 5 (3.6%) patients, and all of them had GTCS type of seizures.

In this study, 106 patients had a headache at presentation. Of them, 58 (54.7%) patients had it for less than three days, while 45 (42.5%) patients had a headache for 3 - 7 days.

In study by Mandal et al. [17], 62.16% patients presented with headache. In some studies like Itoda et al. [18], 90% of patients presented with headache. On the other hand, Awasthi et al. [19] conducted a study in north India and reported that only 9% of cases had headache as their chief symptom

Vital data:
Blood pressure is the essential clinical monitor in the case of dengue for identifying the onset of complications like shock. Hypotension was noted in 23 (16.4%) patients, and the majority were stabilised by using intravenous fluid administration. Among these, 18 (12.8%) patients were diagnosed with Dengue Shock Syndrome (DSS). Systolic Blood Pressure (SBP) association with various types of dengue fever is significant in this study. SBP less than 90 mm of Hg is a must for DSS, and five patients with DHF has

SBP less than 90 mm of Hg. Diastolic Blood Pressure (DBP) was less than 60 mm of Hg in 12 (8.5%) patients. Bradycardia was seen in 22 (16.7%) patients, and tachycardia was seen in 18 (12.8%) patients. The patient should be monitored for cardiac arrhythmias as these are life - threatening. Tachypnea was seen in 23 (16.4%) patients, and it was due to pleural effusion as a part of polyserositis picture of dengue fever.

General Physical Examination:
Pallor was observed in 6 (4%) of the patients in this study. Icterus was observed in 32 (21.3%) of the patients.
Pedal edema was present in 4 (4%) of the cases, and lymphadenopathy was present in 3% of the patients. Rashes were seen in 46.4% of patients. The majority of the patients (31.5%) had rashes that were centrally distributed across the chest and abdomen.

Petechiae over skin was seen in 15 (10.7 %) patients, and conjunctiva bleeds were found in 13 (9.2%) patients.

Systemic examination:

Abdomen:
Right hypochondriac tenderness was seen in 38 (27.21%) cases, followed by splenomegaly in 29 (20.7%). Hepatomegaly was seen in 22 (15.7%) and ascites in 9 (6.4%). The study by Rajesh D et al, from Agra showed 14.8% patients had hepatomegaly. Generally, it was reported that more than 90% of Asian subjects with DHF have hepatomegaly[20]. spleenomegaly was present in 11.33% cases of study by Adhikari P[21].

Respiratory system:
An examination of the respiratory system revealed pleural effusion in 8 (5.7%) of the patients, and 19 (13.6%) of the patients had crepitations on auscultation. In a study by Mandal et al., [17] ascites was present in 8.1% and pleural effusion in 18.9% of cases. In Bangladesh based study by Mia et al. [22], 42% had pleural effusion and 41% of patients developed ascites.

Dengue serology:
IgM positivity indicates acute primary dengue, and IgM and IgG positive indicate acute secondary dengue. NS - 1 antigen and IgM were positive in 36 (25.7 %) patients, and NS - 1, IgM, and IgG were positive in 20 (14.3%) patients. Mortality in this study was seen in acute secondary dengue cases.

Haemoglobin and total leukocyte count:
Hemoconcentration was seen in 18 (8.8%) patients as indicated by raised Hb% (>16gm%). Leukocytopenia (TLC <4000/cubic mm) was seen in 88 (62.9%) patients.

Platelet counts:
Thrombocytopenia was the most commonly studied parameter in previous Dengue studies.136 (97.2%) patients had thrombocytopenia (<1, 00, 000/cubic mm) in the present study.

The mean lowest platelet count throughout the hospital stay was 29, 405/cubic mm. Platelet counts at the time of

admission was below 10, 000 in 26 (18.6%) patients and 10, 000 - 50, 000 in 70 (50) % patients.

Association of lowest platelet count during the course of hospital stay with types of dengue fever was significant in this study.94% of DSS cases and 86% of DHF cases had the lowest platelet count of less than 10, 000/cubic mm. Only 19% of the patients had the lowest platelet count of less than 10, 000/cubic mm. The results were similar to studies conducted by Daniel R et al[.23]. (10%) and lesser than Naseem S et al[.24]. (31%).

Liver function tests (LFT)
LFT was done in all cases. Raised total bilirubin was noted in 47 (33.4%) cases. But clinical jaundice was noticed in only 32 (21.3%) cases. Aspartate transaminase (AST) is elevated (>50 U/L) in 70 % (98) patients. Alanine transaminase (ALT) is elevated (>50 U/L) in 60 % (85) patients. This increase in liver enzymes could be caused by the virus directly injuring liver cells or an immune response. Another possible aetiology is ischemic hepatitis in patients, particularly those in shock.

Renal function tests
Raised serum creatinine levels (>1.1 mg/dl) were seen in 52 (37.1 %) patients. The Association of raised creatinine levels with dengue fever is significant in this study.88% cases of DSS and 34% cases of DHF had raised serum creatinine levels.

Case Fatality Rate
Of the 140 patients, two succumbed to severe forms of infection, and the case fatality rate was 1.4%.
Both the patients who succumbed have been diagnosed with DSS with platelet counts of 7000/cubic mm and 9000/cubic mm on admission. Both the patients had seizure episodes, and one patient had dengue encephalopathy syndrome. Both the patients were aggressively managed in the ICU but succumbed to death. The cause of death was encephalopathy in one patient and refractory shock in the other patient.

Limitations of the study:
1) Serotyping of the Dengue virus was not done in this study.
2) Past history of Dengue virus infection was not analysed in this study.
3) Patients were not followed up after discharge.

4. Conclusion

In this study, classical dengue fever was the most common presentation, followed by other complicated forms such as dengue hemorrhagic fever and dengue shock syndrome. The most common presenting complaints were fever, headache, myalgia, arthralgia, low backache, retro - orbital pain and rashes. Hypotension, hemorrhagic spots, icterus, pleural effusion, and ascites are the typical examination findings associated with severe forms of dengue. Bleeding, shock, hepatitis, polyserositis, pneumonia are the complications seen in severe forms of dengue fever. Blood pressure should be monitored for evaluation of the progress of the disease. Mortality was low and was seen mainly in acute secondary infection of dengue. On investigation, altered liver function test, renal function test, secondary dengue infection were associated with DHF and DSS. Initial platelet counts had no correlation with the length of hospital stay. Secondary dengue infection was associated with a higher rate of complications and mortality.

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