

Study Prevalence of Various Causes of Acute Abdominal Pain in Dengue Illness and its Association with Outcome

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Received Date: 19/09/2023

Acceptance Date: 18/10/2023

Abstract

Background: Dengue viral infections are one of the most important mosquito borne diseases in the world. They may be asymptomatic or may give rise to undifferentiated fever, dengue fever (DF), dengue haemorrhagic fever (DHF), or dengue shock syndrome (DSS). Early recognition and prompt initiation of appropriate treatment are vital if disease related morbidity and mortality are to be limited. Abdominal pain is one of the common symptoms of DF and severe pain abdomen is strongly associated with DHF. About 500 000 people with severe dengue fever require hospitalization each year out of which about 2.5% die.

Aim and Objective: 1.To study prevalence of various causes of acute abdominal pain in dengue illness patients. 2. To study the age wise association of acute abdominal pain with dengue illness.3. Study the Patho-Physiology of dengue fever.

Methods: Hospital based Cross sectional analytical study. Study setting: Paediatrics ward of Government medical college and hospital Sindhudurg **Study duration:** 20/10/22 to 19/10/23

Study population: The study population included all the dengue fever cases with acute abdominal pain admitted at a Paediatrics ward of Government medical college and hospital Sindhudurg **Sample size:** 100 **Results:** majority of cases presented with ascites 36 (36%)

followed by pleural effusion 20 (20%), hepatitis 17 (17%), Mesenteric lymphadenopathy 5 (5%), Pancreatitis 4 (4%),Calculous cholecystitis 3 (3%) and appendicitis 1 (1%). majority of cases presented with fever 100 (100%), followed by vomiting 43 (43%), skin rash 29 (29%), headache 21 (21%), myalgia 18 (18%), arthralgia 4 (4%) and bleeding tendency 3 (3%). majority of cases found in 7-9 years age group 38 (38%). most of the cases were found in males 54%, proportion of acute abdomen with dengue illness was statistical significant in age group 7 and above ($p < 0.05$), Most of cases clinical outcome was Discharged 92%.

Conclusions: Most common cause of abdominal pain in dengue fever was ascites, Most common clinical features found in dengue cases was fever, followed by vomiting and skin rash. Most of cases were found in 7-9 years age group. Highest Proportion of Stage of Dengue Infection was dengue fever

Keywords: Dengue Fever, Dengue Hemorrhagic, Dengue Shock Syndrome

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INTRODUCTION

India is an endemic country for dengue virus infection. Dengue virus infection may be asymptomatic or present as undifferentiated fever: dengue fever (DF) or dengue hemorrhagic fever (DHF).¹ Dengue shock syndrome (DSS) may lead to hypovolemic shock. Abdominal pain is a frequently reported symptom in patients with dengue fever. Pain in abdomen is associated strongly with DHF. Up to 40% of patients with DHF may have abdominal pain at presentation.²

For the past ten years, the number of dengue cases has gradually increased in India. Dengue is driven by complex interactions among host, vector and virus that are influenced by climatic factors. The total number of dengue cases has significantly increased in India since 2001. In the early 2000s, dengue was endemic in a few southern and northern states. It has recently spread to many states, including the union territories.³

In addition to the increased number of cases and disease severity, there has also been a major shift in the geographical range of the disease. Dengue had been restricted to urban areas, but it has now spread to rural regions.⁴

The expansion of dengue in India has been related to unplanned urbanization, changes in environmental factors, host-pathogen interactions and population immunological factors. Inadequate vector control measures have also created favorable conditions for dengue virus transmission and its mosquito vectors. Both *Aedes aegypti* and *Aedes albopictus* are the main competent vectors for dengue virus in India.⁵

The number of dengue cases has increased 30-fold globally over the past five decades.⁶ Dengue is endemic in more than 100 countries and causes an estimated 50 million infections annually.⁷ Nearly 3.97 billion people from 128 countries are at risk of infection.^{8,9}

Individuals infected with dengue exhibit a wide spectrum of clinical symptoms ranging from asymptomatic to severe clinical manifestations, such as dengue shock syndrome.¹⁰ The WHO regions of Southeast Asia (SEA) and the western Pacific represent ~ 75% of the current global burden of dengue.¹¹

PATHO-PHYSIOLOGY

Etiological agent: The dengue virus (DEN) comprises four distinct serotypes (DEN-1, DEN-2, DEN-3 and DEN-4) which belong to the genus *Flavivirus*, family *Flaviviridae*.

Distinct genotypes have been identified within each serotype, highlighting the extensive genetic variability of the dengue serotypes. Among them, "Asian" genotypes of DEN-2 and DEN-3 are frequently associated with severe disease accompanying secondary dengue infections.

The Mosquito:

The *Aedes aegypti* mosquito is the main vector that transmits the viruses that cause dengue. The viruses are passed on to humans through the bites of an infective female *Aedes* mosquito, which mainly acquires the virus while feeding on the blood of an infected person.

The Human:

Once infected, humans become the main carriers and multipliers of the virus, serving as a source of the virus for uninfected mosquitoes. The virus circulates in the blood of an infected person for 2-7 days, at approximately the same time that the person develops a fever. Patients who are already infected with the dengue virus can transmit the infection via *Aedes* mosquitoes after the first symptoms appear (during 4-5 days; maximum 12).

In humans recovery from infection by one dengue virus provides lifelong immunity against that particular virus serotype. However, this immunity confers only partial and transient protection against subsequent infection by the other three serotypes of the virus. Evidence

points to the fact that sequential infection increases the risk of developing severe dengue. The time interval between infections and the particular viral sequence of infections may also be of importance.

WHO classification of dengue virus infection

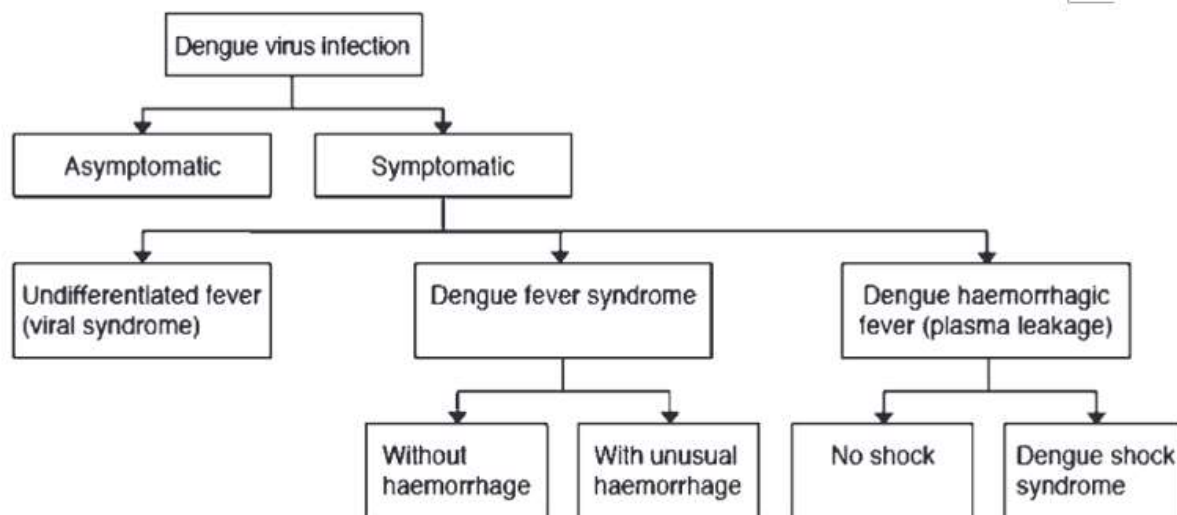


Figure 1: The 1997 WHO classification of dengue virus infection.¹²

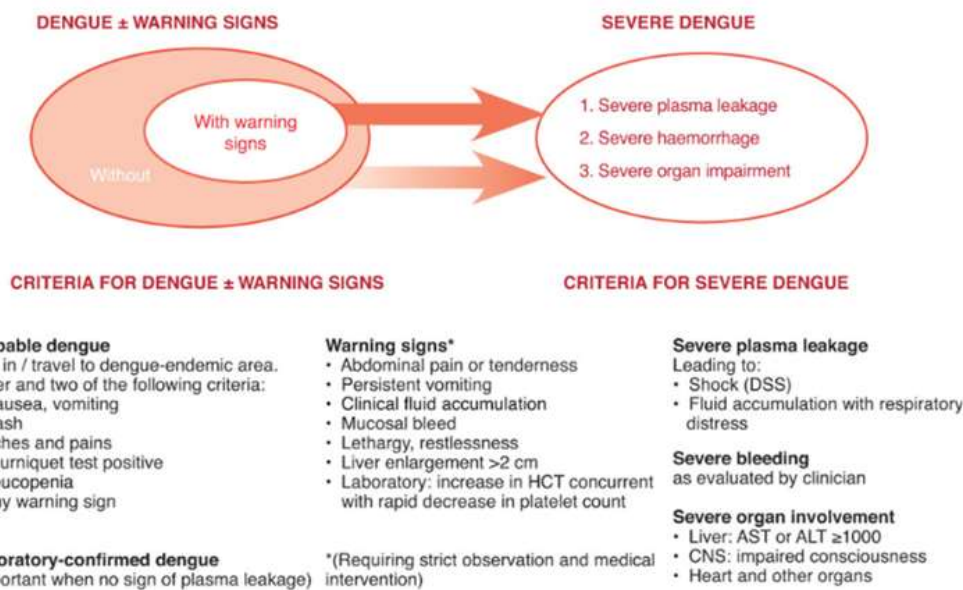


Figure 2: The 2009 revised dengue case classification¹³

WHO case definitions for DF, DHF and DSS.¹⁴

Dengue fever:

Probable: An acute febrile illness with two or more of the following manifestations: headache, retro-orbital pain, myalgia, arthralgia, rash, hemorrhagic manifestations and leucopenia and Supportive serology (a reciprocal haemagglutination-inhibition antibody titre>1280, a comparable IgG enzyme-linked immunosorbent assay (ELISA, see chapter 49,10) titre or a positive IgM antibody test on a late acute or convalescent-phase serum specimen)

Or

Occurrence at the same location and time as other DF cases.

Confirmed

A case confirmed by one of the following laboratory criteria:

- Isolation of the dengue virus from serum/autopsy samples
- An at least four-fold change in reciprocal IgG/IgM titres to one or more dengue virus antigens in paired samples
- Demonstration of dengue virus antigen in autopsy tissue, serum or cerebrospinal fluid samples by immunohistochemistry, immunofluorescence or ELISA
- Detection of dengue virus genomic sequences in autopsy tissue serum or cerebrospinal fluid samples by polymerase chain reaction (PCR)

Dengue hemorrhagic fever

For a diagnosis of DHF, a case must meet all four of the following criteria:

- Fever or history of fever lasting 2–7 days, occasionally biphasic
- A hemorrhagic tendency shown by at least one of the following: a positive tourniquet test; petechiae, ecchymoses or purpura; bleeding from the mucosa, gastro-intestinal tract, injection sites or other locations; or haematemesis or melaena
- Thrombocytopenia [(100,000 cells/mm³(1006109/L)]
- Evidence of plasma leakage owing to increased vascular permeability shown by: an increase in haematocrit >20% above average for age, sex and population; a decrease in the haematocrit after intervention >20% of baseline; signs of plasma leakage such as pleural effusion, ascites or hypoproteinaemia

Dengue shock syndrome

For a case of DSS, all four criteria for DHF must be met, in addition to evidence of circulatory failure manifested by:

- Rapid and weak pulse
And
- Narrow pulse pressure (<20 mmHg or 2.7 kPa) or manifested by Hypotension for age and Cold, clammy skin and restlessness

Stages of dengue fever

Stage I: The acute fever stage is within day 1 to day 5. The patient at this phase has a high fever (39-40 degrees celsius) with abdominal pain, nausea, vomiting. Paracetamol and other antipyretic is important to lower the body temperature to provide the body with minimal fluid loss. The fluid circulation for the patient will be replaced by rehydration by food and electrolyte fluid. Seek medical attention urgently if children do not eat/drink enough and look weak.

Stage II: This is the critical stage shown from Day 5 to 7 When the body temperature drops within 24 hours, the plasma (fluid part of blood component) leaks and the blood pressure will drop.

The patient might feel weak, restless, have cold, clammy skin, fast pulse, in the severe case with very low platelets they could vomit blood, have internal haemorrhage and can die due to circulatory failure or respiratory failure from internal bleeding/ fluid retention.

To prevent blood perfusion to the vital organ and not to overload the fluid in terms of third space leakage prevention, it is very important to provide an appropriate intravenous fluid to the patients in this stage.

Stage III: This is the recovery phase. It usually takes a few days for the patients to get back to normal. At this stage, the patient gains back its appetite, has a slower pulse rate, has a convalescent rash at legs and arms.

METHODOLOGY

Study design: Hospital based Cross sectional analytical study

Study setting: Paediatrics ward of Government medical college and hospital Sindhudurg

Study duration: 1 year (20/10/22 to 19/10/23)

Study population: The study population included all the dengue fever cases with acute abdominal pain admitted at paediatrics ward of Government medical college and hospital Sindhudurg

Inclusion criteria

1. 1 year to 12 years
2. Dengue fever with acute abdomen pain
3. Dengue serology positive

Exclusion criteria

1. All patients with negative dengue serology
2. Died within 24 hours after admission
3. Discharge against medical advice within 24 hours

Approval for the study

Written approval from Institutional Ethics committee was obtained beforehand. Written approval of paediatrics department was obtained. After obtaining informed verbal consent from all patients with the definitive diagnosis of DF admitted to paediatric ward of Government medical college and hospital Sindhudurg such cases were included in the study.

Sample size: 100

Sampling technique: Convenient sampling technique used for data collection. All patients admitted in paediatric department of Government medical college and hospital Sindhudurg from 20 October to 19 October with acute abdomen with dengue illness. Explained the purpose of study and who gave consent and detailed history of Dengue illness with acute abdomen pain such cases included in this study.

Methods of Data Collection and Questionnaire

Pre-designed and pretested questionnaire was used to record the necessary information. Questionnaires included general information, such as age, sex, religion, occupation of parents, residential address, socioeconomic status and date of admission. Medical history- chief complain, past history, immunization history Nutritional status, general examination, systemic examination

Study procedure

Explained the purpose of study and who gave consent and detailed history of Dengue illness with acute abdomen pain such cases included in this study. After obtaining informed verbal consent from all patients with the definitive diagnosis of DF admitted to paediatric ward of Government medical college and hospital Sindhudurg and those with acute abdominal pain were included in the study.

The diagnosis of DF made based on supportive clinical findings and a positive enzyme-linked immunosorbent assay (ELISA) result for specific dengue IgM or NS 1 dengue test in acute-phase serum. The severity of DF categorized in accordance with the World Health Organization definitions; grade III DHF and grade IV DHF were grouped as dengue shock syndrome (DSS) Proportion of acute abdomen in dengue fever compared among various grades of severity.

Management of dengue patients as per WHO protocol acute abdomen due to surgical or medical causes ruled out by investigation according to WHO guidelines Managed all cases of DF with acute abdomen as per WHO protocol

Data Analysis

The data were entered in Microsoft Excel and data analysis was done by using SPSS demo version no 21 for windows. The analysis was performed by using percentages in frequency tables and correlation of acute abdominal pain with age. $p < 0.05$ was considered as level of significance using the Chi-square test.

RESULTS AND OBSERVATIONS

Table 1: Prevalence of various causes of abdominal pain in dengue infection

Diagnosis	Frequency	Percentage
Hepatitis	17	17%
Calculous cholecystitis	3	3%
Pleural effusion	20	20%
Ascites	36	36%
Pancreatitis	4	4%
Appendicitis	1	1%
Mesenteric lymphadenopathy	5	5%
Total	86	100%

The above table shows majority of cases presented with ascites 36 (36%) followed by pleural effusion 20 (20%), hepatitis 17 (17%), Mesenteric lymphadenopathy 5 (5%), Pancreatitis 4 (4%), Calculous cholecystitis 3 (3%) and appendicitis 1 (1%).

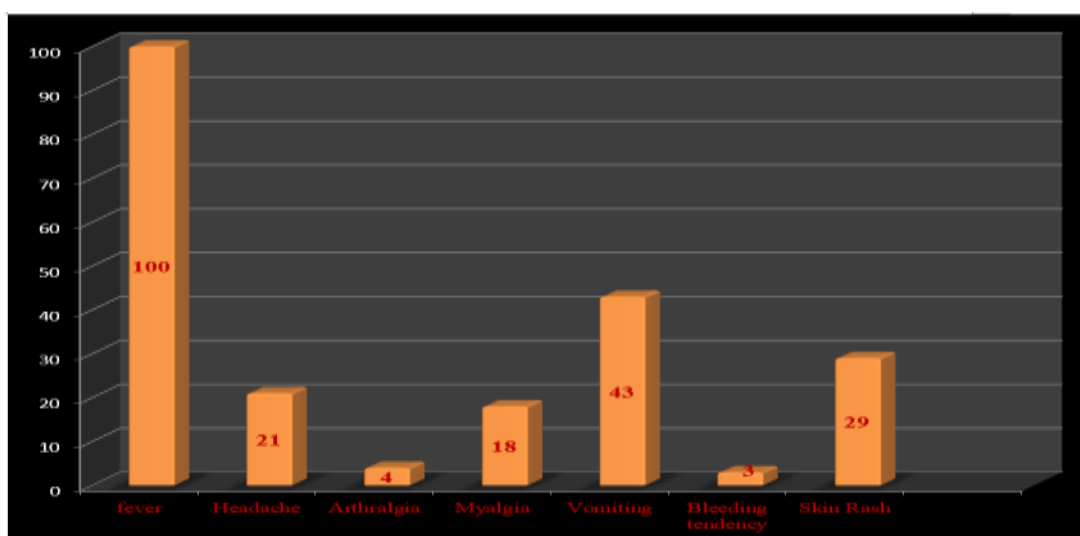


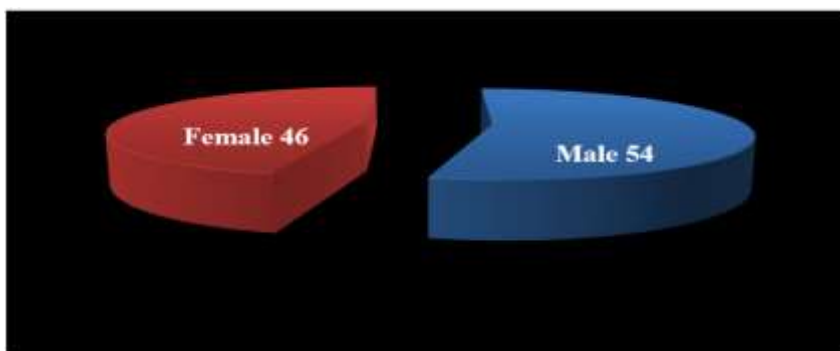
Figure 1: Clinical features of 100 dengue fever patients with abdominal pain

The above Figure 1 shows majority of cases presented with fever 100 (100%), followed by vomiting 43 (43%), skin rash 29 (29%), headache 21 (21%), myalgia 18 (18%), arthralgia 4 (4%) and bleeding tendency 3 (3%).

Table 2: Distribution of study patients according to age

Age In Years	No of Dengue illness cases	Percentage
1 -3	13	13%
4-6	20	20%
7-9	38	38%
10-12	26	26%
Total	100	100%

The above table shows majority of cases found in 7-9 years age group 38 (38%) followed by 10-12 years age group 26 (26%), 4-6 years age group 20 (20%) and 1-3 years age group found 13 cases (13%).

**Figure 2: Distribution of Dengue illness cases according to Sex**

The above figure 2 shows majority of the cases were found in males 54 (54%) and females were 46 (46%)

Table 3: Distribution of Dengue illness cases according to TLC

TLC	Frequency	Percentage
Leucocytosis	26	26%
Leucopenia	33	33%
Normal	41	41%
Total	100	100

The above table shows majority of the cases was found with Normal TLC 41 (41%), 33 cases was found with Leucopenia (33%) and 26 cases with Leucocytosis (26%).

Table 4: Association of acute abdomen with dengue illness cases with age

Age	Acute abdomen with dengue illness				Total (%)
	Present	Percentage	Absent	Percentage	
1-3	3	23.07%	10	76.93%	13(100)
4-6	17	85%	03	15%	20(100)
7-9	30	78.94%	8	21.05%	38(100)
10-12	18	69.06%	11	37.93%	29(100)
Total	68	61.81%	32	38.19%	100

When statistical analysis using Chi- square test was done, proportion of acute abdomen with dengue illness was statistical significant in age group 7 and above ($p < 0.05$).

Table 5: Proportion of Stage of Dengue Infection

Stage of Dengue Infection	frequency	percentage
Dengue Fever	95	95%
Dengue Hemorrhagic	4	4%
Dengue Shock Syndrome	1	1%
Total	100	100

The above table shows majority of cases had Dengue fever 95 (95%, followed by Dengue Hemorrhagic 4,(4%) and Dengue shock syndrome was found in 1 case (1%)

Table 6: Distribution of cases as per Clinical outcome

Clinical Outcome	frequency	percentage
Death	01	01%
Discharged	92	92%
DAMA	07	07%
Total	100	100

The above table shows majority of cases clinical outcome was Discharged 92 cases followed by DAMA 7 cases and Death in 1 case

DISCUSSION

Dengue viral infections are one of the most important mosquito borne diseases in the world. They may be asymptomatic or may give rise to undifferentiated fever, dengue fever (DF), dengue haemorrhagic fever (DHF), or dengue shock syndrome (DSS).

Early recognition and prompt initiation of appropriate treatment are vital if disease related morbidity and mortality are to be limited.¹⁵ Dengue is widely distributed in many countries in southeast and southern Asia, Central and South America, and the Western Pacific regions.¹⁶

The common symptoms in dengue infection are fever, malaise, headache, musculoskeletal pain, nausea and vomiting. Nonetheless, a significant number of patients develop one or more complications that include bleeding, effusions, acute hepatic failure, seizures, acute myocarditis, dengue encephalitis, acute renal failure, dengue shock syndrome (DSS).¹⁷

The abdominal pain in dengue infection can be either specific or non-specific. Of the specific cases, surgical emergencies like acute pancreatitis, acute acalculous cholecystitis and gastrointestinal bleeding are found in literature. In addition, there are reports of dengue enteritis mimicking appendicitis. However, in many cases of severe abdominal pain, no cause can be found.¹⁶

Abdominal pain is one of the common symptoms of DF and severe pain abdomen is strongly associated with DHF. About 500 000 people with severe dengue fever require hospitalization each year out of which about 2.5% die.¹⁸ Severe pain abdomen may mimic many of the surgical emergencies like acute cholecystitis, appendicitis and pancreatitis.

In this study majority of cases presented with ascites 36 (36%) followed by pleural effusion 20 (20%), hepatitis 17 (17%), Mesenteric lymphadenopathy 5 (5%), Pancreatitis 4 (4%),Calculous cholecystitis 3 (3%) and appendicitis 1 (1%).Similar result was found in

Satya Sudhish Nimmagadda et al (2014)¹⁹ A prospective hospital based observational study conducted at hospitals of Kasturba Medical College in Mangalore, India, over a period of two years (June–2010 to May–2012). A total of 150 patients with DF were included in the study. He revealed that the hepatitis in 40.6% patients, renal failure (8%), acalculous cholecystitis (6.66%) and acute pancreatitis (1.33%).

In this study majority of cases found in 7-9 years age group e.g 38 (38%) followed by 10-12 years age group 26 (26%), 4-6 years age group 20 (20%) and 1-3 years age group found 13 cases (13%).

Similar result was found in Khanna S et al (2005)²⁰ Conducted a cross-sectional study in Tertiary care center in India during July to November 2003 and July to November 2004. A total of 100 patients who presented with fever and abdominal pain the mean age of the patients were 7 years (range 1-12 years).

In this study majority of the cases were found in males 54 (54%) and females were 46 (46%) similar result was found in Khanna S et al (2005)²⁰ Conducted a cross-sectional study in Tertiary care center in India during July to November 2003 and July to November 2004. A total of 100 patients who presented with fever and abdominal pain. Fifty-five of these patients had DF were included in the study. He found that the 55 patients with DF, there were 35 male and 20 female patients.

In this study majority of cases had Dengue fever 95 (95%), followed by Dengue Hemorrhagic 4, (4%) and Dengue shock syndrome was found in 1 case (1%). similar result was found in Wasay M, et al (2008)²¹ he Reviewed 225 cases of confirmed dengue virus infection from years 2000-2004. He found that the 30 (73%) had Dengue Fever (DF), 10 (24%) had Dengue Haemorrhagic Fever (DHF) and 1(2.4%) had Dengue shock syndrome (DSS) while after 2005, 107 (58%) had DF, 71 (39%) had DHF and 6 (3%) had DSS.

In current study majority of cases clinical outcome was Discharged 92 cases followed by DAMA 7 cases and Death in 1 case similar result was found in Wasay M et al(2008)²¹ he reported that the Six patients (2.6%) died. Presence of shock (OR 2.9, 95% CI; 1.7-6.2), coma at presentation (OR 1.89, 95% CI; 1.02-3.3) and seizures (OR 1.6, 95% CI; 0.9-3.0) were important predictors of mortality.

CONCLUSION

Most common cause of abdominal pain in dengue fever was ascites, Most common clinical features found in dengue cases was fever, followed by vomiting and skin rash. Most of cases were found in 7-9 years age group. Highest Proportion of Stage of Dengue Infection was dengue fever

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