Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: www.saspublishers.com

OPEN ACCESS

Pediatrics

A Study of Epidemiology, Clinical Profile and Outcome of Dengue Fever among Children in the Age Group of 2 Months to 14 Years Admitted in the Department of Paediatrics, Government General Hospital, Kakinada

Dr. C. N. Mohan Chandran[1], Dr. T. Sravani[2], Dr. K. Sasi Kiran[3], Dr. M. Prakash Kumar[4*]

[1]Associate professor, Department of Pediatrics, Governement General Hospital, Kakinada, Andhra Pradesh, India
[2]Junior resident, Department of pediatrics, Governement General Hospital, Kakinada, Andhra Pradesh, India
[3]Senior resident, Department of pediatrics, Governement General Hospital, Kakinada, Andhra Pradesh, India
[4]Assistant professor, Department of pediatrics, Governement General Hospital, Kakinada, Andhra Pradesh, India

***Corresponding author:** Dr. M. Prakash Kumar
| **Received:** 02.03.2019 | **Accepted:** 15.03.2019 | **Published:** 30.03.2019
DOI: 10.36347/sjams.2019.v07i03.048

Abstract | **Original Research Article**

Dengue fever is the most important emerging tropical viral disease of humans in the world today. Infants and young children are at a higher risk of developing severe illness. A total of 150 Children in the age group of 2 months to 14 years admitted with fever of 2-7 days duration who fit into the clinical case definition for probable dengue fever were investigated and those patients who were positive for any one of the tests like NS1Ag and/or IgM Ab were included in this study. Among them dengue fever WITHOUT warning signs was seen in 78 cases (52%), dengue fever WITH warning signs was seen in 60 cases (40%) and severe dengue was seen in 12 cases (8%).The common symptoms were fever which was present in all the cases (100%), followed by vomitings in (78%) cases, body pains in (70%) cases, abdominal pain in (52%) cases and headache in (46%) cases. Bleeding manifestations were seen in 70% cases with petechiae (53%) being the most common. Hypotension was observed in 57 cases (38%), shock in 18 cases (12%). Thrombocytopenia was seen in 140 cases (93 %). Hematocrit value more than 40% seen in 48 cases. NS 1Ag test was done for 90 cases and it was positive in 70 cases (77 %). Many patients were in the age group of 8 years to 12 years. The common symptoms were fever seen in (100%) cases followed by vomitings, body pains, abdominal pain and headache. Mortality in the study was 6%.Unusual manifestations like Encephalopathy, Acute renal failure and acute respiratory distress syndrome were seen in a small proportion of the patients. There is a need for health education regarding clinical symptoms and early identification of signs, along with vector control.

Keywords: Dengue fever, warning signs, NS1Ag, Thrombocytopenia, Hematocrit.

INTRODUCTION

Dengue fever is caused by several arthropod-borne viruses. It is the most important emerging tropical viral disease of humans in the world today. It has become a major health concern globally and there has been a recent surge of dengue infections in India.It has become a leading cause of hospitalization and death among children in the South-East Asia Region [1] of WHOM, next only to diarrheal diseases and acute respiratory infections. Infants and young children are at a higher risk of developing severe illness.

The infection spreads by Aedes mosquitoes. It is estimated that 50 million cases of dengue fever occur worldwide annually and half a million people suffering from DHF require hospitalization each year, a very large proportion of whom (approximately 90%) are children. About 2.5% of those affected with dengue die of the disease.

The identification of cases is by distinct clinical features but theycan present with varied manifestations. Despite advances in diagnostic modalities and treatment strategies, there is limited published Indian data on dengue fever in the paediatric population, particularly in understanding the pathogenesis of dengue fever. So the present study was done to evaluate the clinical features, laboratory findings, severity and outcome of children with dengue fever.

PATIENTS AND METHODS

The present study was a hospital based Prospective observational study conducted over a period of 18months from January 2017 to June 2018 in the department of Pediatrics, Government General Hospital, and Kakinada. Children in the age group of 2 months to 14 years admitted with fever of 2-7 days duration who fit into the clinical case definition for

probable dengue fever were investigated and those patients who were positive for any one of the tests like NS1Ag and/or IgM Ab were included in the study. Children with any specific identified bacterial or viral febrile illness of more than 5 days duration and children with suspected dengue fever but were negative for the tests like NS 1Ag and IgM were excluded from the study. A total number of 150 patients were included in the study.

Prior counseling was given to parents / guardians. After taking written informed consent from parents, data was collected and was recorded in a predesigned proforma. Demographic data of enrolled children like age, sex and address were recorded. Complete clinical examination was done and details were recorded. Blood samples were collected from these children for complete blood count, haematocrit, liver function tests, NS 1Ag, IgM & IgG Ab, and other relevant investigations like chest X-ray and ultra sound abdomen were also done. The complications, clinical course during hospital stay, treatment given and the final outcome of enrolled children were recorded.

The data collected was tabulated and analysed using SPSS software version 19.The WHO Revised Dengue Clinical Case Management Guidelines 2011 and Clinical Case definitions were used to classify the disease as dengue fever without warning signs, dengue fever with warning signs and severe dengue

OBSERVATIONS AND RESULTS

150 children with dengue fever were admitted in the hospital during the study period.

The cases were categorized into

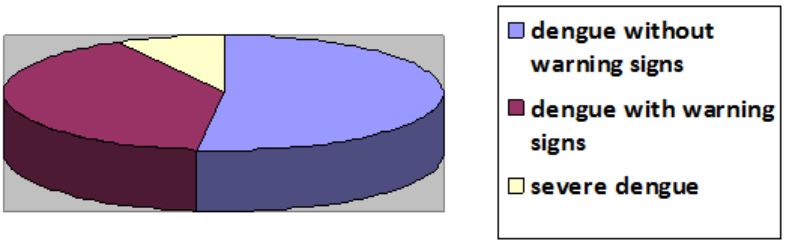

Fig-1: classification of dengue fever

- Dengue fever WITHOUT warning signs
- Dengue fever WITH warning signs
- Severe dengue

Among the 150 cases, dengue fever WITHOUT warning signs was seen in 78 cases (52%), dengue fever WITH warning signs was seeen in 60 cases (40%) and severe dengue was seen in 12 cases (8%). Out of 150 cases 78 were female and 72 were male.

The youngest child was 2 months and the oldest child was 14 years old. The mean age of patients is 9 ± 2 years.

Table-I: Distribution of age

Age group	Number of cases n=150
2m to 5y	34(22%)
6y to 10y	67(45%)
11y to 14y	49(33%)

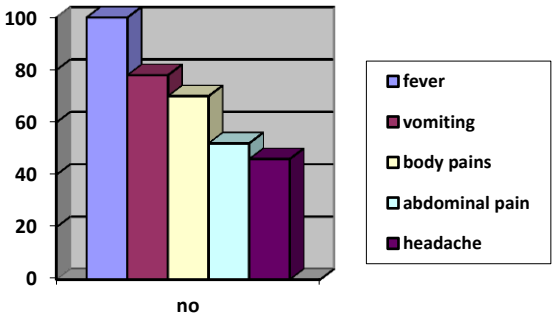

Fig-2: Symptoms of dengue

The common symptoms were fever which was present in all the cases (100%) followed by vomitings in 117 cases (78%), body pains in 105cases (70%), abdominal pain in 78 cases (52%) and headache in 69 cases (46%).

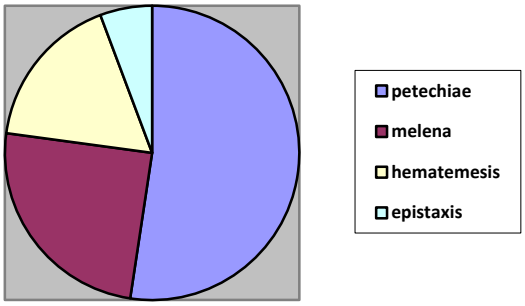

Fig-3: Bleeding manifestations

Bleeding manifestations were seen in 70% cases with petechiae in 55 cases (53%) being the most common followed by melaena in 26 cases (27%), hematemesis in 18 cases (15%) and epistaxis in 6 cases (5%).

Table-II: Signs of dengue fever

Signs	Number of cases
Erythematous rash	38(26%)
Hypotension	57(38%)
Shock	18(12%)
Hepatomegaly	32(21%)
Positive torniquet test	34(22%)

Erythematous rash was seen in 38 cases (26%), hypotension was observed in 57 cases (38%), shock in 18 cases (12%). hepatomegaly was seen in 32 cases (21%) and Positive tourniquet test was seen in 34 cases (22%).

Table-III: Signs in X-ray and USG

Signs in X-ray chest/ USG abdomen	Number of cases
Plural effusion	12(8%)
Ascitis	4(2.6%)
Gall bladder wall edema	12(8%)

Pleural effusion was seen in 12 cases (8%) in chest x-rays. Ascites was seen in 4 cases (2.6%) and gall bladder wall oedema was seen in 12 cases (8%) in abdominal ultrasonography.

Thrombocytopenia was seen in 140 cases (93 %).Platelet count between 1 lakh and 1.5 lakh/mm3 seen in 49 cases, between 50,000 and 1 lakh/mm3 seen in 54 cases between 20,000 and 50,000/mm3 seen in 30 cases and less than 20,000/mm3 seen in 7 cases. Hematocrit value more than 40% seen in 48 cases, between 30 and 39% was seen in 94 cases and less than 30% seen in 8 cases. Mean hematocrit was 37%. NS 1Ag test was done for 90 cases and it was positive in 70 cases (77 %). IgM Ab test was done for 150 cases and it was positive in 80 cases (53%). Both NS 1Ag and IgM Ab were positive in 34 cases.

Table-IV: Unusual complications

Unusual complications	Percentage
Liver dysfunction	24%
ARDS	5%
Encephalopathy	8%
ARF	1.33%
AGN	0.6%

Complications seen were Liver dysfunction (24%) in the form of elevated liver enzymes and Acute Respiratory Distress Syndrome (5%). Unusual complications like encephalopathy (8%) in the form of altered sensoriumand seizures, ARDS in (5%), acute renal failure (1.33%) in the form of oliguria and hypertension. One of the children presented with features suggestive of acute glomerulonephritis like hematuria, hypertension and edema. Mortality in the study was 6% with severe bleeding manifestations and shock being the leading cause followed by ARDS.

Intra-venous fluids (RL or NS) were given for 110 cases. Inotropic support (Dopamine or Dobutamine) was given for 12 cases (8%). Platelet transfusion was given for 4 cases. The average duration of stay in the hospital was 9 days.

DISCUSSION

In the present study of 150 children the common age group affected was 8-12 years with almost equal male to female ratio, similar to Sk kabra *et al*. [2]. In a study by Kulkarni *et al*. the commonest age group affected was 6-12 years with male preponderance, whereas in Dhooria *et al*. study[3] most commonly affected age group was 10 to 14 years and Anju Agarwal *et al*. [4] from Delhi reported<6 yrs as common age group.

In the present study the common symptoms were fever (100%), vomiting (78%), body pains (70%), abdominal pain (52%) and headache (46%). Fever, vomiting were most frequent symptoms as shown by Narayanan *et al*. In a study by Dhooria *et al*. [3] the common symptoms described were fever (91%), vomiting (41%), abdominal pain (16%), poor intake (21%) and significant bleeding (15%). According to Rategeri *et al*. [5] the common symptoms were fever (100%), vomiting (82%), abdominal pain (61%) and headache (22%). According to Rehman *et al*. the common symptoms were headache (91%), myalgia (85%), vomiting (45%).

In the present study the most common bleeding manifestation was petechiae in 55% of cases, followed by significant bleeding in the form of melena (24%), followed by haematemesis (18%), epistaxis (6%) and gum bleeds (3%). Melena constituted the most common form of internal bleeding in the present study and also in the study by Shah *et al*. [6]. Hematemesis was reported as the most common manifestations in the study by Narayanan *et al*. whereas epistaxis was most common in the study by Faridi *et al*. Ahmed *et al*. observed gum bleeds in 16%, hematemesis in19%, epistaxis in 12 % ,malena in 8%, and subconjunctival hemorrhage in 4 % cases. In a study by Rategeri *et al*. [5] gastro intestinal bleeds were seen in 22% and petechiae in 18% cases.

In the present study hepatomegaly was seen in 32% cases and splenomegaly in 8%.According to Faridi *et al*. hepatomegaly was seen in 54% and splenomegaly in 32.4% cases. In a study by Benerjee *et al*. hepatomegaly was in seen 15% and hepatosplenomegaly in 7% cases. In a study by Arif *et al*. hepatomegaly was seen in 35% and splenomegaly in 2% cases.

In the present study thrombocytopenia was observed in 93% cases, which was little higher compared to the study by Kulkarni *et al*. which was (84%). According to Ahmed *et al*.[7] thrombocytopenia was observed in 68.5% and by Benerjee *et al*. thrombocytopenia was observed in 96%. In the present study thrombocytopenia was further graded as 50,000–1,00,000 /cu. mm in 39%, 20,000-50,000 /cu.mm in 22 % and< 20,000/ cu.mm in 5% cases. A study by Malavige *et al*. [8] the platelet counts between 50,000-1,00,000 was 24.2%,20,000-50,000 was 46% and < 20,000 in 30%. In a study by Kamath *et al*. [9] platelet count <50,000/ cu mm was seen in 62.3%.

In the present study there was no correlation between thrombocytopenia and bleeding manifestations which is similar to that of study done by Dhooria *et al*. Although thrombocytopenia was seen in 93% cases, bleeding manifestations were observed in only 70% there was poor correlation between thrombocytopenia and bleeding manifestations, indicating abnormal platelet aggregation rather than reduction in absolute numbers was the cause of bleeding manifestations (p value < 0.05).

In the present study leucopenia was observed in 30% cases. A study by Arif *et al*. leucopenia was observed in 43 %.A study by Ratageri *et al*. leucopenia was observed in 26% of cases.

In the present study the mean haematocrit was 37 %. In a study by Dhooria *et al*. it was 35.5%. In the present study haematocrit>40% was seen in 32%, 30 to 40% in 62.6% and <30% in 5.3 %. In a study by Anju *et al*. haematocrit >40% was seen in 18 %, >30 to 40% in 66 % and <30% in 16 % cases. Since preillness hematocrit was not known it was difficult to document hemoconcentration. These observations suggest that hemoconcentration may not be a good indicator for diagnosis and monitoring of fluid if pre-illness hematocrit is not known, particularly because there is a high prevalence of anemia in the population.

In the present study hepatic dysfunction was seen in 24% children which was more when compared to the study done by Dhooria *et al*. in which it was seen in 14.8%cases.But in a study by Hayat *et al*. it was seen in 40%, Faridi *et al*. 64% and Mohan *et al*. [10] 84% of cases.

In the present study Ig M Ab was positive in 53%. Benerjee *et al*. reported that in Pune, India (54 %) had IgM antibodies for dengue and Faridi *et al*. reported 69% positivity.

In the present study evidence of capillary leakage in the form of ascites and pleural effusion was seen in 6% cases and 12% cases respectively. According to Faridi *et al.* it was 18 % and 9% respectively, Saha *et al*. 2% and 6% respectively. On the contrary, 54%and 70% of children demonstrated ascites and pleural effusion respectively in the study of Ratageri *et al*.

In the present study positive tourniquet test was observed in 22% cases.According to Faridi e*t al.* it was observed in 64% and Saha *et al*. 76%. It may be due to either thrombocytopenia or capillary fragility or both. Low proportion of positivity in tourniquet test in Indian population may be due to darker skin color or dengue strain difference in Indian subcontinent. The tourniquet test did not correlate with overt bleeding manifestation as shown by Wali *et al*. [11]. It may be due to difference in pathogenesis, like vascular permeability and/or capillary fragility.

In the present study unusual manifestations like encephalopathy was seen in 8% cases, acute respiratory distress syndrome in 5% cases. According to Dhooria *et al*. encephalopathy was seen in 4% and ARDS in 6% cases, in Ratageri *et al*. 22% and 3% cases respectively. Daniel *et al*. suggested an association of abnormal AST with a worst outcome

Comparison of mortality

The mortality observed in the present study was 6 %. Dhooria *et al*. and Rachel D *et al*. [12] 0beserved mortality rates of 3.7% and 3.2% respectively. Ashwin kumar *et al*. reported 2.4% and Anju Agarwal *et al*. [4] reported 6% mortality. In our study ARDS was seen in 7 cases out of which 5 expired. In a study by Dhooria *et al*. two patients had ARDS, both of which expired. Dengue associated ARDS is associated with a high mortality [13]. In a study by Shah *et al*. [6] the three patients who died belong to DSS with a case fatality rate of 16.6%. In the present study presence of DSS, liver dysfunction, ARDS are the risk factors for mortality. In a study by Dhooria *et al*.[3] the risk factors for mortality are coagulopathy, ARDS and hyponatremia

The present study highlights the change in the epidemic pattern of presentation with more number of atypical manifestations and lack of classical mode of presentation in some cases. Clinical vigilance, awareness and timely intervention are vital in reducing the morbidity and mortality in dengue fever.

CONCLUSIONS

Many patients were in the age group of 8 years to 12 years with fever, vomitings, body pains and abdominal pain being the most common clinical features. Unusual manifestations like Encephalopathy, Acute renal failure and acute respiratory distress syndrome were seen in a small proportion of the patients. There was no correlation between thrombocytopenia and bleeding manifestations. Mortality in the study was 6%. Effective vector control methods are an essential component to reduce dengue-related mortality and morbidity. Health education regarding the unusual manifestations, changing epidemic trends, early recognition of illness, careful monitoring, timely intervention, and proper public health measures can reduce the morbidity and mortality due to severe dengue infection.

There is a need for more scientific research which will provide further insight in the pathogenesis of dengue infection and help in understanding the underlying molecular mechanisms associated with progression to the severe forms of the disease (DHF/DSS). This will be a step forward to develop an adequate preventive vaccine and effective treatment.

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