A study on clinical profile of pediatric patients with dengue fever at a tertiary care hospital

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Abstract
Dengue fever is a major public health problem especially in Indian subcontinent. It is a mosquito–borne arboviral infection which results in significant morbidity and mortality. The complications of dengue fever usually happen after the 5th day of illness which include fluid leak, bleeding, hepatitis, encephalopathy, ARDS. The studies on dengue in paediatric age group are scant in this part of the country. Cross sectional study was conducted on 250 pediatric cases presenting with fever for 2 to 7 days, presenting at OPD/IPD of pediatric department. This study had shown that, the age group was between 6 – 9 years, males sex, fever was the common sign, hepatomegaly was the common sign, leucopenia, reduced platelet count, NS1 positive, IgM and IgG positive, normal C3 count, positive Widal test abnormal USG abdomen, more than 5 days of hospitalization and mortality was present in 11.1% of the cases.

Keywords: Dengue hemorrhagic fever, complications, laboratory investigations, mortality, pediatric patients

Introduction
Dengue fever is an internationally recognized major public health problem especially in tropical and subtropical countries mainly affecting urban and sub urban areas. It is a most common mosquito – borne arbo viral infection (single stranded RNA virus) which results in significant morbidity and mortality. The dengue virus is capable of infecting humans and causing the disease. The estimates have shown that, 2.5 billion people are mainly living in urban areas who are under risk of acquiring the infection [1]. The literature available has shown that, the dengue is more common in more than 100 countries, most cases are reported mainly from South East Asia and western pacific regions [2]. There are about 50 and 100 million cases of dengue fever (DF) and about 500,000 cases of dengue hemorrhagic (DHF) each year which require hospitalization. It has become a leading cause of hospitalization and death especially among the children in the South – East Asia region of WHO over last 10 – 15 years following diarrhoea disease and acute respiratory infections [3].

Dengue is a mosquito - borne disease caused by serologically related but antigenically distinct single strand positive RNA viruses. The literature available had shown that four different types of serotypes are known cause Dengue infection (DENV through DENV - 4. They belong to flavivirus family (Family flaviviridae). Aedes Aegypti is the primary mosquito vector but other species of genus Aedes, such as Aedes albopictus can also act as vector for the virus transmission. The clinical spectrum may range from asymptomatic infection, mild dengue fever (DF), dengue hemorrhagic fever (DHF) or dengue shock syndrome, which is often fatal because of abnormal capillary permeability and plasma leakage. The disease can also manifest in unusual manner resulting in myocardiopathy, hepatic failure and neurological disorders. Specific treatment for the dengue is not available till today but only vector control is the main preventive strategy [4]. Plasma leakage due to alteration in microvascular permeability is the pathognomonic feature of the severe DHF. No vaccine and specific antiviral therapy for DF/DHF and management of cases remains largely supportive. The dengue virus is often confused with other febrile illness of viral origin which confounds both clinical management and disease surveillance for prevention of viral transmission. Non specific clinical symptoms predominate during the early phase of illness which makes the clinical management difficult. Retro-orbital pain and clinical signs including Petechiae are definitive symptom and sign which do not appear until...
the later stage of illness [5]. The diagnostic tests such as RT-PCR is costly; not sufficiently rapid, such as virus isolation or under field trials including ELISA for NS1 protein of Dengue virus can be used at early stages of illness. Simple haematological or biochemical tests are the need of the hour which can be useful for case management and preventing mortality and morbidity [6].

The radiological techniques including ultrasonography is useful in diagnosing GB wall thickening, pericholecystic fluid, minimal ascites, pleural effusion, pericardial effusion and hepatosplenomegaly. The ultrasonography was also able to find the abnormality of liver parenchyma which can be due to intraparenchymal and subcapsular haemorrhages. GB wall thickening in DF can be due to decrease in intravascular osmotic pressure [7].

The complications of dengue fever usually happen after the 5th day of illness. The complications of dengue include fluid leak, bleeding, hepatitis, encephalopathy, ARDS especially in paediatric age group and its most important public health problem in tropical developing countries and also have a major economic and social impact. The studies on dengue in paediatric age group are scant in this part of the country. Hence this study was taken up with aim of analysing the clinical and haematological and radiological parameters in children during the febrile phase of dengue and correlating them with onset of complications. This may provide us with guidelines for early recognition of children with dengue who are at risk of developing complications, thus reducing morbidity and mortality and providing timely intervention [8].

Methodology
A cross sectional study was undertaken in the Department of Paediatrics of Medical College Hospital and Research Centre, among 250 cases presenting with fever for 2 to 7 days from the outpatient and inpatients departments over period of 20 months. An informed Bilingual and written consent was obtained from the close patient relatives before the study was started. The calculated sample size was 250 cases and calculated as follows,

\[ N = \frac{4 \times Z_{\alpha}^2 \times pq}{d^2} \]

\( p = \) Attack rate of dengue in endemic areas (30%)
\( q = 100 - p \)
\( Z_{\alpha} = 1.96 \)
\( \alpha = 0.05 \)
\( \delta = \) the percentage of error (20% of 30% attack rate)

The calculated sample size is 224 cases which was approximately equal to 250 cases.

Inclusion criteria
- Serologically confirmed (positive for NS1 antigen or IgM or both) dengue fever patients, admitted at Medical College Hospital and Research Centre.
- Those patients whose parents give informed consent.
- All cases in pediatric age group of both sex

Exclusion criteria
- Clinical features of dengue with NS 1 negative and IgM negative.
- IgG positive cases with features of dengue.
- Lost for study (referred during the course of treatment or Discharge against medical advice.

Results

| Age group | Frequency | Percent |
|-----------|-----------|---------|
| Less than 3 years | 47 | 19.0 |
| 3 – 6 years | 38 | 15.2 |
| 6 – 9 years | 56 | 22.4 |
| 9 – 12 years | 45 | 18.0 |
| 12 – 15 years | 44 | 17.6 |
| More than 15 years | 20 | 8.0 |
| Total | 250 | 100 |

This study had shown that, about 22.4% of the study group were aged between 6 – 9 years, 19% were aged less than 3 years, 18% were aged between 9 – 12 years, 17.6% were aged between 12 – 15 years.

| Sex | Frequency | Percent |
|-----|-----------|---------|
| Male | 143 | 57.2 |
| Females | 107 | 42.8 |
| Total | 250 | 100 |

Male patients outnumbered females in this study.

| Symptoms | Frequency | Percent |
|----------|-----------|---------|
| Fever | 250 | 100.0 |
| Cold | 133 | 53.2 |
| Cough | 79 | 31.6 |
| Conjunctival congestion | 47 | 18.8 |
| Lymphadenopathy | 17 | 6.8 |
| Skin rash | 79 | 31.6 |
| Face flushing | 35 | 14.0 |
| Vomiting | 64 | 25.6 |
| Loose stool | 46 | 18.4 |
| Decreased urine output | 47 | 18.8 |
| Pain abdomen | 122 | 48.8 |
| Headache | 43 | 17.2 |
| Retro orbital pain | 12 | 4.8 |
| Myalgia/ Arthralgia | 53 | 21.2 |
| Bleeding tendency | 62 | 24.8 |
| Similar illness in family | 10 | 4.0 |

All the patients in this study had fever, 53.2% had cold, 48.8% had pain abdomen, 31.6% had skin rash and cough and 24.8% had bleeding tendency.

| Signs | Frequency | Percent |
|-------|-----------|---------|
| Tachycardia | 2 | 0.8 |
| Raised Respiratory rate | 1 | 0.4 |
| Positive tourniquet test | 24 | 9.6 |
| Reduced blood pressure | 1 | 0.4 |
| Hepatomegaly | 159 | 63.6 |
Hepatomegaly in 63.6% of the cases followed by positive tourniquet test in 9.6% of the cases and raised total count in 6% of the cases.

Table 5: Distribution of the study group according to Leucopenia and complications

| Leucopenia | Complications | Total n (%) |
|------------|---------------|-------------|
| No         | No n (%)      | Yes n (%)   | Total n (%) |
| No         | 51 (22.9)     | 13 (48.1)   | 64 (25.6)   |
| Yes        | 172 (77.1)    | 14 (51.9)   | 186 (74.4)  |
| Total      | 223 (100)     | 27 (100)    | 250 (100)   |

χ² Value=8.08 df=1 P value, Sig= 0.004, Sig

Leucopenia was observed in 77.1% of the patients without complications and 51.9% of the patients with complications which was statistically significant.

Table 6: Distribution of the study group according to Platelet count and complications

| Platelet count | Complications | Total n (%) |
|----------------|---------------|-------------|
| No             | No n (%)      | Yes n (%)   | Total n (%) |
| No             | 66 (29.6)     | 0           | 66 (26.4)   |
| Decreased      | 157 (70.4)    | 27 (100)    | 184 (73.6)  |
| Total          | 223 (100)     | 27 (100)    | 250 (100)   |

χ² Value=10.857 df=1 P value, Sig= 0.001, Sig

The platelet count was decreased in 70.4% of the patients without complications and all the patients with complications. There was a statistically significant difference in the platelet count between the patients without and with complications.

Table 7: Distribution of the study group according to NS1 test and complications

| NS1 test | Complications | Total n (%) |
|----------|---------------|-------------|
| No       | No n (%)      | Yes n (%)   | Total n (%) |
| Negative | 65 (29.1)     | 1 (3.7)     | 66 (26.4)   |
| Positive | 158 (70.9)    | 26 (96.3)   | 184 (73.6)  |
| Total    | 223 (100)     | 27 (100)    | 250 (100)   |

χ² Value=8.8025 df=1 P value, Sig= 0.005, Sig

NS1 test was positive in 70.9% of the patients without complications and 96.3% of the cases with complications. There was a statistically significant difference in the NS1 test in patients without and with complications.

Table 8: Distribution of the study group according to IgM test and complications

| IgM       | Complications | Total n (%) |
|-----------|---------------|-------------|
| No        | No n (%)      | Yes n (%)   | Total n (%) |
| Negative  | 142 (63.7)    | 16 (59.3)   | 158 (63.2)  |
| Positive  | 81 (36.3)     | 11 (40.7)   | 92 (36.8)   |
| Total     | 223 (100)     | 27 (100)    | 250 (100)   |

χ² Value=0.202 df=1 P value, Sig= 0.653, NS

The IgM test was positive in 36.3% of the patients without complications and 40.7% of the patients with complications. This difference was not statistically significant between the patients without and with complications.

Table 9: Distribution of the study group according to IgG test and complications

| IgG       | Complications | Total n (%) |
|-----------|---------------|-------------|
| No        | No n (%)      | Yes n (%)   | Total n (%) |
| Negative  | 212 (95.1)    | 26 (96.3)   | 238 (95.2)  |
| Positive  | 11 (4.9)      | 1 (3.7)     | 12 (4.8)    |
| Total     | 223 (100)     | 27 (100)    | 250 (100)   |

χ² Value=0.08 df=1 P value, Sig= 0.778, NS

The IgG test was positive in 4.9% of the cases without and 3.7% of the cases with complications. There was no statistically significant difference in IgG between the patients without and with complications.

Table 10: Distribution of the study group according to C3 levels and complications

| C3       | Complications | Total n (%) |
|----------|---------------|-------------|
| Normal   | No n (%)      | Yes n (%)   | Total n (%) |
| Normal   | 197 (88.3)    | 25 (92.6)   | 222 (88.8)  |
| Abnormal | 26 (11.7)     | 2 (7.4)     | 28 (11.2)   |
| Total    | 223 (100)     | 27 (100)    | 250 (100)   |

χ² Value=0.438 df=1 P value, Sig= 0.508, NS

The C3 level was abnormal in 11.7% of the cases without complications and 7.4% of the cases with complications. This difference in C3 levels was not statistically significant between the patients without and with complications.

Table 11: Widal test and complications

| Widal test | Complications | Total n (%) |
|------------|---------------|-------------|
| No         | No n (%)      | Yes n (%)   | Total n (%) |
| Negative   | 81 (36.3)     | 22 (81.5)   | 103 (41.2)  |
| Positive   | 142 (63.7)    | 5 (18.5)    | 147 (58.8)  |
| Total      | 223 (100)     | 27 (100)    | 250 (100)   |

χ² Value=20.274 df=1 P value, Sig= 0.000, Sig

The Widal test was positive in 63.7% of the cases without and 18.5% with complications. This difference in Widal test was statistically significant between the patients without and with complications.

Discussion
About 22.4% of the study group were aged between 6 – 9 years and 19% were aged less than 3 years. A study by Dhubale et al. had shown that, about 39% of the children belonged to 5 – 10 years. Among them, 35.9% were females and 64.1% were males [9]. A study by Gupta et al. had shown that the mean age was 11.6 years [10]. A study by Tamil Selvan et al. had reported that, about 35.5 years aged between 6-10 years [11]. A study by Shinde et al. had shown that, the mean age was 8.7 years [12]. In a study by Banerjee et al., most of the cases were school age children [13]. Male patients outnumbered females in this study. In a study by Dhubale et al., about 72% were females and 28% were males [9]. A study by Gupta et al. had reported that males outnumbered females [10]. A study by Shinde et al. had shown that males were than females [12]. A study by Banerjee et al. had shown that about 58% of the cases were males [13].
Conclusion
This study had shown that, the age group was between 6 – 9 years, males sex, fever was the common sign, hepatomegaly was the common sign, leucopenia, reduced platelet count, NS1 positive, IgM and IgG positive, normal C3 count, positive widal test was present in 11.1% of the cases.

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