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Clinical profile, laboratory investigations and outcome in dengue positive children in south India

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ABSTRACT

Dengue fever is one of the most commonly occurring mosquito borne-viral illnesses that has a wide range of presentation in children and is common during the monsoon season. The severity of illness ranges from mild undifferentiated fever, dengue with warning signs, severe dengue fever and dengue fever with organ dysfunction. The symptoms of dengue may be easily mistaken for those of flu or other viral infections. Contrary to other fevers, complications in dengue occur during the phase of defervescence and can be life threatening in children due to shock or profuse hemorrhage. 55 dengue positive children who were diagnosed by dengue antigen detection or dengue antibody positive were included in the study. Most of children were above 10 years and the commonest presenting symptoms were fever, headache, body pain, nausea, anorexia, abdominal pain and vomiting. Most of the children presented with two or more warning signs like persistent vomiting, thrombocytopenia, increasing hematocrit and hepatomegaly. Few children developed features of early shock, which was diagnosed early and treated effectively. All the children responded well to treatment measures and recovered well during hospital stay. Having a high of suspicion and careful monitoring of children is crucial for reducing occurrence of complications and death due to this severe infection.

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INTRODUCTION

Dengue fever is caused by Dengue virus (DENV) and transmitted mainly by the bite of the female Aedes aegypti mosquito and rarely by Aedes albopictus mosquito. This febrile illness commonly affects children as well as adults all over the world, especially being highly prevalent in Asian and Latin American countries due to various climatic factors such as rainfall, warm temperature, humidity and rapid urbanization. India has contributed to about 6-9% of total cases detected in South-East Asian Region (SEAR) countries between 2009 and 2011, which has increased to 19% in 2013 (Biswas *et al.*, 2015). During the monsoon season in South India, which falls between June till November every year, we see an increase in spurt of childhood fever due to various causes including dengue fever leading to an increase in footfall of fever cases both in outpatient and inpatient departments. The illness generates considerable anxiety and fear among the family

members and community at large due to its associated dreaded complications like dengue shock syndrome, dengue hemorrhagic fever, which can lead to mortality among children. There are four serotypes of Dengue virus, namely DENV1, DENV2, DENV3 and DENV4 and a child may get infected with any of the serotype multiple times (WHO, 2012). The common clinical symptoms of dengue fever are high fever, which has a biphasic pattern and lasts for 4-7 days. Fever is associated with symptoms such as intense headache, body pain, back pain, myalgia and rashes. The illness is classified by WHO as Dengue fever with or without warning signs and severe dengue. Infants, immuno compromised children and children on steroids are likely to progress to severe dengue. The warning signs are severe abdominal pain, persistent vomiting, hepatomegaly, spontaneous bleeding, rise in hematocrit, reducing platelet counts and serosal fluid accumulation leading to ascites and pleural effusions. The three phases of dengue are febrile phase (2-7 days), critical (1-3 days) and the recovery phase (1-3 days). The critical phase is characterized by endothelial cell dysfunction with plasma leakage into extravascular spaces leading to hypotension and hypotensive shock (Biswas *et al.*, 2015). During this critical phase, children may develop serious organ dysfunction involving the heart, brain, or liver. Patients may develop signs of fluid overload during recovery phase. It is important to have a high index of suspicion and evaluate by appropriate investigations like hematocrit, platelet count, white cell count, liver function tests and viral antigen identification by evaluating NS-1 during first five days of fever and IgM ELISA after sixth day of fever (Verdeal *et al.*, 2011). 2 Standard Indian National Guidelines for case management of dengue fever has been developed to recognize uniform criteria for grading the severity that is helpful for better planning and management of dengue infection in the country. Timely investigations, hospitalization, close monitoring of patients and identification of warning signs, fluid support, and standard treatment as per the WHO and National protocols are important in reducing the mortality due to this illness. Surveillance and improved reporting of dengue cases is essential to gauge the true global situation (Global Strategy, 2012).

MATERIALS AND METHODS

The study design was retrospective observational study that was conducted in the period from July 2019 till November 2019 at Saveetha medical College hospital, Chennai. All the children below 18 years who were diagnosed and who were confirmed as a case of dengue fever during above mentioned period based on positive tests for dengue fever, either positive NS1 antigen or positive IgM, IgG antibody rapid serological test kit or ELISA were taken into the study group. According to department protocols for managing a case of paediatric dengue, whenever the duration of fever was less than 5 days, NS1 antigen test was performed and for children who manifested with fever above 5 days had both NS1 as well as Dengue Ig M and IgG test done Children who had negative dengue viral test were excluded from the study. For all patient's basic demographic data was obtained, presenting complaints, clinical examination findings, laboratory investigations and classification of severity of illness. Statistical analysis was done using SPSS (statistical package for social sciences) software. The children were admitted either in general paediatric ward or paediatric intensive care unit for close monitoring based on their clinical presentation. Total 55 children were included in this observational study.

RESULTS AND DISCUSSION

Total of 55 children admitted in the paediatric department at Saveetha medical college, Chennai during the period from 15^{th} July -15^{th} November 2019, who presented with fever and who were diagnosed as dengue fever based on either positive Dengue NS1 antigen or dengue antibody titre were included in the study. As shown in Figure 1, majority of children were above 10 years (40 %), while only 3.6 % of patients were below the age of 1 year. In an observational study at Behrampur, Orissa which included 97 pediatric cases of dengue fever, it was observed that the maximum number of cases which was 34 % of patients were above 11 years and the mean age of children hospitalised with dengue was 8.7 years (Mishra *et al.*, 2016). In the present study, the mean age of presentation was 7.8 years, the percentage of boys was 60 % while that of girls was 40 %. In the Southern Orissa study, the number of boys affected was 77 % compared to girls 23 % (Mishra *et al.*, 2016).

As seen in Table 1, laboratory diagnosis was established by positive NS1 antigen-based ELISA test in 41 % children, positive dengue IgM antibody in 31 % and 15 % children had both NS1 antigen with positive IgM antibody titre while 13 % children had positive IgM and IgG antibodies. It was seen from Figure 3 that fever was the commonest presenting symptom in our study (100 %) and the duration of fever was varying between 2 and 10 days with a mean duration of fever was 4.5 days +1.6 days . In a retrospective study conducted in North

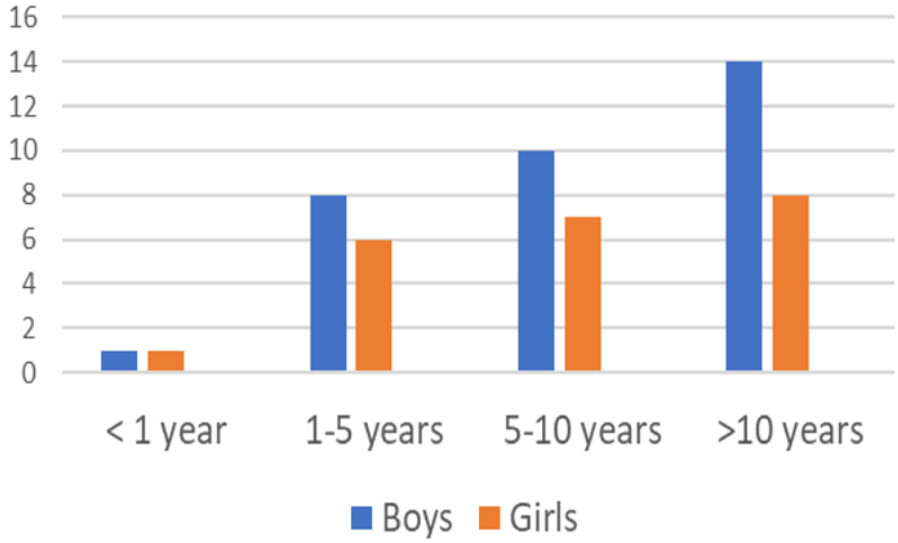

Figure 1: Demographic profile

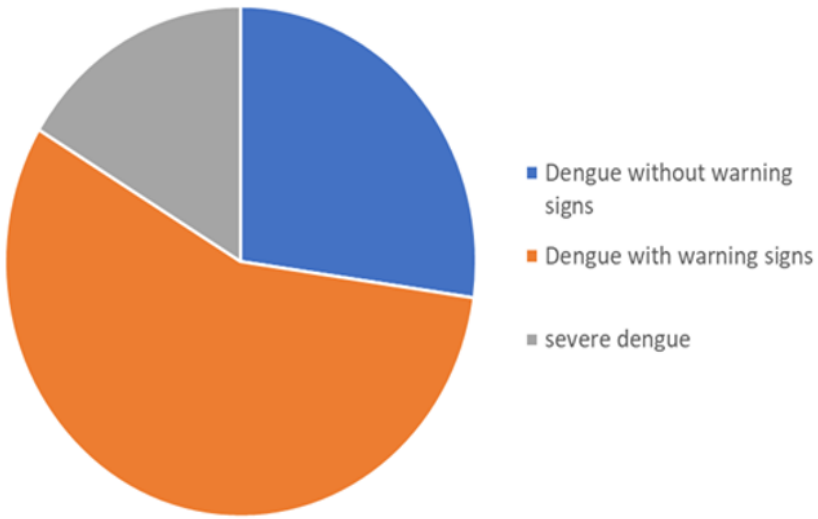

Figure 2: Classification of illness severity

Table 1: Diagnostic test

Diagnostic test	N %
NS1 antigen positive	23(41)
Positive dengue serology IgM antibody titer	17(31)
Positive NS1 antigen and IgM antibody titer	8(15)
Positive dengue serology IgM and Ig G titer	7(13)

Table 2: Laboratory values

Laboratory values	N%
Anemia	10 (18)
Raised hematocrit	37 (67)
Thrombocytopenia Platelet count < 1 lac/cmm	38(69)
Leucopenia WBC < 4000/cmm	48(87)
SGOT > 120 U/ml	11(20)

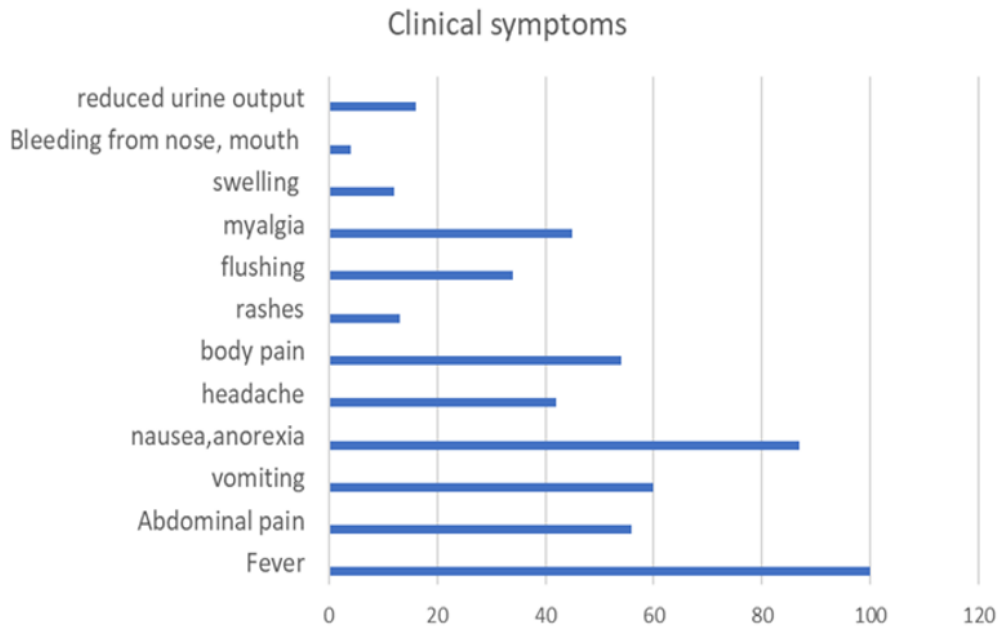

Figure 3: Clinical features- symptoms

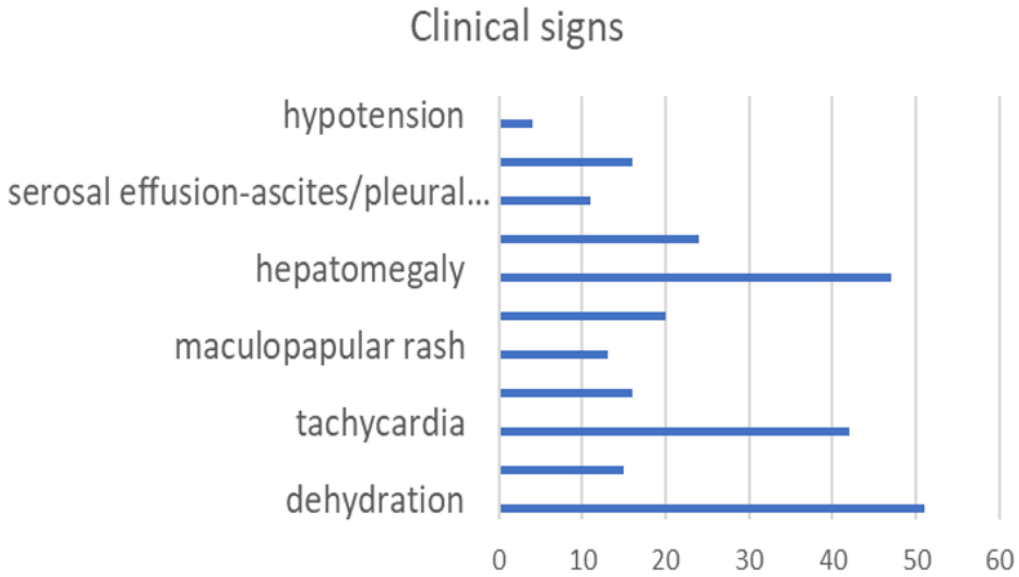

Figure 4: Clinical features-signs

India, it was seen that mean age (± SD) of children were 8.3 ± 3.5 y with male: female ratio 1.32 and mean duration of fever was 6.3 days (Mittal *et al.*, 2012). As shown in Figure 3, apart from fever, most children (87 %) presented with loss of appetite with nausea as the commonest accompanying symptom. Many children also complained of recurrent diffuse abdominal pain (56 %) and vomiting (60 %). Some children had repeated episodes of vomiting, which was controlled by administering parental antiemetics. In a study conducted in Chennai, it was observed that the most common presentations were fever (98.3%), vomiting (83.0%), bleeding manifestations (66%) and myalgia (54.2%) (Narayanan *et al.*, 2002). In the study published by Mittal *et al*. in North India, it was similarly observed that fever was the commonest presenting symptom in 100 % cases with headache in 63 % and abdominal pain in 71 % patients (Mittal *et al.*, 2012). Other common presenting symptoms in the present study were myalgias (45%), leg pain, headache (42%) and body ache (54 %). Some children (12%) developed itching during the recovery phase. About 10 % of children had symptoms of reduced urine output, swelling over the body and breathing difficulty. These manifestations occurred during the critical afebrile phase of illness. Minor bleeding like epistaxis and petechiae was seen in smaller percentage

of patients of 3 %. None of the patients had evidence of major bleeding like intracerebral bleed or gastrointestinal bleed. It was observed from Figure 4 that 16 % of children developed severe dengue in our study with features of early shock such as tachycardia, low volume peripheral pulses, dehydration, oliguria, prolonged capillary refill and altered sensorium with restlessness. About 4 % of children developed hypotension during the afebrile phase of the illness. As seen in Figure 2, the majority of children were clinically categorized as Dengue fever with warning signs (with two or more warning signs), commonest being abdominal pain (56 %), persistent vomiting (60 %) and hepatomegaly (56 %). In a study conducted in Puducherry in 2016, the common warning signs of presentation in hospitalised children with dengue fever were persistent vomiting (75.1%), liver enlargement (59.8%), cold and clammy extremities (45.2%), pain abdomen (31.0%), hypotension (29.5%), restlessness (26.4%), giddiness (23.0%), bleeding (19.9%), and oliguria (18.4%). As noted in Table 2, 69 % of children suffered from thrombocytopenia with platelet counts less than 100,000/mm during the illness. Most of the patients, 87 %, had leukopenia and 67 % of children developed increasing haematocrit values during the hospital stay. During an outbreak of dengue fever in Delhi in 2003 it was revealed that thrombocytopenia occurred in about 61.39% of cases, leukopenia and haemoconcentration (Hct>20% of expected for age and sex) were found in 68% and 52% of the cases (Singh *et al.*, 2005). Liver dysfunction with elevated SGOT > 130 U/ml was present in 20 % cases in the present study and no patient developed features of liver failure, myocarditis, or severe organ damage. The presence of spontaneous bleeding, hepatomegaly, signs of capillary leakage like ascites and pleural effusion, leukopenia<4000 mm3 and age >5 years were found out to be significant risk factors of shock in paediatric patients of DHF (Gupta *et al.*, 2011) . In a retrospective study conducted in Cambodia, it was seen that the five indicators for dengue severity included haematocrit, Glasgow Coma Scale, urine protein, creatinine, and platelet count (Phakhounthong *et al.*, 2018). Thrombocytopenia occurs in dengue fever either due to peripheral platelet destruction or due to impaired thrombopoiesis. Studies have also indicated reasons for thrombocytopenia such as altered proliferative capacity, inhibition of differentiation and megakaryocytic progenitor apoptosis (Paknikar and Sarala, 2014). Children were monitored and investigated based on department dengue management protocol as well as WHO guidelines for case management 2017. Daily assessment of platelet counts, PCV were performed for fluid management of patients. At admission investigations like complete blood count, liver function test, serum electrolytes, ultrasonography of abdomen, chest radiography were performed. Children received supportive care with intravenous fluids and antipyretics. They were also administered *Nilavembu Kudineer* or *Carica Papaya* Leaves extract for children with thrombocytopenia. In a Sri Lankan study, 12 patients with dengue fever received two doses of pf papaya extract, which was followed by an increase in platelet count and improvement of leukopenia within the next 24 hours. In another Indonesian study where 80 patients with dengue fever associated thrombocytopenia were treated with C. papaya, L. leaves extract capsule and these patients had a faster increase in platelet counts compared to those patients who did not receive the extract (Paknikar and Sarala, 2014). None of the children required ventilatory support in the present study and all children recovered completely during a hospital stay, whereas in the study published from Puduchery, there were six deaths (2.7%) (Pothapregada *et al.*, 2016).

CONCLUSION

Dengue fever commonly affects children of all ages in tropical regions during the monsoon season. The commonest presenting features are fever, nausea, anorexia, vomiting, abdominal pain and body pain, which can occur in other infections too. It is necessary to have a watchful eye and high index of suspicion to clinically recognise paediatric dengue, diagnose, perform relevant investigations and initiate appropriate supportive care to reduce the complications and mortality rates since the course of illness is highly variable in children.

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