Research Paper

Volume : 4 | Issue : 9 | Sept 2015 • ISSN No 2277 - 8179

clinicohematological profile and complications of dengue fever in children

Medical Science

KEYWORDS : tourniquet test, ns1 antigen, ARDS

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ABSTRACT

Objectives- to study clinical features, lab profile and complications of dengue in children between 6months to 12 yrs of age.

Methods- an observational prospective study of 150 cases of suspected dengue admitted in a hospital in metropolitan city from May 2011-Nov 2013. Patients were classified as per WHO 2011. The serological tests were done by rapid strip test.

Results- Out of 150, 101 came dengue positive with mean age 6.5 yrs .out of 101 positive 29 (28.7%) had dengue without warning signs, 28 (27.7%) had dengue with warning signs and 44(43.5%) had severe dengue. Common symptoms were fever, headache, vomiting ,pain in abdomen , rash, bleeding ,cough . Common findings were hepatomegaly, congested eyes, shock, tachypnea, positive tourniquet test ,icterus ,alteration in sensorium .Lab findings were platelets<1,00,000 (83.1%) ,leucopenia (62.3%). Abnormal Liver function (72.3%), deranged coagulation (54.5%), Chest x-ray and USG revealed plasma leakage. NS1positive in 1-5days of fever (p<0.5), Ig M in 6-10 days .Complications of severe dengue were plasma leakage (48.5%) , shock (43.5%), encephalopathy (11.9%),acute renal failure (7.9%), ARDS (5.9%) , severe hepatitis (4%) and DIC (2.9%). Mortality was 6(5.9%).

Conclusions- severe dengue is associated with high morbidity and mortality which can be prevented by early diagnosis, using severity indicators as described.

Introduction

Today about 2.5 billion people, or 40% of the world's population lives in dengue risk zone .It is endemic in at least 100 countries .WHO estimates that 50 to 100 million infections occur yearly, With 22,000 deaths, mostly among children(1) .Dengue viruses (DV) belong to family Flaviviridae and there are four serotypes referred to as DV-1, DV-2, DV-3 and DV-4. DV is a positive-stranded encapsulated RNA virus and is composed of three structural protein genes, which encode the nucleocapsid or core (C) protein, a membrane-associated (M) protein, an enveloped (E) glycoprotein and seven non-structural (NS) proteins. It is transmitted mainly by Aedes aegypti mosquito and also by Ae. albopictus. .After an incubation period of 4- 7 days, Illness begins. HYPERLINK \l "cite_noThe course of infection is divided into three phases: febrile, critical, and recovery.(2)

Aims and objectives

- To study clinical presentation and hematological profile of dengue in children between 6months to 12 yrs of age
- To study complications and outcome of dengue fever.

Material and methods

It is an observational prospective study of 150 admitted cases of fever in children between 6 months to 12 years of age done from May 2011-Nov 2013. The cases are defined as dengue without warning sign, dengue with warning sign and severe dengue as per WHO 2011 classification .patients were examined daily and investigated with daily complete blood counts which were recorded in a predesigned data sheet . chest x-rays and USG abdomen done within 3 days of admission .

The serological tests for detection of IgM and Ig G were performed by rapid strip test. Only serologically positive cases were taken for the final data analysis. A fall of hematocrit by more than 20% on treatment was considered as high hematocrit on admission. Chi-square test was applied to find out the significance of difference in terms of P-value with the help of computer SPSS programme. P-value of 0.05 or less was considered as statistically significant.

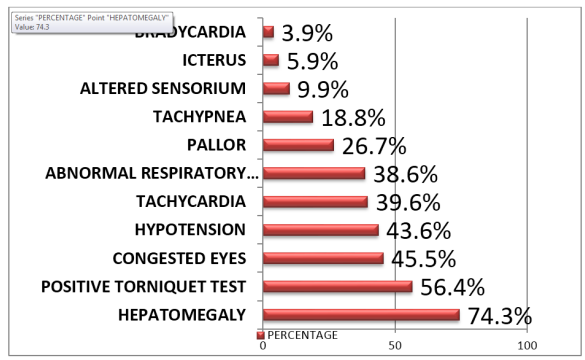
Review of literature

Dengue fever was first referred as "water poison" associated with flying insects in a Chinese medical encyclopedia in 992 from the Jin Dynasty (265-420 AD). The first clinical case report dates from 1780 epidemic in Philadelphia. Benjamin Rush coined the term "break bone fever" because of the symptoms of myalgia and arthralgia(3) . In India the first epidemic of clinical dengue-like illness was recorded in Madras (now Chennai) in 1780. Cases in India in 2013 by NVBDCP were 74,454 with 167 deaths. Infection with one dengue serotype provides lifelong immunity to that virus, but there is no cross protective immunity to the other.

Results

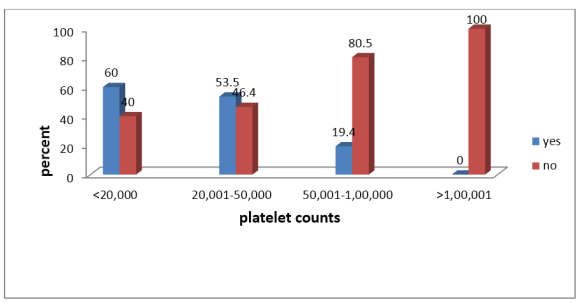
Mean age of presentation was 6.5 + 3.84 years. There were 66males (65.34%) and 35 females (34.66%). . Out of 101 cases, 29 (28.7%) had dengue fever without warning signs, 28 (27.7%) had dengue fever with warning signs and 44 (43.5%) had severe dengue .All pts had high grade fever , headache in 77 (76.2%), vomiting in 75 (74.3%), pain in abdomen in 65 (64.4%), rash in the form of either macular ,erythematous with or without itching in 38 (37.6%), bleeding in the form of malena , epistaxis, upper GI bleed or pulmonary bleed in 33 (32.7%),respiratory complaints such as cough or increased respiratory activity in 29 (28.7%) patients. All of the above symptoms had significant association (p<0.05).

Common findings on examination were hepatomegaly >2cm with or without tenderness in 75(74.3%) , congested eyes in 46(45.5%) , signs of shock in the form of tachycardia (when afebrile) in 40 (39.6%) and hypotension in 44(43.6%), bradycardia in 4 (3.9%) , tachypnea in19 (18.8%) , positive tourniquet test is seen in 57 (56.4%) , icterus in 6 (5.9%), alteration in sensorium in 10 (9.9%), abnormal respiratory findings s/o pleural effusion or ARDS in 39 (38.6%) patients. All of above examination findings were significantly associated with dengue fever.(p<0.05) (fig-1) Figure 1 common examination findings in dengue



Common findings in Hemogram was thrombocytopenia <1,00,000/cumm was found in 84 (83.1%) ,leucopenia in 63 (62.3%) and rise in hematocrit was found in 50 (49.5%). change in hematocrit and thrombocytopenia was significantly associated with severe dengue (p=<0.001) but leucopenia was not (p<0.05) r .Bleeding was also significantly associated with thrombocytopenia (p<0.01)

Fig-20 Association of platelet count with bleeding in dengue fever



Raised liver transaminases were found significantly associated with dengue severity (p<0.001). SGOT is observed to be abnormal in more number of patients than SGPT .41.4% patients with dengue fever without warning signs, 78.9%with dengue fever with warning signs and 88.6% with severe dengue had raised SGOT . However 13.8% with dengue fever without warning signs, 50% with warning signs and 59.1% with severe dengue had raised SGPT. Deranged coagulation profile was important cause of bleeding in dengue fever and it was found to be significantly associated with severe dengue (p<0.01) .

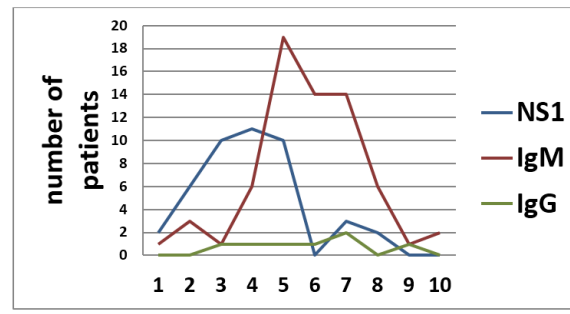
Chest x-ray was done in all 101 patients and was found that 6 (5.9%) patients had findings of ARDS , and all of them belonged to severe dengue , 24 (23.7%) patients had evidence of pleural effusion, All patients with dengue fever without warning signs had normal x-rays .The association was significant (p<0.01).Common findings on USG were evidence of plasma leakage as ascitis and pleural effusion, gall bladder wall pseudothickening and hepatomegaly. Out of 101 patients ; 4patients had dengue without warning signs, 13patients had dengue with warning signs and 42patients had severe dengue. Abnormal USG findings were significantly associated with severe dengue (p<0.01) .(table-1)

Table 1 – association of laboratory test with dengue fever

test	Positive pts	association	Highest value
SGOT	72.3%	Significant (p<0.01)	3616 IU
SGPT	43.6%	Significant(p<0.01)	2369IU
BILIRUBIN	0.9%	Non significant (p=0.5)	3gm%
PT , aPTT ,INR	32.7%	Significant(p<0.01)	
CHEST X RAY	23.7%	Significant(p<0.01)	6(5.9%) ARDS
USG	58.4%	Significant(p<0.01)	

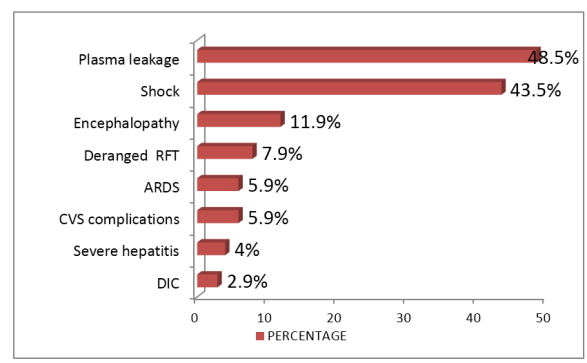
Among serological tests , NS1 antigen detection was significantly positive in 1-5 days of fever (p<0.01),Ig M in 6-10 days of fever(p<0.01) ..Ig G for dengue was not significantly associated with first 10 days of fever. (figure -3)

Figure 3- association of serological tests with day of fever in dengue .



plasma leakage (pleural effusion or ascitis) was most common complication in 49(48.5%) patients , 44 of them had severe dengue ,5 had dengue fever with warning signs . cardiovascular complications in 6(4 had myocarditis and 2 had pericardial effusion) .

Figure 4 – Association of complications with dengue



Out of 101 positive dengue cases 6 patients died and 95 got cured and discharged.

Discussion

Many studies have been done on the clinical spectrum of dengue fever in children .Similar to our study **Abhinav Jain et all (2013)** (4)studied 58 patients, 43 (76%) were Dengue, 11 (20%) were Dengue with warning signs, and 2 (3%) were Severe Dengue. However **Mittal H et all (2010)** classified as dengue fever (8%), dengue hemorrhagic fever (51%) and dengue shock syndrome (42%).(5)

Study done by **Saba Ahmed et all(2008)** with mean age 8.3 ± 3.5 years and majority were male (54%).(65). He also concluded frequent clinical features as fever (97%), vomiting (68%), abdominal pain (68%) and rashes (65%). Gastrointestinal bleeding (61%) and epistaxis (26%) which correlated with our study.(6)

Mittal H et all (2010) also found the mean age (± SD) of children to be 8.3±3.5 y with male: female ratio 1.32. The clinical features included fever (100%), headache (63%), abdominal pain (71%), petechia (35.5%), rash (26.6%) and bleeding manifestations (48.8%).

C.V.Prathyusha (2013)et all found Hepatomegaly was seen in 33.75% cases, leak syndrome in 25% cases. Torniquet is positive in 38.7% of cases and bradycardia during convalescence in 13% ,thrombocytopenia in 85% which correlated with our findings . increasing severity of thrombocytopenia there is increasing incidence of bleeding(7) .Similarly **ABM Shahidul Alam et all (2009),** found that bleeding manifestation had a significant association with the degree of thrombocytopenia but no correlation was observed with tourniquet test positivity(8). But **Dhoo-**

Volume : 4 | Issue : 9 | Sept 2015 • ISSN No 2277 - 8179

ria *et al*., (2008) and **Sunil Gomber,et all(1996)** found poor correlation between thrombocytopenia and bleeding .(9)

Likewise **Shah GS et all (2006)** concluded high hematocrit was significantly higher in DHF/DSS group. However **Gurdeep S. Dhooria et all (2008)** concluded that hemoconcentration may not be a good indicator for diagnosis and monitoring of fluid if pre-illness hematocrit is not known

DR. IRFAN ARSHAD et all (2011) found raised aminotransferases, have strong association with the complications of dengue fever and hence may be associated with the poor outcome of disease (10).Similarly to our study **Venkata Sai PM et all,** concluded that in an epidemic of dengue, ultrasound features of thickened gall bladder wall, pleural effusion and ascites should strongly favour the diagnosis of dengue fever.(11)

Similar to our study **Dongmei Hu et all (2011)** also concluded that Combining the results of NS1 and IgM detection allowed positive diagnosis in 96.9% -100% for samples taken after day 3 of fever. Gurdeep S. Dhooria et all (2008) found frequency of Complications **as** Liver dysfunction 12 (14.8%) , Significant bleed 12 (14.8%) , Coagulopathy 3 (3.7%) , Altered Sensorium 3 (3.7%) , Renal dysfunction 3 (3.7%) , Respiratory failure 3 (3.7%) , ARDS 2 (2.4%), DIC 1 (1.2%).(12)

Death was similar in study by ABM SHAHIDUL ALAM et all who found Majority of the patients recovered from the disease and only 6% patients died

Conclusions

In an epidemic setting, if a child presents with fever, vomiting, and musculoskeletal pain and bleeding along with hepatomegaly, low platelet count and high hematocrit, a strong possibility of Dengue should be kept.Deranged LFT ,deranged coagulation and plasma leakage are indicators of severity.USG and Chest x-ray good non invasive test for early diagnosis of severe dengue.NS1 antigen and Ig M together are investigation of choice in first 10 days of fever.be ready to manage complications like plasma leakage, encephalopathy, ARDS, shock, myocarditis , renal failure, DIC and severe hepatitis .

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