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RESEARCH ARTICLE

CLINICAL PROFILE AND OUTCOME OF DENGUE FEVER AND DENGUE HAEMORRHAGIC FEVER IN PAEDIATRIC AGE GROUP WITH SPECIAL REFERENCE TO WHO GUIDELINES (2012) ON FLUID MANAGEMENT OF DENGUE FEVER

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Abstract

Objective: To study the clinical profile and outcome of dengue fever and dengue hemorrhagic fever in pediatric age group using WHO fluid management guidelines (2012).
Settings: Pediatric teaching hospital in Sangli, Maharashtra.
Duration: 2.1 years
Design: Observational study
Participants: 100 admitted patients of serologically confirmed dengue.
Methods: After clinical assessment, they were investigated and classified according to WHO classification of dengue. Serial monitoring for clinical and hematological parameters was done. Intravenous fluids were administered according to WHO guidelines along with supportive management. Statistical evaluation of the various clinical parameters was done using p value estimation.
Results: Common clinical symptoms and signs were fever, vomiting, abdominal pain, hepatomegaly, bleeding diathesis and hypotension. Along with serological tests, hematocrit, platelet counts, liver enzymes and abdominal ultrasonography were useful in management. Fluid management played a vital role.
Conclusions: Dengue fever had a constellation of symptoms and signs and investigations. A high index of suspicionin endemic areas was important.Fluid management played a vital role and helped in recovery.

INTRODUCTION

Dengue is currently regarded globally as the most important mosquito borne viral infection [1]. The frequency of epidemic dengue has increased dramatically over the past forty years[2]. Severe dengue affects most of the Asian and Latin American countries and has now become the leading cause of hospitalization and death in children. About 2.5 % of those affected succumb to this illness[4].

As we have come to understand this illness, fluid therapy has become the most important aspect in the management of dengue. In 2009, WHO new guidelines for management of dengue were published[5]. In 2012, the revised comprehensive guidelines were published by WHO[8].

An observational study of dengue and dengue hemorrhagic fever was carried out. It was decided to study the clinical pattern of dengue and the outcome of fluid management guidelines, which were the mainstay of treatment.

METHODS

This study was conducted in the Department of Pediatrics atBharatiVidyapeeth Deemed University Medical College and Hospital, Sangli. Patients from age group birth to 16 years were included in this study. The period of study was from May 2012 to June 2014. 100 patients were included in this study. The study was approved by Institution Ethics Committee. Patients were enrolled after obtaining written consent from parents or legal guardian.

Inclusion criteria were admitted patients in 0-16years age group with serologically confirmed dengue. Patients with enteric fever, rickettsialfever , malaria, leptospirosis, septicemia and viral hemorrhagic fever other than dengue were excluded from this study. Detailed clinical examination along with laboratory parameters like serial hemoglobin estimation, serial hematocrit, platelet counts, liver function tests, abdominal sonography, chest X Ray, serology tests for dengue: NS1 Antigen,IgG and IgM antibody were done.

Based on these parameters the patients were classified as dengue fever, dengue hemorrhagic fever grade I,II, III and IV; according to WHO traditional 1997 classification. According to WHO 2012 classification, they were classified as dengue, dengue fever with warning signs and severe dengue.

Symptomatic treatment was given for fever. Along with supportive care, fluid management was done according to WHO 2012 fluid management guidelines. During the treatment period monitoring charts for vital parameters were used, initially one hourly monitoring was done till clinical improvement was seen. Isotonic saline was used for initial management. Intravenous fluids were discontinued after patient became hemodynamically stable. Analysis was done using Microsoft Excel and p values < 0.05 were considered significant.

RESULTS

100 children were included in this study. There was a male preponderance (p value 0.034).

There was a seasonal incidence from September to November, which was the post monsoon period, (p value 0.000). 94% of cases required PICU admission for monitoring. Average number of days for admission was 4-6 days(p value 0.000).

The most prevalent symptoms of dengue were fever, vomiting, rash, abdominal pain and bleeding diathesis. History of fever was elicited in 100% of cases (p value 0.000). The next common symptom was abdominal pain and vomiting. Table I here illustrates the symptomatology.

TABLE I : SYMPTOMS OF DENGUE

SYMPTOMS	NUMBEROF CASES	PERCENTAGE
FEVER	100	100
RASH	21	21
VOMITING	79	79
BLEEDING DIATHESIS	27	27
ABDOMINAL PAIN	84	84

Hepatomegaly was significantly more common sign than any other symptom. Only 11 % had fever at admission.Hypotension with low pulse volumes were found in 45% of patients.100% of patients had hepatomegaly (P value = 0.00).Poor tissue perfusion was found in 9% of cases as indicated by prolonged capillary refill time (CRT).Bleeding diathesis in form of petechiae, epistaxis, positive tourniquet, hematemesis was found in 60% of cases. Third space losses (pleural effusion and ascites) was found in 29 % of cases (Table II).

TABLE II: CLINICAL SIGNS OF DENGUE.

Signs	**Number of cases**	**Percentage**
fever at admission	11	11

low pulse volume	45	45
hypotension	45	45
CRT>3	9	9
bleeding diathesis	60	60
hepatomegaly	100	100
free fluid (ascites, pleural effusion)	29	29

There was no statistically significant difference in any of the investigations (pvalue 0.245).Collective analysis of investigations was required. Hemoconcentration as demonstrated by increased hematocrit was seen in 100%.Thrombocytopenia was seen in 96% of cases. Sonographic evidence of hepatomegaly was seen in 100% of cases.Plasma leakage in the form of ascites and pleural effusion was found in 44% of cases. None of the patients had pericardial effusion. For evidence of dengue, NS1 antigen was the most common evidence, 88 % had NS1 positive, 205 cases were positive for IGG, 21% of cases were positive for IgM (Table III).

TABLE III: INVESTIGATIONS IN DENGUE

Investigations	**Number of cases**	**Percentage**
Hemoconcentration	100	100
Thrombocytopenia	96	96
AST/ALT elevation	97	97
ASG hepatomegaly	100	100
ASG free fluid	44	44
NS1 antigen	88	88
IgG	20	20
IgM	21	21

According to traditional classification of dengue, 2% had simple dengue fever, 23% of cases were of DHF grade I. 33% of cases were of DHF II. 40 % of cases were of DHF III, DHF IV constituted 2% of cases. 42 % of cases were of severe DHF (DHF III and DHF IV) or dengue shock syndrome (DSS). According to revised classification WHO of 2009, Dengue without warning signs constituted to 3% of cases. Dengue with warning signs constituted 47% of cases.Severe Dengue constituted 50% of cases.

The patients were administered parenteral fluids along with supportive management.

Monitoring charts were meticulously maintained.The parenteral fluids used in our study were 0.9% normal saline and colloid Dextran 40.100% of cases were treated with 0.9% NS

Only 1 patient required colloids-Dextran 40. There was no statistically significant difference in proportion of patients for rate of IV fluids. Initial resuscitation with 10 ml/kg bolus of normal saline was done in 47% of cases.2% 0f cases required 5-7ml/kg /hour of normal saline for a maximum period of 24 hours. 51% of patients required 3ml/kg/hour of normal saline.There is no statistically significant difference in proportion of patients for duration of parenteral therapy.

3% of cases needed parenteral fluids for 1 day.16% of patients required intravenous fluids for 2 days.32% of cases recovered in 3 days.28% of patients needed 4 days of parenteral fluids. 8% of cases required intravenous fluids for 5 days.12% of cases and 1% of cases needed IV fluids for 6 days and 1 day respectively.Those needing longer duration of parenteral therapy had associated medical conditions like Thalassemia major, west syndrome, pneumonitis and gastroenteritis. There was no statistically significant difference in duration of parenteral therapy (p value 0.645).

The mortality was 1% where the patient had presented late with multi organ dysfunction with renal failure, pulmonary edema and encephalopathy. This child died within 6 hours of admission.99% of cases recovered completely from dengue with the WHO fluid management guidelines and supportive care (p value 0.000).

DISCUSSION

Dengue infection is a systemic and dynamic disease. It has a wide clinical spectrum. that includes both severe and non severe manifestations. After incubation period, the illness begins abruptly and is followed by three phases- febrile, critical and recovery[5].

Therefore monitoring for vital signs is crucial. WHO in their 2012publication "Handbook of clinical management of dengue", have described a stepwise approach to the management of dengue.

Addressing the plasma leakage and complications of it has become the mainstay of treatment of dengue. The characteristics studied were age, sex, seasonal incidence, number of days of admission, clinical symptoms, clinical signs, and investigations.In our study the youngest child was 3 months old and the oldest was 16 years old. There was a distinct higher incidence in older age group above 9 years accounting for 66% of the total cases. There were statistically more patients in the age group 12-15 years (p value 0.010).Similar observations were made in other studies[2,4,8,31]. There was a male preponderance in our study. The male to female ratio was 1.38:1. This was statistically significant (p value 0.034). Days of admission were more in the 4-9 days period and were statistically significant (p value 0.000). Similar observation was made by Celia et al (2005)[3]. 94% of cases needed admission in pediatric intensive care unit. Significantly more patients were admitted in PICU (p value 0.000). This was because clinical monitoring of patients was better in the PICU setting. Once the patients were stabilized hemodynamically they were shifted to the wards. So dengue was a burden on the healthcare facilities and also for the patient. Kamath SR et al[15] studied 858 cases and 109 cases needed PICU admissions.

A seasonal pattern was observed. 21% of cases were in June to August, 44% of cases were from September to November, 16 % of cases were from December to February and 19% of cases were from March to May. Maximum number of cases about 65% were seen from June to November. This corresponded to the monsoon and post monsoon season in our country. The mosquito breeding was maximum during this period due to abundance of water bodies in this area. Wongkoon S et al (2013) [30] have also described seasonal pattern of dengue which corresponded with the rainy season due to abundance of mosquito breeding in this season.

History of fever was ubiquitously present. Abdominal pain was the next common symptom This could be higher because in the younger child it was difficult to elicit this history. Agarwal A. et al[1] in their study from Delhi, have also noted fever, abdominal pain and vomiting as the commonest symptoms. The commonest hemorrhagic manifestation was hematemesis followed by epistaxis and skin bleeds. This was also similar in our study.Similar observations were noted in other studies too[18,14,25,3,12,13,26]. The clinical signs which were studied were fever at admission, low pulse volume and hypotension, prolonged capillary refill time >3 seconds, bleeding diathesis, hepatomegaly, and signs of fluid leakage like ascites and pleural effusion.Though 100% of cases had history of fever, only 11% of cases had fever at admission. Hypotension with low pulse volume was noted in 45% of cases. 9% of cases had CRT> 3 second indicating poor tissue perfusion.100% of cases had hepatomegaly. Hepatomegaly was significantly more common sign (p value 0.000). Similar observation has also been made in other studies[19,1, 21,14,13].

Hemoconcentration, thrombocytopenia, abnormal liver function tests in the form of elevated transaminases, ultrasonographic evidence of hepatomegaly along with ascites and/or pleural effusion and gall bladder wall edemawere noted .NS1 antigen was found in 88% of cases, Dengue IgM antibodies in 21% of cases and IgG in 20% of cases. Previous studies have also reported similar findings[18,22,29,13]. There was no correlation between platelet counts and bleeding manifestations. In our study too, though thrombocytopenia was found in 96% of cases only 60% of cases had bleeding manifestations.

42% of cases had severe Dengue hemorrhagic fever (DHF III and DHF IV) The new WHO classification of 2009, severe dengue was found in 50% of cases. In our study the new classification picked up more cases of severe dengue. Previous studies have also had similar observations[20,6,7,16].

In our study fluid management was the mainstay of treatment, along with supportive care.The parenteral fluids used were 0.9% normal saline, dextran. Inotropes like dopamine was used in some cases. All of cases received 0.9% normal saline (99.1%). Colloids (dextran) was used in 1(0.9%) of cases. Other studies have also observed that replacement with intravenous fluids was the treatment of choice and had a favorable outcome[27, 24]. Colloids were given in profound shock. This was also the observation in our study.

WHO in their 2012 Handbook on management of dengue, have described stepwise approach to the management of dengue, where only isotonic solutions have been advised, followed by serial monitoring of clinical status, fluid balance and hematocrit. Judicious fluid resuscitation was advised to maintain effective circulation during the leak period. Similar observations were made by others[16,23,28]. Crystalloids were preferred over colloids. This was done in

our study and we found a good recovery in our patients. In our study of 100 cases of dengue, we found 99% made a complete recovery from illness. There was 1 % mortality .We found a highly significant statistical correlation (p value 0.000) for treatment guidelines which helped in recovery of patients. Kamath SR et al[62] study of dengue had 9 deaths in 858 cases (1.048%) which was similar to our study. Our mortality rate was comparable in this study.
A high index of suspicion for early diagnosis, monitoring and prompt fluid management and supportive treatment resulted in decreased mortality in patients of severe dengue.

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