

FACTORS AFFECTING THE OUTCOME IN CHILDREN WITH DENGUE AT A TERTIARY CARE HOSPITAL

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Abstract

Background: The mosquito-borne arboviral disease dengue has become a global public health concern. However, very few studies have reported atypical clinical features of dengue among children. Because an understanding of various spectrums of presentation of dengue is necessary for timely diagnosis and management, we aimed to document the typical and atypical clinical features along with predictors of severity among children with dengue. **Materials and Methods:** This was a hospital based prospective observational study conducted at Niloufer Hospital, a tertiary care pediatric hospital attached to Osmania Medical College, Hyderabad, Telangana from June 2020 to May 2023. All children between 6months to 12 years of age who had clinical features suggestive of dengue with serology confirmed were included in this study. Statistical analysis was performed on SPSS 20.0. Discrete variables were analyzed by Chi-Square test, and continuous variables by ANOVA. P value less than 0.05 was considered significant. **Result:** Out of 400 children included in the study, 116(29%) children had dengue fever without warning signs, 112(28%) children had dengue fever with warning signs, 172(43%) children had severe dengue and, males (224) out-numbered females (176). Male female ratio was 1.3:1. 160(40%) children were between 6 to 9 years, which being the most common age of presentation. About 280(70%) children were from urban areas and the remaining 120(30%) from rural areas. The most frequent clinical features noted in the present study were fever seen in 400(100%) followed by generalized body pains. Significant effect ($P < 0.05$) on outcome was found in children who presented with abdominal pain, body pains, vomiting, headache, retro-orbital pain, rash, bleeding manifestations, abdominal distension, cough, shortness of breath, altered sensorium and abdominal tenderness. Undernutrition ($BMI < 18.5$) was found in 296(74%) children in the present study. More than 10 times rise in SGOT was found in 12(7%) children with Severe Dengue. With regards to gall bladder wall thickness, out of 172 cases of severe dengue, 102 cases (59.3%) had gall bladder wall thickness $> 5mm$, only 6 cases of dengue fever and 10 cases of dengue fever with warning signs had gall bladder wall thickness $> 5mm$. Raised hematocrit, thrombocytopenia, elevated SGOT & SGPT, elevated serum creatinine, ultrasound findings of Gallbladder Wall thickness $> 5mm$, pleural effusion, elevated PT and APTT were found to have significant effect on the outcome. Case fatality rate was 2% and, 98% cases were discharged. **Conclusion:** Parameters such as BMI, Abnormal coagulation profile, Elevated liver enzymes, Elevated serum urea and creatinine, Abnormal ultrasound findings including gall bladder wall edema and pleural effusion on chest X ray must be looked for in all cases admitted with dengue to predict the severity and outcome.

INTRODUCTION

Dengue is a mosquito-borne viral disease that is widespread throughout the tropics, with local variations in risk influenced by climate parameters as well as social and environmental factors. It is estimated that 390 million dengue infections occur every year, of which 96 million (67–136 million) manifest clinically (with any severity of disease).^[1] WHO states that the number of dengue cases reported have increased over 8 fold in the last two decades, from 5,05,430 cases in 2000, to over 2.4 million in 2010, and 5.2 million in 2019. Reported deaths between the year 2000 and 2015 increased from 960 to 4032, affecting mostly the younger age group. India is one of the seven identified countries in the South-East Asia region regularly reporting incidence of DF/DHF outbreaks and becoming major niche for dengue infection.^[2] The total number of cases seemingly decreased during years 2020 and 2021 as COVID-19 pandemic might have also hampered case reporting in several countries.

MATERIALS AND METHODS

This was a hospital based prospective observational study conducted at Niloufer Hospital, a tertiary care pediatric hospital attached to Osmania Medical College, Hyderabad, Telangana from June 2020 to May 2023. All children between 6 months to 12 years of age who had clinical features suggestive of dengue with serology confirmed were included in this study. Children with other significant disease were excluded from study. Informed consent was taken from parents. Study was conducted after the approval of Institutional Ethics Committee. A detailed history was taken to determine symptoms. Detailed clinical examination which included vitals, findings of general and systemic examination were recorded in a proforma at the time of admission. Patients were categorized into Dengue without Warning Signs, Dengue with Warning Signs and Severe Dengue according to WHO newer grading system (2009) and were managed appropriately.

Laboratory parameters like hematocrit, daily platelet count, Renal function tests, Coagulation Profile, liver function tests, Chest Xray, Ultrasound abdomen and ECG were done in all patients. The clinic-epidemiological profile and the determinant factors affecting the outcome in children admitted with dengue were analysed. Statistical analysis was performed on SPSS 20.0. Discrete variables were analysed by Chi-Square test, and continuous variables by ANOVA. P value less than 0.05 was considered significant.

RESULTS

Patients were classified according to WHO newer classification system of severity into three grades. Out of 400 children included in the study, 116(29%)

children had dengue fever without warning signs, 112(28%) children had dengue fever with warning signs, 172(43%) children had severe dengue (Figure 1). Of 400 children, males (224) out-numbered females (176). Male female ratio was 1.3:1.

Among admissions, 42(10.5%) children were aged 6 months to 2 years, 90(22.5%) children were between 2-5 yrs age, 160(40%) were between 6 to 9 years and 108(27%) were 9-12 years' age.

The mean age of presentation was 84 months. Children between the 6-9 yrs were the most commonly affected. 95% of the total cases were admitted during the months of August-November in all years combined. About 280(70%) children were from urban areas and the remaining 120(30%) from rural areas.

The most frequent clinical features noted in the present study were fever seen in 400(100%) followed by generalized body pains 264(66%), Vomiting 256(64%), Headache 248(62%), pain abdomen 244(61%), Retro-orbital pain 104(26%), Rash 76(19%), Bleeding manifestations 76(19%), Abdominal distension 56(14%), shortness of breath 24(6%) and seizures 8(2%) children respectively [Figure 2].

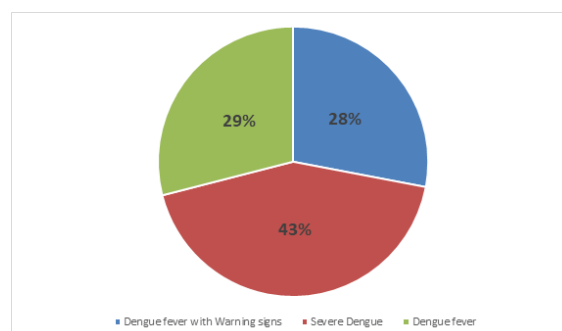


Figure 1: Pie chart showing Distribution of Dengue among Study population (N=400)

In children with DF with Warning Signs, Abdominal pain, Vomiting, Body pains and headache was complained by 96(85%), 84(75%), 76(67%) and 68(60.7%) children respectively. Rash 20(17.8%), Retro orbital pain 12(10.7%), abdominal distension 12(10.7%) and bleeding manifestations 8(7.1%) were other symptoms seen in this group.

In patients with Severe Dengue grade- Headache, Pain abdomen, Body pains and vomiting were complained by 152(88%), 148(86%), 148(86%) and 136(79%) respectively and, Retro orbital pain 84(48%), rash 56(32.5%), bleeding manifestations 68(39.5%), breathing difficulty 20(11.6%) and seizures 8(4.7%) were seen respectively.

Significant effect ($P < 0.05$) on outcome was found in children who presented with Abdominal pain, Body pains, vomiting, Headache, Retro-orbital pain, Rash, Bleeding manifestations, Abdominal distension, Cough, Shortness of breath, altered Sensorium and abdominal tenderness [Table 1].

Undernutrition ($BMI < 18.5$) was found in 296(74%) children in the present study. $BMI < 18.5$ were seen

in 68(58.6%),76(67.8%) and 152(88.3%) children with DF, DF with Warning Signs, and Severe Dengue respectively [Table 2].

Leucopenia (<4000) was found in 152 (38%) children, of which 60(34.4%), 52(46.4%) and 60(34.8%) children with DF, DF with Warning Signs, and Severe Dengue had Leukopenia, respectively. Leucopenia had no significant effect on the outcome of children with dengue.

Thrombocytopenia (platelet count < 1,50,000) was seen in 368 (92%) children. About 96(82.7%), 104(92.8%) and 168(97.6%) children with DF, DF with Warning Signs and Severe Dengue had thrombocytopenia respectively [Table 3].

Severe Thrombocytopenia (<10,000) was seen in 4(3.6%) and 20(11.6%) children with dengue with warning signs and severe dengue respectively.

Raised Hematocrit was seen in 76(19%) children of which, 8(7.1%) and 68(39.5%) children with DF with Warning Signs and Severe Dengue had raised hematocrit respectively [Table 4].

Elevated Prothrombin time (PT > 17) was seen in 164 (27%) children with 4(13.8%), 24(32.1%) and 80(65.1%) children of DF without warning signs, DF with Warning Signs and Severe Dengue had prolonged PT respectively [Table 5].

Elevated activated partial Thromboplastin time (PT > 37) was seen in 39% patients. 16(13.8%), 40(35.7%) and 100(58.1%) patients of DF without warning signs, DF with Warning Signs and Severe Dengue had prolonged APTT respectively [Table 6].

Elevated SGOT was seen in 244 (61%) children in this study. Up to 10 times rise in SGOT was found in 44 (37.9 %), 52(46.4%) and 120(69.7%) patients with DF without warning signs, DF with Warning Signs and Severe Dengue respectively. More than 10 times rise in SGOT was found in 28(16.2%) children with Severe Dengue [Table 7].

Elevated SGPT was seen in 148(37%) children in this study. SGPT was more than 10 times elevated in 20 (11.6%) of children with Severe Dengue. Up to 10 times rise in SGPT was found in 16(13.8%), 16(14.3%) and 96(55.8%) patients of DF without warning signs, DF with Warning Signs and Severe Dengue grades respectively. [Table 8]

Blood urea was elevated in 40(10%) of children of which 4(3.4%) and 38(22.09%) children among dengue fever and Severe Dengue respectively.

Creatinine was elevated in only 4(2.32%) of children with severe Dengue.

Table 1: Clinical findings and outcome in the study population(N=400).

Symptom/sign	n400	Dengue fever (n=116)	Dengue with Warning Signs (n=112)	Severe Dengue (n=172)	P Value
Fever	400(100%)	116(100%)	112(100%)	172(100%)	
Generalized Body pains	264(66%)	40(34.5%)	76(67%)	148(86%)	<0.001
Vomiting	256(64%)	36(31%)	84(75%)	136(79%)	<0.001
Headache	248(62%)	28(24.1%)	68(60.7%)	152(88.3%)	<0.001
Abdominal pain	244(61%)	0	96(85.7%)	148(86%)	<0.001
Retroorbital pain	104(26%)	8(6.8%)	12(10.7%)	84(48.8%)	<0.001
Rash	76(19%)	0	20(17.8%)	56(32.5%)	<0.001
Bleeding manifestations	76(19%)	0	8(7.1%)	68(39.5%)	<0.001
Abdominal distension	56(14%)	0	12(10.7%)	44(25.6%)	<0.001
cough	38(9.5%)	0	16(14.2%)	20(11.6%)	0.015
Breathing difficulty	24(6%)	0	4(3.5%)	20(11.6%)	0.01
Seizures	8(2%)	0(0%)	0(0%)	8(4.7%)	0.067
Abdominal tenderness	248(62.1%)	0	24(21.4%)	100(58%)	<0.001
Altered sensorium	20(5%)	0	0	20(11.6%)	0.001
Edema	36(9%)	0	4(3.57%)	32(18.6%)	<0.001

Table 2: Nutrition and outcome in children with Dengue.

Nutrition	Dengue fever (n=116)	Dengue with warning signs(n=112)	Severe dengue (n=172)
Normal BMI	48(41.4%)	36(32.1%)	20(11.6%)
BMI<18.5	68(58.6%)	76(67.8%)	152(88.3%)
P Value	0.013		

Table 3: Thrombocytopenia and outcome in study population.

Platelet count	Total	Dengue	Dengue with Warning signs	Severe dengue
Platelets<10000 Category1	24(6%)	-	4(3.6%)	20(11.6%)
Platelets10000-50000 Category2	108(27%)	8(7%)	36(32.1%)	64(37.2%)
Platelets50000-100000 Category3	188(47%)	64(55.2%)	52(46.4%)	72(41.8%)
Platelets100000-1,50000 Category4	48(12%)	24(21%)	12(10.7%)	12(6.9%)
Platelets<1.5lakh	368(92%)	96(82.7%)	104(92.8%)	168(97.6%)
Platelets normal Category5	32(8%)	20(17.2%)	8(7.14%)	4(2.3%)
P Value	P 0.009			

Table 4: Hematocrit and outcome in study population.

Hematocrit	Dengue Fever	Dengue with Warning signs	Severe dengue
Raised	0(0.0%)	8(7.1%)	68(39.5%)
Normal	116(100%)	104(92.8%)	104(60.5%)
P value	<0.001		

Table 5: PT and outcome in the study population.

PT	Dengue Fever (n=116)	Dengue with warning signs (n=112)	Severe Dengue (n=172)
PT>17	4(3.4%)	24(21.4%)	80(46.5%)
PT<17	112(96.5%)	88(78.5%)	92(53.4%)
P value	<0.001		

Table 6: a PTT and outcome in children with Dengue.

	DF(n=116)	DF with warning signs(n=112)	Severe dengue(n=172)
aPTT <37	100(86.2%)	72(64.3%)	72(41.9%)
aPTT >37	16(13.8%)	40(35.7%)	100(58.1%)
P Value	<0.001		

Table 7: SGOT and outcome in children with Dengue.

	Dengue Fever (n=116)	DF with warning signs (n=112)	Severe Dengue(n=172)
SGOT normal	72(62.1%)	60(53.6%)	24(14%)
SGOT 1x-10x times	44(37.9%)	52(46.4%)	120(69.7%)
SGOT>10x Times elevation	0	0	28(16.2%)
P Value	<0.001		

Table 8: SGPT and outcome in children with Dengue.

	Dengue fever (n=116)	Dengue fever with warning signs (n=112)	Severe dengue (n=172)
SGPT Normal	100(86.2%)	96(85.7%)	56(32.5%)
SGPT 1x-10x times	16(13.8%)	16(14.3%)	96(55.8%)
SGPT>10x times elevation	0	0	20(11.6%)
P value	<0.001		

Urine proteins was trace in 52(44.8%), 44(39.2%), 2(1.5%) in Dengue fever, Dengue with warning signs and severe dengue respectively. 1+ Proteinuria was found in 2(1.7%) and 5(2.9%) children among Dengue fever and Severe Dengue categories respectively. Abnormal ultrasound findings were seen in 88(22%) of children in this study. The ultrasound abnormalities found were gall bladder wall edema, hepatomegaly, ascites and pleural effusion [Table 9].

Ultrasound abnormality (hepatomegaly, ascites and pleural effusion) was found in 12(10.7%) and 164(95.3%) in dengue with warning signs and severe dengue respectively. With regards to gall bladder wall thickness, out of 172 cases of severe dengue, 102 cases (59.3%) had gall bladder wall thickness >5mm. Only 6 cases of dengue fever and 10 cases of dengue fever with warning signs had gall bladder wall thickness >5mm [Table 10].

Pleural effusion on radiograph was found only in severe dengue category. 36(20.9%) of the severe dengue children had pleural effusion detectable on x ray. There was a significant association ($P<0.001$) of pleural effusion on chest x ray with the outcome in children in this study. Raised Hematocrit, Thrombocytopenia, elevated SGOT, SGPT, elevated Serum Creatinine, ultrasound findings of Gallbladder Wall thickness, pleural effusion elevated PT and APTT were found to have significant effect on the outcome. 41% of the cases needed intravenous fluids. All the cases of severe dengue were treated with intravenous fluids. Inotropes were required in 2% of the cases and all of them were severe dengue cases. Blood products were given in 18 severe dengue cases and 2 dengue with warning signs cases. Case fatality rate was 2% and 98% cases were discharged successfully after recovery [Table 11].

Table 9: Ultrasound abdomen and outcome in the study population.

	Dengue (n=116)	Dengue with warning signs(n=112)	Severe Dengue(n=86)
Abnormal USG (hepatomegaly, Ascites and pleural effusion)	-	12(10.7%)	164(95.3%)
Normal study	116(100%)	100(89.3%)	8(4.7%)
P value	0.001		

Table 10: Gallbladder wall thickness and outcome in study population.

Gallbladder wall thickness	Dengue fever (n=116)	Dengue with warning signs(n=112)	Severe Dengue(n=172)
>5mm	6(5.17%)	10(8.9%)	102(59.3%)
<5mm	110(94.8%)	102(91.1%)	70(40.69%)

P value	<0.001		
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Table 11: Secondary outcome

Outcome	n=400	Dengue Fever (N=58)	Dengue with warning Signs (N=56)	Severe dengue
Discharged in Stable condition.	392(98%)	116(100%)	112(100%)	164(95.4 %)
Mortality.	8(2%)	-	-	8(4.6%)
ventilation.	8(2%)	-	-	8(4.6%)
Iv fluids.	164(41%)	-	-	164(95.4%)
inotropes	8(2%)	-	-	8(4.6%)
Blood products	80(20%)	-	8(7.14%)	72(41.86%)
Mean duration of Stay (in days)		2.586	3.071	6.791

DISCUSSION

Dengue is a major international health concern that is prevalent in tropical and sub-tropical countries. This study describes the factors affecting the outcome of dengue in children in Dengue admitted to Niloufer Hospital, Hyderabad. In our study we adhered to WHO revised classification of Dengue, a total of 400 cases were included. Among them, 116(29%) developed only dengue fever, 112(28%) developed dengue fever with warning signs and 172(43%) developed severe dengue.

Significant numbers of cases 160(40%) were from 6-9 years age children. This is comparable to Hemant Jain³,^[3] study which reported 46% cases in 5-10 years age group and Mistry et al,^[4] study which reported more than one third cases from 6-9 years age group. In Colbert J et al's study, 35.6% were in 5-8 years age group while 42.4% belonged to >9 years age. In Ishita Majumdar, Devdeep Mukherjee et al's study,^[5] Children between 2-8 years were the most commonly affected.

The ratio of males to female was 1.3:1 similar to studies conducted by Mistry et al^[4] reported 57.9% incidence in boys.

Dengue fever follows a seasonal pattern with cases peaking after monsoon, but in the southern states the transmission remains perennial. Seasonal distribution of the study population showed most of the patients (95%) were admitted in second half of each year (July to December) which is consistent with vector breeding season (monsoon). Similar seasonal peak during the months of July- November was also observed in Mistry et al's,^[4] study. This was also comparable with the study done by Om prakash et al^[6] and sharma et al^[7].

In our study, 70% of the children were from urban areas. Similar to Mistry et al's study.^[4]

The most frequent clinical features noted in our study were fever, generalised body pains, vomiting, headache, and pain abdomen seen in 100 %, 66%, 64%, 62%, and 61% patients respectively. Sharma et al,^[7] reported body pains in 58%. Pain abdomen was found in 61% of the study population similar to a study by Rachel et al^[8] Vomiting was noted in 64% cases which was comparable to Sahana KS et al^[9]. Retro-orbital pain, rash, bleeding manifestations

and abdominal distension were seen in 26%, 19%, 19% and 14% children respectively.

Vomiting, Abdominal pain, body pains, headache, retro-orbital pain, rash, bleeding manifestations and abdominal distension were statistically significant clinical parameters associated with outcome, with P<0.05 similar to study done by N S Shewale.^[11]

Bleeding manifestations were seen in 19% of cases which was comparable to Pothapregada et al's^[10] and Sahana KS et al's,^[9] studies, while Ishita et al,^[5] reported bleeding manifestations in only 8% children. Among 14% of children admitted with abdominal distension, 21% of them had shock and 7% of them developed bleeding. This was comparable with the study done by N S Shewale.^[11]

There was a significant association of respiratory distress at presentation and the outcome with p value of 0.001. Among 6% of children admitted with respiratory distress, [21%] of them were in shock and 8% of them had bleeding.

This was comparable with a study done by Akshatha Rao Aroor, Rama Prakasha Saya et al^[12] which showed that children presenting with respiratory distress had poor prognosis.

General condition was normal in 95% of children at presentation while 5% children presented in altered sensorium. There was a significant association of general condition at presentation and the outcome with p value of 0.001. This was comparable with the study done by Bhav S, Rajput CS et al,^[13] which also showed increased morbidity in children presenting with poor general condition. Seizures were seen in 2% children in this study. There was a significant association of seizures on morbidity with P value being 0.02. Undernutrition (BMI<18.5) was found in 74% patients in the study cohort. There was a significant association (P=0.013) of BMI on the outcome. Gaurav Mogra et al^[14] studied DF in 100 children and found that 64% had a normal nutritional status and the remaining 36% had under nutrition (28 moderate malnutrition and 8% severe malnutrition.) Leucopenia was seen 34.8% of patients with severe dengue and 46.4% of patients with dengue with warning signs grade. This was comparable with the study done by Sahana KS,^[9] et al which reported 34.5% leukopenia while other studies^[4,7] reported higher incidence of leukopenia.

Thrombocytopenia was present in 92% of children in our study. This was comparable to Kulkarni et al's,^[15] and Sahana KS et al's studies.^[9] Thrombocytopenia and hemoconcentration (rising hematocrit from base line of 20% or more) representing the pathophysiologic hallmarks of abnormal hemostasis and plasma leakage, respectively, are constant laboratory findings. These changes occur simultaneously before subsidence of fever and before the onset of shock.

There were 96(82.7%), 104(92.8%) and 168(97.6%) patients with DF, DF with Warning Signs and Severe Dengue grades having thrombocytopenia, respectively. Severe Thrombocytopenia (<10,000) was seen in 6% children. 3.6% in dengue with warning signs and 11.6% in severe dengue had severe thrombocytopenia.

There was a significant association of thrombocytopenia on the outcome in children in this study. This was similar to studies by Chacko, Subramanian and Dhooria et al,^[16] Ishita majumdar et al,^[5] Pothapregada et al.^[10]

There was a significant association of Raised hematocrit at presentation on the outcome with p value of <0.001, similar to study done by Ishita et al^[5] There was a significant association of abnormal coagulation profile at presentation in the outcome with p value of <0.001. This was comparable with the study done by Fariz- Safhan MN, Tee HP, Abu Dzarr GA et al,^[17] which also showed increased morbidity in children presenting with abnormal coagulation profile.

Most studies on the mechanisms of bleeding in DHF identified consumptive coagulopathy in a large proportion of cases. All severe cases with shock have coagulopathy, manifested by a prolonged partial thromboplastin (a PTT) time. Elevated aPPT seen in 39% of the study patients, most of the cases were Severe Dengue (58.1%) grade.

Deranged liver functions are common in patients with dengue infection due to direct attack on liver cells or unregulated host immune response against the virus. The degree of liver dysfunction in dengue infection varies from mild Injury with elevation of aminotransferases alone to severe injury with jaundice and even fulminant hepatic failure. In the present study, Mild to Moderate Hepatitis found in 58% patients of study population. Severe Hepatitis found in 3% patients of study population. Cumulatively hepatitis found in 61% of the patients, which is consistent with Wong et al,^[18] and similar to the study of Mishra S et al., Sharma et al,^[19] reported hepatitis in 28% cases. SGPT was very high (>1000 IU/L) in 2 patients whereas SGOT was very high (>1000 IU/L) in 3 patients. This was similar to Sharma et al's study. There is a significant association of elevated liver enzymes at presentation in the outcome with p value of <0.001. This was comparable to studies done by Ishita Majumdar, Devdeep et al and Wahid SF, Sanusi S, Zawawi MM et al,^[20] which also showed that the morbidity was high in those children presenting with elevated liver

enzymes. There was a significant association of abnormal Renal function test at presentation on the outcome with p value of 0.006. Among 6% of children admitted with abnormal renal function test, 5% were in shock and 1% had bleeding. This was comparable with the studies done by Ishita Majumdar, Devdeep Mukerjee et al, Christian S. Haas, Walter Lehne et al.^[21]

Glomerular injury secondary to immune complex deposition from dengue antigens is recognized as the etiology of renal injury. Mild mesangial proliferation, deposition of Ig G, Ig M, and C3 and thickening of the Glomerular basement membrane with dense spherical particle deposition was demonstrated in DHF patients. Albuminuria found in 51% of the study group, higher prevalence was noted in patients with Severe Dengue group.^[22]

Ultrasound can be useful for the early recognition of severe forms of DF before they become clinically apparent. Ultrasonographic examination of abdomen revealed 44% of patient had hepatomegaly and mild ascites. 95% of the patients with Severe Dengue grade had ultrasonographic evidence of ascites. There was a significant influence of ascites at presentation in the outcome with p value of 0.001. This was comparable with the study done by N S Shewale.^[11]

With regards to gall bladder wall thickness, out of 172 cases of severe dengue, 102 cases (59.3%) had gall bladder wall thickness >5mm. Only 6 cases of dengue fever and 10 cases of dengue fever with warning signs had gall bladder wall thickness >5mm. The association between severity of dengue and gall bladder thickness was found to be highly significant statistically with P value <0.001 which was similar to studies done by Colbert j et al,^[23] and Jitendra Premjibhai Parmar et al,^[24]

Chest roentgenographic abnormalities found in 9% of the study cohort. The radiographs had effusions alone. Most of these abnormalities are found in patients with Dengue with Warning Signs and Severe Dengue grade. This was comparable with the study done by Sharma et al. There was a significant association of pleural effusion at presentation and the outcome with p value of 0.001. Among 91% of children admitted with pleural effusion, 19% were in shock and 14% had bleeding. This was comparable with the study done by N S Shewale.^[11]

Intravenous fluids were started according to the national guidelines. 41% of the cases needed intravenous fluids which was comparable to Pothapregada et al's study.^[10] Almost all the cases of severe dengue were given intravenous fluids.

Inotropes were required in 2% of the cases and all of them were severe dengue cases. Blood products were given in 18 severe dengue cases and 2 dengue with warning signs cases. In our study, Case fatality rate was 2% and 98% cases were discharged successfully after recovery.

CONCLUSION

Parameters such as BMI, Abnormal coagulation profile, Elevated liver enzymes, Elevated serum urea and creatinine, Abnormal ultrasound findings including gall bladder wall edema and pleural effusion on chest X ray must be looked for in all cases admitted with dengue to predict the severity and outcome.

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