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Original Research Article

STUDY OF URINE PROTEIN CREATININE RATIO AS A PREDICTOR OF DISEASE SEVERITY IN PEDIATRIC DENGUE FEVER

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Abstract

Background: To assess whether urine protein creatinine ratio (UPCR) could be used as predictor of disease severity in children with Dengue fever. **Materials and Methods:** This was a Prospective study with study period of one year from July 2021 to August 2022 done in children aged 1 month to 12years. This study was done in the Department of Pediatrics, Andhra Medical College, King George Hospital, Visakhapatnam after getting informed consent from parents / guardian and participants. The study was approved by Ethical Committee of the institute. **Result:** In this current study, we have observed that the peak Urine PCR can distinguish patients who are likely to develop DHF from those who do not. Peak Urine PCR occurred on day 4- 7 of the illness. A significant rise in Urine PCR was seen on the day which correlated to one day before the development of dengue hemorrhagic fever. Children with uncomplicated Dengue Fever had significantly lower Urine PCR than patients with impending DHF and DSS. Daily follow-up of dengue affected children in the prospective study helped us in a time course analysis implying that discriminatory value of Urine PCR was not seen in the initial febrile period, it is discriminatory between 4th and 7th day just before defervescence where maximal plasma leakage significantly occurs. **Conclusion:** In this study, we have found that Urine PCR is an accurate marker in predicting the disease severity, need of inotropes, bleeding manifestations and adverse outcome in children from 1 month to 12 years with dengue fever. So we recommend Urine Protein Creatinine Ratio estimation in all children with dengue as a screening test for admission into hospitals, treatment and assessment of prognosis.

INTRODUCTION

Dengue fever is caused by arthropod borne virus, Dengue virus which belongs to Flavivirus family and has diverse spectrum of clinical features like fever, rash, haemorrhage, shock and even death. It affects all age groups and has significant mortality rates.[1] Epidemics are common in Australia, Asia, Europe and America which are all temperate areas in the 20th century. In tropical Asia, it is endemic now.[2] Outbreaks of dengue fever (DF/DHF) are recurrent now and have been reported in India from various states/ union territories Kerala, Karnataka, Punjab, Andhra Pradesh, Delhi, Chandigarh, Goa, Haryana, Tamil Nadu and West Bengal.[3] There is a peak in the occurrence of Dengue fever and DHF cases during July to November. There is also a seasonal variation where there is upsurge of cases following monsoon and not throughout the year. Dengue mainly affects the pediatric age group and causes mortality because of increased capillary permeability, abnormalities of homeostasis and in severe cases Dengue Shock Syndrome. Initiating

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management after occurrence of shock or haemorrhage results in higher mortality rate.

The risk factors for progression to severe disease are poorly characterised, so uncomplicated cases are frequently hospitalised for observation during the critical phase to monitor for capillary leakage syndrome, thereby increasing the financial burden to patients. So, improvements in early diagnosis and risk prediction are necessary, particularly with respect to identification of simple clinical and/or laboratory parameters those are practical and affordable for utility in resource poor countries. This would enable appropriate and timely intervention. Ideally, the test should be cheap, easy to perform, highly sensitive and specific.

This study was undertaken to establish urine protein creatinine ratio (UPCR) as early predictor of disease severity.

This study is a hospital based observational study and is taken up to know whether there is correlation between urine protein creatinine ratio (UPCR) and severity of Dengue fever in children.

Aims & Objectives

Aim:

To assess whether urine protein creatinine ratio (UPCR) could be used as predictor of disease severity in children with Dengue fever.

Objectives:

1. To assess clinical features and outcome of dengue in relation to urine protein creatinine ratio.
2. To monitor urine PCR on daily basis and to correlate urine PCR with severity of dengue.

MATERIALS AND METHODS

Study Design: This was a Prospective study with study period of one year from July 2021 to August 2022 done in children aged 1 month to 12years.

This study was done in the Department of Pediatrics, Andhra Medical College, King George Hospital, Visakhapatnam after getting informed consent from parents / guardian and participants. The study was approved by Ethical Committee of the institute.

Dengue positive cases were followed up from the day of admission and subsequently until the child recovered.

Demographic data including the age, sex, and epidemiological data were collected at admission. Detailed general examination and systemic examination was done. Biochemical investigations and imaging studies were done whenever necessary.

The patients were categorised into three categories based on WHO guidelines i.e, category A, Category B and Category C. Symptoms and signs were recorded each day. Complete blood count and Spot urine collection were done every day.

Dengue Detection: Dengue detection was done using NS1 antigen or IgM antibody based on the day of admission.

Laboratory diagnosis of dengue fever is dependent on proper collection, processing, storage and shipment of the samples. All universal precautions were taken while\ Collecting blood for serological studies from suspected DF/DHF cases. While Sending the samples for lab confirmation, the day of onset of dengue fever and day of sample collection were written on the sample bottles to guide the laboratory for the type of test to be performed (NS1 for samples collected from day1 today5and Ig M after day5)

Urine PCR (protein creatinine ratio): Urine protein was detected, quantified by pyrogallol red method. Urine Creatinine was estimated by modified Jaffe method.

Normal Urine PCR<2yrs - <0.5, >2yrs - <0.2, values lower than this range was considered insignificant.

Peak value of urine PCR (protein creatinine ratio) were compared among patients with dengue with no warning signs vs dengue with warning signs vs DHF /DSS Urine Protein Analysis Pyrogallolred method was used for quantitative Colorimetric determination of Total Protein in Urine.[4]

Urine Creatinine by Modified Jaffe Method: Creatinine Quantitative estimation in urine was done by modified Jaffe method.

Inclusion Criteria

All dengue NS1 or IgM positive case which were admitted on any day of illness. Children from the age of 1 month to 12 years of age

Exclusion Criteria

Children with other causes of proteinuria like Nephrotic syndrome or pre existing renal disease. Those who did not give consent for the study

Statistical Analysis

Data obtained was analysed using statistical package for social sciences (SPSS) software–version 21.0. Outcomes were tested using Chi-square test; p value<0.05 was considered significant. Data was represented using bar diagrams, pie diagrams.

RESULTS

In this study, 80 children in the age group of 1month to 2years with dengue infection were enrolled.

Out of 80 children in the study, 22 children belong to less than 2 years age group and 58 children belong to more than 2 years age group. [Table 1]

Out of 80 children, 52 were male and 28 were female. Male to female ratiowas1.9:1. Out of 28 female, 10 (35%) children were below age group of 2 and18 (65%) were above2 years of age. Out of 52male children, 12 (23%) were below 2 years age and 40 (65%) were above 2 years age.

The children with dengue infection were grouped into 3categories based on the WHO guidelines.

Category A-dengue with no warning signs category B-dengue with warning signs Category C-severe dengue (DHF and DSS). [Table 2]

Out of 80 children affected with dengue infection, 24(30%) cases belonged to category A, 34(42.5%) belonged to category B and 22(27.5%) cases belonged to category C. [Table 3]

Out of 80 children in this study, 22 (27.5%) children were less than2 years of age and 58(72.5%) children were more than2 years of age. Out of 22 children of

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less than 2 years age group 5 (22%) belonged to category A, 10(45%) to category B and 7(33%) to category C. Out of 58 children of age more than 2 years19 (38%) belonged to category A, 24 (41%) to category B, and15(21%)to category C. [Table 4]

In this study out of 24 children in category A, 20 (83%)had urine PCR value of less than 0.5.4(17%) had 0.5-1.In category B, out of 34, 22 (65%)had urine PCR of less than 0.5,10(29%) had 0.5-1, 2(6%) had 1-1.5. Category C 5 (23%) had PCR of less than 0.5,4(18%) had urine Pcr value of more than 0.5. correlation between spot UPCR on admission day and category of the patient is significant statistically. [Table 5]

Out of 80 children in this study. category C children had higher peak urine PCR values when compared to category B and category A. out of 22 children from category C, 5 (22 percent) had urine PCR value of more than 1.5, 6(28%) had 1-1.5, 9(41%) had 0.5-1. In category B,1(3%) children had urine PCR value of more than1.5.,3 (8%). Had between1-1.5,11(32%) had between 0.5-1and19 (56%) children had urine PCR value of less than 0.5. Among children in category A, most of the children had urine PCR value of less than 0.5 ie It was also showed that peak urine PCR values are higher among children in category C when compared with category B and A. In children infected with dengue, relation between peak UPCR and category of the patient is found to be statistically significant (p value 0.0004). [Table 6]

In this study, mean urine PCR values were highest in the category C followed by category B and then category A. we also calculated mean urine PCR values in children with age less than 2 years and age more than 2 years which was almost same in the both age groups.

Hence, it was proved that urine PCR values were higher among category C children with dengue infection. As severity of dengue infection increases, urine PCR increases which can be used as predictor of disease severity in children with dengue infection. [Table 7]

Out of 80 children, 20 children had urine platelet count of less than 50000, 30 children had platelet count between 50000 to1 lakh, 30 children had platelet count of more than1 lakh.Of 20 children with platelet count of less than 50000,25 percent children had urine PCR value of more than 1.5, 20 percent children had urine PCR value of 1-1.5, 25 percent children had urine PCR value of 0.5-1.according to above table higher PCR values are higher among low platelet group when compared with higher platelet count group. Platelet value is comparatively lower when the peak UPCR value is high and the relation is found to be statistically significant (p value 0.0011). [Table 8]

Out of 80 children with dengue Infection, normal hematocrit of 30-40 was seen in 56 children who have lower urine PCR values ie 62 percent children had urine PCR value of less than 0.5. in children with lower and high hematocrit had higher urine PCR values. The table showed that relation between hematocrit and urine PCR in dengue infected children is statistically significant. [Table 9]

Out of 80 children, 63 children had no bleeding manifestations, 17 children had bleeding manifestations. Out of 17 children with bleeding manifestations,89 percent children had higher urine PCR values of more than 0.5 of which 25 percent had urine PCR value of more than 1.5. among children with no bleeding manifestations, only 40 percent children had urine PCR value of more than 0.5 of which 4 percent children had urine PCR value more than 1.5.

Patients with bleeding manifestations are compared with the peak value of UPCR. cases those presented with bleeding had high UPCR values which is statistically significant. [Table 10]

Out of 80 children, 41 children had organomegaly and 39 children had no organomegaly. There was no significant difference in urine PCR among children with no organomegaly and with organomegaly. In children with organomegaly 46 percent children had urine PCR value of more than 0.5 and also in children with no oragnomegaly 64 percent children had urine PCR value of more than 0.5. children with dengue infection with organomegaly does not have increased UPCR when compared with children with no organomegaly and was found to be statistically insignificant. [Table 11]

Among 80 children infected with dengue, 69 children had no requirement of inotropic support, 11 children infected with dengue had requirement of inotropic support. Of 11 children who required inotropes up-portal the children had urine PCR value of more than 0.5 of which 45 percent of children had urine PCR value of 1.5. Among children with no requirement of inotrope support, 58 percent of children had urine PCR value of less than 0.5 and only 2 percent of children had urine PCR values of more than 1.5. when these values were compared it was found that relation between requirement of inotropic support in children with dengue infection and their peak urine PCR was found to be statistically significant. [Table 12]

Table 1: Age wise distribution of children in the study group

Age:	No of children	Percentage of children
Less than 2years	22	27.5%
More than2years	58	72.5%

Table 2: gender wise distribution of patients in the study

Age group	Male	Female	Total
Less than 2 years	12(23%)	10(35%)	22
More than 2 years	40(77%)	18(65%)	58

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	52	28	

Table 3: category wise distribution of children in the study

Category	No of children	Percentage of children
Category A	24	30%
Category B	34	42.5%
Category C	22	27.5%

Table 4: age wise distribution of patients in the study and relation with categories

Age	Category A	Category B	Category C	Total
<2 years	5 (22%)	10 (45%)	7 (33%)	22
>2 years	19 (38%)	24 (41%)	15 (21%)	58
Total	24	34	22	80

Table 5: SPOTU PCR on day of admission and relation with category of the patient

Spot UPCR on day of admission	Category A	Category B	Category C	Total
<0.5	20 (83%)	22(65%)	5(23%)	47
0.5- 1.0	4(17%)	10(29%)	10(45%)	24
1.0-1.5	0	2(6%)	3(13.6%)	5
>1.5	0	0	4(18%)	4
Total	24	34	22	80
Chi square	17.0849			
p'value	<0.0089 Significant			

Table 6: peak value of UPCR and relation with category of the patients in the study

Peak value of UPCR	Category A	Category B	Category C	Total
<0.5	19(79%)	19(56%)	2(9%)	40
0.5-1.0	4(16%)	11(32%)	9(41%)	24
1.0-1.5	1(5%)	3(8%)	6(28%)	10
>1.5	0	1(3%)	5(22%)	6
Total	24	34	22	80
Chisquare	24.5856			
p'value	<0.0004Significant			

Table 7: mean urine PCR among different categories vs age group in the study population

Urine spot PCR	Category A	Category B	Category C
Mean	0.28	0.34	1.27
Mean in Less than 2yrs age group	0.27	0.32	1.4
Mean urine PCR in More than 2 yrs age group	0.29	0.36	1.25

Table 8: relation of platelet count with peak UPCR in the study

PLT ON PEAK SPOTPCR	Peak value				
	<0.5	0.5-1.0	1.0-1.5	>1.5	Total
<50000	6(30%)	5(25%)	4(20%)	5(25%)	20
50000-1lakh	12(40%)	15(50%)	2(7%)	1(3%)	30
>1lakh	22(73%)	4(13%)	4(14%)	0	30
Total	40	24	10	6	80
Chi square	22.2182				
p' value	<0.0011Significant				

Table 9: relation of haematoocrit with peak UPCR in the study

HCT	Peakvalue				Total
	<0.5	0.5-1.0	1.0-1.5	>1.5	
<20	1(16%)	3(50%)	1(16%)	1(17%)	6
20-30	3(30%)	3(30%)	3(30%)	1(10%)	10
30-40	35(62%)	16(25%)	4(7%)	1(3%)	56
>40	1(13%)	2(25%)	2(25%)	3(37%)	8
Total	40	24	10	6	80
Chi square	24.6508				
p' value	0.00338 Significant				

Table 10: relation of bleeding manifestations with peak UPCR in the study

Bleeding	Peak value				Total
	<0.5	0.5- 1.0	1.0-1.5	>1.5	
Yes	2(11%)	5(29%)	6(35%)	4(25%)	17
No	38(60%)	19(30%)	4(6%)	2(4%)	63
Total	40	24	10	6	80

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Chi square	22.6829	
p'value	0.00004Significant	

Table 11: relation of organomegaly with peak UPCR in the study

Organomegaly	Peak value				Total
	<0.5	0.5 - 1.0	1.0 - 1.5	>1.5	
Yes	22(54%)	12(29%)	4(10%)	3(7%)	41
No	18(46%)	12(31%)	6(15%)	3(8%)	39
Total	40	24	10	6	80
Chi square	0.7505				
p'value	0.8612Not Significant				

Table 12: correlation between requirement of inotrope support and peak urine PCR

Inotropesused	<0.5	0.5-1.0	1.0-1.5	>1.5	Tot AL
No	40(58%)	23(33%)	5(7%)	1(2%)	69
Yes	0	1(10%)	5(45%)	5(45%)	11
Total	40	24	10	6	
chi square	39.2626				
p'value	<0.00001(significant)				

DISCUSSION

Dengue infection with warning signs and severe dengue (DHF and DSS) results in mortality significantly in pediatric population. There are many studies which predict the severity of dengue infection in adult population but there are only few studies available to predict severity of dengue infection in pediatric patients. Deaths due to dengue infection are higher among pediatric population due to more number of complications in children due to capillary leakage and multiple organ involvement like kidney, lungs, liver, heart and CNS. So close monitoring of children with dengue infection is required to prevent morbidity and mortality due to dengue infection in children. This study was done to assess severity of dengue fever in early stages, so that with appropriate assessment of child who are likely to progress to severe dengue and develop the complications like bleeding, shock and death can be managed early and aggressively. Hallmark of dengue infection is increase in vascular permeability due to damage to endothelial cell dysfunction which affects various organs.

Proteinuria is seen in most dengue patients and hypoalbuminemia is due to altered filtration of the glomerular membrane. Dengue virus and NS1 antigen attach to heparan sulphate, which is part of the glomerular membrane (glycocalyx)16 causing alteration infiltration of basement membrane leading to proteinuria and hypoalbuminemia.

This study was done to estimate severity of proteinuria as one of the important marker to predict severity of dengue infection and urine PCR values the severity of proteinuria, extent of glomerular basement membrane damage by estimating the urine PCR values at admission and in the subsequent days. To assess whether urine PCR is useful to identify children with dengue infection who are more likely to develop severe dengue in the early stages so that with early intervention and management, children are likely to recover with good outcome.

This study was done to estimate urine PCR in children with dengue infection from the day of admission. This study was done in the Department of Pediatrics, Andhra medical college, King George Hospital, Visakhapatnam over a study period of one year from July 2021 to august 2022.80 cases who were dengue positive (NS1antigen and IgM) with age group of 1 month to 12 years were enrolled in this study. These patients were divided depending on clinical and laboratory parameters into 3 categories as per WHO guidelines ie category A(dengue with no warning signs), category B (dengue with warning signs) and category C(severe dengue-DHF &DSS).

Age-wise distribution: Out of 80 children, children in the age group of < 2 years were22 (27.5%%) and children in the age group of more than 2years were 58 (72.5%).

Category-wise distribution: Out of 80,24 (30%) of children dengue infection belonged to category A, 34 (42.5%) children with dengue infection belonged to category B and 22(27.5%) children with dengue infection belonged to category C. In the study done by Priyanka Datla et al5 there were totally 76 cases of which 19(25%) belonged to category A, 28(37%) belonged to category b and 29(38%) belonged to category C.

Gender incidence: Out of 80 cases, 52 (65%) patients were male and 28(35%) were female. The ratio of male children to female children in our study is1.9:1. out of 28 female children, 10 were below 2 years age group and 18 were above 2 years age group. In male children out of 52, 12 were below 2 years age group and 30 were more than 2 years age group.

Even-though gender distribution did not produce any change in Urine PCR, most of the cases affected were male. It is similar to the study done by Priyanka Datla et al5 which also showed no difference statistically with p value of 0.638 with male to female ratio of 1.45:1 and it is also similar to the study done by

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Edintha Joseph et al6 which showed no difference in urine PCR according to gender with male to female ratio of 1.19:1.

In the present study, comparison gender with peak urine PCR, out of 52 male children, 46 percent had urine PCR value of less than 0.5 and 54 percent children had more than 0.5 of which 7 percent had more than1.5. when compared female children they also had similar urine PCR ie of 28 female children, 57 percent children had urine PCR value less than 0.5 and 43 percent children had urine PCR value of more than 0.5 of which10 percent children had urine PCR value of more than1.5.and there is no significant correlation between gender and urine PCR.

Age incidence: Out of 22 children with dengue infection in less than 2 years age group, 22 percent children belonged to category A, 45 percent children belonged to category B and 33 percent belonged o category C. among children in age group more than 2years, 38 percent children belonged to category A, 24 percent belonged to category B and 21 percent belonged to category C.

This is similar to the study done by Venkataraman et al, whereas study done by Priyanka Datla et al,[5] Edintha Joseph etal showed significant relation with respect to age where urine PCR was higher among age group of > 2 years.[6]

According to studies done by Priyanka Datla et al,[5] and EdinthaJosephetal,[6] high urine PCR was seen in children of older age group affected by dengue when compared to younger age groups which is statistically significant. But in the present study it was not significant.

Day of hospital admission in children infected with dengue infection: Most of the cases in all the categories were admitted on day 4 and day 5 of illness which is in critical phase of dengue infection during which maximum plasma leakage occurs and multiple organ damage occurs

This is similar to the study done by Venkataramanan etal.[7] They showed that Majority of their cases were admitted on day 4 and day 5 of illness where maximum plasma leakage occurs.

Day of peak urine protein creatinine ratio: In our study, 51 cases (63%) cases out of 80 cases showed peak Urine PCR values between 4 and 5 days, which is critical phase where maximum plasma leakage occurs and proteinuria occurs due to damage to glycocalyx.

This was similar to the study done by Venkataramanan et al,[7] where same number of children ie 63% showed peak urine protein creatinine ratio on day 4 and day 5.

Relation between spot urine PCR at admission and category of the children with dengue infection: In our study on day of admission, 4(18%) children belonging to category C had spot urine PCR of ratio >1.5,3(13.6%) children had urine PCR value of >1 and 10(45%) children had ratio of 0.5-1 which was found to be statistically significant.

Category A and B showed lower urine PCR values when compared to children having severe dengue. Category A children had lower PCR values mostly between <0.5 ie 20 (83%) out of 24 children had urine PCR value of <0.5 whereas category B children had urine PCR values from 0.5-1 in 10 children (45%), <0.5 in 22(65%) children. This is similar to the study done by Priyanka Datla et al,[5] where p value is found to be significant. 18out 29 children belonging category C showed urine PCR of more that 1. 9 out of 28 children belonging to category B showed urine PCR of more than 1. This study was also similar to the study done by Venkataramanan et al,[7] where spot urine PCR was significantly high among children belonging to category.

Categories vs peak urine spot PCR: In the [Table 7, Figure 6], out of 80 children,6 children had urine PCR value of more than 1.5.among children in category C,27 percent of children had peak urine PCR value of more than1.5 when compared with other categories it showed than only10 percent of children in category B and no children in category A had urine PCR value of more than1.5.It was also showed that peak urine PCR values are higher among children in category C when compared with category B and C. in children infected with dengue, relation between peak urine PCR and category of the patients found to be statistically significant. This is similar to the study done by Priyanka datla et al,[5] Venkataramanan et al,[7] Edintha Joseph et al,[6] and Vasanwala et al.[8]

Mean urinePCR vs categories: In the present study, that mean PCR was higher among children with category C which was 1.27 and in category B mean urine PCR was 0.34 and in category A it was 0.28.The values were similar in both the age groups ie less than 2 years and more than 2 years.

This is similar to the study done by Venkataramanan etal where there is significant elevation of urine PCR among children in category C when compared to category A and category B.[7] It is also similar to the study done by Vasanwala et al8 where median peak urine PCR was higher among children with dengue hemorrhagic fever and dengue shock syndrome.

It is also similar to the study done by Andries et al where children with severe dengue and dengue with warning signs had higher urine PCR values when to children with no warning signs.

Hematocrit vs urine spot PCR: Out of 80 children with dengue infection, normal hematocrit of 30-40 was seen in 56 children who have lower urine PCR values ie 62 percent children had urine PCR value of less than 0.5. in children with lower and high hematocrit had higher urine PCR values. The table showed that relation between hematocrit and urine PCR in dengue infected children is statistically significant.

This is similar to the study done by Ngiyunthihanhtien et al,[6] and venkataramanan et al,[7] who also showed high urine protein creatinine ratio is high among patients with falling or raising hematocrit values.

Bleeding manifestations vs Urine spot PCR: Out of 80 children, 63 children had no bleeding

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manifestations,17 children had bleeding manifestations. Out of 17 children with bleeding manifestations, 89 percent children had higher urine PCR values of more than 0.5 of which 25 percent had urine PCR value of more than 1.5 among children with no bleeding manifestations, only 40 percent children had urine PCR value of more than 0.5 of which 4 percent children had urine PCR value more than 1.5.

Patients with bleeding manifestations are compared with the peak value of UPCR. cases those presented with bleeding had high UPCR values which is statistically significant.

Organomegaly vs urine spot PCR: Out of 80 children, 41 children had organomegaly and 39 children had no organomegaly.

There was no significant difference in urine PCR among children with no organomegaly and with organomegaly. In children with organomegaly 46 percent children had urine PCR value of more than 0.5 and also in children with no oragnomegaly 64 percent children had urine PCR value of more than 0.5.

Children with dengue infection with organomegaly does not have increased UPCR when compared with children with no organomegaly and was found to be statistically insignificant. This is similar to the study done by Venkataramanan et al where urine PCR did not correlate with organomegaly.[7]

Inotropes usage vs Urine spot PCR: Among 80 children infected with dengue, 69 children had no requirement of inotropic support, 11 children infected with dengue had requirement of inotropic support. Of 11 children who required inotrope support all the children had urine PCR value of more than 0.5 of which 45 percent of children had urine PCR value of 1.5. Among children with no requirement of inotrope support, 58 percent of children had urine PCR value of less than 0.5 and only 2 percent of children had urine PCR values of more than1.5. when these values were compared it was found that relation between requirement of inotropic support in children with dengue infection and their peak urine PCR was found to be statistically significant.[8,9]

CONCLUSION

In this current study, we have observed that the peak Urine PCR can distinguish patients who are likely to develop DHF from those who do not. Peak Urine PCR occurred on day 4 -7 of the illness. A significant rise in Urine PCR was seen on the day which correlated to one day before the development of dengue hemorrhagic fever. children with uncomplicated Dengue Fever had significantly lower Urine PCR than patients with impending DHF and DSS. Daily follow-up of dengue affected children in the prospective study helped us in a time course analysis is implying that discriminatory value of Urine PCR was not seen in the initial febrile period, it is discriminatory between 4th and 7th day just before defervescence where maximal plasma leakage significantly occurs.

There is increasing incidence of dengue fever now a days. Dengue has many associated complications which necessitate the need for early predictors of disease severity in dengue fever. Especially pediatric populations are more prone for severe complications finally leading to high morbidity and mortality due to dengue. So early markers of disease severity can help identify the children who are more prone for complications so that they can be treated early. Such markers are not well studied in the pediatric population. Urine PCR assessment is easy to perform and inexpensive.

In this study, we have found that Urine PCR is an accurate marker in predicting the disease severity, need of inotropes, bleeding manifestations and adverse outcome in children from 1 month to 12 years with dengue fever. So we recommend Urine Protein Creatinine Ratio estimation in all children with dengue as a screening test for admission into hospitals, treatment and assessment of prognosis.

Limitations

Our study had less number of patients with DHS/DSS.

Another limitation is we were not able to eliminate many confounding factors of proteinuria which can be even cause by other viruses like EBV, CMV etc.

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