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Original Research Article

An observational study to determine the incidence and the clinico-epidemiologic profile of dengue fever in paediatric age group presenting to a tertiary care centre in Western Rajasthan, India

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ABSTRACT

Background: Dengue remains major public health concern because of the expanding geographic distribution of both the virus and the mosquito vector. Aims and objectives was to determine the incidence of dengue fever in paediatric age group presenting to a tertiary care centre in Western Rajasthan and to evaluate the clinico-epidemiologic profile of these children.
Methods: This is observational epidemiological study on patients of pediatric age group, over a period of one year.
Results: A total of 210 ELISA positive cases, comprising of 55% males and 45% female (Male to female ratio of 1.2:1) were enrolled. In this study most (44.7%) were age group of 10-18 years, 80% patients from urban area, 93.8%. admitted between the months of September to December, 70.95% presented between 3rd to 5th days of their illness, 48 (22.86%) were tourniquet test positive at the time of admission with fever being most common (95.23%) presenting symptom, followed by headache (60%) and vomiting (55%). Almost all (99.52%) had thrombocytopenia (34.2% of them had severe thrombocytopenia), most (85%) had a hospital stay of less than a week, 98.10% patients required fluid therapy for less than 5 days. and a mean of 3.41±2.60 days were required by these patients to recover from significant thrombocytopenia. Here 22% (46) patient's required ICU care, with shock being main indication for ICU admission, followed by requirement of blood product transfusion (73%). Bleeding manifestations were seen in 73(34%) patients, commonest being the epistaxis in 40 patients (55%).
Conclusions: Incidence of dengue was 0.42% with 32.38%patients were IgG ELISA positive also.

Keywords: Dengue fever, Epidemiology, Thrombocytopenia

INTRODUCTION

Now a day's dengue is endemic in most of the tropic and sub tropic countries like India especially in urban population. An estimated 50 million dengue infections occur annually and approximately 2.5 billion people live in dengue endemic countries.[1] The world health organization (WHO) declared dengue as a major international public health concern because of the expanding geographic distribution of both the virus and the mosquito vector, the increased frequency of epidemics, the co-circulation of multiple virus serotypes, and the emergence of dengue hemorrhagic fever in new areas.[2,3] In the latter part of 2010, based on surveillance being conducted by the Desert Medicine Research Centre (an ICMR institution) it was anticipated that there was potential for an outbreak of dengue in Jodhpur given the conducive weather conditions.[4] Ambient temperatures ranged between 24°C and 32°C and humidity levels fluctuated between 50 and 70% (Relative humidity). In desert and semi-arid areas of Rajasthan, where people possess tendency of over and sustained storage of

domestic water, present observations on occurrence of all four dengue virus types may have important bearing on the epidemiology of DHF in the area.[5] Because of this variability of climatic conditions in this area, there is a wide spectrum of clinical variations possible here.

Case definitions

A case of dengue was defined as per WHO case definition.[6,7]

Diagnosis

Authors screened all total IPD (49,711) patients during year and 1750 patients detected positive for NS-1 by rapid diagnostic tests, these patients were further investigated for confirmation of dengue by ELISA tests and a total of 210 were proved positive.

Aims and objectives was to determine the incidence of dengue fever in paediatric age group presenting to a tertiary centre in Western Rajasthan and to evaluate the clinico-epidemiologic profile of these children.

Outcome measures

Clinico epidemiology of dengue patients in paediatric age group in Western Rajasthan, India.

METHODS

The study was an observational epidemiological study conducted on patients of paediatric age group (up to 18 years) in Department of Paediatrics, Dr S. N. Medical College Jodhpur over a period of one year. Eligible patients fulfilling diagnostic criteria were enrolled and data were collected and recorded in a specially designed Proforma on a daily basis.

Inclusion criteria

All the patients presented with an acute febrile illness of 2 to 7 days are screened for various diagnostic tests for dengue fever, if tests turn positive for dengue virus infection, these cases were involved in study. This acute fever, often associated with nausea vomiting, pain abdomen, headache, anorexia, myalgia, facial flushing, skin erythema, injected pharynx, conjunctival injection, various bleeding manifestations (mucosal bleed, petechial haemorrhages, epistaxis, etc.)

Exclusion criteria

- Parents/guardian refused for written consent.
- Having thrombocytopenia due to a well proven other cause.
- Having other diagnosed cause of fever.

A written consent was taken from a parent/guardian, permission from ethical committee was obtained and all information was recorded on a predesigned proforma for this study.

All children were managed as per standard protocols. All statistical analyses was performed by standard statistical methods.

RESULTS

Present study was an observational epidemiological study conducted on patients of paediatric age group (up to 18 years) in Department of Paediatrics, Dr S. N. Medical College Jodhpur over a period of one year. A total of 49711 patients were admitted during study period.

All suspected patients were screened for dengue fever and a total of 1750 patients were screened positive for NS-1 by rapid diagnostic tests. Out of these of 210 were proved confirmed positive for IgM out of which 68 were also positive for IgG for dengue by ELISA. So 210 were enrolled in the study and further investigated as per study protocols.

The salient observations made from the study were as follows:

When we analyzed admission month wise distribution of IPD patients, we observed that maximum number (128; 60.95%) of cases were detected in the month of October followed by November 37 (17.62%) while no case were found in months of April, May and June (Table 1).

In this study maximum number of patients were males (55.23%) as compared to females (44.76) with a male female ratio of 1.2:1, with the difference being statistically not significant. Highest rate of screening positivity for NS-1 was observed in the month of October (50.4%) followed by November (35.2%). The IgG positivity by ELISA was also highest in these months in that order. While IgM ELISA positivity rate was observed highest in the month of September (16.92%) followed by July (16.6%) and December (14.7%). No ELISA IgM or IgG positive cases were found in months of February, March, April, May, and June (Table 2).

Table 3 shows that maximum (93.80% out of 1696 screened) cases of NS-1 positive, and maximum number of ELISA IgM confirmed dengue were found during the period from September to December 2018. The highest positivity rate was seen in the period of May 2018 - August 2018.

Maximum number (80.48 %) of our study patients were from urban area and only 19.52% were from rural area showing that urban population was affected more than the rural (p value <0.0001). Most of the patients (70.95%) presented between 3rd and 5th day of their illness with mean day of presentation was 4.52±1.44 days with the difference being statistically insignificant (p Value 0.434).

Table 1: Admission month wise distribution of dengue patients.

Months 2018	Total Admissions (IPD)	Screened positive for NS-1	ELISA IgM positive cases N (%)
January	3960 (7.97%)	21 (0.53%)	01 (0.48%)
February	4394 (8.84%)	05 (0.11%)	00
March	4208 (8.46%)	02 (0.04%)	00
April	3530 (7.10%)	00	00
May	3440 (6.92%)	00	00
June	2998 (6.03%)	00	00
July	4027 (8.10%)	06 (0.14%)	01 (0.48%)
August	4407 (8.87%)	20 (0.45%)	11 (5.24%)
September	4694 (9.44%)	130 (2.76%)	22 (10.48%
October	4901 (9.86%)	882 (17.99%)	128 (60.95%)
November	4447 (8.95%)	616 (13.85%)	37 (17.62%)
December	4705 (9.46%)	68 (1.44%)	10 (4.76%)
Total	49711	1750 (3.52%)	210 (100%)

Table 2: Month wise ELISA positivity rate.

Months	No of cases screened (NS1 positive)	Total positive cases by ELISA(IgM + IgG)	IgG ELISA Positive cases	Exclusively IgM Positive cases
January	21	01 (4.76%)	--	01 (0.48%)
February	05	--	--	--
March	02	--	--	--
April	00	--	--	--
May	00	--	--	--
June	00	--	--	--
July	06	01 (16.66%)	01 (0.48%)	--
August	20	11 (55%)	04 (1.90%)	07 (3.33%)
September	130	22 (16.92%)	09 (4.29%)	13 (6.19%)
October	882	128 (14.51%)	39 (18.57%)	89 (42.38%)
November	616	37 (6.00%)	13 (6.19%)	24 (11.43%)
December	68	10 (14.70%)	02 (0.95%)	08 (3.81%)
Total	1750	210 (12.00%)	68 (3.89%)	142 (8.11%)

Table 3: Season wise incidence of dengue cases.

Season	Total IPD	Screened positive for NS-1 cases	ELISA IgM +IgG positive cases (n=210)	Exclusive ELISA IgM positive cases (n=142)	Incidence of ELISA IgM positive cases (%)	Incidence of ELISA IgG positive cases (%)
Jan 18 - April 2018	16092	28	1 (3.57%)	1 (3.57%)	----	0.09
May 18- Aug 2018	14872	26	12 (46.15%)	07 (26.92%)	--	--
Sep 18 - Dec 2018	18747	1696	197 (11.61%)	134 (8.49%)	0.90	0.29
Total	49711	1750	210	142	0.42	0.14

In this study the commonest symptom of presentation was fever which affected 200 patients (95.23%) followed by headache (60%), vomiting (55.23%), pain abdomen (45.23 %) and body ache (29.04%) (Table 4). Authors observed that 48 (22.86%) patients out of a total 210 were found tourniquet test positive. Table 5 depicts that mean values of SGOT and SGPT was found to be quite variable with a mean of 177.44±542.31 and 152.10±525.07 respectively. This wide range was because of two patients having high SGOT and SGPT values falling in range of 5000 and above. Mean PT was found 18.39±3.64 and mean INR was 1.57±0.51. The values of serum creatinine were found between 0.10-2.4 with a mean value of 0.59±0.37. In our study almost all

patients (99.52%) presented with thrombocytopenia out of which 34.2% were with severe, 29.52% with moderate, 34.76% with mild thrombocytopenia on day first of admission. Only 3 (1.42%) patients were admitted with normal range of platelet counts.

Table 4: Various clinical features of patients admitted with dengue.

Clinical features	Number of cases
Fever	(95.23%) 200
Vomiting	(55.23%) 116
Rashes	(48.57%) 102
URI	(9.52%) 20
Joint pain	(16.19%) 34
Nausea	(15.71%) 33
Flushing	(14.28%) 30
Body ache	(29.04) 61
Urticaria	(0.47%) 01
Headache	(60%) 126
Loss of appetite	(4.76%) 10
Abdomen pain	(45.23%) 95
Pruritus	(0.95%) 02
Weakness	(2.38%) 05
Irritability	(5.71%) 12
Diarrhea	(0.95%) 02
Cough/Cold	(5.71%) 12
Abdominal distention	(4.28%) 09
Itching	(2.38%) 05
Convulsion/Seizure	(2.38%) 05
Refusal feed	(4.28%) 09
Sore throat	(1.42%) 03

Table 5: Various laboratory parameters in dengue patients.

Dengue serology	Mean ± SD	Median (95%C.I)
SGOT(U/L)	177.44±542.31	85.0 (22.0-5512.0)
SGPT(U/L)	152.10±525.07	64.0 (16.0-5331.0)
Prothrombin time Sec.	18.39±3.64	17.45
International normalized ratio	1.57±0.51	1.50
S. Creatinine (mg/dl)	0.59±0.37	0.50 (0.10-2.4)

In this cohort mean Hemoglobin on day one was12.74±1.70 which fell down during next three days and started rising again on day 4 with a mean value of 12.34±1.49. Similar trends were observed in HCT with a mean value 37.85±3.57 % on day one and 35.55±3.27% on day 5th of admission which was statistically significant. Other significant trends were followed by platelet large cell ratio (PLCR) which was 28.25±9.18% on admission and 25.44±11.56% on day 5th of admission. Platelet distribution width (PDW) of 13.15±4.57 was found to be on admission which decreased to 11.69±3.01 over time of a week (Table 6). Most of the cases in study group (84.76%) required average stay in the hospital for less than a week, nearly 2 % of the patients stayed for more than 2 week. The mean duration of hospital stay was found to be 4.16±2, 52 days. Among various radiological findings of dengue patients, 20% patients were having pleural effusion on chest X-ray, common ultrasonography findings were ascites (21.90 %), hepatomegaly alone (30.95%), and Hepato-splenomegaly (2.38 %).

Table 6: Various laboratory parameters in dengue cases (mean values).

Parameters	Day 1	Day 2	Day 3	Day 4	Day 5	Anova
Hb (gm/dl)	12.74±1.70 (n=210)	12.53±1.73 (n=201)	12.45±1.53 (n=161)	12.23±1.70 (n=72)	12.34±1.49 (n=17)	0.170
Mean HCT (%)	37.85±3.57 (n=210)	35.54±4.15 (n=201)	35.21±3.50 (n=161)	34.90±3.59 (n=72)	35.55±3.27 (n=14)	<0.0001
TLC (Total leukocyte count×10^3/μ***L***)	4.42±3.06 (n=210)	4.25±1.81 (n=201)	4.99±1.86 (n=161)	5.47±2.17 (n=72)	5.51±1.81 (n=14)	0.0002
Mean platelet counts(×10^3/μL)	76.52±41.86	114.11±79.35	130.06±91.55	143.66±122.64	111.0±57.83	<0.0001
MPV (fL)	10.44±2.06	10.94±1.78	10.85±1.61	10.85±2.00	10.49±1.60	0.075
PCT (%)	0.14±0.09	0.13±0.08	0.14±0.08	0.22±0.64	0.12±0.04	0.074
Platelet-large cell ratio [PLCR %]	28.25±9.18	28.74±8.43	30.40±9.85	31.48±10.44	25.44±11.56	0.018
Platelet distribution width [PDW] (%)	13.15±4.57	12.59±3.00	13.69±3.29	13.29±3.82	11.69±3.01	0.046

Most of the patients (98.10%) required fluid therapy for less than 5 days out of which 55.33% required fluidtherapy for 2 days or less while only 2% patients required fluid therapy beyond 5 days. Mean duration of

fluid therapy requirement was found to be 2.41±1.46 days.

Out of total 22% patients required ICU care. In our study 83.81 % improved without developing the shock, while 16.19 %patients landed up in shock, 18 % patients required blood products. Mean duration to achieve platelet count above or equal to 1 lac was found to be 3.41±2.60 days. Among various neurological symptoms in our cohort of dengue, common feature were irritability (8.57%), Lethargy and stupor in (5.71% each). Epistaxis was the commonest bleeding manifestation observed in 36 patients (17.14%) followed by melaena which was found in 18 patients (8.57%). Overall incidence of bleeding manifestation was 32.85%. Most common bleeding manifestation in our study was epistaxis which was commonly (72.50%) associated with severe thrombocytopenia. Other common bleeding manifestations were melena (8.57%), totally presented with severe thrombocytopenia and petechiae seen commonly with severe thrombocytopenia (85.71%) (Table 7).

Table 7: Correlation of thrombocytopenia with bleeding manifestation.

Bleeding manifestation	Platelet count per micro liter at Day 1				
	<10,000	**10000-50000**	**50000-100000**	**100000-150000**	**>150000**
Epistaxis	11 (73.33%)	18 (62.07%)	04 (80.0%)	05 (83.33%)	02 (100.0%)
Melena	10 (66.67%)	08 (27.59%)	--	--	--
Hematemesis	--	01 (3.45%)	--	--	--
Petechiae	03 (20.0%)	09 (31.03%)	01 (20.0%)	01 (16.67%)	--
Total number with platelet count, n (%)	15	29	05	06	01

In study group 18% out of total enrolled patients required blood product transfusion. RDP was transfused most commonly (65.78%) followed by SDP (31.57%). Only one patient required PCV along with RDP which makes 2% of total blood product receivers. RDP was transfused at a mean platelet count of 13.64±20.76, similarly SDP transfused at a mean platelet value of 9.75±5.83 ×103/µL. Nearly 72 % patients were presented with dengue fever alone, while almost 12% patients developed DHF anytime during course of hospitalization and 16.19% patients were developed in DSS any time during hospitalization (Table 8).

Table 9 shows that the mean duration of stay was seen maximum with DSS group as compared to other two which was 7.58±2.54 .All patients with DSS were kept in ICU and 83% of total DSS patients required blood product transfusion. Time taken to recover from thrombocytopenia and duration of fluid therapy requirement was also more with DSS group with mean values of 6.11±2.07 and 3.88±1.06 respectively. Other system involvement was also more frequent with DSS group. Maximum number of cases on admission were of dengue fever with warning signs which were 72% of the total. Patients below 5 year of age were admitted maximally (80%) with dengue fever (DF) alone .DSS was seen highest in 10-18 year age group of patients.

Table 8: Classification of dengue fever severity (WHO).

Type	Frequency	Frequency (%)
Dengue fever	151	71.91
Dengue hemorrhagic fever	25	11.90
Dengue shock syndrome	34	16.19
Total	210	100%

Table 9: various morbidity parameters among three classes of dengue fever.

Type	DF n=151 (72%)	DHFn=25 (12%)	DSS n=34(16%)	p value
Hospital stay	3.27±1.54	4.95±3.16	7.58±2.54	<0.0001
Fluid therapy requirement	1.96±1.32	3.16±1.16	3.88±1.06	<0.0001
ICU care	13 (8.6%)	09 (36%)	34 (100%)	<0.0001
Blood products given	04 (2.6%)	06 (24%)	28 (82.3%)	<0.0001
Time to recover from thrombocytopenia ≥100000	2.26±2.14	4.50±2.20	6.11±2.07	<0.0001
Liver dysfunction SGPT ≥ 45	85 (56.29%)	21 (84%)	33 (97%)	<0.0001
RFT creatinine ≥1.0	14 (9.27%)	09 (36%)	14 (41.17%)	0.0002
Neurological symptoms	17 (11.2%)	06 (24%)	26 (76.47%)	<0.0001

Table 10: Correlation between clinical feature with dengue cases severity.

Clinical features	Number of cases	DF (I) (n=151)	DHF (II) (n=25)	DSS (III) (n=34)
Fever	(95.23%) 200	130 (86.09%)	24 (96.0%)	33 (97.06%)
Vomiting	(55.23%) 116	55 (36.42%)	12 (48.0%)	11 (32.35%)
Rashes	(10.47%) 22	15 (9.93%)	01 (4.00%)	06 (17.65%)
URI	(9.52%) 20	14 (9.27%)	04 (16.0%)	02 (5.88%)
Joint pain	(16.19%) 34	27 (17.88%)	04 (16.0%)	03 (8.82%)
Nausea	(15.71%) 33	23 (15.23%)	04 (16.0%)	04 (11.76%)
Flushing	(14.28%) 30	21 (13.91%)	04 (16.0%)	05 (14.71%)
Body ache	(28.10%) 59	40 (26.49%)	05 (20.0%)	14 (41.18%)
Urticaria	(0.48%) 01	01 (0.66%)	--	--
Headache	(60%) 126	90 (59.60%)	22 (88%)	14 (41.17%)
Loss of appetite	(4.76%) 10	03 (1.99%)	02 (8.0%)	05 (14.71%)
Abdomen pain	(45.23%) 95	64 (42.38%)	15 (60.0%)	16 (47.06%)
Pruritus	(0.95%) 02	02 (1.32%)	--	--
Weakness	(6.67%) 14	09 (5.96%)	04 (16.0%)	01 (2.94%)
Irritability	(5.71%) 12	09 (5.93%)	01 (4.00%)	02 (5.88%)
Diarrhea	(0.95%) 02	02 (1.32%)	--	--
Cough/Cold	(5.71%) 12	06 (3.97%)	01 (4.00%)	05 (14.71%)
Abdominal Distention	(4.76%) 10	06 (3.97%)	01 (4.00%)	03 (8.82%)
Itching	(2.38%) 05	03 (1.99%)	--	02 (5.88%)
Convulsion/Seizure	(2.38%) 05	04 (2.65%)	--	01 (2.94%)
Refusal feed	(0.47%) 01	01 (0.66%)	--	--
sore throat	(4.28%) 09	05 (3.31%)	02 (8.0%)	02 (5.88%)

Male were admitted more than female in all the three groups with maximum number of cases seen in DF group with 75.86% males and 67% females. DSS was seen more in females (19.15%).

Table 10 shows that maximum enrolled cases were from group (I), followed by (II) and then (III).The predominant symptom observed was fever in all three groups, apart from it, headache (60%) followed by pain abdomen (42.38%) and body ache (42%) were some other common features in (I). common symptoms in group (II) were headache (88%), pain abdomen(60%) and vomiting (485%) abdominal pain(47.06%) was the second most common symptom in group (III), followed by body ache and headache which were almost equal (41%) in this group.

DISCUSSION

Maximum patients in our study were admitted from October to December (Table 1, 2) months, similarly C.H. Rasul et al, observed that dengue transmission occurred round the year but the peak in post monsoon seasons.[8] Tripathi et al and Nidhi et al also opined that infection started in the post monsoon season, with highest number of cases peaked in October (>70%) and reduced till December every year.[9,10] In this study 55% patients were males and 45% were females with a male: female ratio of 1.2:1. Significant gender preponderance was not noted in this study. In one study Betty et al, found the similar sex ratio.[11] The similar gender ratio was observed in other studies also with ratio varying between 1.6-1.7:1.[12] Female were more affected with DHF. Similar results were reported by Agarwal et al, with a sex ratio of 1.4:1. Whereas in studies by C. H. Rasul et al, and Kamath et al, the male: female ratio was observed as 1:1.[13,8,14] This slightly male preponderance in this study might be because of gender bias, seeking early medical treatment for males and comparatively more outdoor activities by boys. There are some more studies which are showing a slight male preponderance with almost similar results.[12,15-18]

In this study authors found that 80% enrolled patients were from urban areas in this study while Tripathi et al observed that dengue transmission equally occurs in both urban and rural population.[9]

It can be difficult to distinguish dengue clinically from non-dengue febrile diseases in the early febrile phase. A positive tourniquet test in this phase increases the probability of dengue.[19] In addition, these clinical features are indistinguishable between severe and non-severe dengue cases. Therefore monitoring for warning signs and other clinical parameters is crucial to recognizing progression to the critical phase. Dengue virus infections may be asymptomatic, or may lead to undifferentiated fever, DF or DHF/DSS. According to

Betty et al.[11] DF was diagnosed in 24 (32.88%), DHF in 15 (20.55%) and DSS in 34 (46.57%) patients. They also found that, the commonest presentation was fever in 69 (94.52%), Eleven (15.07%) patients had bleeding manifestations and it was significantly commoner in patients without DSS (p = 0.0404). Bradycardia was noticed in five (6.85%) patients in the post-febrile stage which resolved without any treatment. In our study most common presenting symptom was fever (95.23%). Results were comparable with earlier studies.[20-24]

Hepatomegaly was seen in 33% of our cases, however earlier studies reported an incidence of 70-80%.[12,20,25, 26] Although liver size does not correlate with disease severity or abnormal liver function tests, an enlarged liver is observed more frequent in DHF compared to DF group. There were more DHF patients with hepatomegaly compared to DF group but the difference was not of statistical significant. The hepatic involvement may be due to direct infection of the dengue virus or due to immune mediated hepatocyte injury or various other mechanisms as mentioned earlier.

Pain abdomen in dengue fever can be due to mesenteric lymphadenitis, hepatic enlargement or bowel wall ischemia secondary to shock. In this study Pain abdomen was seen in about 45% cases similar to earlier studies which had an incidence of 40 to 50%.[27,28] This can be due to various factors like age of the patients, high number of DHF cases seen in this study, variation in the host immune system, or may be due to gastrointestinal tract predilection of the circulating dengue virus in this part of the country which requires further studies for confirmation.

Vomiting in dengue fever may be due to hepatic involvement, mesenteric adenitis or bowel wall ischemia. Vomiting was present in 55.23% of the cases comparable with other studies which had an incidence of 55 to 65%.[13,20,21]

Headache was seen in 60% of our patients which was more commonly. Findings are comparable with earlier studies which had an incidence of 50 to 65%.[29,30]

Rash was seen in 48.57% of the cases while in earlier studies by Saba Ahmed et al, and Farid -uddin et al.[23,24] It was seen in around 60% cases.

Bleeding is one of the dreaded complications of dengue infection. In our study the overall incidence of the bleeding manifestations was seen 32.85% tourniquet test was positive in 22.8% of cases. Epistaxis (54.79%), Melena (24.65%) and petechiae (19.17%) were significant bleeding manifestations in enrolled cases. Other manifestation was hematemesis (1.36%). Ira Shah et al presented with melena (85.7%), hematemesis (9.5%), petechiae (2.6%), whereas in Agarwal et al, presented with hematemesis (39%), epistaxis (36%), skin bleeds (33%) and tourniquet test positive (32%) cases.[31,13]

Shivbalan et al, in his study of predictors of spontaneous bleeding, petechiae was the most frequent (46.6%) followed by hematemesis (26%), melena (21.6%), sub-conjunctival hemorrhage (6.6%).[32] Richard et al found that the tourniquet test was positive in 100% cases, followed by petechiae (43.5%) and epistaxis (39.1%).[33] There is poor sensitivity of tourniquet test in the diagnosis of DHF.[34]

Bleeding manifestation were seen even above severe thrombocytopenia level (>50000). So qualitative defect also thought to be the cause of bleeding.

In various other studies fever was the commonest symptom as observed in our study also.[13,18,23,24,29,30] Narayanan et al found vomiting (83%) was the second most common symptom, while in our study headache(60%) was the second common symptom as observed by some other authors also.[20,30] Authors found hepatomegaly in 33% cases while others found it in more than 50% cases.[20,23,24]

In this study authors can conclude that our observation in present study is comparable with earlier studies, except for bleeding manifestations which were very low in the present study (17.14%). Present study also had Lower incidence of hepatomegaly and compared to other studies which can be attributed to several factors such as the age of the patients, differences of dengue strains and virulence, low number of DHF cases seen in our study, and variation in the host immune system. Other complaints like diarrhea (1%) and cough (5.7%) were also present.

In this study mean leukocyte counts on day one were found to be 4.42±3.06, thrombocytopenia was seen in almost 100% on day one of admission, raised SGPT in 65.23%, hemoconcentration in (%). Dengue IgM by ELISA was positive in 100% cases while 32.38% out of them were IgG ELISA positive. Ira Shah et al, study showed thrombocytopenia (92.3%), raised liver enzyme (74.3%), leukopenia (23%), and hemoconcentration (>40%) in 7.7%.[31]

In this study revealed that patients who were having both IgM and IgG positive (possible secondary infection) were underwent more severe thrombocytopenia (64.91±43.00). they were having lower TLC (4.35±3.01), lower MPV (10.32±2.24) lower PLCR and PDW as compared to those who were found to be IgM Positive only The theory of immune enhancement, developed extensively by Halstead34 predict that individual who have been immunologically sensitized to one dengue virus serotype may develop non- neutralizing antibodies that actually enhance the entry of different serotypes of dengue viruses into mononuclear phagocytes, resulting in the activation of complement and kinins, and the release of mediators of vascular permeability. In a study from Sri Lanka dengue patients by G.N. Malaviage, P.K. Ranatunga et al, observed that secondary dengue infection increased the

risk of severe disease in case of dengue.[35] It was observed that most of the cases (84.76%) required hospitalization for less than a week. Nearly 2% of the patients stayed for more than 2 week. The mean duration of stay was found to be 4.16±2, 52 days. Betty and Gayathri found that duration of hospital stay averaged 6.19 days with a maximum stay of 20 days and a minimum of 3 days.[11]

It was observed that demonstrates that 20% patients were having pleural effusion on chest X- ray other common ultrasonography findings were ascites (21.90%), hepatomegaly alone (30.95%), Hepato-splenomegaly (2.38 %). Betty et al observed that Occurrence of pleural effusion was significantly higher in patients with DSS (p = 0001).[11] The presence of any other factor on ultra-sonogram of the chest or abdomen was not significantly associated with DSS. The common age group of dengue affected patients in this study was between 10-18 years. Which is comparable with other studies with common age group of presentation between 8-15 years.[11,20,21]

Where as in Ira Shah et al, observed that the mean age of presentation was 4.9 years, C.H. Rasul et al observed that the common age group was 5-9 years (57.1%) and mean age being 7.2 years.[31,8] In our study the mean age for DHF was 5.9 years and for DSS was 4.1 years, where as in the study by Ira Shah et al the mean age for DHF was 6.3 years and for was 3.6 year.[31]

Dengue infection is being categorized into three groups by WHO, which are dengue fever (DF), dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). The incidence of DF in our study was 72%. Out of 210 enrolled patients DHF cases were 12% and DSS were 16%. Various studies reported DF (10%), DHF (42%) and DSS (47%), but in our study DF was seen more commonly (72%) as compared to DHF (12%) and DSS (16%).[31,36] This variation is partially may be because of the well aware urban population due to previous year exposure to this rapidly spreading disease and partially due to this study was conducted at a tertiary care center which is well equipped with trained staff and doctors who can recognize warning signs timely and capable of doing adequate intervention timely.

CONCLUSION

Incidence of dengue in this study was found to be 0.42% of the total IPD (49,711) during that year. Meticulous care by medical and paramedical staff, early recognition of danger signs and symptoms, timely and necessary management helped in speedy recovery and prevention of mortality in these cases.

Take home massage

Quite significant number of children are affected by dengue in this part of India, authors require close monitoring of all febrile to detect and manage earliest to prevent morbidity and mortality in these patients.

Recommendations

With further studies with larger cohort with longitudinal follow-up we might be able to unfold unknown facts about this disease, better able to know prognostic factors in our region in future especially with the help of various platelet indices.

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