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Assessment of Accuracy and Reliability of History, Physical Examination and Investigations for Prediction of Complications in Dengue like Illnesses

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Abstract

Background: Dengue is the most important arthropod-borne viral infection of humans. Each year there are about 50 million dengue infections and about 500,000 individuals are hospitalized with DHF, mainly in Southeast Asia.

Methods: The hospital based study was conducted in the Department of Paediatric, P.B.M. Hospital attached to S.P. Medical College Bikaner. The study was commenced after obtaining clearance from the institutional ethical committee. Written consent was taken from the parents and those who were not willing excluded from the study. Patients presenting to paediatric hospital, who fulfilled inclusion and exclusion criteria were enrolled for the study.

Results: Mean age was 10.22± 3.04 year in dengue negative cases and 10.15±3.21 year in dengue positive cases. Male patients outnumber than the female with a male to female ratio of 1.65:1. Fever was present in 100% of cases while documented fever was present in 92.2 % of dengue positive group, followed by vomiting (76.5%), pain abdomen (58.8%), headache (43.1%), eye pain bodyache (41.2% each), rash (11.8%) and joint pain (3.9%). Petechiae and melaena were present in 21.6% of dengue positive cases while nasal bleeding was present in 2(3.9%) cases.

Conclusion: It concluded that low platelet count and rising hematocrit has good association to differentiate dengue from other dengue like illness in a resource limited setting. Cases with prolonged fever rarely turns out to be severe dengue. Significant number of dengue like illness cases etiology was undiagnosed. This is an area of research. Other virus of virulence might be the explanation.

Keywords: Hematocrit, Dengue, Dengue like Illness

Introduction

Dengue is the most important arthropod-borne viral infection of humans. Each year there are about 50 million dengue infections and about 500,000 individuals are hospitalized with DHF, mainly in Southeast Asia. Dengue has been an urban disease but now has spread to rural areas of India as well[1].

Dengue has a wide spectrum of clinical presentations, often with unpredictable clinical evolution and outcome[2]. While most patients recover following a self-limiting nonsevere clinical course, small proportion progress to severe disease. Early recognition of dengue is challenging because the initial symptoms are often non-specific. Viremia may be below detectable levels and serological

tests confirm dengue late in the course of illness[3]. The key to a good clinical outcome is understanding and being alert to the clinical problems that arise during the different phases of the disease, leading to a rational approach in case management.

For severe disease (severe dengue according to the new classification or DHF/DSS according to the older classification) the case fatality rate can be as high 15% but can be decreased to 1% by early diagnosis and prompt treatment[4]. The overall mortality rate of 1.2% in 2007 dropped to 0.25% in 2013. Year-wise analysis revealed that the proportion of DHF cases was about 20% in 2005, 2006 and 2008; the proportion dropped to 6.8% in 2007, 2009 and 2010.This fall probably reflected improved diagnosis and better reporting of non-hospitalized dengue cases.

For a disease that is complex in its manifestations, management is relatively simple, inexpensive and very effective in saving lives, so long as correct and timely interventions are instituted. Hence it is very important to be able to predict which patients are more likely to land up in complications. Such early prediction of adverse outcome and early detection of danger signs can help in reducing mortality and morbidity. Predictors will also help in monitoring the therapy and the course of illness in dengue-like illnesses. Since there is a paucity of literature on this, and there exist many gaps in the current understanding of such predictive factors, this study is being planned to assess history, examination,and investigation based predictive factors for complications of dengue-like illnesses.

Material and Methods

Study Design:Hospital-basedcross-sectional study.

Study Duration: 12 months (January 2018-December 2018).

Study place: Department of Paediatric Medicine, Sardar Patel Medical College, and P.B.M. Hospital Bikaner.

Sample size: The review of the literature shows the prevalence of dengue-like illness ranges from 11 to 20%. In our study we expect prevalence to be around 11%. With allowable error fixed at 20% of prevalence, sample size calculated to be 175.

Sampling method: Convenience sampling

Selection of Study Population

Inclusion criteria

All the patients admitted to Paediatric ward with-

1. Age 3 months to 14 years.
2. A history of fever as given by the patient or parents or a documented fever > 38-degree Celsius in the first 24 hours after admission.
3. Thrombocytopenia of < 100,000 /cubic mm as documented in the automated counter within 24 hours of admission.
4. Informed consent obtained from the guardians or relatives (Annexure A).

Exclusion criteria

1. Patients with a proven bacterial infection as the cause for thrombocytopenia and fever.
2. Patients with a pyogenic focus of infection.
3. Discharge against medical advice or referral to higher center before ascertaining the final outcome.

Method of Study

The study was conducted in the Department of Paediatric, P.B.M. Hospital attached to S.P. Medical College Bikaner. The study was commenced after obtaining clearance from the institutional ethical committee. Written consent was taken from the parents and those who were not willing excluded from the study. Patients presenting to paediatric hospital, who fulfilled inclusion and exclusion criteria were enrolled for the study. A comprehensive

history taking, physical examination, and lab investigations were carried out and data were collected in pre-designed proforma.

Observations

Table 1:Distribution of Cases According to Age Group (years)

Age Group (years)	Dengue				Total	
	Negative		Positive			
	No.	%	No.	%	No.	%
≤5	15	12.1	6	11.8	21	12.0
6-10	49	39.5	18	35.3	67	38.3
>10	60	48.4	27	52.9	87	49.7
Total	124		51		175	100
Mean	10.22		10.15			
SD	3.04		3.21			
t	0.137					
p	0.891					

Out of total 51 dengue positive cases, 11.8%, 35.3% and 52.9% cases belonged to age group ≤5, 6-10 and >10 years respectively while in dengue negative cases,12.1%, 39.5% and 48.4% cases belonged to age group ≤5, 6-10 and >10 years respectively.

Mean age was 10.22±3.04 year in dengue negative cases and10.15±3.21 year in dengue positive cases. This difference was found statistically insignificant (p>0.05).

Table 2: Distribution of Cases According to Gender

Gender	Dengue				Total	
	Negative		Positive			
	No.	%	No.	%	No.	%
Female	50	40.3	16	31.4	66	37.7
Male	74	59.7	35	68.6	109	62.3
Total	124		51		175	100
χ^2	1.232					
P	0.267					

In the present study, male patients outnumber than the female with a male to female ratio of1.65:1. Among all the dengue positive patients 16 and 35 patients belonged to female and male group respectively. This difference was found statistically insignificant (p>0.05).

Table 3: Distribution of Cases According to Symptoms

Symptom	Dengue				Total		χ^2	p
	Negative		Positive					
	No.	%	No.	%	No.	%		
Fever	124	100	51	100	175	100.0	-	-
Documented Fever	110	88.7	47	92.2	157	89.7	0.465	0.495
Rash	12	9.7	6	11.8	18	10.3	0.171	0.680
Headache	74	59.7	22	43.1	96	54.9	3.992	0.046
Eye Pain	69	55.6	21	41.2	90	51.4	3.028	0.082
Bodyache	74	59.7	21	41.2	95	54.3	4.984	0.026
Joint pain	20	16.1	2	3.9	22	12.6	4.900	0.027
Pain Abdomen	79	63.7	30	58.8	109	62.3	0.367	0.544
Vomiting	98	79.0	39	76.5	137	78.3	0.139	0.709

According to symptoms, fever was present in 100% of cases while documented fever was present in 92.2 % of dengue positive, followed by vomiting (76.5%), pain abdomen (58.8%), headache (43.1%), eye pain bodyache (41.2% each), rash (11.8%) and joint pain (3.9%).On applying chi-square test, the difference was found statistically insignificant (p>0.05) in all except headache, joint pain and bodyache where the difference was found statistically significant (p<0.05).

Table 4: Distribution of Cases According to Haemorrhagic Manifestation

Haemorrhagic Manifestation	Dengue				Total		χ^2	p
	Negative		Positive					
	No.	%	No.	%	No.	%		
Petechiae	23	18.5	11	21.6	34	19.4	0.211	0.646
Melaena	15	12.1	11	21.6	26	14.9	2.563	0.109
Hematemesis	1	0.8	0	-	1	0.6	0.414	0.420
Nasal Bleeding	5	4.0	2	3.9	7	4.0	0.001	0.973
Gum Bleeding	1	0.8	0	-	1	0.6	0.414	0.520
Hematuria	2	1.6	0	-	2	1.1	0.832	0.362
Vaginal Bleeding	1	0.8	0	-	1	0.6	0.414	0.520

Above table shows the distribution of cases according to haemorrhagic manifestation. Petechiae and melaena were present in 21.6% of dengue positive cases while nasal bleeding was present in 2(3.9%) cases. Among all dengue negative cases petechiae, melaena, nasal bleeding, hematuria, hematemesis, gum bleeding and vaginal bleeding were present in 18.5 %, 12.1%, 4%, 1.6%, 0.8%, 0.8%, and 0.8% of cases respectively. On applying the chi-square test, the difference was found statistically insignificant (p>0.05 in all).

Table 5:Distribution of Cases According to Complication

Complication	Dengue				Total	
	Negative		Positive			
	No.	%	No.	%	No.	%
Bleeding	15	12.1	23	45.1	38	21.7
Myocarditis	0	-	2	3.9	2	1.1
Shock	36	29.0	17	33.3	53	30.3
Convulsion	0	-	1	2.0	1	0.6
No Complication	73	58.9	9	17.6	81	46.3
Total	124		51		175	100
χ^2	36.314					
P	<0.001					

According to complications, in dengue positive cases, bleeding was the most common complication seen in 45.1% cases while shock, myocarditis, and convulsion were present in 33.3%, 3.9% and 2% of cases respectively. Among the dengue negative cases, 58.9% had no complication while shock and bleeding were present in 29% and 12.1% cases respectively.

On applying the chi-square test, the difference was found statistically highly significant (p<0.001).

Table 6:Distribution of Cases According to Signs of Shock

Signs of Shock	Dengue				Total		χ^2	P
	Negative		Positive					
	No.	%	No.	%	No.	%		
Rapid Pulse	4	3.2	2	3.9	6	3.4	0.053	0.818
Weak Pulse	5	4.0	1	2.0	6	3.4	0.468	0.494
Low BP/ delayed CFT	20	16.1	33	64.7	53	30.3	40.388	<0.001
Skin Pallor	5	4.0	3	5.9	8	4.6	0.284	0.594
Cold Extremities	20	16.1	33	64.7	53	30.3	40.388	<0.001
Cyanosis	1	0.8	0	-	1	0.6	0.414	0.520
Decrease Urine Output	28	22.6	25	49.0	53	30.3	11.964	0.001

According to signs of shock in dengue positive cases, 64.7 % cases had low BP/delayed CFT and cold Extremities and 49% had decrease urine output, while 5.9 % cases had skin pallor, 3.9% cases hadrapid pulse and 2% cases had a weak pulse. In dengue negative cases, 22.6% cases had decreased urine output, 16.1% cases each had low BP/delayed CFT, cold Extremities, 4% each case had a weak pulse and skin pallor while 3.2% and 0.8% cases had rapid pulse and cyanosis respectively.

On applying chi-square test, low BP/delayed CFT, cold Extremities and decrease urine output had a highly significant difference (p<0.001) while all other signs had an insignificant correlation (p>0.05).

Table 7:Distribution of Cases According to Outcome

Outcome	Dengue				Total	
	Negative		Positive			
	No.	%	No.	%	No.	%
Discharge	123	99.2	51	100	174	99.4
Death	1	0.8	0	-	1	0.6
Total	124		51		175	100
t	0.414					
p	0.520					

In the present study out of total 124 dengue negative cases, 1 patient died, while no mortality was observed in

dengue positive group cases. This difference was found statistically insignificant (p>0.05).

Table 8:Distribution of Cases According to Outcome

RDT Test	Outcome				Total	
	Death		Discharge			
	No.	%	No.	%	No.	%
IgM	0	-	9	5.2	9	5.1
NS1	0	-	42	24.1	42	24.0
Negative	1	100	123	70.7	124	70.9
Total	1		174		175	100
t	0.414					
p	0.813					

This table shows distribution of cases according to outcome, out of total 175 cases, 42 were NS1 positive, 9 were IgM positive and 124 were RDT test negative. All patients from RDT test positive group were discharged while in RDT test negative group, 123 patients were discharged and 1 died.

Discussion

Dengue is a major international health concern that is prevalent in tropical and sub-tropical countries. Since the first confirmed case of dengue in India, during the 1940s, intermittent reports from Delhi, Ludhiana, Mangalore, Vellore and from other states have been published. The diagnosis is by clinical profile but they can present with varied manifestation[5-6].

There is a steady increase in the outbreak of dengue fever over the years and so among children. This is due to the rapid urbanization with unplanned construction activities and poor sanitation facilities contributing fertile breeding grounds for mosquitoes. Due to an increase in the awareness among health care professionals following the initial epidemic and the availability of diagnostic tests have contributed to the increased diagnosis[7].

A outbreak of dengue fever during pre-monsoon and monsoon season reported due to stagnation of water after a bouts of rainfall which facilitate vector breeding. This highlight the preventive measures against dengue fever should be taken during water stagnation periods after the initial bouts of rainfall and at the end of monsoon.

In our study out of total 51 dengue positive cases, 11.8%, 35.3% and 52.9% cases belonged to age group ≤5, 6-10 and >10 years respectively while in dengue negative cases,12.1%, 39.5% and 48.4% cases belonged to age group ≤5, 6-10 and >10 years respectively. This may be due to out-door activities of these children, where chances of getting bitten by mosquitoes are more. Similar finding was observed in other studies[8-10].

In the present study, male patients outnumber than the female with a male to female ratio of 1.65:1. Among all these dengue positive patients 16 and 35 patients belonged to female and male group respectively. But this difference was found statistically insignificant (p>0.05).

Boys were slightly more affected then girls were also observed by Selvan et al[10] and Sahana et al[9]and similar pattern was seen in the retrospective analysis of the 2006 North Indian Dengue outbreak[14]. This may be due to out-door activities of these children, where chances of getting bitten by mosquitoes are more.

Fever was the most common presentation (100%) which is in unison with most of the studies from India[12-13] and South East Asia[14-15]. Headache was common complaints of the patients which is similar to the most of the previous studies[12-14]; however study conducted by Munde et al[89] showed lower incidence of 25%. Myalgia was noted in 41.2% of the patients which is comparable with previous studies conducted[12-13], however study conducted by Kauser et al[15] showed lower incidence (32.87%).

In our study petechie and melaena were present in 21.6% each of dengue positive cases while nasal bleeding was present in 2(3.9%) of cases. Among all dengue negative cases petechiae, melaena, nasal bleeding, hematuria, hematemesis, gum bleeding and vaginal bleeding were present in 18.5 %, 12.1%, 4%, 1.6%, 0.8%, 0.8%, and 0.8% of cases respectively.

Kamath et al[16] observed that 69 patients (63%) had evidence of hemorrhagic manifestations such as spontaneous skin and mucus membrane bleeds, upper or lower gastro-intestinal tract (GIT) bleeds and prolonged ooze from venepuncture sites. Severe hemorrhagic manifestations contributing to shock due to spontaneous GIT hemorrhage was seen in 18 patients (16.5%). Of these, 2 patients remained in shock with DIC and massive fatal bleeding and despite maximal supportive treatment could not be resuscitated.

According to complications, in dengue positive cases, bleeding was the most common complication seen in 45.1% cases while shock, myocarditis, and convulsion were present in 33.3%, 3.9% and 2% of cases respectively. Among the dengue negative cases, 58.9% had no complication while shock and bleeding were present in 29% and 12.1% cases respectively in our study.

Raj et al[17] observed that shock was the most common and difficult to treat complication despite appropriate fluid management in accordance with WHO regimen. 20(10.2%) children had shock, of which 7 were refractory to fluid therapy and blood products (whole blood, packed cell volume, FFP) given as indicated.

According to signs of shock in dengue positive cases 64.7% cases had low BP/delayed CFT with cold Extremities, 49% cases had decreased urine output, 5.9 % cases had skin pallor, 3.9% cases had rapid pulse, 2% cases had a weak pulse. In dengue negative cases, 22.6% cases had decreased urine output, 16.1% cases each had low BP/delayed CFT with cold Extremities, 4% each case had a weak pulse and skin pallor while 3.2% and 0.8% cases had rapid pulse and cyanosis respectively in our study. Out of total 124 dengue negative cases, 104 had their systolic BP within normal range while in dengue positive cases, out of total 51 cases, 18(35.3%) had their systolic BP within normal range and this difference was found statistically highly significant.

A study of hemodynamic profiles in DHF from Thailand reported lowered cardiac index due to decreased ejection fraction and lowered preload[18] while reports from New Delhi, India have reported global hypokinesia[19-20].

Conclusion

It concluded that low platelet count and rising hematocrit has good association to differentiate dengue from other dengue like illness in a resource limited setting. Cases with prolonged fever rarely turns out to be severe dengue. Significant number of dengue like illness cases etiology was undiagnosed. This is an area of research. Other virus of virulence might be the explanation.

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