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Investigation for assessing dengue in children with their clinical presentations

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ABSTRACT

To identify the cases of Dengue fever in children admitted to the pediatric ward with clinical presentations of febrile illness. To elaborate on the knowledge of dengue management with respect to its clinical manifestations. Methodology: The present study is a prospective observational study which has been conducted in RVS hospitals and Chittoor Government Hospital of Chittoor, Andhra Pradesh, India. The study was conducted between January 2017 and January 2018 in the department of paediatrics. The study population included the children admitted in the pediatric ward with presenting symptoms of febrile illness and other conditions like lymphadenopathy, hepatomegaly, shock features and haemorrhage, falling under the age of 1-14 years of age. No subjects of non-severe dengue have been subjected for platelet transfusion, whole fresh blood transfusion, dopamine and adrenaline. Whereas 9 subjects of severe dengue have been treated with platelet transfusion, 7 were treated with whole fresh blood transfusion, 3 have been given with dopamine and 6 were managed with adrenaline. Dengue is an acute febrile illness, can be better managed with prior investigation and confirmation of dengue serology. Raised SGOT investigation is the major laboratory parameter for differentiating non-severe and severe dengue. Thus, the study will improve and elaborates the knowledge for better management of dengue, which results in improved outcome.



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INTRODUCTION

Dengue is an acute fever which is also known in many other terms like Hemorrhagic dengue, dengue shock syndrome, Philippine hemorrhagic fever, Thai hemorrhagic fever, Singapore hemorrhagic fever, and also as break-bone fever as it may sometimes lead to severe bone joints pain which resembles the pain of bone breaking (Wichmann O

et al., 2004). Dengue was first reported in the Philippines in 1958. Hence it is known as Philippines hemorrhagic fever, which has been later called Dengue Hemorrhagic Fever (DHF) (Basuki *et al.*, 2010). Dengue is usually spread by mosquitoes bite namely *Aedes aegypti* & *Aedes albopictus*. Which carries the dengue virus. After malaria dengue is the most important topical disease globally. There are nearly four serotypes of virus found here, which includes, Flavivirus, dengue virus types 1, 2, 3 & 4 and Chikungunya virus (Wanigasuriya K *et al.*, 2012). Many parts of the world have faced severe epidemics of dengue in the past as well as in recent years (WHO, 1997).

Annually nearly 50 million infections with dengue have been reported analytically. In India, the first fever with Dengue was reported in 1956 at Vellore and in 1963 first Dengue Hemorrhagic Fever (DHF) was reported in Calcutta. WHO has reported

Table 1: Representing the Different Variables of Study Population

Parameters	Variables	Number (n=220)	Percentage (%)	Non severe dengue	Severe dengue	Stats
Age	<3 yrs	45	20.45%	40	5	Mean age 9.2years
	4-7 yrs	40	18.18%	35	5	
	8-11 yrs	60	27.27%	52	7	
	>11 yrs	75	34.09%	64	11	
Gender	Male	135	61.3%	116	19	
	Female	85	38.63%	75	10	
Duration of hospitalization	0-3 days	70	31.81%	93	9	Mean duration 4 days
	3-6days	86	39.09%	81	7	
	>6 days	64	29.09%	17	13	
Day of admission	0-3 days	96	43.63%	83	7	Mean day 3.8days
	3-6days	71	32.27%	96	10	
	>6 days	53	24.09%	12	2	
Classification	Undifferentiated fever					
	DF (with and without warning signs)	98	44.54%			
	Severe dengue fever(DHF)	93	42.27%			
		29	13.18%			

roughly 5% of deaths in India are of Dengue (WHO, 2012).

Dengue fever clinical manifestations range from asymptomatic or nonsevere to severe Dengue illness, and sometimes may lead to death if left untreated [6]. The causes of Dengue under their respective symptoms are classified as (Poo J *et al.*, 2011):

- Dengue Hemorrhagic Fever (DHF)
- Dengue shock syndrome (DSS)
- Expanded dengue syndrome (EDS)
- Unusual dengue (UD)
- Dengue fever (DF)
- Undifferentiated febrile illness (UF)

According to their symptomatic naming, the investigation for diagnosis also differs for each type of illness mentioned above. UF can only be diagnosed by serology or virology. DF may be associated with massive bleeding symptoms, DHF is nearly similar to DF but differs with severity, were, DHF is severe when compared to DF. DHF may show plasma leakage (increased vascular permeability) which differentiates it from DF (Nunes Araujo FR *et al.*, 2003).

WHO has listed the signs and symptoms of Dengue fever in 2011, as follows (Diaz-Quijano A *et al.*, 2006):

- A headache
- Retro-orbital pain
- Myalgia
- Arthralgia/ bone pain
- Rash

- Bleeding manifestations: petechiae, epistaxis, gum bleeding, hematemesis, melena, or positive (Leelarasamee A and Chupaprawan C, 2004).
- Leucopenia ($WBC \leq 5,000$ cells/mm³)
- Platelet count $\leq 150,000$ cell/mm³ (Huerre MR *et al.*, 2001).
- Hematocrit (Hct) rising 5-10%.

Positive for Dengue fever (Phuong CX *et al.*, 2004)

The major criteria for identifying febrile illness as Dengue fever include elevated Hct $\geq 20\%$, chest x-ray, checking for pleural effusion by physical examination (Wang LY *et al.*, 1990). Whereas, the minor criteria include, positive tourniquet test, platelet count $\leq 100,000$ cells/mm³ (Mohan B *et al.*, 2000).

Aims and objectives

- To identify the cases of Dengue fever in children admitted to the pediatric ward with clinical presentations of febrile illness.
- To evaluate the prevalence of dengue fever in children with different age groups.
- To differentiate the cases of dengue form non-severe and severe dengue cases.
- To evaluate the severity of various clinical manifestations of DF like leucopenia, thrombocytopenia, elevated SGOT.
- To elaborate on the knowledge of dengue management with respect to its clinical manifestations.

Table 2: Laboratory Values of Study Population in Different Variations

Investigations	Variations	Nonsevere Dengue (n=191)	Severe Dengue(n=29)	Total (n=220)
TLC	Leukopenia (<4000 cells/mm ³)	70(36.64%)	10(34.48%)	80(36.36%)
	Leukocytosis (>11000 cells/mm ³)	63(32.98%)	13(44.8%)	76(34.54%)
	Normal TLC (4000-11000/mm ³)	58(30.36%)	6(3.14%)	64(29.09%)
	Rise in SGPT (IU/L)			
	Total	80(50.28%)	10(34.48%)	
	50-200U	42	3	90
	200-1000U	36	2	(40.90%)
Liver enzyme	>1000U	2	5	
	Rise in SGOT (IU/L)			
	Total	68(35.60%)	19(65.51%)	
	50-200U	32	9	87
	200-1000U	36	5	(39.54%)
TPC	>1000U	0	5	
	>100001	64(33.5%)	11(37.93%)	75(34.09%)
	100000-50001	98(51.30%)	9(31.03%)	107(48.63%)
Hematocrit	<50000	29(15.18%)	9(31.03%)	38(17.27%)
	>36.3%	101(52.87%)	10(34.48%)	111(50.45%)
Chest X-ray	<36.3%	90(47.12%)	19(65.51%)	109(49.54%)
	Pleural effusion	50(26.17%)	9(31.03%)	59(26.81%)
	Right sided effusion	78(40.83%)	12(41.37%)	90(40.90%)
	Left sided effusion	38(19.89%)	6(20.68%)	44(20.00%)
USG abdomen	Right + left effusion	25(13.08%)	2(6.89%)	27(12.27%)
	Hepatomegaly	78(40.83%)	12(4.13%)	90(40.90%)
	Ascites	94(17.80%)	9(31.03%)	103(46.81%)
Dengue serology	Gall bladder wall edema	19(9.94%)	8(27.58%)	27(12.27%)
	NS1	61(31.93%)	6(20.68%)	66(30.00%)
	IgM	59(30.89%)	8(27.58%)	67(30.45%)
	IgG	48(25.13%)	8(27.58%)	56(25.45%)
	IgM & IgG	13(6.80%)	3(10.34%)	16(7.27%)
	NS1 & IgM	10(5.23%)	4(13.79%)	14(6.36%)

METHODOLOGY

The present study is a prospective observational study which has been conducted in RVS hospitals and Chittoor Government Hospital of Chittoor, Andhra Pradesh, India. The study was conducted between January 2017 and January 2018 in the department of paediatrics. The study population included the children admitted in the pediatric ward with presenting symptoms of febrile illness and other conditions like lymphadenopathy, hepatomegaly, shock features and haemorrhage, falling under the age of 1-14 years of age. Thus, the required materials and information for the study has been collected from the department of paediatrics of the above-mentioned workplaces. The cases of the patients who had a positive report of dengue have been collected with their presenting signs and symptoms and other laboratory reports.

RESULTS

The present study has revealed that about 191 children out of 220 have been suffering from nonsevere dengue and 29 out of the same 220 samples

have been diagnosed with severe dengue, falling under a mean age group of 9 years old (WHO, 1997).

Table 3: Bleeding Manifestations of Children with Dengue Fever

	Bleeding manifestations		
	Present	Absent	Total
Thrombocytopenia			
Present	30	63	77
Absent	45	53	98
Total	75	116	191
Hepatomegaly			
Present	76	33	109
Absent	70	12	82
Total	146	45	191
Raised SGOT			
Present	67	67	134
Absent	42	15	57
Total	109	82	191

Table 4: Management of Dengue in Subjects with Non-Severe and Severe Dengue Fever

Management	Non-severe Dengue(n=191)	Severe Dengue (n=29)	Total (n=220)
Antipyretics	191	29	220
Intravenous fluids	89 (46.59%)	22(75.86%)	111(50.45%)
Platelet transfusion	0	9(31.03%)	9(4.09%)
Whole fresh blood transfusion	0	7(24.13%)	7(3.18%)
Dopamine	0	3(10.3%)	3(1.36%)
Adrenaline	0	6(20.68%)	6(2.72%)

DISCUSSION

About 545 cases of febrile illness have been reported during the overall study period. In which 200 cases of febrile illness are from RVS hospitals, and the remaining 345 cases of febrile illness have been collected from Chittoor Government Hospital. All the cases collected with febrile illness has been undergone for laboratory investigations for dengue serology- +ve and 220 children have been diagnosed to have dengue. The age group of subjects, their gender, duration of hospital stay, the day of admission to hospital and type of dengue fever were expressed in the following Table 1.

By analysing the data collected from the study, it was noted that 45 members fell under the age group of <3 years, 40 were under the age group of 4-7years, 60 were under the age group of 8-11years, >11 years' age group included 75 subjects. With an overall population of 220. Among these 220 subjects, 191(86.81%) children were diagnosed with nonsevere dengue, and 29(13.18%) subjects were diagnosed with severe dengue. Of which 135 were male, and 85 were of the female gender. Duration of stay of subjects varied from 1 to >6 days. About 31.81% of subjects had a hospital stay between 0-3 days and about 39.10% had a hospital stay of 3-6 days, 29.09%, *i.e.*, 64 members had the longest duration of stay, *i.e.*, >6 days. Subjects were admitted to the pediatric ward with different days of admission, in which 43.63% (83) were admitted on and before 3rd day of onset of febrile illness, between 3-6 days of onset of illness, 32.27% (96) have been admitted, only 24% of subjects were found to be admitted after 5 days of onset of febrile illness (Ali N *et al.*, 2006). About 44.54% (98) members were diagnosed with Undifferentiated fever (UF), 42.27% (93) were diagnosed with Dengue fever (with or without signs), and 29(13.18%) have been diagnosed with Severe dengue(DHF).

The subjects with both nonsevere and severe dengue fever have been undergone for various laboratory investigations like dengue serology, USG (ultrasonography) abdomen, chest x-ray, Total leukocyte count (TLC), Total platelet count(TPC), Liver enzymes like SGOT (Aspartate transaminase) and SGPT (Alanine aminotransferase) & Hematocrit,

and their various values have been noted and recorded for better understanding of clinical presentations of dengue fever (WHO, 2011). Dengue serology included investigation of IgM (Immunoglobulin M antibody), IgG (Immunoglobulin G antibody), and their combination of IgM & IgG and recorded in the above table 2.

Table 3 represents the prevalence of bleeding manifestations in children with nonsevere dengue (n=191, in the present study). It was noted that about 77 members were presented with thrombocytopenia, 109 out of 191 were presented with hepatomegaly, and raised SGOT was noted in 134 children out of 191 children.

Management of dengue

In the study, subjects diagnosed with nonsevere and severe dengue were treated for management of illness. Among 220 subjects, 191 were found to be suffering from nonsevere dengue, and 29 were diagnosed to be suffering from severe dengue. All the 220 subjects have been prescribed with antipyretics, 89 out 191 nonsevere dengue have been undergone for intravenous fluids for maintaining electrolyte balance (WHO, 2009; WHO, 1997). No subjects of nonsevere dengue have been subjected for platelet transfusion, whole fresh blood transfusion, dopamine and adrenaline. Whereas 9 subjects of severe dengue have been treated with platelet transfusion, 7 were treated with whole fresh blood transfusion, 3 have been given with dopamine and 6 were managed with adrenaline. Which is represented in table 4.

CONCLUSION

Dengue has become a very common febrile illness with its increased rates of mortality especially in children ageing between 0 to 14 years. Hence, our present study reveals all the clinical manifestations and laboratory investigations, along with the differentiation between nonsevere and severe dengue. Dengue is an acute febrile illness, can be better managed with prior investigation and confirmation of dengue serology (Guzman MG and Kouri G, 2003). Raised SGOT investigation is the major laboratory parameter for differentiating nonsevere and severe dengue. Thus, the study will improve and elaborates the knowledge for better

management of dengue, which results in improved outcome.

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