Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com/sjams/

OPEN ACCESS

Medicine

To Study the Immunological and Clinical Profile of Dengue Fever

Shilpa TA*, Dr. Nirmala AC

Department of Medicine, Bangalore Medical College and Research Institute, Bangalore, India

DOI: 10.36347/sjams.2020.v08i05.030 | **Received:** 05.05.2020 | **Accepted:** 12.05.2020 | **Published:** 22.05.2020

***Corresponding author:** Shilpa TA

Abstract **Original Research Article**

Background: The incidence of dengue has grown dramatically across the world in the recent decade. According to World Health Organisation (WHO), about 50-100million new dengue infections are estimated to occur annually in more than 100 endemic countries, with a steady increase in the number of countries reporting the disease. This study describes clinical and immunological profile of dengue fever in patients admitted to the hospitals attached to Bangalore Medical College and Research Institute, Bangalore. ***Materials and methods:*** This is a retrospective study including 200 patients of dengue fever from November 2017 to April 2018. ***Results:*** Amongst 200 patients, who presented with dengue fever, 58.5% were males and 41.5% were females. About 37% were in the age group of 21 to 30 years with mean age of study group being 33.7 ± 12.1 years. All of them (100%) had fever at the time of presentation followed by generalised bodyache(). 13.5% of them had hypotension. They were treated accordingly. This study showed NS1 positivity had significant association between platelet transfusion, bleeding manifestations and raised ALT levels. Our study showed mortality rate of 3% for dengue fever. ***Conclusions:*** Early diagnosis and timely intervention are needed to prevent life threatening complications.

Keywords: World Health Organisation, generalized, Dengue Fever.

Copyright @ 2020: This is an open-access article distributed under the terms of the Creative Commons Attribution license which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use (NonCommercial, or CC-BY-NC) provided the original author and source are credited.

INTRODUCTION

Dengue is the most rapidly spreading mosquito-borne viral infection of mankind, with a 30 fold increase in global incidence in the last decade [1].

Dengue virus was isolated in India for the first time in 1945. The first evidence of occurrence of dengue fever in the country was reported in 1956 from Vellore district in Tamil Nadu. The first Dengue hemorrhagic fever (DHF) outbreak occurred in Calcutta (West Bengal) in 1963[1].

Dengue is a mosquito-borne disease, caused by serologically related but antigenically distinct single-strand positive sense RNA viruses. The viruses have been grouped into four serotypes (DENV-1 through DENV-4) belonging to the genus Flavivirus (family Flaviviridae*)*. Aedes aegypti is the primary mosquito vector. However, other species from the genus Aedes such as Aedes albopictus can also be vectors of dengue virus transmission.

Previously classified as dengue fever (DF), dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS), currently according to the WHO dengue classification 2009, dengue is classified as dengue fever with or without warning signs and severe dengue [2].

Usually with the initial symptoms of dengue patients can't be differentiated into mild and severe form of dengue fever. Later as the disease progresses and they develop complications and with laboratory reports, it can be differentiated.

Generally, a dengue virus (DENV) infected person may be asymptomatic or may just develop undifferentiated fever, typically with rashes, body aches and pains, nausea, vomiting and diarrhea. This patient may then recover or may further deteriorate and develop warning signs which include persistent vomiting, abdominal pain and tenderness, bleeding tendencies, fluid accumulation, hepatomegaly, with increased hematocrits and decreased platelets. In this critical phase, if not clinically well-managed, severe plasma leakage, bleeding and organ impairment may occur and can be fatal [2].

Laboratory diagnosis of dengue is made by detecting the virus and/or any of its components (infective virus, virus genome, dengue antigen) or by investigating the serological responses present after infection (specifically IgM and IgG levels)[2].

There are studies reporting that thrombocytopenia,coagulopathy and vasculopathy are related to platelet and endothelial dysfunction in severe dengue.Some studies concluded that risk of developing DHF is more in patients with diabetes and hepatitis, also thrombocytopenia is more common in dengue patients who are NS1 positive[3,4].

Study done by Shiran Ajith Paranavitane *et al*., showed that NS1 positivity is associated with higher risk of developing severe dengue especially when positive beyond day 5 of illness [5].

METHODS

This is a retrospective study which included 200 patients of dengue fever from November 2017 to April 2018 in the hospitals attached to Bangalore Medical College and Research Institute, Bangalore, data based on the medical records of these hospitals.

STATISTICAL ANALYSIS

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation.

RESULTS

Table-1: Age distribution of subjects

		Count	%
Age	<20 years	27	13.5%
	21 to 30 years	74	37.0%
	31 to 40 years	50	25.0%
	41 to 50 years	29	14.5%
	51 to 60 years	13	6.5%
	>60 years	7	3.5%
	Total	200	100.0%

In the study majority of subjects were in the age group 21 to 30 years (37%), 25% were in the age group 31 to 40 years, 14.5% were in the age group 41 to 50 years, 13.5% were in the age group <20 years, 6.5% were in the age group 51 to 60 years and 3.5% were in the age group >60 years. Mean age of subjects was 33.7 ± 12.1 years.

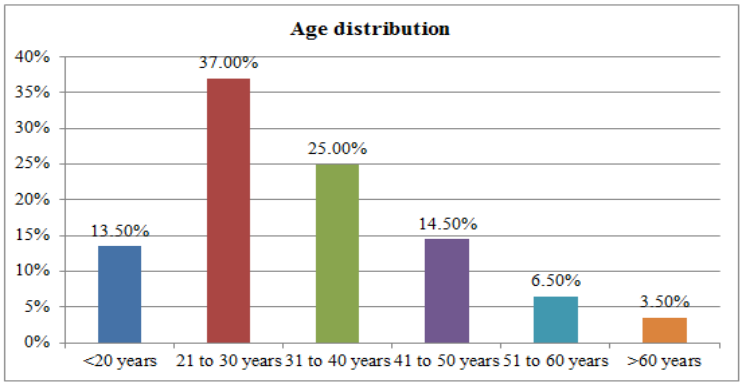

Fig-1: Bar diagram showing Age distribution of subjects

Table-2: Gender distribution of subjects

		Count	%
Gender	Female	83	41.5%
	Male	117	58.5%
	Total	200	100.0%

In the study 58.5% were males and 41.5% were females.

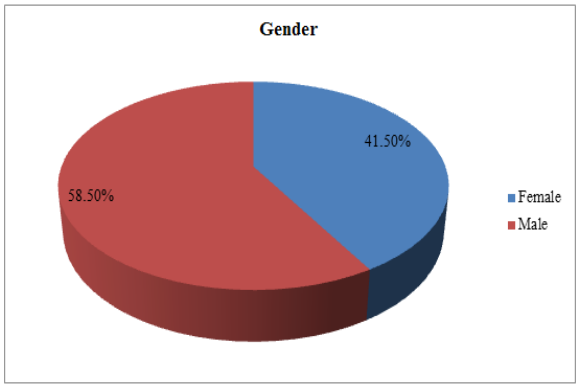

Fig-2: Pie diagram showing Gender distribution of subjects

Table-3: Symptoms on presentation

	Yes		No	
	Count	%	Count	%
Fever	200	100%	0	0%
Retro orbital pain	28	14.0%	172	86.0%
Generalised body ache	88	44.0%	112	56.0%
Arthralgia	31	15.5%	169	84.5%
Skin rashes	9	4.5%	191	95.5%
Vomiting	48	24.0%	152	76.0%
Bleeding manifestations	51	25.5%	149	74.5%
Abdominal pain	13	6.5%	187	93.5%
Breathlessness	5	2.5%	195	97.5%
Lethargy	12	6.0%	188	94.0%
Seizures	0	0%	200	100%
Altered sensorium	0	0%	200	100%

In the study 100% presented with fever, 14% had Retro orbital pain, 44% had generalised body ache, 15.5% had Arthralgia, 4.5% had skin rashes, 24% had Vomiting, 25.5% had Bleeding manifestations, 6.5% had abdominal pain, 2.5% had Breathlessness, 6% had Lethargy.

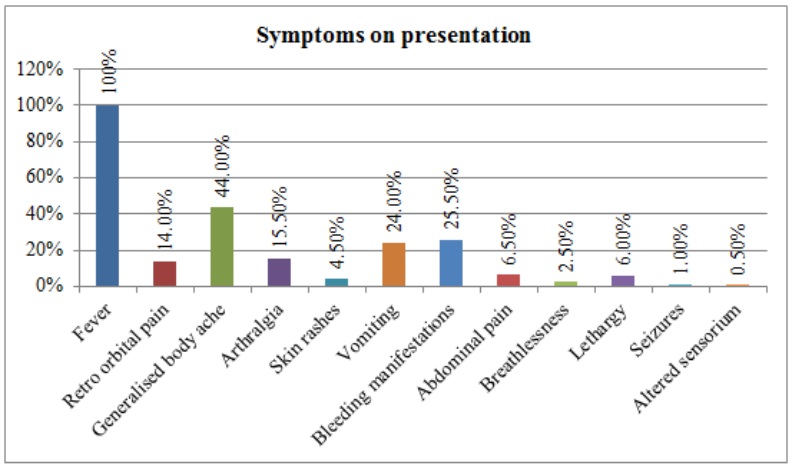

Fig-3: Bar diagram showing Symptoms on presentation

Table-3

Others	**Cough**	**1**	**0.5%**
	Loose stools	2	1.0%
	No	197	98.5%
Hypotension	Absent	163	81.5%
	HTN	10	5.0%
	Present	27	13.5%
Serosities	Absent	131	65.5%
	Present	69	34.5%

In the study 1% had loose stools and 0.5% had cough, 13.5% had hypotension and 5% had HTN and 34.5% had Serosities.

Table-4: Dengue serology findings distribution among subjects

	Negative		Positive	
	Count	%	Count	%
NS1	57	28.5%	143	71.5%
IgM	143	71.5%	57	28.5%
IgG	149	74.5%	51	25.5%

In the study 71.5% were Positive for NS1, 28.5% were positive for IgM and 25.5% were positive for IgG.

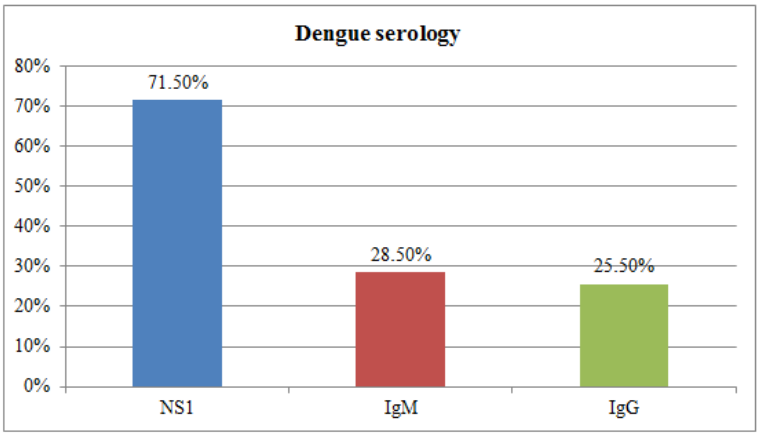

Fig-4: Bar diagram showing Dengue serology findings distribution among subjects

Table-5: Chest X ray findings distribution among subjects

		Count	%
Chest X ray	Bilateral Effusion	60	30.0%
	Normal	140	70.0%

In the study 30% had Bilateral Effusion and 70% had normal Chest X ray.

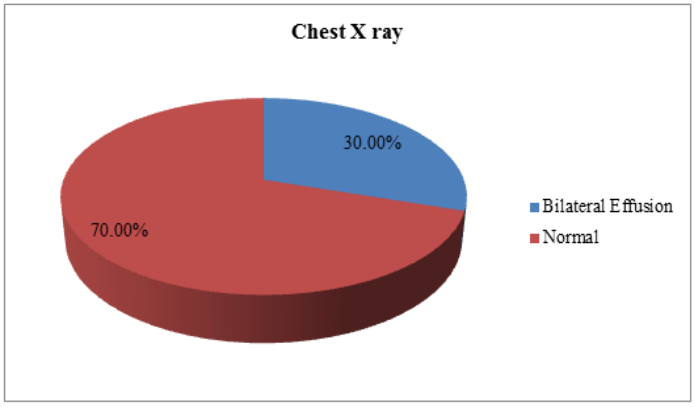

Fig-5: Pie diagram showing Chest X ray findings distribution among subjects

Table-6: Outcome of patient distribution among subjects

		Count	%
Outcome of patient	Death	6	3.0%
	Discharged	194	97.0%

In the study 3% had mortality and 97% were discharged.

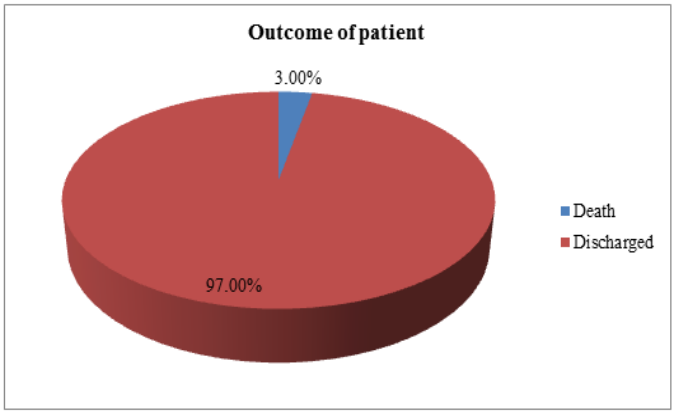

Fig-6: Pie diagram showing Outcome of patient distribution among subjects

Table-7: Platelet transfusion distribution among subjects

		Count	%
Platelet transfusion	No	132	66.0%
	Yes	68	34.0%

In the study 34% had Platelet transfusion.

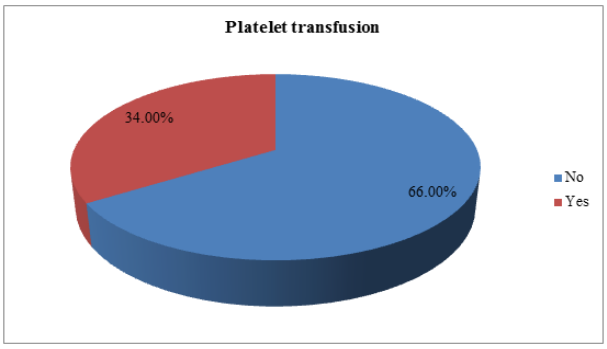

Fig-7: Pie diagram showing Platelet transfusion distribution among subjects

Table-8: Mean distribution of laboratory parameters

	Mean	SD	Median	Minimum	Maximum
Haemoglobin	13.5	2.2	13.6	6.0	18.8
Total count	6218.5	8472.5	5000.0	7.3	118000.0
Platelet at admission	43474.8	40870.3	31000.0	3800.0	305000.0
Total bilirubin	1.0	1.2	0.7	0.1	8.8
Direct bilirubin	0.5	0.8	0.2	0.0	6.6
Indirect bilirubin	1.7	16.0	0.4	0.0	203.0

Mean Hb among subjects was 13.5 ± 2.2 gm/dl. Median total count was 5000.0, median Platelet at admission was 31000.0, median Total bilirubin was 0.7 mg/dl, median direct bilirubin was 0.2 and median was 0.4.

Table-9: Association between platelet transfusion and Dengue serology

		Platelet transfusion				P value
		No		Yes		
		Count	%	Count	%	
NS1	Negative	47	35.6%	10	14.7%	0.002*
	Positive	85	64.4%	58	85.3%	
IgM	Negative	96	72.7%	47	69.1%	0.592
	Positive	36	27.3%	21	30.9%	
IgG	Negative	93	70.5%	56	82.4%	0.067
	Positive	39	29.5%	12	17.6%	

In the study among those who received platelet transfusion, NS1 was positive in 85.3%, IgM in 30.9%, IgG in 17.6%. There was significant association between NS1 positivity and platelet transfusion.

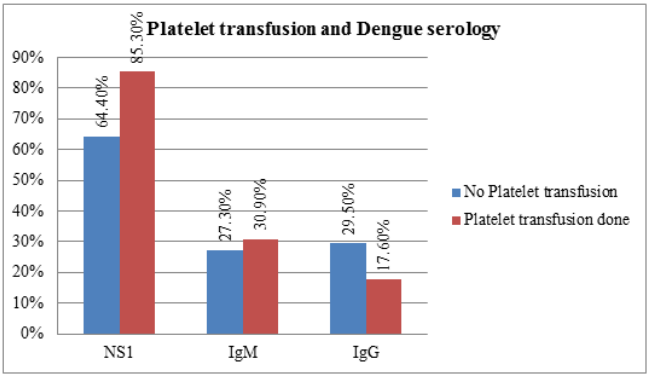

Fig-8: Bar diagram showing Association between platelet transfusion and Dengue serology

Table-10: Association between bleeding manifstation and Dengue serology

		Bleeding manifestations				P value
		No		Yes		
		Count	%	Count	%	
NS1	Negative	48	32.2%	9	17.6%	0.047*
	Positive	101	67.8%	42	82.4%	
IgM	Negative	108	72.5%	35	68.6%	0.599
	Positive	41	27.5%	16	31.4%	
IgG	Negative	110	73.8%	39	76.5%	0.708
	Positive	39	26.2%	12	23.5%	

In the study among those with bleeding manifestations, NS1 was positive in 82.4%, IgM in 31.4%, IgG in 23.5%. There was significant association between NS1 positivity and bleeding manifestations.

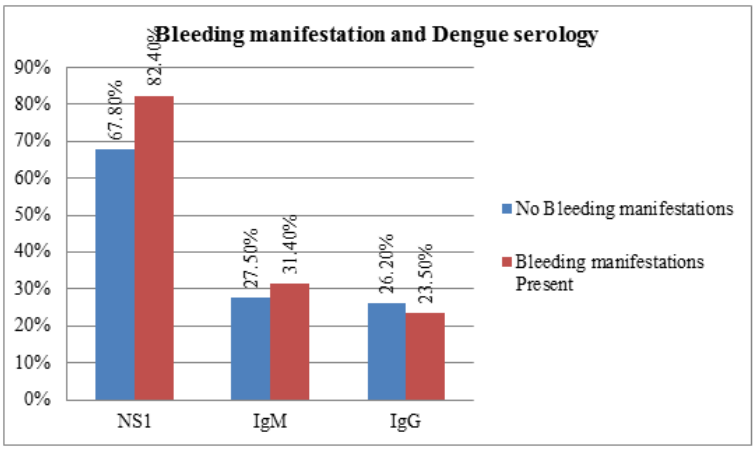

Fig-9: Bar diagram showing Association between platelet transfusion and Dengue serology

Table-11: Dengue serology distribution

		Count	%
Dengue Serology	IgG	29	14.5%
	IgM	19	9.5%
	IgM+IgG	9	4.5%
	NS1	103	51.5%
	NS1+IgG	11	5.5%
	NS1+IgM	27	13.5%
	NS1+IgM+IgG	2	1.0%

In the study 14.5% were only IgG positive, 9.5% were only IgM Positive, 4.5% were IgM+IgG positive, 51.5% were only NS1 positive, 5.5% were NS1+IgG positive, 13.5% were NS1 + IgM positive and 1% were NS1+IgM+IgG positive.

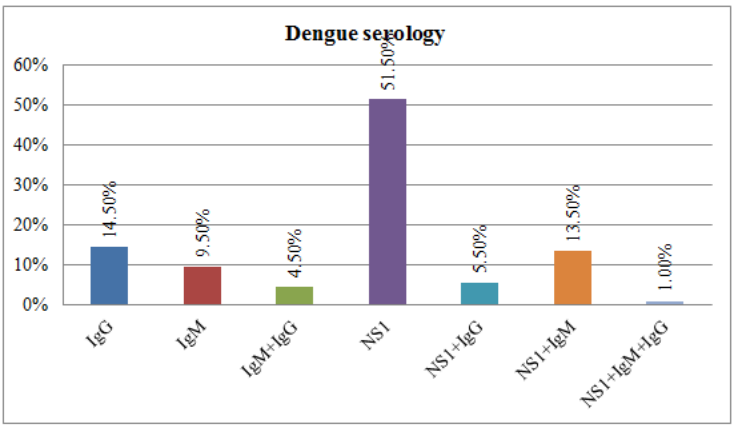

Fig-10: Bar diagram showing Dengue serology distribution

Table-12: AST and ALT distribution

		Count	Column N %
AST	Increased	187	93.5%
	Normal	13	6.5%
ALT	Increased	156	78.0%
	Normal	44	22.0%

In the study 93.5% had raised AST levels and 78% had raised ALT levels.

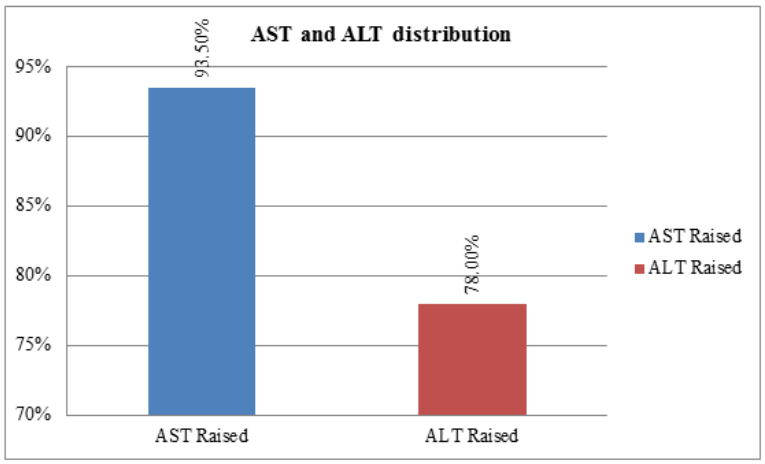

Fig-11: Bar diagram showing AST and ALT distribution

Table-13: Association between AST findings and Dengue serology

		AST				P value
		Increased		Normal		
		Count	%	Count	%	
NS1	Negative	51	27.3%	6	46.2%	0.145
	Positive	136	72.7%	7	53.8%	
IgM	Negative	131	70.1%	12	92.3%	0.086
	Positive	56	29.9%	1	7.7%	
IgG	Negative	141	75.4%	8	61.5%	0.267
	Positive	46	24.6%	5	38.5%	

In the study there was no significant association between NS1, IgM, IgG with AST levels.

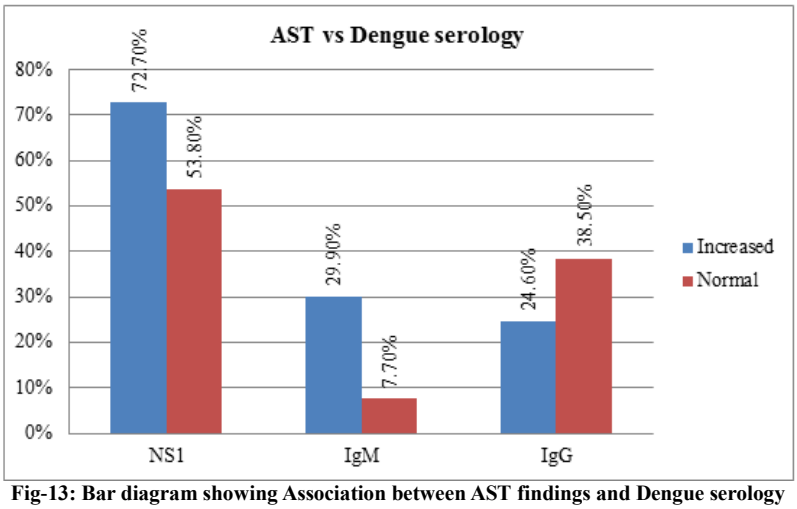

Fig-13: Bar diagram showing Association between AST findings and Dengue serology

Table-15: Association between AST findings and Dengue serology

		ALT				P value
		Increased		Normal		
		Count	%	Count	%	
NS1	Negative	38	24.4%	19	43.2%	0.015*
	Positive	118	75.6%	25	56.8%	
IgM	Negative	110	70.5%	33	75.0%	0.560
	Positive	46	29.5%	11	25.0%	
IgG	Negative	119	76.3%	30	68.2%	0.276
	Positive	37	23.7%	14	31.8%	

In the study there was significant association between NS1 and ALT levels, among those with raised ALT levels, 75.6% were positive for NS1.

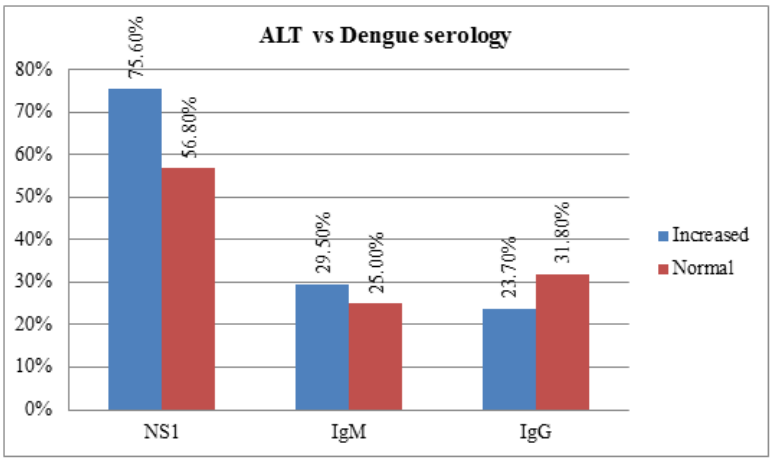

Fig-14: Bar diagram showing Association between AST findings and Dengue serology

DISCUSSION

Our study showed that out of 200 patients with dengue fever, 58.5% were male and 41.5% were female. About 37% were in the age group of 21 to 30 years with mean age of study group being 33.7 ± 12.1 years.

Our study showed varied spectrum of clinical presentation all of them had fever as a symptom at presentation,44% of them had generalised body ache, 25.5% had bleeding manifestations, 24% had vomiting,6.5% has abdominal pain, 6% had lethargy, 1% had seizures and 0.5% had altered sensorium. 13.5% of the patients had hypotension. 6% of them had diabetes and 5% being hypertensives.

In this present study serosities was present in 34.5% of patients and 30% had bilateral pleural effusion. In a study done by Mandal *et al*., ascites was present in 8.1% and pleural effusion in 18.9% of cases [6].

In this present study 71.5% were NS1 positive, 28.5% were positive for IgM and 25.5% were positive for IgG. In northeast India study NS1 was positive in 91.6% cases, IgM positive in 4.7% cases and mixed positivity in 3.7% cases [7].

In our study among those who received platelet transfusion NS1 was positive in 85.3% and those who had bleeding manifestation NS1 was positive in 82.4%. Study showed significant association between NS1 positivity, bleeding manifestation and platelet transfusion.

In our study there was significant association between NS1 and ALT levels, among those with raised ALT 75.6% were positive for NS1. Mandal *et al*. documented elevated transaminases in 83.78% of cases [6].

Study done by Maimoona M. Ahmed concludes that sequential infection with different dengue virus serotypes, concurrent/sequential infection of more than one serotype and differences in host immune reponses associated with host genetic variations increase the risk of developing dengue haemorrhagic fever. Our study has showed that NS1 positivity was associated with severe form of dengue [8].

This study had mortality rate of 3%. Out of 6 patients who died 4 of them were positive for NS1, 1 patient was positive for IgM and IgG and another being positive for IgG. Among those who died 2 of them NS1 positivity and fulminant hepatitis. 4 of them had

bleeding manifestation requiring blood transfusion. Study by Gupta et al had mortality rate of 4.14%[9].

Dengue fever presents with nonspecific symptoms during early phase, which is differentiated from other febrile illness by testing for Dengue profile and if NS1, it cautions the treating physician for close monitoring and follow up of the dengue positive cases for the development of DHF and DSS thereby reducing the complications by early intervention.

CONCLUSION

Initial presentation of Dengue fever is very nonspecific and is difficult to differentiate the mild and severe form of the disease. Hence dengue profile is essential for all the suspected cases. If NS1 is positive, complications like DHS and DSS are expected and they are to be closely monitored and managed effectively.

REFERENCES

1. World Health Organization and Tropical Diseases Research. Dengue: Guidelines for diagnosis, treatment, prevention and control. Geneva: World Health Organization; 2009: new edition.
2. WHO handbook for clinical management of dengue fever
3. Elzinandes Leal de, Robson Q, Luzia Maria. Thrombocyopenia in dengue: Interrelationship between virus and the imbalance between coagulation and fibrinolysis and inflammatory mediators. Hindawi. 2015.
4. Parameswarappa Jyoth, Basavaraj C. Metri. Correlation of serological markers and platelet count in the diagnosis of dengue virus infection. Adv Biomed Res. 2015;4:26.
5. Paranavitane. Dengue NS1 antigen as a marker of severe clinical disease. BMC infectious diseases. 2014; 14:570.
6. Mandal SK, Ganguly J, Sil K, Chatterjee S, Chatterjee K, Sarkar P, Hazra S, Sardar D. Clinical profiles of dengue fever in a teaching hospital of eastern India. Headache. 2013;40:62-16.
7. Bharaj P, Chahar HS, Pandey A, Diddi K, Dar L,Guleria R. Concurrent infections by all four dengue virus serotypes during an outbreak of dengue in 2006 in Delhi, India. Virol J. 2008; 5:1.
8. Maimoona M. Ahmed. Clinical profile of dengue fever infection in King Abdul Aziz Uiversity Hospital Saudi Arabia. J Infect Dev Ctries. 2010; 4(8):503-10.
9. Gupta E, Dar L, Kapoor G, Broor S. "The changing epidemiology of dengue in Delhi, India," virology Journal. 2006;3;92.