Section: Microbiology

Original Research Article

CORRELATION OF HEMATOLOGICAL AND BIOCHEMICAL PARAMETERS AMONG DENGUE RTPCR POSITIVE CASES

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ABSTRACT

Background: Dengue viral infection is a arboviral disease which is transmitted by Aedes aegypti and Aedes albopictus. Dengue cases are now increasing a global burden, especially in tropical and subtropical countries.1 The patients with dengue fever have high levels of non-structural protein-1 (NS1) protein in their serum after onset till<14 days. The present study was aimed to study the correlation of hematological & biochemical parameters among dengue RTPCR positive cases.

Materials & Methods: Total 200 suspected Dengue patients who have less than 2 weeks of fever were enrolled in the study at Fever Clinic, Maa Kamla General Hospital, Ahmedabad from period of 2019-22 Dengue was detected by molecular analysis. Dengue RTPCR was done by TRU PCR 3B Black Bio kits as per standard protocol.

Results: Out of 200 dengue like illness cases, a total of 114 (57%) cases were found dengue positive by RTPCR. Among 114 dengue positive cases 82 (71.92 %) were male while 32 (28.07%) were females. Male: female ratio was 2:1 observed. Among 114 dengue positive cases 104 (91.22%) belonged to dengue without warning sign while 10 (8.77%) cases were dengue with warning sign and 3 (2.63%) severe dengue cases were found with No death was observed

Conclusion: Dengue infection is now endemic in India and no longer seasonal though the peak incidence remains during the rains. Early and prompt diagnosis with aggressive measures for proper sanitation can greatly limit dengue-afflicted mortality.

Keywords: Dengue, RTPCR, Hematological, Biochemical.

INTRODUCTION

Dengue is a flu-like arbo-viral disease spread by the bite of infected Aedes aegypti and Aedes albopictus mosquitoes carrying this virus is the leading cause of arthropod-borne viral disease worldwide, posing a significant global health concern. This disease is also known by various monikers, such as breakbone or 7-day fever, and is characterized by intense muscle spasms, joint pain, and high fever, reflecting both the severity and the duration of symptoms. Although most dengue fever cases are asymptomatic, severe illness and mortality can occur. The incidence of dengue fever has increased dramatically over the past few decades, and the infection is now endemic in some parts of the world, possibly due to increased global travel.[1]

The dengue virus genome encodes three structural (capsid [C], membrane [M], and envelope [E]) and seven non-structural (NS1, NS2A, NS2B, NS3, NS4A, NS4B, and NS5) proteins10. Sequence variation at different loci such as CprM, E/NS1, preM/E, C/prM/M and non-translated regions etc have been studied for its association with disease severity.[2]

The 2009 WHO guidelines distinguish between severe and non-severe dengue. Severe dengue is defined by the occurrence of plasma leakage and/or fluid accumulation leading to shock or respiratory distress; and/or severe bleeding; and/or severe organ

impairment. The non-severe dengue group is divided into patients with and without warning signs. Abdominal pain or tenderness, persistent vomiting, clinically manifest fluid accumulation, mucosal bleeding, lethargy and restlessness, hepatomegaly, and increase in hematocrit with a drop in platelet count are all listed as warning signs.[3]

Based on the data of National Vector Borne Disease Control Programme (NVBDCP), the number of Dengue cases reported in 2021, 193245 cases were positive of dengue it which 346 patients were died, In 2022 total 233251 dengue positive cases were reported including 303 deaths while total 289235 with 485 deaths were reported in 2023 from all over India.[4]

The diagnosis of dengue fever is carried out based on clinical, epidemiological and laboratory data. Among laboratory tests, both non-specific blood count, platelet count, HCT, liver function tests and specific tests Dengue RTPCR were used.

The present study was aimed to study the correlation of hematological & biochemical parameters among dengue RTPCR positive cases.

MATERIALS AND METHODS

A total of 200 suspected Dengue patients who have less than 2 weeks of fever were enrolled in the study at Fever Clinic, Maa Kamla General Hospital, Ahmedabad from period of 2019-22 Dengue was detected by molecular analysis. Dengue Positive samples by molecular testing were characterized for serotyping. Molecular detection and serotyping were done in a collaboration with M Genix Diagnostic, Jaipur.

For Dengue RNA Extraction was done by QIAamp Viral RNA Mini Kit cat log 52904.5 Dengue RTPCR was done by TRU PCR 3B Black Bio kits as per standard protocol.

RESULTS

In this present study, a total of 200 dengue suspected sample were tested by Dengue RTPCR. Out of 200, total114 (57%) cases were found positive by RTPCR (fig.1).

Among 114 dengue positive cases 82 (71.92%) were male while 32 (28.07%) were females. Male: female ratio was 2:1 observed (fig.2).

In the present study total 33 dengue positive cases were found TPC between 50000-100000 followed by 31 cases (TPC 21000-40000) (fig.3).

In the present study (fig.4) maximum dengue cases 104 (91.22%) belonged to dengue without warning sign while 10 (8.77%) cases were dengue with warning sign and 3 (2.63%) severe dengue cases were found with No death was observed.

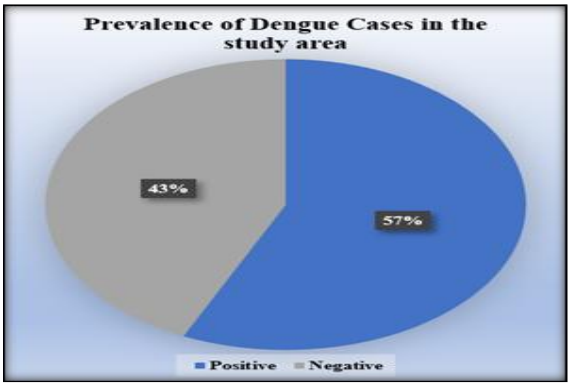

Figure 1: Prevalence of dengue cases in the study area

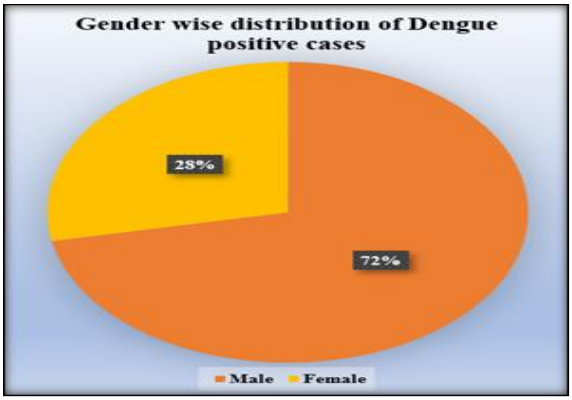

Figure 2: Gender wise distribution of dengue positive cases

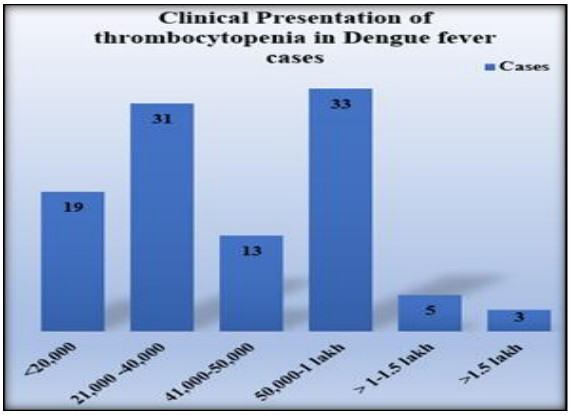

Figure 3: Thrombocytopenia among dengue positive cases

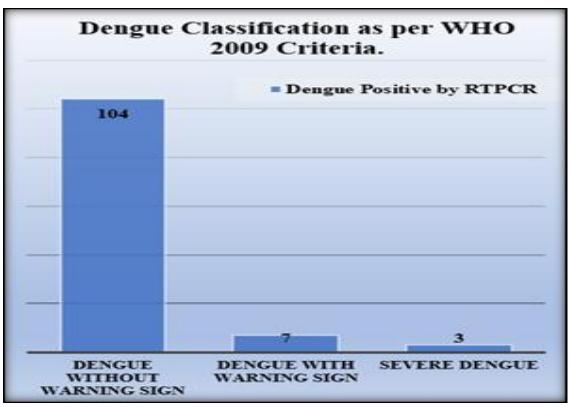

Figure 4: Dengue classification as per WHO 2009 criteria

Table 1: Correlation of dengue clinical manifestations with hematological and biochemical parameters as per WHO classification 2009

Variables	Dengue without warning sign / %(n=104)	Dengue with warning sign%(n=7)	Severe Dengue %(n=03)
Total Cases			
Mean Age group	31-40yrs	31-40yrs	31-40 yrs
Sex	Males 73%	Male 75%	Male 100%
Fever	104 (100.00%)	7 (100.00%)	03 (100.00%)
Nausea	92 (84.46%)	07 (100.00%)	03 (100.00%)
Myalgia/Arthralgia	69 (66.34%)	04 (57.14%)	03 (100.00%)
Vomiting	57 (54.80%)	03 (42.85%)	03 (100.00%)
Rash	22 (21.15%)	07 (100.00%)	03 (100.00%)
Torniquet test	104 (100.00%)	07 (100.00%)	03 (100.00%)
Retro-orbital Pain	63 (29.45%)	04 (57.14%)	2 (66.66%)
Platelet transfusions	3 (2.32%)	07 (100.00%)	03 (100.00%)
Fluid accumulation	0	07 (100.00%)	03 (100.00%)
Mucosal Bleed	0	07 (100.00%)	0
Severe Plasma Leak	0	0	03 (100.00%)
CNS Involvement	0	0	2 (66.66%)
Hepatomegaly	20 (19.23%)	07 (100.00%)	03 (100.00%)
Biochemical Parameters			
Elevated SGOT (AST) (>35U/mL)	92(90.19%)	07(100.0%)	03 (100.00%)
Elevated SGPT(ALT) (>45U/mL)	94(92.15%)	07 (100.0%)	03 (100.00%)
Hematological Parameters			
Thrombocytopenia (Platelet<1.0lakhs/cu.mm)	92 (88.46%)	07 (100.00%)	03 (100.00%)
Leukopenia (<4000/cu.mm)	44(39.53%)	01 (14.28%)	01 (33.33%)
HCT >40%	50 (48.07%)	07 (100.00%)	03 (100.00%)

DISCUSSION

Dengue fever is an emerging disease associated with high morbidity and mortality. The diagnosis is still great challenge in developing country due to lack of resources, infrastructure and skilled manpower. A recent study published shows that the prevalence of dengue fever occurred in increasing order of each year.6 this disease is a major health problem in India and needs to be diagnosed and treated in early phase of the disease to avoid any associated morbidity and mortality.

Total 114 Dengue Positive cases were detected in this study. Majority of the patients 46 (40.35%) belong to the 31-40 yrs of age group and Among 114 dengue positive cases 82 (71.92 %) were male while 32 (28.07%) were females. Male: female ratio was 2:1 observed. This was similar to the study conducted by Preeti Bharaj et al in 2008, in which the common age group involved was20-40 years (35.4%)6, followed by 0-20 years Ekta Gupta et al, 2006 also showed that the maximum number of cases in a 3 year study period was seen in the 21-40 year age group.[7] Pramod Sidram Manthalkar et al Karnataka, 2019 in their study (53.03%) were male and 217 patients (46.96%) were female. Age group of 16-30 years was more affected followed by 31–45 years.8 In the study of Banthia et al, Moradabad U.P 2020, male to female ratio was 1:0.75 due to the female is dressed fully in sarees and other clothes which prevents them from exposure to mosquitoes.9

The predominant symptoms in the present study were fever (100%), nausea 89.47% myalgia/arthralgia (66.66%), haemorrhagic manifestations (07.04%), rash (20.17%), vomiting (55.26%) and retroorbital pain 60.52%. present study was in an agreement with the study conducted by Min-Shen Lee et al in 2005 in Taiwan 96.1% fever followed by myalgia (68.5%), headache (55.4%), skin rash (53.7%) and retro-orbital pain (15.8%), which correlated well with the present study.[10] In a study by Shahid Ahamed et al in 2008 reported fever (100%), followed by, myalgia (67%), headache (54%) and rash (28%).[11] Birendra Prasad Gupta et al, 2015 From Nepal 198 patients reported with fever (100%), headache (59.1%), rashes (18.2%), retroorbital pain (30.3%), vomiting (15.1%), joint pain (28.8%) and thrombocytopenia (74.3%).[12]

In the present study out of total 114 dengue positive cases, maximum dengue cases 104 (91.22%) were belong to dengue without warning sign, 10 (8.77%) cases were dengue with warning sign and 3(2.63%) severe dengue cases were found with No death was observed which was in an agreement of In the study done by Tewari K et al, 2018, classical dengue fever was seen in 85.8%, DSS in 11% DHF in 3.2%.[13] While it was differ from the study of Banthia et al, Moradabad U.P 2020 the clinical outcome of dengue fever without warning sign was 29.46%, dengue fever with warning sign 57.87%, severe dengue fever in 12.12%. Mortality noted in the present study was 1.8%.[14]

In the present study, hematocrit >40% was found in 52.63% dengue positive cases, which was similar to the study of Anita Talhan et al,[15] an increase in hematocrit levels was above 45% in DHF AND DSS and higher to various studies such as Sharma S et al,[16] showed an epidemic of DHF in adults in Delhi during 1996 that raised Hct> 48% were present in 6 (6.12%) cases and Hct> 20% were present in 14 (14.28%) cases. Hematocrit was raised

in more than half of the patients in a study done by Nazis et al.[17]

Thrombocytopenia (<1, 00,000/mm3) is one of the defining criteria for dengue haemorrhagic fever and was seen in 89.47 % of the cases in the present study, study done by Sharma S. et al,[16] Tahlan A et al.[15]

In the present study 89.47%dengue positive cases had Elevated SGOT, 91.22% SGPT which was higher to the findings of various other studies like Anusha Murthyunjaya swamy, 2021 at Mangalore,[18] India reported 74.2% of patients had elevated transaminases. SGOT was elevated in 73.3% of the patients and SGPT in 50.8% of the patients but similar to the findings of various other studies below table 2. This is in stark contrast with other viral hepatitis which is characterized by higher SGPT values. Plausible mechanisms include the release of SGOT from damaged erythrocytes, cardiac and skeletal muscle cells. This pattern of SGOT&SGPT derangement, along with the presence of thrombocytopenia and persistence of fever even after the appearance of icterus may hint towards dengue infection when the presentation and laboratory parameters mimic acute viral hepatitis.

Table 2: Correlation of SGOT, SGPT finding with other studies

Studies	Patients	Raised SGOT	Raised SGPT	SGOT>SGPT
Our study	114	89.47%	91.22%	-
Saha *et al*.[19]	1226	52% (5 times normal was criteria)	50%	-
Souza *et al*.[20]	1585	63.4%	45%	+
Shukla *et al*.[21]	70	100%	91%	-
Kuo *et al*.[22]	270	93.3%	82.2%	+
Wong *et al*.[23]	127	90.6%	71.7%	+ in 75.6%
Itha *et al*.[24]	45	96%	96%	Equal
Parkash *et al*.[25]	699	95%	86%	+
Trung *et al*.[26]	644	97%	97%	+
Lee *et al*.[27]	690	86%	46%	-
Karoli *et al*.[28]	138	92%	-	+

CONCLUSION

Dengue infection is now endemic in India and no longer seasonal though the peak incidence remains during the rains. Patients with fever and other clinical symptoms suspicious of dengue should be subjected to a complete hematological & biochemical profile as well as specific tests for dengue. Early and prompt diagnosis with aggressive measures for proper sanitation can greatly limit dengue-afflicted mortality.

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