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Original Article

Relationship of Platelets Count and Serological Marker of Dengue Infection: A Prospective Study

Sunanda Chauhan

Assistant Professor, Department of Pathology, Ananta Institute of Medical Sciences and Research Centre, Rajsamand

ABSTRACT

Background: *Dengue fever is a mosquito-borne virus disease of humans. In terms of numbers of individuals infected, it is by far the most devastating of all the recognized arthropod-transmitted virus diseases. It is estimated that more than 3 billion humans live in dengue endemic regions of the world, and currently, more than 50 million infections occur annually with at least 500,000 individuals requiring hospitalization.*

Methods: *This study was conducted in Department of Pathology, Ananta Institute of Medical Sciences and Research Centre, Rajsamand. A total of 160 serum positive samples from clinically suspected dengue patients attending outdoors, causality services and indoor patients were included in this study. Five milliliter of blood was collected from all suspected cases of dengue fever.*

Results: *In our study, 525 total samples were included in this study. 160 samples were positive out of 525 samples. In the present study, 53.7% were males and 46.3% were females. In this study showed relationship between Platelet count and other parameters. From which notice that, 110 patients had less than 1 lakh count.*

Conclusion*: Thrombocytopenia found in case of fever which is more constantly in dengue positive sooner than dengue negative cases. It correlates well when NS1 & IgM are found simultaneously.*

Key words: *febrile illness, Dengue virus, endemic, IgM, IgG, NS1*

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***Corresponding Author**

Dr. Sunanda Chauhan
Assistant Professor, Department of Pathology, Ananta Institute of Medical Sciences and Research Centre, Rajsamand.

INTRODUCTION

Dengue is an acute febrile illness which is endemic to the Indian subcontinent. It is one of the most significant mosquito-borne viral diseases transmitted to humans by the *Aedes aegypti* mosquitoes.[1,2]

It is caused by the Dengue virus (DENV) belonging to the family *Flaviviridae*. On the basis of the neutralization assay data, four serotypes (DENV-1, DENV-2, DENV-3, and DENV-4) have been distinguished. DENV infection is a major cause of sickness in tropical and subtropical countries.[3-6]

Each year almost 100 million people are infected. Out of these, 5,00,000 people suffer from dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) with 30,000 fatalities, mostly of children.[7]

There are three basic methods for the diagnosis of dengue virus infection. These are viral isolation, detection of the viral genomic sequence by a nucleic acid amplification technology assay (Reverse transcription polymerase chain reaction (RT-PCR)), and detection of dengue virus-specific IgM antibodies by the IgM-capture enzyme-linked immunosorbent assay (MAC-ELISA) and/or the rapid dengue immunochromatographic test (ICT).

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The laboratory methods should be rapid and sensitive to reduce the morbidity and mortality of the dengue.[8] The antibody (IgG/M) detection is the most commonly used method for diagnosis of dengue infection but it is not a rapid method because time needed for appearance of IgM antibody is approximately 4-6 days.[9] Dengue non-structural 1 antigen (NS1) is highly conserved glycoprotein produced in both membranes associated and secretory forms is a new biomarker which is used for early diagnosis of dengue infection.[10]

Besides the dengue specific parameters, platelet count is the only other accessory lab test that can support the diagnosis of DHF or DSS. The platelet counts can be rapidly, easily and roughly estimated by microscopy even in the remotest of the areas.[11]

With this background it was planned to study correlation of the platelet count and microbiological laboratory tests of detection of NS1 antigen and IgG/M antibody tests in dengue suspected patients attending hospital.

METHODS

This study was conducted in Department of Pathology, Ananta Institute of Medical Sciences and Research Centre, Rajsamand. A total of 160 serum samples from clinically suspected dengue patients attending outdoors, causality services and indoor patients were included in this study. Five milliliter of blood was collected from all suspected cases of dengue fever. Serum was separated from all blood samples and was further tested for NS1 Ag and the presence of IgM and IgG Dengue antibody by dengue day1 test (J. Mitra) according to manufacturer s instructions.

Platelet Count:-

EDTA blood samples were collected and the platelet count was done by automated analyzer and cross checked by microscopy in the Department of Pathology, AIMSRC.

Ethical Considerations:

This was a analysis of routine laboratory diagnostic work thus ethical approval was not necessary.

RESULTS

In our study, 1052 total samples were included in this study. 160 samples were positive and 892 samples were positive out of 1052 samples. In the present study, 53.7% were males and 46.3% were females. In this study showed relationship between Platelet count and other parameters. From which notice that, 110 patients had less than 1 lakh count.

Table 1. Positive sample found from total number of sample

Sample	No. of sample	Percentage
Positive	160	15.2%
Negative	892	84.7%
Total	1052	100%

Table 2:- Gender-wise distribution

Gender	No. of Patients	Percentage
Male	86	53.7%
Female	74	46.3%
Total	160	100%

Table 3:- Various dengue Parameters in diagnosis of dengue cases

Parameters	No. of Patients	Percentage
NS1	48	30%
IgM	80	50%
IgG	5	3.1%
NS1 & IgM	17	10.6%
NS1 & IgG	1	0.6%
IgG & IgM	9	5.6%
TOTAL	160	100%

Table 3:- Relationship of platelets count with other parameters

Parameters	No. of Patients	Platelets less than 1 lakh	Percentage
NS1	48	35	31.8%
IgM	80	48	43.6%
IgG	5	4	3.6%
NS1 & IgM	17	16	14.5%
NS1 & IgG	1	1	0.9%
IgG & IgM	9	6	5.4%
TOTAL	160	110 (68.75)	100%

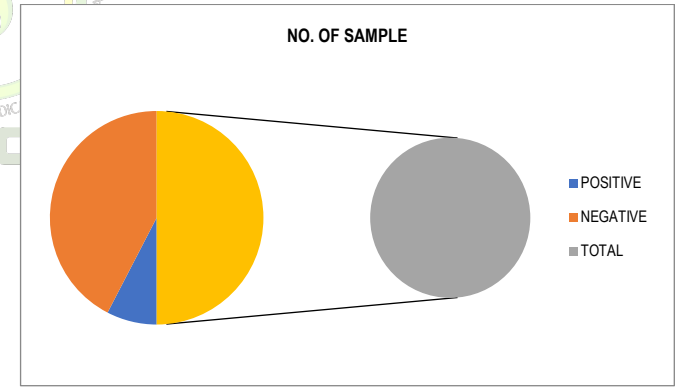

Fig:-1 This chart showed number of positive and negative sample

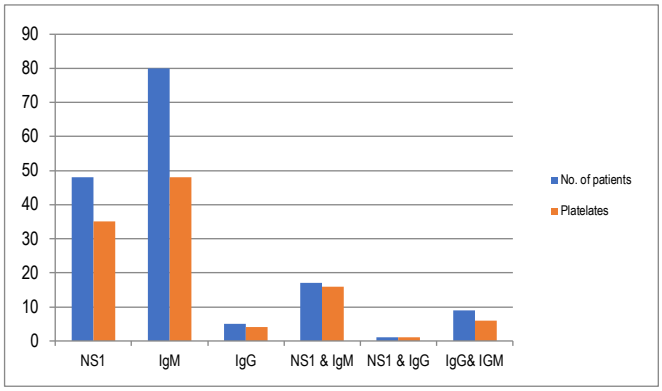

Fig:-2 This chart showed relationship between palates count and other parameters

DISCUSSION

The detection of dengue-specific antibodies IgG/M has been the main diagnostic modality of DI for a long. The dengue-specific antibodies appear from fifth day of fever in primary infection[5] and from third day in the most secondary infections.[9] Thus, both in primary and secondary DI, there is a window period when only antibodies can be tested. On the other hand, the NS1 antigen can be detected from first day of fever both in primary and secondary infections. NS1 antigen test has been reported to be highly specific viral marker and an extremely reliable parameter for the diagnosis of DI from first day of the fever.[10] Out of the 160 cases reported in the present study, 48 cases (30%) were positive only for NS1 antigen indicating if the NS1 antigen test had not been included in the study, the 30% cases of DI had been missed.[11,12] Almost the similar findings were reported by Datta and Shrivastava in their studies.[10,13] In the present study, NS1 alone or in combination with IgM/G was positive in 66 cases (41.25% cases). IgG has been reported to be a less reliable marker in the diagnosis of DI between the two dengue antibodies test.[5] It has been found that antibody IgG can be produced both in clinical and sub-clinical infections and may persist even for several years.[14] High levels of IgG in endemic areas can be attributed to the bites of infected mosquitoes.

On the contrary, dengue-specific IgM is a good indicator of recent DIs. Along with primary, it can also be detectable in secondary DI. In antibodies test, the diagnosis of DIs mainly depends on rising titers while in NS1 antigen test, there is no need of repeat testing as it is a highly specific marker of DI.[5] Out of the 160 cases reported in the present study, 110 (68.75%) were having thrombocytopenia. Out of 66 cases positive for NS1, thrombocytopenia was evident in 52 cases. Contrary to this, thrombocytopenia was present only in 117 (61.6%) cases out of 190 cases positive only with antibodies tests. The association of thrombocytopenia with NS1 showed higher SEP test = 5.01, Z=3.51 and *P* value <0.001 (highly significant).

On analysis of NS1 only group (73.68%) with NS1 plus IgM (94.12%) group, thrombocytopenia was found to be associated more with NS1 plus IgM group (SEP = 6.06, Z=3.37, *P*<0.001, highly significant).

It has been reported that platelet counts are decreased in some other conditions such as some viral infections other than DI, drug induced thrombocytopenia, collagen vascular diseases, idiopathic thrombocytopenia etc.[3]

In the present study, On statistical analysis (SEP = 4.55, Z=8.51, *P*<0.001), it was found that the association of thrombocytopenia and dengue parameter was significantly higher in comparison to thrombocytopenia and dengue negative cases.

CONCLUSION

In the diagnosis of dengue, presence of NS1 antigen increases the detection rate significantly. Thrombocytopenia found in case of fever which is more constantly in dengue positive sooner than dengue negative cases. It correlates well when NS1 & IgM are found simultaneously.

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