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STUDY OF PLATELET INDICES IN SEROPOSITIVE DENGUE FEVER AND THEIR SIGNIFICANCE IN ASSESSING THE SEVERITY OF THE DISEASE.

Pathology

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ABSTRACT

Background: Dengue fever (DF) is vector borne disease usually causes self-limiting illness, but it can lead to fatal complications like dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). Early detection of these complications helps in limiting the morbidity and mortality. **Objective:** To study the changes in the platelet indices in seropositive dengue fever and their significance in assessing the severity and outcome of the disease. **Material And Methods:** Prospective study was conducted on 450 seropositive cases of dengue fever during the time period November 2017 to June 2019 at Basaveshwara medical college and hospital, Chitradurga. **Results:** The prospective study included 450 study participants, 431 cases (95.8%) were clinically diagnosed with DF and 19 cases were diagnosed with DHF. Among 19 cases of DHF 14 cases were diagnosed as DSS and remaining 5 cases as DHF. 220 cases of DF and 16 cases of DHF had thrombocytopenia. Among 431 cases of DF, 65 cases had increase PDW values and among 19 cases of DHF, 6 cases had increase in PDW values. Among 431 cases of DF, 2 cases showed increase in MPV values and among 19 cases of DHF, none of the case had increase in MPV values. Among 431 cases of DF, 35 cases showed increase in PLCR and among 19 cases of DHF, none of the case had increase in P-LCR values. Almost all cases of DF and DHF showed low plateletcrit. **Conclusion:** The study of these platelet indices along with platelet counts during the course of the dengue fever helps in the predicting the course, severity and outcome of the disease.

KEYWORDS

Dengue Fever, Thrombocytopenia, Platelet Indices.

INTRODUCTION:

Dengue fever (DF) is a major public health problem in tropical and subtropical countries associated with high morbidity and mortality. The WHO estimates the incidence of dengue infection approximately 50-100 million per year and 20,000 people die annually due to dengue disease. WHO identified dengue as one of the 17 neglected tropical diseases in 2010.[1]

DF caused by dengue virus, which is single stranded RNA virus belongs to Flaviviridea family. Dengue virus infects human by the bite of infected female Aedes aegypti mosquito, which is major vector in India.[2]

Dengue virus infection results in asymptomatic infection, undifferentiated fever, classic dengue fever (DF) and complications like dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). DHF associated with bleeding manifestations while DSS associated with severe capillary leakage leads to hypo perfusion and multiple organ damage.[3]

Dengue causes several alterations in hematological parameters where thrombocytopenia is a persistent finding in dengue fever, but absence of thrombocytopenia doesn't rule out Dengue infection. Thrombocytopenia is due to bone marrow suppression, presence of autoantibodies the platelets and direct infection of Dengue virus to megakaryocyte.[4]

These change alters the platelet indices such as Mean platelet volume (MPV), Platelet distribution width (PDW), Platelet large cell ratio (P-LCR) and Plateletcrit (PCT). Peripheral destruction of platelet in excess causes, activation of large number of platelets. During activation, change in shape from biconcave to spherical and formation of pseudopods causes increase in MPV. Bone marrow suppression causes reduction in MPV. In case of bone marrow suppression, rising trends of MPV implies the recovery of platelets in future days.(5)

PCT is defined as percentage of platelet volume to total blood volume. It is analogous to hematocrit. PCT directly related to platelet count.[6]P-LCR is a marker of circulatory larger platelet of >12fl size. P-LCR directly correlates with MPV, PDW but inversely related to platelet count. In destructive thrombocytopenia rise in P-LCR is noted.[7] PDW is a measure of platelet anisocytosis i.e. variability in platelet size and changes with platelet activation. PDW directly correlates with MPV.[8] When platelet counts are stable but high MPV suggests about recovery of Dengue fever. Persistently high MPV and progressive thrombocytopenia suggests active disease and needs for transfusion. Reduced MPV with severe thrombocytopenia is ominous sign and indicates of transfusion. High PDW, high P-LCR, low PCT and Low platelet count are suggestive of DHF.[5]Study of these parameters helps in the early detection of complications like DHF and DSS and management of these complications. If these parameter are used timely can help in the better care of the patient and reduces dengue associated morbidity and mortality.

AIMS AND OBJECTIVES:

To study the changes in the platelet indices in seropositive dengue fever and their significance in assessing the severity and outcome of the disease.

SUBJECTS AND METHODS:

This prospective study, included 450 seropositive dengue fever cases from a period of November 2017 to June 2019 at Basaveshwara medical college and hospital, Chitradurga. The present study included all the age group patients and both the sexes. 4ml off blood was drained, 2 ml of blood in EDTA container used for hematological investigations and 2ml of plain blood for serological investigations to confirm Dengue by ELISA method. The hematological investigations include a complete hemogram for platelet count and platelet indices. The blood counts were performed on the fully automated hematology analyzer Sysmex XP-100 with a three part differential. Platelet count recorded individually and verified on the slide. Platelet indices were noted. The above procedure will be done at the time of admission and repeated as and when required during the stay in the hospital.

RESULTS:

Among 450 study participants, 431 cases were clinically diagnosed with DF and 19 cases were diagnosed with DHF. Among 19cases of DHF 14 cases were diagnosed as DSS and remaining 5 cases as DHF which had bleeding manifestations. All the patients of dengue presented with fever, 28% of patient presented with abdominal pain, 16.7% patient had complain of vomiting and 1.6% (5cases) were presented with bleeding.

In the present study out of 450 patients, maximum number of patients that is 239 patients presented with thrombocytopenia, only 211 patients had normal platelet count of more than 1,50,000/cumm. Majority of the patients with thrombocytopenia that is 89 cases had platelet count between 50,000-99,999/cumm, whereas 29 cases patients had platelet count <20,000/cumm.

Table 1: Comparison Of Platelet Count Of Patients In DF & DHF

Platelet count	DF	DHF
<20,000	9(2.1%)	16(84.2%)
20,000-49,999	54(12.5%)	2(10.5%)
50,000-99,999	88(20.4%)	1(5.3%)

1,00,000-1,49,999	69(16%)	0
>1,50,000	211(49%)	0
Total	431(100%)	19(100%)

Table 2: Comparison Of Plateletcrit Among DF And DHF

PCT	DF	DHF
Increased	92(21.3%)	0
Normal	28(6.5%)	0
Decreased	311(72.2%)	19(100%)
P-value: 0.027		

Table 3: Comparison Of Platelet Distribution Width (PDW) Among DF and DHF

PDW	DF	DHF
Increased	65(15.1%)	6(31.6%)
Normal	355(82.4%)	13(68.4%)
Decreased	11(2.6%)	0
p-value: 0.132		

Table 4: Comparison Of Mean Platelet Volume (MPV) Among DF And DHF

MPV	DF	DHF
Increased	2(0.5%)	0
Normal	254(58.9%)	3(15.8%)
Decreased	175(40.6%)	16(84.2%)
P-value:0.001		

Table 5: Figure 29: Comparison Of Platelet Large Cell Ratio (P-LCR) Among DF And DHF

P-LCR	DF	DHF
Increased	35(8.1%)	0
Normal	262(60.8%)	3(15.8)
Decreased	134(31.1%)	16(84.2%)
P-value:0.001		

DISCUSSION:

Due to change in climate, urbanization, poor living conditions and inadequate waste management have led to increase in vector borne disease like dengue fever particularly in children. The frequency of dengue fever was higher in the age group 1-20 years (50.9%) followed by 21-30 years. A study by Relwani PR et al had 111 cases (74%) in the age group of 18 to 30 years followed by 28 cases in 31-45 years of age and the least was only one case in >60 years of age group.[9] The above studies are comparable with the present study.

In the present study, majority of patients 268 were male and 182 were female. Hypothetically male predominance could be due to increased risk of exposure to mosquito bite by males due to occupational and recreational activity.[10]

Among 450 study participants, 431 cases were diagnosed DF and 19 cases were diagnosed with DHF. Among 19 cases of DHF, 14 cases were diagnosed as DSS and remaining 5 cases as DHF which had bleeding manifestations. In the present study dengue shock syndrome was more common. The above studies differ as they had more cases of DHF. However the cause for higher DSS cases could not be determined.

Thrombocytopenia is the most common hematological alteration in dengue. In the present study, out of 19 patients of DHF, 16 cases (84.2%) had platelet count < 20,000/cumm and 2 cases (10.5%) had platelet count between 20,000-49,999/cumm. Among 431 DF cases, 220 cases (48.8%) had thrombocytopenia, among these thrombocytopenic cases, 88 cases (20.4%) had platelet count between 50000 to 99999/cumm, followed by 54 cases (12.5%) had platelet count between 20,000 to 49,999/cumm.

A study by Shekar EC showed that 13 cases (16.04%) of DF and 8 cases (84.44%) of DHF had platelet count below 25,000/cumm.[11] This study showed correlation with the present study.

In the present study, among 431 cases of DF, 65 cases (15.1%) had increase PDW values and among 19 cases of DHF, 6 cases (31.6%) had increase in PDW values. This is attributed to release of immature large platelets accounts for variability in platelet size. A study by Muddapu L et al observed that among 93 cases of DF and 12 cases of DHF, 59 cases (56.1%) of DF and 12 cases (11.42%) of DHF had high PDW values.[12]
In the present study, among 431 cases of DF, 2 cases showed increase in MPV values and among 19 cases of DHF, none of the case had increase in MPV values indicating continued bone marrow suppression. A study by Muddapu L et al showed that among 93 cases of DF and 12cases of DHF none of them had high MPV.[12] A study by SR Dewi et al, among 52 cases of DF, 31 cases (59.9%) had increased (>9.7fl) and among 48 cases of DHF, 45 cases had increase in MPV values.[13] A study by Khatri et al, 98 cases (92.5%) had normal, 5cases (4.7%) had high and remaining 3 cases (2.8%) had low MPV.[14]

In the present study, among 431 cases of DF, 35 cases showed increase in PLCR and among 19 cases of DHF, none of the case had increase in P-LCR values. This may be due to reduced platelet production due bone marrow suppression. In the present study among 431 DF cases, 311 cases had decreased plateletcrit values and among 19 cases of DHF, all of the 19 cases had decreased plateletcrit. A study by Khatri et al 104 cases (98.1%) had low plateletcrit had which was correlated with the present study.[14]

CONCLUSION:

Persistently high MPV and progressive thrombocytopenia suggests active disease. Reduced MPV with severe thrombocytopenia is ominous sign and indicates of transfusion. High PDW, high P-LCR, low PCT and Low platelet count are suggestive of severe disease.The study of these platelet indices along with platelet counts during the course of the dengue fever, gives an idea about status of the bone marrow responsiveness for the platelet production. Hence careful study of these indices can help in the predicting the course, severity and outcome of the disease.

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