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Evaluation of Haematological Parameters in Dengue Patients

Sushil Kumar Sharma[1], **Mansi Rathore**[2]

[1]Assistant Professor, Department of Pathology, People's college of medical sciences and research, Bhopal, Madhya Pradesh, India, [2]PG Resident 2nd year, Department of Pathology, People's college of medical sciences and research, Bhopal, Madhya Pradesh, India.

Abstract

Background: The aim is to evaluate haematological parameters in dengue patients. **Subjects and Methods:** Thirty patients in age ranged 2 months- 83 years of either gender of dengue infection were enrolled in the study. Haematological investigation such as haemoglobin (Hb), red blood cell count (RBC), platelet count, packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin concentration (MCHC), red cell distribution width (RDW- CV), total leucocyte count (TLC), mean platelet volume (MPV) etc. was measured in all. **Results:** Haemoglobin level <8 g/dl was seen among 4 (13.4%) and >8 g/dl in 86.7%. The mean haemoglobin level was 10.25 g/dl). Mean platelet volume found to be 9.53 fL. There were 11 (36.7%) patients with MPV >9 fL and 19 (63.3%) with MPV <9 fL. Mean corpuscular haemoglobin concentration found to be 33.4 g/dl. There were 29 (96.7%) patients with MCHC > >30 g/dl and 1 (3.3%) with MCHC <30 g/dl. Mean red cell distribution width found to be 15.9%. There were 12 (40%) patients with RDW- CV > 16% and 18 (60%) with RDW- CV <16%. Red blood cell count found to be 4.1 million cells/mcL, PCV was 43.8%, MCV was 85.9 fL, MCH was 30.8 pg, TLC was 11.7 x 10^9 cells per litre, neutrophils was 79.5 x 10^9 cells per litre, lymphocytes was 30.7 x 10^9 cells per litre, monocytes was 5.54 x 10^9 cells per litre, basophils was 0.06 x 10^9 cells per litre and eosinophils was 3.09 x 10^9 cells per litre. **Conclusion:** Dengue infection is spreading worldwide. Haematological parameters such as packed cell volume, mean corpuscular volume, mean corpuscular haemoglobin concentration, red cell distribution width helps in identification and early management of dengue cases.

Keywords: Dengue Infection, Haemoglobin, Packed Cell Volume.

Corresponding Author: Mansi Rathore, PG Resident 2nd year, Department of Pathology, People's college of medical sciences and research, Bhopal, Madhya Pradesh, India.
E-mail: mansirathore82@gmail.com

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Introduction

Dengue virus infection is quite common and occur in epidemics in the last three decades. It is seen all over the world in tropical ands sub- tropical region. In India, 4 serotypes of dengue such as dengue 1, 2, 3 and 4 has been recognized.[1,2] Various symptoms may occur in patients and the disease may be seen as viral illness, dengue fever, dengue haemorrhagic syndrome and dengue shock syndrome.[3] Approximately, it accounts in 7.5 to 32.5 million in India. It is an arboviral infection spread by Aedes mosquito.[4]

The viral infection starts with prodromal symptoms such as nausea, vomiting, high grade fever, rashes over body, body-ache, headache and muscular pain etc. World health organization (WHO) in year 2009 differentiated it into 2 forms such as severe dengue and non- severe dengue with or without warning signs.[5] It mimics other fever like illnesses caused in typhoid, malaria and leptospirosis. It is self- limiting illness, however, in about 5-11% patients it may prove fatal. Therefore, an early identification and prompt treatment is necessary is order to avoid dengue associated complications and mortality.[6]

For the diagnosis of dengue infection, test like reverse transcriptase polymerase chain reaction, NS1 antigen with IgG and IgM and viral isolation are available that helps differentiating it from other infections.[7] These tests are easy to perform, simple and of high diagnostic value. Platelet counts are excellent indicators of dengue haemorrhagic syndrome and dengue shock syndrome.[8] A fall in platelets count is observed after 3 days of infection. A rise in haematocrit occurs in these patients. Serological assessment of total white blood cell count (WBC) and T and B- lymphocytes play an important role. Considering this, we conducted present study on 30 patients with dengue infection.

Subjects and Methods

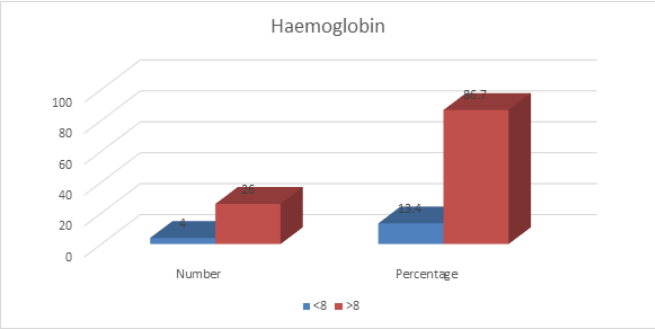
The present prospective, observational study was commenced with the approval from institutional review and ethical clearance committee of the institute. A sum total of thirty patients in age ranged 2 months- 83 years of either gender were enrolled in the study. A written consent from all patients/ guardians were obtained before selecting them.

A case history sheet was prepared including relevant patient information such as name, age, gender, patient ID etc. was recorded. A thorough clinical examination was carried out. Baseline investigation such as haemoglobin (Hb), red blood cell count (RBC), platelet count, packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin concentration (MCHC), red cell distribution width (RDW- CV), total leucocyte count (TLC), mean platelet volume (MPV) etc. was measured using peripheral smears. Chest radiography and ultrasonography (USG) were also performed. Results of the study was studied and compiled. SPSS version 16.0 was used for the analysis. P value less than 0.05 was considered significant and less than 0.01 as highly significant.

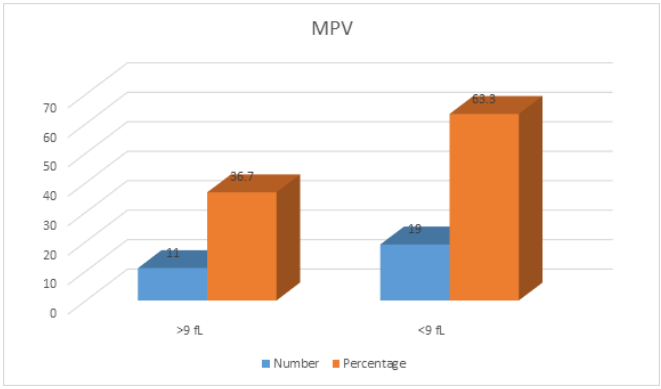
Results

Age group 1 month- 20 years comprised of 5 (25%) males, 21 years- 40 years had 9 (45%) males and 7 (70%) females, 41 years- 60 years had 4 (20%) males and 2 (20%) females, 61 years- 80 years had 1 (5%) males and 1 (10%) females and >81 years had 1 (5%) males [Table 1].

Haemoglobin level <8 g/dl was seen among 4 (13.4%) and >8 g/dl in 86.7%. The mean haemoglobin level was 10.25 g/dl). A highly significant difference was observed (P< 0.05) [Table 2, Figure 1.



Mean platelet volume found to be 9.53 fL. There were 11 (36.7%) patients with MPV >9 fL and 19 (63.3%) with MPV <9 fL. A significant difference was observed (P< 0.05) [Table 3, Figure 2].



Mean corpuscular haemoglobin concentration found to be 33.4 g/dl. There were 29 (96.7%) patients with MCHC > >30 g/dl and 1 (3.3%) with MCHC <30 g/dl. A highly significant difference was observed (P< 0.01) [Table 4].

Mean red cell distribution width found to be 15.9%. There were 12 (40%) patients with RDW- CV > 16% and 18 (60%) with RDW- CV <16%. A significant difference was observed (P< 0.05) [Table 5].

Red blood cell count found to be 4.1 million cells/mcL, PCV was 43.8%, MCV was 85.9 fL, MCH was 30.8 pg, TLC was 11.7 x 10^9 cells per litre, neutrophils was 79.5 x 10^9 cells per litre, lymphocytes was 30.7 x 10^9 cells per litre, monocytes was 5.54 x 10^9 cells per litre, basophils was 0.06 x 10^9 cells per litre and eosinophils was 3.09 x 10^9 cells per litre [Table 6].

Discussion

Haematological parameters are of great importance especially in patients with dengue infection. Research shows that there have been more than 24000 deaths every year with dengue infection. With the expansion of geographic area, there have been rise in cases of dengue infection.[9] It is caused mosquito bite. Reasons for rapid spread are poor sanitation facilities, frequent climate changes, poor vector control and urbanization. Early detection and evaluation may be fruitful for protecting precious patients' life. Fluid replacement with the use of antipyretics and analgesics are treatment of choice.[10] We conducted present study on 30 patients suffering from dengue infection. It comprised of patients ranged from 2 months to 83 years of age.

Our data demonstrated that age group 1 month- 20 years comprised of 5 (25%) males, 21 years- 40 years had 9 (45%) males and 7 (70%) females, 41 years- 60 years had 4 (20%) males and 2 (20%) females, 61 years- 80 years had 1 (5%) male and 1 (10%) female and >81 years had 1 (5%) male. Nandwani et al,[11] conducted a study on 613 dengue patients

Table 1: Age and gender wise distribution

Age group	Male	Female
1 month- 20 years	5 (25%)	0
21 years- 40 years	9 (45%)	7 (70%)
41 years- 60 years	4 (20%)	2 (20%)
61 years- 80 years	1 (5%)	1 (10%)
>81 years	1 (5%)	0
Total	20 (66.7%)	10 (33.4%)

Table 2: Distribution based on haemoglobin level

Haemoglobin (g/dl)	Number	Percentage	P value
<8	4	13.4	<0.01
>8	26	86.7	
Mean Hb	10.25	2.5	

Table 3: Distribution based on platelet volume

Platelet volume (fL)	Number	Percentage	P value
>9 fL	11	36.7	<0.05
<9 fL	19	63.3	
MPV	9.53	1.7	

Table 4: Distribution based on mean corpuscular haemoglobin concentration

MCHC (g/dl)	Number	Percentage	P value
>30 g/dl	29	96.7	<0.01
< 30 g/dl	1	3.3	
MCHC	33.4	4.8	

Table 5: Distribution based on red cell distribution width

RDW- CV (%)	Number	Percentage	P value
>16%	12	40	<0.05
< 16%	18	60	
Mean RDW- CV (%)	15.9	2.9	

Table 6: Assessment of other haematological parameters

Haematological parameters	Mean	SD
RBC (million cells/mcL)	4.1	1.1
PCV (%)	43.8	5.6
MCV (fL)	85.9	9.3
MCH (pg)	30.8	3.7
TLC (x 10^9 cells per litre)	11.7	2.4
Neutrophils (x 10^9 cells per litre)	79.51	12.4
Lymphocytes (x 10^9 cells per litre)	30.7	5.6
Monocytes (x 10^9 cells per litre)	5.54	1.1
Basophils (x 10^9 cells per litre)	0.06	0.04
Eosinophils (x 10^9 cells per litre)	3.09	1.2

with 26 days to 17 years of mean patient age. Subhaschandra et al,[12] included 100 patients age ranged 15- 25 years having 67 male and 33 female. Ali et al,[13] included 210 dengue patients age ranged 6- 74 years of age. Male to female ratio was 1.6:1. Ferede et al,[14] included 102 dengue patients with 76.5% (78) male and 23.5% (24) female. In their study sixteen patients were less than 15 years and eighty- six were more than 15 years of age.

We observed that the mean haemoglobin level was 10.25 g/dl. Haemoglobin level <8 g/dl was seen among 4 (13.4%) and >8 g/dl in 86.7%. The mean platelet volume found to be 9.53 fL. There were 11 (36.7%) patients with MPV >9 fL and 19 (63.3%) with MPV <9 fL. The mean corpuscular haemoglobin concentration found to be 33.4 g/dl. There were 29 (96.7%) patients with MCHC > >30 g/dl and 1 (3.3%) with MCHC <30 g/dl. Nandwani et al,[11] in their study reported that mean haemoglobin level in their patients was 11.53 g/dl, mean platelet volume was 11.1 fL, mean MCHC was 31.9 g/dl. Ali et al,[13] found that at admission 77.1% (156) patients had Platelet <100X10^9/l. Ferede et al,[14] found that platelet count less than 1.40 lakhs per cubic mm of blood was evident in 61 (59.8%) patients. Haemoglobin level was <13 g/dl was seen in 43.6% male and 45.8% females.

The results of our study revealed that mean red cell distribution width found to be 15.9%. There were 12 (40%) patients with RDW- CV > 16% and 18 (60%) with RDW- CV <16%. Nandwani et al in their study found RDW- CV of 14.23%.[11]

We observed that red blood cell count found to be 4.1 million cells/mcL, PCV was 43.8%, MCV was 85.9 fL, MCH was 30.8 pg, TLC was 11.7 x 10^9 cells per litre, neutrophils was 79.5 x 10^9 cells per litre, lymphocytes was 30.7 x 10^9 cells per litre, monocytes was 5.54 x 10^9 cells per litre, basophils was 0.06 x 10^9 cells per litre and eosinophils was 3.09 x 10^9 cells per litre. Ferede et al,[14] found that neutrophils counts less than1500 was seen in 16 (15.7%) and lymphocyte more than 2900 in 2 (2%) patients. They also observed that 100% patients exhibited fever, 69.6% had nausea and vomiting, 80.4% had myalgia, 87.3% had headache. Thrombocytopenia was seen among 59.8% (61), anaemia in 44.1% (45) and leucopenia in 26.5% (27).

Early detection with the measurement of haematological factors lead to timely management of cases. In most of the cases, the cell counts start falling after 2-3 days of infection, hence repeated blood prolife is essential.[15]

Conclusion

Dengue infection is spreading worldwide. Haematological parameters such as packed cell volume, mean corpuscular volume, mean corpuscular haemoglobin concentration, red cell distribution width helps in identification and early management of dengue cases.

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