Haematological Parameters and Their Utility in Dengue Infection

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Abstracts: Background and objectives: Dengue infection is most important emerging tropical viral disease in world today. Dengue infection is known to increase in India in last decades. So present study is undertaken to know haematological profile associated with dengue seropositivity and evaluation of early and prompt diagnosis of symptoms with complete hemogram to give early treatment of patient rather than waiting for disease to progress. Methods: This prospective study included all the patient positive for NS1 antigen or Ig G or Ig M antibody by rapid card test in the central laboratory of C. U. Shah medical college and hospital, Surendranagar, Gujarat, India, from June 2015 to October 2015. Blood samples taken in EDTA and heparin vaccute and were subjected for NS1 antigen and Ig G and Ig M antibody by rapid card test. Haematological parameters were examine by Beckman coulter haematological auto analyser. Result: A total of 50 proven cases of dengue infection were observed during study period. Thrombocytopenia was the most common change observed in 70% patients followed by 54% patients showed decrease total count and 12 % patients showed increase haematocrit. Conclusion: In our study thrombocytopenia is the most common haematological change followed by leukopenia and increased haematocrit in dengue infection. [Sweta S NJIRM 2017; 8(2):48-50]

Key Words: Dengue infection, Leukopenia, Thrombocytopenia.

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Introduction: Dengue infection is most important emerging tropical viral disease in world today. The WHO estimates 50 million dengue infections occur annually and almost half the world's populations lives in countries where dengue infection is endemic[1]. Dengue infection is caused by one of the four serotypes of dengue virus also referred to as an arbovirus that belongs to genus flavivirus of the family flaviviridae[1,2]. It is transmitted by mosquitoes of the genus Aedesaegypti[3]. Dengue virus infection is known to exist in India for a long time [4]. The incidence of dengue fever (DF) has increased many folds in last four decades, in developing nations like India[5]. The present study is undertaken to know haematological profile associated with dengue seropositivity and evaluation of early and prompt diagnosis of symptoms with complete hemogram to give early treatment of patient rather than waiting for disease to progress.

Methods: This is a prospective study conducted in Department of pathology, C. U. Shah medical college and hospital, Surendranagar, for a period of 5 months from June 2015 to October 2015, with permission of ethical committee of our institute. Blood samples were collected in EDTA vaccute was used for haematological analysis and serum obtained from plain vaccute was used for serological examination. Complete hemogram including haemoglobin, haematocrit, total WBC count, differential count, platelet count were noted of 50 patients. Hemogram was done by five part differential counter (Beckman Coulter LH750 haematology auto analyser) and serological examination was done by rapid card test for detection of dengue NS1 antigen and IgM and IgG antibodies (J. Mitra and CO. Pvt. Ltd). Haematological findings were confirmed by peripheral smear examination. Here we used simple statistical analytic method for comparison of data.

Result: A total of 50 cases were studied based on positive dengue test. Complete hemogram of these patients were done. Observations and result are described below in form of tables.

Table 1: Platelet count of patients

Platelet count (lac)	No. of patient	IgM positive	IgG positive	NS1 positive
<1	37	7	4	32
1- 1.5	5	1	1	4
1.5- 4	8	1	2	6
> 4	0	0	0	0

Table 2: Total leucocyte count of patients

Total leucocyte count	No. of patients	IgM positive	IgG positive	NS1 positive
<4000	30	3	1	27
4000-11000	17	4	4	15
>11000	3	1	1	1

Table 3: Haematocrit of patients

Hematocrit	No. of patients	IgM positive	IgG positive	NS1 positive
<30	7	2	0	6
30-40	20	4	3	18
>40	23	2	2	20

Tables showed that thrombocytopenia observed in 84% patients, leukopenia observed in 60% patients and increased haematocrit observed in 46% patients.

Discussion: Due to changing climate, urbanization, poor living conditions and inadequate waste management, vector born diseases like dengue fever are becoming more common. Although vector control programs are launched in endemic countries every year, yet dengue fever has become a serious problem worldwide. India being a tropical country provides suitable weather for aedes mosquito to grow and an increase in the disease burden has been noticed in recent years [5]. Dengue is caused by a virus belonging to the flaviviridae family (single stranded, positive, non-segmented RNA virus). It has four distinct serotypes DEN1, DEN2, DEN3 and DEN4 [6]. Infection with one serotype confers immunity to only that serotype and hence a person may become infected four times [7]. Humans are the main reservoir of dengue virus[8]. The severity of the disease depends on the strain and serotype of the virus, age of the patient and degree of viremia. Based on the clinical and laboratory parameters dengue infection is divided in dengue fever and severe dengue haemorrhagic manifestation. Hepatomegaly, platelet count less than 1 lakh and hemoconcentration more than 20% quantifies for the diagnosis of DHF [9]. A range of haematological parameters are observed in dengue fever, most common being thrombocytopenia and increased haematocrit more than 20% [10]. In the present study thrombocytopenia was the most frequent abnormality observed constituting 84% and the findings are in correlation with the literatures[9,11,12]. Thrombocytopenia is due to the direct and antibody mediated destruction of the platelets and megakaryocytes and also due to the suppression of the bone marrow by virus[10].Hemoconcentration is an abnormality observed in this disease which is measured by increased haematocrit. In the present study 46% showed increased haematocrit. Leukopenia is well established feature of dengue fever which is due to the direct marrow suppression by the virus[10]. In the present study 60% cases showed leukopenia. Banerjee et al[11] in their study observed that 19% of patient showed thrombocytopenia and leukopenia was observed in 26% of patients. Batra et al [13] observed increased mean haematocrit of 33.6%, thrombocytopenia 40%, leukopenia in 20% of cases. In the acute phase of infection identification of disease is possible by NS1 antigen and IgM antibodies by rapid card test[14]. GeetikaDhir et al[15] in their study observed thrombocytopenia 74.35%. Rashmi et al[16] in their study observed thrombocytopenia 80% and increased haematocrit 23%. Kinjal Patel et al[17] in their study observed thrombocytopenia 93.08%, increased haematocrit 11.54% and leukopenia in 56.92%. However false positive reactions are seen with other flavivirus infection and in rheumatoid fever[11]. Presence of IgG antibodies indicates carrier status and confirms secondary infection and it is needed to know the disease burden in geographic area. The recorded clinical features of dengue fever and dengue haemorrhagic fever includes fever, vomiting, hepatomegaly, abdominal pain, ascites, pleural effusion, shock, haemorrhagic manifestation[18]. Dengue fever is self-limiting disease. Dengue haemorrhagic fever causes morbidity and mortality. No antiviral treatment is available hence fluid and electrolyte replacement and supportive therapies are available modalities of treatment. Hence early and prompt diagnosis with complete hemogram helpful to give early supportive treatment to patient rather than waiting for disease to progress. Since no vaccines for this disease is available, vector control is the only way to check the transmission of the disease[18].

Conclusion: In our study thrombocytopenia is the most common haematological change observed followed by leukopenia and increased haematocrit in dengue infection. Hence study of haematological parameters in dengue infection is helpful in evaluation of early and prompt diagnosis and early treatment of patient rather than waiting for disease to progress.

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References:

1. World Health Organisation, 2009. Dengue : Guidelines for Diagnosis, Treatment, Prevention and Control. New Edition, World Health Organisation and TDR for research on diseases of poverty.
2. FrancisaRaimundaF. GuerreiroAzin et al. DENGUE: PROFILE OF HEMATOLOGICAL & BIOCHEMICAL DYNAMICS. Rev Bras Hematol Hemoter. 2012;34(1):36-41.
3. Brasil.Ministerio da Saude. Secretaria de Vigilancia em Saude.Dengue: diagnostic e manejo clinic.2nd ed.Brasilia, DF; 2005.
4. Sunil Gomber, V.G.Ramchandran, Satish Kumar, K.N.Agarwal, P. Gupta, D.K.Dewan. Hematological observations as diagnostics markers in dengue hemorrhagic fever-a reappraisal. indianpediatrics. IndianPediatrics 2001; 38: 477-481.
5. Munde DD, Shetkar UB, Clinical Features And Hematological Profile Of Dengue Fever, Indian Journal Of Applied Research; vol: 3 Issue 1, Jan 2013, 131-132.
6. Gubler DJ. The global emergence/resurgence of Arboviral diseases as public health problems. Arch med res 2002:33:330-42.
7. Guzman MG, KouriG.Dengue: An update .Lancet Infect Dis 2002;2:33-42.
8. Gibbons RV, Vaughn DW. Dengue : An escalating problem .BMJ 2002;324:1563-6.
9. Kalayanarooj S, Vaughn DW, Nimmannitya S, Green S, Suntayakaron S, Kunentrasai N, etal. Early clinical and laboratory indicators of acute dengue illness. J Infect Dis,1997 Aug;176(2): 313-21.
10. JameelT,Mehmood K, Mujtaba G, Choudhary N, Afzal N, Paul RF. Changing hematological parameters in dengue viral infections. J Ayub Med Coll Abbotabad.2012 Jan – Mar;24(1):3-6.
11. Banerjee M. Chatterjee T, Choudhary GS, Srinivas V, Kataria VK. Dengue : A Clinicohaematological Profile. Medical Journal Armed Forces India. 2008:64:333-6.
12. Jain A, Shah AN, Patel P, Desai M, Somani S, Parikh P, et al . A clinic – Hematological profile of dengue out break among health care professional in tertiary care hospital of Ahmedabad with analysis on economic impact. National journal of community medicine. 2013;4(2): 286-90.
13. Batra P, Saha A, Chaturvedi P, Vilhekar KY, Mendiratta DK. Outbreak of dengue infections in rural Maharashtra. Indian J Paediatr 2007; 74: 794-5.
14. Shu PY, Huang JH. Current advances in dengue diagnosis. ClinDiagn Lab Immunol. 2004JUL;11(4):642-50.
15. GeetikaDhir1 ,Tanish Dhir2 , Vijay Suri3 , Dinesh Dhir4 , Kavin Khatri5. Hematological and Serological Test Profile in Dengue, Dengue Hemorrhagic Fever and Dengue Shock Syndrome in Bathinda Region of Punjab. Scholars Journal of Applied Medical Sciences (SJAMS) 2015; 3(8C):2926-2930.
16. RASHMI MV MD and HAMSAVEENA* MD. Haematological and biochemical markers as predictors of dengue infection. Malaysian J Pathol 2015; 37(3) : 247–251.
17. Kinjal Patel1*, Dipanki Patel2 , V. K. Das3. Hematological Parameters and Its Utility in Dengue Fever: A Prospective Study. International Journal of Science and Research (IJSR) 2016; 4(5):1077-79.
18. Guzman MG, Kouri G. Dengue: An update THE LANCET infectious diseases 2002; 2: 33-41.

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