



AN OBSERVATIONAL STUDY ON SERUM FERRITIN LEVEL IN DENGUE FEVER AND ITS CORRELATION WITH SEVERITY OF DENGUE FEVER

General Medicine

Dr. S Jeevanandam	MD, Assistant Professor, Department of the General Medicine, Thanjavur Medical College & Hospital, Thanjavur.
Dr G Arun Kumar	MD, Junior Resident, Department of General Medicine, Thiruvavur Medical College & Hospital, Thiruvavur.
Dr Sathish Kannan G*	III Year Post Graduate, Department of General Medicine, Thanjavur Medical college, Thanjavur. *Corresponding Author

ABSTRACT

Background: Dengue is an arthropod borne viral infection caused by flavivirus which causes simple fever to severe complications like Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS). Hemophagocytic syndrome (HS) is being frequently reported in patients with severe dengue. Hyperferritinemia (levels above 10000ug/L) is a flagship sign of HS. **Methods:** Fifty patients of Dengue IgM Positive cases of age more than 18 admitted in Thanjavur medical college formed the study group. These patients were analysed clinical symptoms, Laboratory investigation- Platelet count and Serum Ferritin level - Its Correlation with Severity of Dengue fever was analysed. **Results:** Duration of hospital stay showed mild positive correlation with age, moderate positive correlation with serum ferritin and moderate negative correlation with platelet count. There was moderate negative correlation between serum ferritin and platelet count. As the serum ferritin level increased there was a decrease in platelet count

KEYWORDS

Dengue fever, serum ferritin, Hemophagocytic syndrome, Hyperferritinemia

INTRODUCTION:

Dengue is a rapidly emerging pandemic disease, which is a major health problem in the tropics. Dengue fever is a viral infection spread by *Aedes aegypti* or *Aedes albopictus* mosquitoes that may first be suspected if spikes a very high fever, severe muscle, bone, and joint pain. It is sometimes referred to as break bone fever.

In recent times a phenomenon called macrophage activation syndrome (MAS) or hemophagocytic syndrome (HS) is being frequently reported in patients with severe dengue.

Hyperferritinemia (levels above 10000ug/L) is a flagship sign of MAS. Hemophagocytic syndrome (HS) is being increasingly reported in patients with severe dengue with multiorgan complication and is observed in severe dengue.

AIMS AND OBJECTIVES:

- To measure the serum ferritin levels in dengue fever patients
- To determine the relationship between serum ferritin level and thrombocytopenia in patients with dengue fever

Study Design: Cross sectional observational study.

Study Setting: The study will be conducted in the inpatient wards, Department of General Medicine, Thanjavur Medical College.

Study Subjects:

Inclusion Criteria:

- Confirmed cases of Dengue IgM positive and Age > 18 yrs.
- Patients willing to give informed written consent.

Exclusion Criteria:

- Pregnancy
- Other febrile illness
- Mixed infections
- Patients with known haematological disorders
- Patients on heparin
- Patients on chemotherapy and radiotherapy / immunocompromised patients.
- Known patients with qualitative and quantitative platelet disorders

SAMPLE SIZE:

50 Dengue IgM positive patients of both sexes.

Parameters Analysed:

Clinical findings- signs of bleeding and capillary leakage
Laboratory parameters- platelets count, serum ferritin level
Chest X-Ray and USG Abdomen

Method And Principle Of Serum Ferritin Estimation:

Immuno enzymatic colorimetric method for quantitative determination of Ferritin concentration in human serum or plasma.

RESULTS:

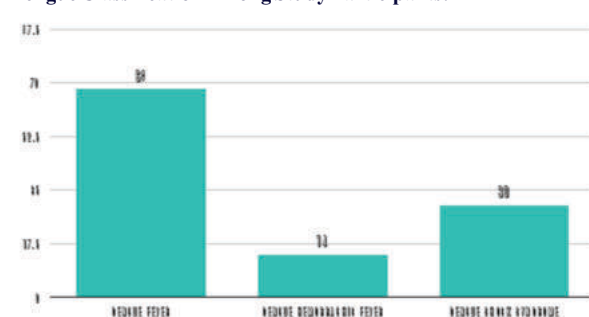
Collected data during the study was formulated into a master chart in Microsoft office excel and statistical analysis was done with help of computer using statistical software package SPSS V.21 for windows.

Using this software, frequencies, range, mean, standard deviation and 'p' value were calculated through Pearson's Correlation, Independent sample 't' test and also univariate analysis was done using chi square test. P value of < 0.05 was taken as statistically significant.

Age Distribution Among Dengue Cases

AGE	NUMBER OF CASES(N)	PERCENTAGE(%)
18-45 Years	33	66
More than 45 years	17	34
TOTAL	50	100

Dengue Classification Among Study Participants:



Signs & Symptoms Among Cases:

S.No.	Symptoms	Frequency N	Percentage %
1	Fever	50	100
2	Headache	11	22
3	Myalgia	11	22
4	Arthralgia	4	8
5	Vomiting	3	6
6	Rash	2	4
7	Gum bleeding	1	2
8	Black coloured stools	1	2
9	Menorrhagia	1	2

10	Breathlessness	1	2
11	Giddiness	1	2

Association Of Age, Duration Of Symptoms And Hospital Stay, Lab Findings With Complications Of Dengue:

Variable	Complication		t value	p value
	Present	Absent		
	Mean $\pm$ SD	Mean $\pm$ SD		
Age	45.94 $\pm$ 11.67	39.85 $\pm$ 12.09	1.699	0.099
Duration of symptoms	5.94 $\pm$ 0.99	5.88 $\pm$ 1.22	0.157	0.876
Duration of hospital stay	8.13 $\pm$ 1.70	5.24 $\pm$ 0.69	8.53	<0.001
Serum Ferritin (ng/ml)	648.44 $\pm$ 222.18	263.79 $\pm$ 116.85	8.054	<0.001
Platelet count (per microliter)	38637.50 $\pm$ 13291.45	95302.94 $\pm$ 28254.74	7.60	<0.001

Correlation Between Age, Duration Of Hospital Stay, Serum Ferritin And Platelet Count:

Variable	r value and p value	Age	Serum Ferritin (ng/ml)	Platelet count (per microliter)
Age	Pearson correlation (r)	1	0.509	-0.405
	p value		<0.001	0.004
Duration of hospital stay	Pearson correlation(r)	0.286	0.664	-0.731
	p value	0.044	<0.001	<0.001
Serum Ferritin	Pearson correlation(r)	0.509	1	-0.590
	p value	<0.001		<0.001

DISCUSSION:

Dengue fever is a dynamic febrile illness which can manifest as a mild self-limiting or severe life threatening situation following hemorrhage, plasma leakage, or multiple organ failure. The severity of dengue fever depends on the interactions between virus and host's immune response.

Now-a-days, many haematological parameters have been suggested to evaluate the severity of the disease including decreased platelet count, raised hematocrit level, prolonged prothombin time and activated partial thromboplastin time, liver transaminases, muscular enzymes etc. But there is paucity of researches which can predict bad outcome in dengue fever.

Elevated level of serum ferritin during the febrile phase of dengue fever might predict the severity of dengue fever during critical phase which would help physicians to prepare for the prevention and treatment of extended dengue fever. Thus, it can reduce the morbidity and mortality in dengue fever. A raise in serum ferritin level has been observed to have linear correlation with severity of dengue fever.

In our hospital based cross sectional study, we had measured the serum ferritin levels in 50 dengue fever patients and determined the relationship between serum ferritin level and severity in patients with dengue. From this study we have conclude that the maximum number of cases were in the age group of 18 to 45 years, the younger working age group. And only 10% of patients had Bleeding manifestation. Only 16 (32%) had complications.

The mean duration of symptoms and mean duration of hospital stay was high with mean values 5.9 and 6.16 days respectively. In our study the mean serum ferritin was significantly different between patients with complication and without complication. Serum ferritin carries more predictive value in determining the severity of dengue fever, which results in an early intervention that reduces hospital stay.

Hyperferritinemia is associated with immune activation and coagulation disturbances. A raise in serum ferritin level has been observed to have correlation with severity of dengue fever. Mean Serum ferritin was higher in those with complications and mean

platelet count was lower in those with complications.

Ferritin level is significantly correlated with Duration of hospital stay and platelet count of the patients.

Elevated serum ferritin levels can be used as a potential early prognostic marker to predict the severity of dengue infection in clinical practice.

CONCLUSION:

From this study we conclude that out of 50 Dengue IgM positive patients maximum number of cases were in the age group of 18 to 45 years. The mean duration of hospital stay was significantly different between patients with complication and without complication. Increased serum ferritin has been associated with severe dengue. There was a positive correlation between serum ferritin with Age and Duration of hospital stay of patients. From all these results we can clearly say that serum ferritin can predict the severity of dengue.

REFERENCES:

- Harrison's Principles of Internal Medicine, 20e Jameson J, Fauci AS, Kasper DL, Hauser SL, Longo DL, Loscalzo J. Jameson J, & Fauci A.S., & Kasper D.L., & Hauser S.L., & Longo D.L., & Loscalzo J(Eds.),Eds.
- GuzmanMG, HalsteadSB, ArtsobH, BuchyP, FarrarJ,etal.(2010) Dengue: a continuing global threat. Nat Rev Microbiology 8: S7– S16.
- Bhatt S, Gething PW, Brady OJ. The global distribution and burden of dengue.Nature. 2013;496(7446):504-7.
- Guglani L, Kabra SK. T cell immunopathogenesis of dengue virus infection. Dengue Bull, 2005; 29: 58–68.
- Environmental Health Project, Dengue Fever: An Environmental Plague for the New Millennium?1999; Camp Dresser & McKee International Inc, Cambridge, Massachusetts. 1–8.
- Centers for Disease Control and Prevention. Dengue Fever.Division of Vector-Borne Infectious Diseases.2005; CDC, Atlanta.
- Broor S, Dar L, Sengupta S, Chakraborty M, Wali JP, Biswas A, et al. Recent dengue epidemic in Delhi, India. In: Saluzzo JE, Dodet B, editors. Factors in the emergence of arbovirus diseases. Paris: Elsevier; 1997.p. 123-7.
- Sharma PL, Sood OP, editors. Round table conference series— dengue outbreak in Delhi: 1996. Gurgaon, India: Ranbaxy Science Foundation; 1996..
- Park's Textbook of Preventive and Social Medicine, 26th Edition
- ComprehensiveguidelinesforpreventionandcontrolofDengue and Dengue Haemorrhagic fever WHO, 2011, http://www.searo.who.int/entity/vector_borne_tropical_diseases/documents/en/.
- National GuidelinesN for Clinical Management of Dengue Fever, National Vector Bourne Disease Control Programme, 2015, <http://www.nvbdc.gov.in/Doc/Clinical%20Guidelines.pdf>.
- Ferritin levels predict severe dengue:R.Soundravalleyetal; springer;October2014
- Serum Ferritin: An Indicator of Disease Severity inPatientswith Dengue Infection; Muhammad Nadeem I, MuhammadMudassirShafiq; Journ alo(RawalpindiMedicalCollege(JRMC);2016;20(3):165-167
- ChannaptnaSureshS,HanumanthaihaR,RamakrishnaC,SandeepR, Narasimhasetty PS, Ramakrihna V, Raju B. Serum Ferritin As a Prognostic Indicator in Adult Dengue Patients. The American Journal of Tropical Medicine and Hygiene. 2020 Dec 28;tpmd201111.
- BharathiKG,AswinthR,SudarshanS.AnObservationalStudyon Serum Ferritin Level in Dengue Fever and Its Correlation with Severity of Dengue Fever.