

Scale in Predicting the Date of Discharge

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I. INTRODUCTION

In the recent decades the incidence of dengue has grown rapidly. The current estimate by WHO is 50-100 million cases of dengue infection per year^[1]. The name dengue was derived from the Swahili word for "bone breaking fever" or the Spanish word for "the walk of a dandie"^[2]. It is a self limited arboviral infection characterised by fever with rash, joint pains, nausea, vomiting, headache and retroorbital pain. Several theories have been established in the etiopathogenesis of thrombocytopenia in dengue patients which includes release of inflammatory mediators, complement components and cytokines such as IL 2, IL 6, IL 8, IL 10, TNF α and IFN γ leading to damage of vascular endothelial cells which in turn results in increase in the capillary permeability, consequent plasma leakage and hence, thrombocytopenia^[1]. The course of illness is divided into three phases- febrile, critical and recovery phase. The critical phase occurs towards the late febrile phase (after 3rd day of fever) or around defervescence (usually between 3rd to 5th day of illness but may go up to 7th day) and the patient may manifest with thrombocytopenia and increase in hematocrit. Critical phase may progress to serious manifestations like dengue haemorrhagic fever and dengue shock syndrome. As per WHO 2007 criteria, patients may be labelled as having Dengue fever (DF), Dengue haemorrhagic fever (DHF) and Dengue shock syndrome (DSS). As per the new terminology recommended by WHO in 2009, the cases are classified into dengue without warning signs, dengue with warning signs (abdominal pain/persistent vomiting/mucosal bleed/increase in HCT with decrease in platelet count) and severe dengue (severe plasma leakage, severe bleeding and severe organ involvement)^[3].

The disease activity is estimated by the platelet counts and the complete blood counts including the hematocrit. The plasma leakage in DHF/DSS can lead to rise in hematocrit values and if the rise is above 20% of the baseline levels, it indicates impending DHF/DSS. The disease severity may vary from mild fever which does not require hospitalisation to severe disease with features of DHF/DSS which may require intensive care for the patient. Several discharge criteria have also been established for optimum patient care and avoid unnecessary prolonged hospitalisation.

II. MATERIAL AND METHODS

A prospective study was done from May 2012 to May 2013 in a tertiary care hospital in North India. Written consent was taken before including the subject to the study. The study included 300 patients who consented to be a part of the study. The patients were subjected to detailed history and clinical examination. The diagnosis of Dengue was confirmed by either Dengue NS1 antigen or IgM Dengue serology (ELISA). The patients were subjected to routine investigations. The platelet counts were closely monitored. LDH levels were done on the day of minimum platelet counts. The duration of symptom onset, date of admission, and duration of hospital stay were recorded.

An estimate of date of discharge was calculated based on the levels of LDH on the day of least platelet count (LID Scale). The calculated date of discharge based on the LDH levels were then compared with the actual date of discharge of the patient from hospital. They were discharged when their platelet count showed significant rises in three consecutive samples.

Cases showing only IgG positivity and patients with concomitant diseases such as diabetes, cardiac disease, renal disease, hematological disorders, acquired immune deficiency syndrome and malignancy were excluded from our study.

Statistical analysis was done using acceptable statistical tests.

III. RESULTS

The mean age of our cases was 30.5 years. Male to female ratio was 29:1. The mean of least platelet count reached during the disease course was 53353.33 ± 43169.36 /cumm. The mean number of days of illness onset prior to admission was 5.87 ± 3.46 days while the mean duration of illness was 10.63 ± 3.27 days.

The mean LDH levels on the day of least platelet count were 608.87 ± 228.67 IU/L and the mean number of days to discharge from the date of testing LDH was 2.43 ± 1.10 days ($p = 0.0001$, $r = 0.8178$).

The mean number of days to discharge calculated by LID scale were 2.43 ± 1.04 days and the mean number of days to actual discharge from the date of testing LDH was 2.43 ± 1.10 days ($p = 1$).

IV. DISCUSSION

In our study, the mean age of dengue patients was 30.5 years. This was found to be concordant with the study done by Cecilia D who found that most of the Dengue cases were in the age group of 21 to 30 years^[2]. The present study showed that dengue is more common in males than females (M: F-29:1). This is concordant with the other studies done on epidemiology of dengue^[4]. The mean duration of illness in our study was 10.63 ± 3.27 days which were found to be concordant with previous studies.

On review of literature, Sirikutt P, Kalayanarooj S have compared LDH levels in patients of dengue with the other febrile illnesses and they found that the LDH levels were higher in dengue patients and the LDH levels correlated with the disease severity^[6]. One study compared LDH levels in patients of DF, DHF WHO Grades 1, 2 and 3. And they found LDH levels were higher in DHF than DF and highest in DHF-3^[7]. The rise in LDH levels in severe disease has been attributed to skeletal muscle damage and/ or liver damage^[6]. Based on these findings, in the present study we measured LDH levels on the day of least platelet count.

We performed a study on newly diagnosed dengue cases and based on platelet counts and lactate dehydrogenase (LDH) levels, calculated an estimate of duration of stay in the hospital (using the LID Scale). This was compared with the actual duration to discharge from the date of sending of the LDH test. Our results showed a significant correlation ($p < 0.001$, $r = 0.8178$) between the LDH levels with the time to discharge thereafter.

Our review of literature revealed no study that has been done on LDH levels as an estimate of duration of hospital stay in dengue cases. Based on our results of the present study, we conclude that the date of discharge can be estimated from the LDH levels done on the day of the least platelet count using our LID scale.

LDH at least platelet count	No. of days for Platelet count to rise
<400	1-2 DAYS
400-600	2-3 DAYS
600-800	3-4 DAYS
>800	≥4 DAYS

V. CONCLUSION

We, in a tertiary care hospital in North India, performed the study on newly diagnosed dengue cases to evaluate LDH as a predictor of discharge for the patient. We observed a correlation between the LDH levels and the time of discharge from the hospital. On this basis we formulated a LDH in Dengue (LID) Scale (Table 1). Based on our LID scale, we can predict the time to discharge (with discharge criteria as three consecutive rises in platelet levels). In a developing country with limited health resources, it is important to be able to predict the possible date of discharge. This will also help the treating physicians to counsel the anxious patients and their families in a more scientific manner.

VI. LIMITATIONS

The study has a limited number of patients compared to the incidence of the illness. The correlation with higher levels of LDH may be studied further.

REFERENCES

- [1]. Ichiro Kurane. Dengue hemorrhagic fever with special emphasis on immunopathogenesis. *Comparative Immunology, Microbiology & Infectious Diseases* 2007; 30: 329–340.
- [2]. Cecilia D. Current status of dengue and Chikungunya in India. *WHO South-East Asia Journal of Public Health*. 2014; 3(1): 22-27.
- [3]. Cecilia D, Shah PS, Alagarasu K. Dengue: Achievements in the last decade. In: Cecilia D, editors. *NIV Golden to Diamond Jubilee: The Glorious Decade*. Pune, India: Golden Jubilee Publication; 2012. p. 141-62.
- [4]. PM Ukey, SA Bondade, PV Paunipagar, RM Powar, SL Akulwar. Study of Seroprevalence of Dengue Fever in Central India. *Indian J Community Med*. 2010; 35(4): 517–519.
- [5]. Sirikutt P, Kalayanarooj S. Serum lactate and lactate dehydrogenase as parameters for the prediction of dengue severity. *J Med Assoc Thai*. 2014 ; 97 (6): 220-31.
- [6]. Khwaja et al. A follow up on biochemical parameters in dengue patients attending Birdem hospital. *Ibrahim Med. Coll. J*. 2008; 2(1): 25-27.
- [7]. Luis Angel Villar-Centeno, Fredi Alexander Díaz-Quijano, Ruth Aralí Martínez-Vega. Biochemical Alterations as Markers of Dengue Hemorrhagic Fever. *Am. J. Trop. Med. Hyg* 2008; 78(3): 370–374.