

PREDICTORS OF DENGUE MORTALITY IN A TERTIARY CARE HOSPITAL AT KOLKATA: A CROSS SECTIONAL STUDY

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ABSTRACT

Background: Dengue fever, the most common arbo viral illness transmitted worldwide. Dengue infection in adolescents and adults is also a potential hazard in endemic areas, especially South-east Asia.

Aims & Objective: The present study was done to evaluate the magnitude of dengue death and its predictor factors in a tertiary care hospital of Kolkata.

Material and Methods: This observational cross sectional study was conducted at a tertiary care centre of Kolkata over 1 year period with 77 patients with a diagnosis of dengue fever based on the serology positive for dengue IgM with fulfilling the inclusion and exclusion criteria. The data were collected on predesigned questionnaire which include gender, clinical findings, complications and laboratory test. Baseline laboratory tests obtained were complete blood count (CBC), partial thromboplastin time (PTT), serum glutamine pyruvate transaminase (SGPT), SGOT, bilirubin, urea, creatinine and IgM. SPSS 16.0 version was used for statistical analysis.

Results: Dengue mortality rate was 28.57% in this study. Among 5 lab parameters chosen i.e. leukopenia, bilirubin > 6 mg/dl, thrombocytopenia, altered PT/APTT, enzyme > 4 fold rise, raised urea/cr. On multivariate logistic regression analysis hyperbilirubinemia (> 6 mg/dl) was statistically significant predictor for mortality (as p value < 0.05).

Conclusion: The laboratory parameters could predict the dengue mortality, so proper emphasis should be given to address the situation.

KEY-WORDS: Dengue Infection; Mortality; Predictors

Introduction

Dengue fever, the most common arbo viral illness transmitted worldwide. Dengue viruses are small, spherical single stranded enveloped RNA viruses of the family Flaviviridae. Dengue is transmitted by mosquitoes of the genus *Aedes aegypti*. Dengue caused by one of four closely related but antigenically distinctive virus serotypes DEN-1, DEN2, DEN-3, and DEN-4. Infection with dengue viruses produces a spectrum of clinical illness ranging from non-specific viral syndrome to severe Haemorrhagic disease. Dengue Haemorrhagic fever is characterized by acute fever, Haemorrhagic manifestations and marked capillary leaking the latter manifesting as pleural effusions, ascites and a tendency to develop shock. The common manifestations of dengue Hemorrhagic fever are petechial rash, epistaxis, gum bleeding and gastrointestinal bleeding. ELISA can be used to classify dengue virus infection as primary or secondary infection by determining

the ratio of units of dengue IgM:IgG antibodies titers. High levels of IgG are indicative of secondary infections. The epidemiology of dengue fevers in the Indian subcontinent has been very complex and has substantially changed over almost past six decades in terms of prevalent strains, affected geographical locations and severity of disease. The very first report of existence of dengue fevers in India was way back in 1946.^[1] Data from several South-east Asian countries have shown that the mean age of reported dengue cases has increased from 5–9 years to older children and adults.^[2-6] Dengue infection in adolescents and adults is also a potential hazard in international travellers returning from endemic areas, especially South-east Asia.^[7-10] Dengue has a substantial economic impact in developing countries.^[11,12] Individuals and families are impacted by lost wages, cost of seeking care, cost of treatment, missed school, and extended effects of recovery.^[11-15] Prevention and control strategies have been poorly implemented or unsustainable and thus largely ineffective.^[16,17]

The present study was done to evaluate the magnitude of dengue death and its predictor factors in a tertiary care hospital.

Materials and Methods

This present observational cross sectional study was conducted in general medicine department of IPGME&R, Kolkata within October 2011 to October 2012 on 77 patients. All patients above 12 years old admitted at our institution and suspected to have dengue infection based on the serology positive for dengue IgM were included in the study during that period. The patients with (1) Hematologic abnormalities (ITP, TTP, HSP, myelodysplasia); (2) history of liver disease and splenic dysfunction; (3) fever from a known focus of infection; (4) intake of medications that may affect platelet count or platelet function (antiplatelets, anticoagulants, diuretics, etc.); (5) immunocompromised state were excluded from the study. All of the patients in this study were tested for malaria, typhoid, leptospira and brucellosis, hepatitis A, B, C, E and those who revealed positive also excluded. The clinical data were collected on predesigned questionnaire which include age, gender, clinical findings, complications and laboratory findings. Baseline laboratory tests obtained were complete blood count (CBC), partial thromboplastin time (PTT), serum glutamine pyruvate transaminase (SGPT), SGOT, bilirubin, urea, creatinine and IgM dengue. SPSS v. 16.0 was used to done the statistical analysis i.e. multiple logistic regression.

Results

Among 77 study participants 54 (70.1%) were male and 23 (29.9%) were female. Out of the 77 dengue patients 22(28.57%) were having the bad outcome i.e. death. It is evident that mortality gradually decreased with advancement of age having highest mortality (50%) in age group 20-29 (Table 1). Though major portion of the study participants were male (70.13%) but death among male and female showed equal distribution (50%) (Table 2). Among clinical parameters rash was most frequent manifestation (58.3%) and among lab parameters thrombocytopenia was most common finding (46.8%) (Table 3). Among the laboratory parameters hyperbilirubinemia (>6

mg/dl) was found to be statistically significant ($p = 0.011$) predictor for dengue death. Though Leukopenia, Altered PT/APTT, Raised serum enzyme and Raised urea & creatinine were found to be risk factors ($OR > 1$) for dengue mortality but not statistical significant ($p > 0.05$) (Table 4).

Table-1: Distribution of Dengue Death according to Age (n=77)

Age Group (Years)	Dead	Survived	Total
20-29	11 (50)	10 (18.2)	21 (27.3)
30-39	7 (31.8)	16 (29.1)	23 (29.9)
40-49	4 (18.2)	18 (32.7)	22 (28.6)
50-59	0	9 (16.4)	9 (11.7)
>60	0	2 (3.6)	2 (2.6)
Total	22 (100)	55 (100)	77 (100)

(Figures in parenthesis are in percentages)

Table-2: Distribution of Dengue Death according to Gender (n=77)

Sex	Dead	Survived
Male	11(50)	43(78.2)
Female	11(50)	12(21.8)
Total	22(100)	55(100)

(Figures in parenthesis are in percentages)

Table-3: Distribution of Clinical and Laboratory Parameter among the Study Participants*

Symptoms and Signs		Total	Percentage
Fever	> 102°	50	64.9
	< 102°	18	23.4
	No Fever	9	11.7
Retrorbital pain		17	22.1
Lymph adenopathy		12	15.6
Hepatomegaly		26	33.8
Splenomegaly		11	14.3
Rash		45	58.4
Leucopenia		6	7.8
Decreased platelet		36	46.8
Altered PT, APTT		27	35.1
Increased urea creatinine		32	41.6
Increased serum enzymes (>4 fold rise)		22	28.6
Increased bilirubin(> 6 mg/dl)		15	19.6

* Multiple responses

Table-4: Predictive Laboratory Parameters of Dengue Death in Multiple Logistic Regressions

Independent variable	OR	95% OR	p-value
Leukopenia	4.703	0.622-35.553	0.134
Bilirubin > 6mg/dl	11.635	1.754-77.191	0.011*
↓ Platelet	0.264	0.059-1.189	0.264
Altered PT/APTT	2.590	0.562-11.929	0.222
Enzyme > 4 fold rise	1.045	0.207-5.268	0.958
Raised Urea & Creatinine	1.814	0.486-6.774	0.376

* Statistically significant

Discussion

The continued emergence of dengue virus infection and its severe disease manifestation has

made it a growing public health problem. Shock and bleeding are the two most dreaded complications. The presence of shock, coma on presentation and seizures were previously reported as important predictors of mortality in dengue infection.^[18] Shock has been reported previously as an important factor for mortality with or without a history of associated blood loss. Vascular collapse (shock) was present in 12 (85.7%) cases, with or without the association of major bleeding, and was the most important cause of death.^[19]

Aysha alam et al. 2010, found mortality due to dengue viral infection was significantly associated with a high white cell count, uremia, acidosis and deranged liver function. A high white cell count indicates an associated bacterial infection. Dengue infection usually causes leukopenia.^[20] Renal failure are associated with mortality in dengue infection.^[21] Acute renal failure has a worse prognosis in the elderly with dengue infection.^[22] A few studies have shown that factors such as hemoconcentration, platelet count less than 50,000/mm³, elevated ALT level and prolonged coagulation factors VII can predict spontaneous bleeding. Rubio Jr. GD et al (2007) showed, the odds of having thrombocytopenia is higher among leukopenic participants than among nonleukopenic ones but the severity of leukopenia did not show increase risk of bleeding. Though few previous studies showed predictors of bleeding risk in dengue but not all cases of dengue associated with haemorrhage & shock resulted in death, so bleeding risk predictors does not predict risk of death. Still now very few studies had been reported regarding predictors of mortality in dengue in adult population. We found leukopenia having higher odd in dengue death but the p-value is insignificant. We also did not found raised serum liver enzyme (> 4 fold), raised PT & APTT and increased serum urea and creatinine as predictor of death in dengue fever. Only raised serum bilirubin (>6 mg/dl) has been found to be an important risk factor death (p- value 0 .011). So from our study we can comment that raised serum bilirubin (>6 mg/dl) may be a predictor of death in dengue fever but further larger study to be conducted to confirm the same. Limitation of our study is small patient population. Reduced mortality in higher age group may be due to very

small number of patient in that age group. But one important aspect of our study is that we took those patients who were serologically confirmed as dengue, not on clinical suspicion only as taken in previous study.

Conclusion

So, in conclusion we can comment that though there are several predictors of mortality but hyperbilirubinemia was statistically significant in our study. Early recognition of clinical predictors of disease severity early in the disease are of crucial importance in the management of dengue. We recommend patients with dengue infection with such predictors of mortality on presentation warrant management in high dependency units .Not only Dengue is a highly under recognized and underreported disease even in areas of the world where there is a high level of public health and clinical awareness and diagnostic capacity but also Dengue infections pose a huge burden to health care providers in most tropical countries.

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