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RISK FACTORS OF MORTALTIY AMONG PATIENTS SUFFERING FROM DENGUE INFECTION

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Abstract:

Objective: *There is an increase in the dengue infection in our country Pakistan from last few years with adverse outcomes. Data about the risk factors of mortality because of this viral infection is not sufficient. We conducted this research study to determine the main factors responsible of death among patients having dengue infection in Mayo Hospital Lahore to identify the complication in initial stage and to improve the treatment in coming future.*

Methodology: *The design of this study was an observational study and the study was conducted at Mayo Hospital, Lahore from August 2018 to January 2020. All the patients who were positive for dengue IgM in presence of febrile illness completing the criteria of WHO for Dengue Fever, Dengue Shock Syndrome or Dengue Hemorrhagic Fever and died in the same setting were only the participants of this research work. Information about demography, parameters of clinical and laboratory findings in addition with the detail of treatment were under discussion and analysis. We anonymized all examined records.*

Results: *The average age 36 year with a range of 13 to 80 years among 95 mortalities because of dengue. There were total 63.1% (n: 60) males. We found co-morbidities present in 77.9% (n: 74) patients with Hypertension in 22.1% (n: 21), Diabetes Mellitus in 11.58% (n: 11), diseases of liver in 9.47% (n: 9) and Ischemic Heart Disease in 8.4% (n: 8) patients. Patients appeared at 2nd day of febrile illness and mortality occurred at median of four days with a range of 30 minutes to 23 days. The stay in hospital was lower than 7 days for 83.2% (n: 79) patients and 16.8% (n: 16) remain admitted for greater than 7 days. There was requirement of critical care in 71% (n: 67) patients. There was occurrence of severe hepatitis in 43.1% (n: 41) patients, renal impairment in 33.7% (n: 32) and intra-vascular coagulation occurred in 16.8% (n: 16) patients. Deaths were the outcome of prolonged shock in 51.5% (n: 49), fluid overload in 48.4% (n: 46) and bleeding in 19% (n: 18) causing the failure of organ.*

Conclusion: *High leakage of plasma, failure of organs and fluid overloading were the main cause of increased mortality in the patients suffering from dengue infection. Co-morbidities, particularly Diabetes Mellitus, are the adverse prognostic factors for the prediction of the mortality due to dengue infection.*

KEYWORDS: *Dengue Fever, Organ Failure, Co-Morbidities, Impairment, Mortality, Ischemic Heart Disease, Syndrome, Overload.*

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INTRODUCTION:

About 3.6 billion persons residing in sub-tropics and tropics are affected by infection of DENV [1]. There four subtypes of this disease as DENV1, DENV2, DENV3 and DENV4. There is very large spectrum of this diseases from mild illness to the Dengue Fever and in severe patients Dengue Hemorrhagic Fever and dengue shock syndrome [2]. There is a continuous in the number of patients and deaths due to this complication in our country Pakistan in last few years [3]. There is rise on the epidemics of dengue infection in the countries of South Asia. There are great chunks of the patients suffering from the infection of this disease in Sri Lanka, Pakistan and India [3]. A current research study conducted displayed that there was increase in the proportion of the patients suffering from dengue shock syndrome and dengue hemorrhagic fever in our country [4]. Primary dengue prevention of dengue through the activities of vector control are not able to obtain the favorable outcomes [5]. In recent times, there is no proper anti-viral therapy for the treatment of dengue.

There is development of vaccine which has reduced the rate of mortality from 20% to less than 1% by preventing different subtypes of dengue [6]. Different research works conducted in Australia, USA, Africa and South Asia [5, 7, and 8] have stated the risk factors that are the cause of the adverse prognosis. There is more propensity of severe illness in the patients of elder age as stated by a research work conducted in Taiwan [9]. One other research work conducted in Cuba stated that dengue fever and dengue hemorrhagic fever has raised the rates of mortality in elder ages [10]. A research work from Singapore stated that infection of dengue in addition with chronic illness had adverse outcome [11]. There was also association of the secondary bacteremia with the high rates of mortality as per one research work conducted in Taiwan [9]. Upper gastrointestinal bleeding [12], thrombocytopenia and leukocytosis [13] and tachycardia [14] at the time of admission are the vital indicators of mortality.

MATERIAL AND METHODS:

We carried out this observational research work on 95 deaths due to dengue at Mayo Hospital, Lahore from August 2018 to January 2020. We scrutinized the mortality records and then identified the patients present with positive serology of dengue. All the patients who were positive of dengue IgM with the presence of febrile illness completing the criteria of World Health Organization and met their death in the same hospital were the participants of this research work. We obtained the data about the demography, epidemiological, medical, and radiological and laboratory findings of all the patients. We recorded the present co-morbidities and therapy details in addition with the outcome of the disease of all the patients. We calculated the total duration of the illness by note down the start of the fever to the discharge date from our hospital.

Ethical committee of the institute gave the permission to conduct this research work. In accordance with guidelines of WHO, dengue fever needed the availability of the fever and other 2 or more than two clinical symptoms as headache, rash, myalgia, leukopenia, retro-orbital pain and hemorrhagic manifestations, we labelled the patients with dengue hemorrhagic fever if patients of dengue fever were present with thrombocytopenia of 100.0×10^9/L, large bleeding and leakage of plasma manifesting as either change of hematocrit ≥ 20.0%, accumulation of the fluid identified clinically in form of ascites. Dengue Shock syndrome needed the symptoms of the circulatory failure among patients present with dengue hemorrhagic fever. We labelled the patients with severe hepatitis when the level of serum alanine was ≥ 300.0 units/L. We defined the renal impairment as the level of serum creatinine was two times greater than the normal limit. We labelled the patients with shock if there was presence of narrow pulse. The patients present with the free fluid in their body were labelled as fluid overload.

RESULTS:

There were deaths of 95 adult patients of dengue with median age of 36 years with a range from 13 to 80 years. There were total 63.1% (n: 60) male patients. Co-morbidities were present in 77.9% (n: 74) with Hypertension following by DM, diseases of liver and Ischemic Heart Disease as presented in Table-1. There were reports about other minor complications in 26.3% (n: 25) patients. All the patients appeared for the admission with a median of 2 days with a range from 1 to 8 days from 1st day of febrile illness and death occurred at median of 4 days with a range of 30 minutes to 23 days. The stay in hospital was less than one week in 83.2% (n: 79) patients and 16.8% (n: 16) patients remained admitted for greater than 7 days. There was requirement of ICU admission for 71% (n: 67) patients. There was occurrence of severe hepatitis in 43.1% (n: 41) patients, renal impairment in 33.7% (n: 32) patients and DIC in 16.8% (n: 16) patients. We offered the support of dialysis to only 2 patients.

Table-I: Co-Morbidities Along With Dengue Fever

Comorbidities	No	Percentage
Hypertension	21	22.1
Diabetes	11	11.58
Liver Disease	9	9.47
Ischemic heart disease	8	8.4

There was requirement of mechanical ventilation in 24.2% (n: 23) patients and inotropic support was provided to 25.3% (n: 24) patients. The transfusion of blood carried out in total 84.2% (n: 80) patients. We provided the transfusion of platelets in 22.1% (n: 21) patients whereas 7.5% (n: 7) patients got packed red cells. We provided the FFP in 7.3% (n: 7) patients. Deaths were because of the prolonged shock in 51.5% (n: 49) patients, fluid overload in 48.4% (n: 46) patients and heavy bleeding in 19% (n: 18) patients causing failure of organ. Dengue was the primary reason of death in 21 patients and there was label of dengue infection with other co-morbidities on 74 patients. We did not perform autopsy on any patient.

DISCUSSION:

Dengue was reported for the first time in Pakistan in 1994 [15]. After that, our country has regular outbreaks of this disease every year. Mayo Hospital, Lahore suffered the heavy burden of this disease in the duration of this research work. The data of the deceased patients proved that majority of the patients were adult males. Other research work conducted in Philippines and Singapore also revealed that there was dominance of male gender in this complication [16-18]. This is because of the high exposure of the males with outdoor activities. There are also opposite results in some research works conducted in South America which showed the dominance of the female gender as compared to the male patients [19, 20].

In this research work there was presence of comorbidities in 77.9% patients which is similar to the other research works stating high amount of the comorbidities in dengue mortalities in various countries of America and Africa [21]. In this research work, the most important co-morbid disease was DM. there was high risk of mortality in the patients who appeared delayed in the hospital after onset of the complication [22]. Prolonged shock was the most important cause of death among patients. In our research work, the 2nd most important reason of death was overload of fluid. Research works state that respiratory deterioration importantly because of the fluid overload performs a vital part in the rise of the mortality rate in the patients of dengue hemorrhagic fever [23]. Low count of platelets has association with the high rate of mortality in the patients of dengue infection [24].

CONCLUSION:

Heavy bleeding, plasma leakage and failure of the organs are the main contributory factors of increases mortality among patients present with dengue infection. There is an important role of diabetes mellitus as a co-morbidity in the adverse prognostic factors for the prediction of mortality in the patients having dengue viral infection.

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