Original Article

Dengue Fever in Patients

Study of Biochemical, Hematological & Clinical Profile of Dengue Fever Patients in a Tertiary Care Hospital in Northern Pakistan

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ABSTRACT

Objective: To assess the changes in biochemical and hematological profiles of the patients with dengue and to evaluate the effects of the patient's co-morbidities on the outcome.

Study Design: Descriptive / observational and retrospective study

Place and Duration of Study: This study was conducted at the Medical Ward of Hayatabad Medical Complex, Peshawar from August 2017 to October 2017.

Materials and Methods: This study was carried on a total of 470 patients. Biochemical tests namely ALT, AST and Creatinine along with full blood count were carried out. SPSS 20 was used for statistical analysis.

Results: Biochemical markers such as AST and ALT showed a wide degree of deviation from the mean while platelets and WBC counts were markedly decreased. Fever, Headache and Myalgia was the most common presenting complaints whereas Capillary leak, Acute Respiratory Distress Syndrome and Multi organ failure were the major complications. Diabetes mellitus, malaria and coronary artery disease were reported to be the major co-morbidities.

Conclusion: Dengue is a matter of global health concern and has become increasingly hard to manage and control over the last decade. It is a public health care issue and needs to be addressed in due time. Moreover, our study highlights the importance of admission and timely management of dengue patients with comorbid, which are lethal if not managed properly. So routine biochemical tests should be carried out to rule out these.

Key Words: Dengue; Pleural Effusion; Capillary leak; Epidemic

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INTRODUCTION

Dengue Fever presents with headache, fever, joint pain, skin rash and a variety of other signs and symptoms.[1-3] Dengue shock syndrome (DSS) is due to excessive bleeding and low blood pressure. In such cases fluid replacement therapies or transfusions may be required. Dengue is a mosquito-borne viral disease spread by the female Aedesaegypti. Rainfall, temperature and unplanned urbanization are risk factors for the spread of dengue.[4-6]

The very first cases of dengue hemorrhagic fever (DHF) were documented in Thailand and Philippines during the 1950s.[7] Dengue fever was considered to be prevalent in endemic areas but it has been transferred to other parts of the world due to trade and tourism.[8] Pakistan has had a few dengue epidemics in the recent past since the first one in 1994 and is now prevalent in all provinces of the country.[9,10] In 2010 over 21,000 people were affected by dengue in Pakistan, of which 16,000 were reported only from the capital of Punjab, Lahore.[11,12] A substantial surveillance system and fumigation lead to a control over this issue. This time the province of Khyber Pakhtunkhwa is under the attack of this fatal yet manageable medical condition. It is still an uphill task to clinically diagnose and identify the patients of dengue. In the absence vaccine for dengue fever, preventive strategies have to be used to counter the problem.[13] Goal of the study is identification ofcauses which can predict the severity of the disease and the outcome of patients with dengue infection. The main objective of this study is to assess the changes in biochemical and hematological profiles

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of the patients with dengue and to evaluate the effects of the patient's co-morbidities on the outcome. It will help us in improving the diagnosis and management amongst the patients and point out factors which can help in identifying patients more likely to develop severe disease.[14-16]

MATERIALS AND METHODS

We planned to carry out the assessment of the biochemical, hematological and clinical profile of patients presenting with dengue during the recent outbreak in the parts of Peshawar, Pakistan. This descriptive observational and retrospective study was carried on a total of 470 patients admitted in the various medical wards from August 2017 to October 2017. The study was carried out in the department of Medicine of Hayatabad Medical Complex, Peshawar. The subject under observation were admitted patients brought to the hospital with a variety of clinical complaints that required evaluation and admissions. All the patients with dengue NS1 positive / Dengue IgM positive hospitalized in the Medical Unit were studied by analyzing case records.A standard proforma was devised to fulfill the study objectives information was gathered on demographic, haematological profile, biochemical tests, management, comorbidities, use of blood and platelet transfusions and the outcome. The data was collected and analyzed on SPSS 20 and MS Excel. The results were displayed in a tabulated form and interpretations were made.

RESULTS

A total of 470 patients were included in the study. The patients presented with a variety of signs and symptoms as shown in table 1. All the 470 patients presented with fever while bleeding was present in 100 patients. Biochemical parameters (ALT, AST and Creatinine) and hematological parameters (Hb, WBC, Platelets and HCT) are shown in Table 2. Amongst the hematological markers, Platelet count and Hematocrit show a Mean and Standard Deviation as follows: Hemoglobin (gm/dl) = 11.0 ± 1.49 and PLT (/cmm) = 70000 ± 40000. This particularly wide range of standard deviation with which the platelet count is noted, can be instrumental in Dengue patients especially in those with dengue hemorrhagic syndrome and comorbid. Capillary leaks (Pleural effusion and ascites) was the most common complication in these patients as 170 patients had them while only 20 patients had renal failure, 15 had hepatic dysfunction and 10 had encephalopathy as shown in Table 3. Table 4 shows the comorbidities present in the patients. Diabetes mellitus was the most common comorbidity present in 50 (10.64%) cases. Only 150 (31.9%) of the patients required platelet therapy while 320 (68.1%) were given symptomatic treatment. Of the total 470 patients, 445 (94.7%) recovered while 25 (5.3%) died.

Table No.1 Frequency of different Symptoms and Signs that patients had at presentation.

Sign and Symptoms	Number of Cases
Fever	470
Headache	350
Myalgia	450
Vomiting	400
Skin Rash	150
Bleeding	100
Breathlessness	120
Abdominal Pain	170

Table No.2 Biochemical and Hematological parameters of the dengue patients. (n=470)

Parameter	Mean +/- SD	Reference Range
Hemoglobin (gm/dl)	11.0 ± 1.49	13-18
RBC (Millions/ cmm)	5.1 ± 0.32	4.5 – 6.5
WBC (/cmm)	6000 ± 2300	4000 – 11,000
PLT (/cmm)	70000 ± 40000	150,000 – 400,000
HCT	42 +/- 3	40-52
AST (IU/ml)	112.8 ± 60	05-42
ALT (IU/ml)	115 ± 45	05-42
Creatinine (mg/dl)	1.05 ± 0.25	0.7 – 1.3

Table No.3 Frequency of different complications that patients developed due to dengue fever.

Complication	Number of Cases
Hepatic Dysfunction	15
Renal Failure	20
Multi Organ Failure	30
Encephalopathy	10
Acute Respiratory Distress Syndrome (ARDS)	40
Capillary leak (P. Effusion/ Ascites)	170

Table No.4 Frequency of different comorbidities in dengue patients fever.

Comorbidities	Number of Cases
Diabetes Mellitus	50
Malaria	30
Coronary Artery Disease	30
Pregnancy	20
Hypertension	15

DISCUSSION

This study describes different aspects of clinical profile such as the frequency and severity of signs and symptoms, their biochemical status throughout the illness, the co-morbidities and how these affect the overall clinical outcome of patients. Dengue is emerging as a major health concern throughout the world in the recent decade because it is widespread

geographically and affecting many countries causing major epidemics.

This research was done in post monsoon months (August to October) as the epidemics are reported in many areas of the country from the month of August to October and the number of cases tends to fall afterwards as the temperature falls. A study conducted in Khyber Pakhtunkhwa showed a significant rise in the number of patients admitted with Dengue fever in the hospitals in 2013 also.[17] Out of 470 hospitalized patients included in this study, fever was the most common symptom at the time of presentation with a frequency of 100%. The frequency of other symptoms at the time of presentation was in the order of myalgia 95% , vomiting 85% , headache 74% , abdominal pain 36% , skin rash 31% , breathlessness 25% and bleeding 21% (including hematemesis , melena, gum bleeding and epistaxis. Congruent pattern was also seen in a study conducted during Faisalabad epidemic 2014.[18]

A study reveals that these five signs/symptoms predict the prognosis of dengue. These include: vomiting/ nausea, abdominal pain, skin rashes, bleeding, and hepatomegaly.[19] Sixty percent (60%) of the patients included in our study had different complications over the period of stay at the hospital with the most common being capillary leak i.e. abdominal ascites and pleural effusion affecting 36% of the patients. Other complications reported were Acute respiratory distress syndrome 8%, multiple organ failure 6%, renal failure 4.2%, hepatic dysfunction 3%, encephalopathy 2%.

In the hematological and biochemical parameters of the patients bicytopenia was more pronounced in majority of the patients with a significant decrease in WBC counts and Platelet counts below the normal ranges. In the initial phase there is a quick fall in WBC's count when compared with platelet count. In the convalescent phase, WBC count increase was preceded by platelet increase after 72 – 96 hours. Similar findings were observed in a retrospective study conducted in Punjab Pakistan.[20] It suggested that WBC counts is also a good indicator of recovery from Dengue infection rather than focusing on Platelet counts only.[20] A rise in Hematocrit was observed in majority of patients and was more pronounced in patients who had complications as DHF and DSS. AST and ALT were raised in patients with hepatic dysfunction. Creatinine was only raised in patients with acute kidney injury as a complication of DSS. With proper patient care and timely management of complications the overall outcome was found to be satisfactory with majority of the patients recovering from the illness in a period of 5-7 days of admission in the hospital.

It is seen that mortality rate is increased when patients have comorbidities like acute kidney injury, respiratory failure, coagulopathy and results in increased stay in hospitals. Similar findings were also evident in a study conducted in 2014.[21] 94.7% of the hospitalized patients recovered from the illness completely and were in a good state of health at the time of discharge from hospital while 5.3% of the patients expired. Our study shows that majority of the patients admitted to the hospital could be treated only with symptomatic treatment and fluid therapy and rehydration as per WHO guidelines without platelets transfusion with only 31.9% requiring platelets transfusion as a treatment modality. The reason behind platelets transfusion in these patients was sudden drop in platelet count over a period of 24 hrs, platelet counts below 10000/cmm, DHF and DSS. Therefore this study suggests that fluid therapy and symptomatic treatment is the preferred modality of treatment and majority of the patients respond well and improve whereas platelets transfusion is not only related with its own side effects such as transfusion reaction but had no additional benefit in preventing severe bleeding or decreasing time to stop bleeding. Similar findings were observed in a randomized control trial conducted in Pakistan in 2013.[22]

Patients with a past history of any illness are more at risk of developing complications. Diabetes and hypertension were common co morbids in the middle aged patients but these did not pose any difficulty in the overall management of dengue fever in general. We found that any patient having uncontrolled hypertension alone or along with uncontrolled diabetes led to DSS. Similar results were obtained in a study from Taiwan.[23]

Malarial parasite was positive in many of the patients diagnosed with dengue fever. The coexisting dengue and malaria infection in significant number of patients throws light on the need of carrying out MP as a routine investigation in dengue patients.[24,25] Diarrhea as a common finding in patients with Dengue fever, which still needs to be evaluated thoroughly to find out the cause. Coronary artery disease and stroke in elderly patients darken the already gruesome picture of managing these patients. Pregnant women have increasingly been reported to present with dengue. This poses a threat for both the mother and baby. One limitation was that as this was a retrospective study, because of which some important information could not be obtained but this would pave path for further research in the medical condition under consideration.

CONCLUSION

Dengue is a matter of global health concern and has become increasingly hard to manage and control over the last decade. It is a public health care issue and needs to be addressed in due time. Moreover, our study highlights the importance of admission and timely management of dengue patients with comorbids, which are lethal if not managed properly. This studies stresses the importance of carrying out routine biochemical tests to rule out comorbidities. Further research including level 1 studies are needed in this field to establish a better understanding of the subject.

Author's Contribution:

Concept & Design of Study:	Mohsin Shafi, Syed Shahmeer Raza
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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