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Research Article

**DEMOGRAPHIC AND CLINICAL CORRELATES OF
PATIENTS DIAGNOSED WITH DENGUE FEVER: A MULTI-
CENTER CROSS-SECTIONAL STUDY****Dr Salma Kadir¹, Dr Zohaib Feroze Memon², Dr Musarat Jehan Baloch³,
Dr Naila Jabeen Baloch⁴**¹ Assistant Professor, Liaquat University Hospital Jamshoro^{2,3} Liaquat University Hospital Hyderabad⁴ Ojha Campus Dow University Hospital Karachi**Article Received:** January 2020 **Accepted:** February 2020 **Published:** March 2020**Abstract:**

Objective: To evaluate the frequency of the dengue fever at a tertiary care hospital in Hyderabad, Sindh, and to analyze the demographic and clinical characteristics of the patients diagnosed with the fever.

Methodology: A cross-sectional observational study conducted at Liaquat University Hospital, Hyderabad, Pakistan and Dow University Hospital, Karachi (OJHA Campus), from September to November, for duration of 3 months. The patients with positive antibodies against dengue fever, presenting with symptoms consistent with dengue fever were included in the study. All demographic and clinical information were recorded in a predefined pro forma. SPSS v.24 was used to enter and analyze the data.

Results: A total of 300 dengue patients were enrolled in the study with a mean age of 23.6 ± 10.35 years. There were 203 (67.6%) men and 97 (32.4%) women. One-third of the patients belonged to the rural areas. Almost 50% the patients, who were employed, had an outdoor job involving field work or a lot of travelling. The majority of the patients presented with only the constitutional symptoms i.e. fever, chills, headache, and myalgia. About one-half of the patients also had the characteristic skin rash. The total frequency of patients who presented with thrombocytopenia was 203/300, while about one-fourth patients presented with lymphocytosis and about 40% patients had leukopenia.

Conclusion: The present study indicates that dengue fever is still a major issue in areas infested with *Aedes* mosquitoes and cause significant burden to the patient and the overall health care. Proper public health measures to prevent the spread of dengue virus are needed.

Keywords: *Aedes* mosquito; dengue fever; demographics; endemic; flaviviridae; infection

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INTRODUCTION:

Dengue fever is a disease caused by a dengue virus which is transmitted to humans through the bite of *Aedes mosquito*. The virus belongs to the family *Flaviviridae*, genus *flavivirus* and it is a single-stranded enveloped RNA virus. The virus has four identified serological subtypes; DV-1 to DV-4 [1]. About a hundred million patients are diagnosed with dengue fever annually with 200,000 cases being reported from South East Asia, alone [2]. Thus, dengue virus remains a major cause of morbidity and mortality in South Asian countries. In Pakistan, there have been many dengue viruses' outbreaks since 1994 reported from different parts of the country. The number of cases has been increasing since then with the highest and greatest outbreak of dengue fever in 2006 with DV-2 and DV-3 being the most dominant serotypes [3, 5].

Dengue fever is a serious disease and may cause death unless treated promptly and effectively. The dengue fever manifests with a high-grade fever, headache, nausea, vomiting, myalgia, and a characteristic rash. The incubation period for the virus is about 7 days [6, 7]. The patient usually recovers within a week with proper care however, in some severe cases the symptoms worsens and develops into the dengue hemorrhagic fever, a more severe form of illness which can cause multiple organ damage, thrombocytopenia, severe dehydration and eventually death [8].

The data on demographic and clinical profile from Pakistan is very limited, despite the ever-increasing number of cases, not much is known about the demographic risk factors associated with the viral disease. The present study aimed to evaluate the frequency of the dengue fever at two different health care set ups, and analyze the demographic and clinical characteristics of the patients diagnosed with the disease.

METHODOLOGY:

This was a cross-sectional observational study conducted at Liaquat University Hospital, Hyderabad, Pakistan and Dow University Hospital, Karachi (OJHA Campus), from September to November, for three months. Ethical approval was obtained from the institutional review board committee prior to the initiation of the study. The non-probability convenience sampling technique was used for the recruitment of patients in the study. The sample size was calculated using the previous study by Khan E, *et al*, where the

prevalence of dengue fever was observed to be 26.3%. The following formula was used to calculate the sample size; $n = N * X / (X + N - 1)$, where, $X = Z_{\alpha/2}^2 * p * (1-p) / MOE^2$, and $Z_{\alpha/2}$ is the critical value of the normal distribution. Keeping the confidence level of 95%, α as 0.05 and the critical value as 1.96, MOE is the margin of error, p as 26.3%; the sample proportion [9], and N as one million; the population size, the sample size obtained was 297.

The inclusion criteria were all patients with positive antibodies against dengue fever, presenting at the Dengue Wards of Liaquat University Hospital and Dow University Hospital (OJHA Campus) with symptoms consistent with dengue fever, residents of Hyderabad, Sindh were included in the study. All demographic information including the age, gender, residence, marital and employment status, number of children, comorbidities and education level of the participants were recorded, serological tests results including the tests for dengue IgM antibody were also obtained. All the patients were further stratified into Dengue Fever without warning signs, Dengue fever with warning signs, and severe dengue fever with shock and multi organ failure according to the 2009 classification by World Health Organization (WHO) severity grading scale [10].

The statistical analysis was performed using the statistical package for software sciences (SPSS v. 24). The continuous data was presented as mean (SD) while the categorical data was presented as frequency and percentage. The association between the demographic characteristics and the severity of the disease was also determined using a Chi square test.

All data was presented in tabular and graphical form. A p-value of 0.05 was considered as statistically significant.

RESULTS:

A total of 300 dengue patients were enrolled in the study of seven months. The mean age of patients was 23.6 ± 10.35 years. There were 203 (67.6%) men and 97 (32.4%) women. Out of the total 300 patients, one-third of them belonged to the rural regions. Almost one-half the patients, who were employed, had an outdoor job involving field work or a lot of travelling.

Table 1: Demographic profile of patients in the study

Demographic Characteristics	Frequency n (%)
Age group	
21-35	164 (54.6%)
36-55	86 (28.6%)
56-65	41 (13.6%)
>65	9 (3%)
Gender	
Male	203 (67.6%)
Female	97 (32.4%)
Marital Status	
Unmarried	152 (50.6%)
Married	128 (42.6%)
Divorced or separated	8 (2.6%)
Widowed	12 (4%)
Residence	
Urban	202 (67.3%)
Rural	98 (32.7%)
Employment status	
Government job	59 (19.7%)
Private job	117 (39%)
Self-employed	18 (6%)
Unemployed	74 (24.6%)
Retired	32 (10.6%)
Type of job	
Outdoor/field work or lots of traveling involved	93 (47.9%)
Indoor/Office work or work from home	101 (52.1%)

Table 2. Clinical Characteristics of patients in the study

Clinical characteristics	Frequency n (%)
Presenting symptoms	
High grade fever	291 (97%)
Cough	27 (9%)
Headache	168 (56%)
Nausea and vomiting	180 (60%)
Muscle ache/Myalgias	168 (56%)
Rash	141 (47%)
Diarrhea	54 (18%)
Hemoglobin levels	
<10	57 (19%)
10-12	138 (46%)
>12	104 (34.6%)
Other blood cell abnormalities	
Thrombocytopenia	208 (69.3%)
Lymphocytosis	46 (15.3%)
Leukopenia	121 (40.3%)
Neutropenia	87 (29%)
Monocytosis	124 (41.3%)

The majority of the patients presented with only the constitutional symptoms i.e. fever, chills, headache, and myalgia. About one-half of the patients also had the characteristic skin rash.

The total frequency of patients who presented with thrombocytopenia was 203/300, while about one-fourth patients presented with lymphocytosis and about 40% patients had leukopenia. Other clinical and laboratory abnormalities are mentioned in table 2.

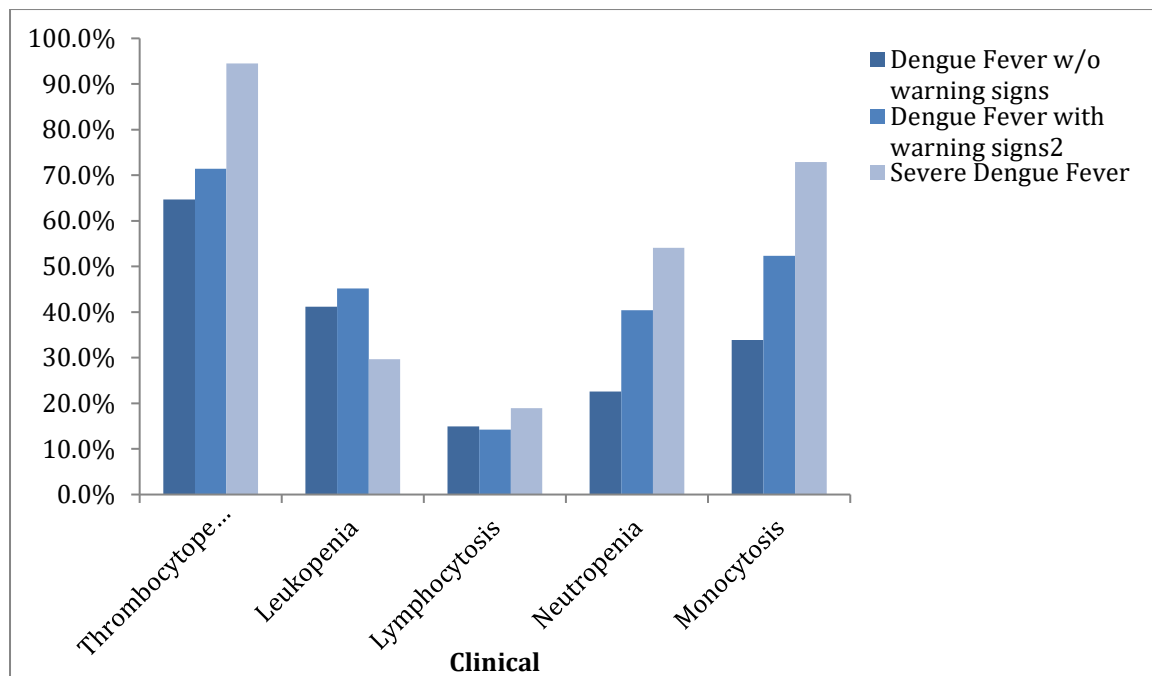


Figure 1. The frequency of patients with thrombocytopenia, total and differential leukocyte counts according to the severity of the dengue fever among study participants.

Table 3: Association of the clinical profile with the severity of the disease

Independent variable	Dengue Fever without warning signs n = 221	Dengue Fever with warning signs n = 42	Severe Dengue Fever n = 37
Thrombocytopenia	143 (64.7%)	30 (71.4%)	35 (94.5%)
Leukopenia	91 (41.2%)	19 (45.2%)	11 (29.7%)
Lymphocytosis	33 (14.9%)	6 (14.2%)	7 (18.9%)
Neutropenia	50 (22.6%)	17 (40.4%)	20 (54.1%)
Monocytosis	75 (33.9%)	22 (52.3%)	27 (72.9%)

The patients were categorized according to the 2009 WHO classification criteria of severity of dengue fever. 221 (73.6%) patients had dengue fever without any warning signs, 42 (14%) patients had dengue fever with warning signs, while 37 (12.3%) patients had severe dengue fever. The frequency of patients with total and differential leukocyte counts according to the severity of their condition is given in figure 1.

In patients with mild disease, thrombocytopenia was seen in 143/221, leukopenia in 91/221, lymphocytosis in 33/221, neutropenia in 50/221, and monocytosis in 75/221 patients. In patients with a moderate disease i.e. patients with warning signs, thrombocytopenia was present in 30 (71.4%) patients, leukopenia in 19 (45.2%), lymphocytosis in 6 (14.2%), neutropenia in 17 (40.4%), and monocytosis in 22 (52.3%) patients. In patients with severe dengue fever, 35 (94.5%) patients had thrombocytopenia and 27 (72.9%) patients had monocytosis.

DISCUSSION:

Dengue fever is a rising threat to the public health worldwide which is associated with substantial mortality. According to the World Health Organization (WHO) the dengue fever is classified into three main groups according to the severity of the disease i.e. dengue fever with or without warning signs, and severe dengue fever with presence of severe plasma leakage resulting in shock or respiratory distress, severe hemorrhage or any signs of organ failure [11].

The present study evaluated the frequency of dengue fever patients in a tertiary care hospital,

assessed the demographic and clinical profile of patients. The results indicated that the mean age of dengue fever was 23.6 ± 10.35 years and majority of them were male patients. The virus that causes dengue fever is transmitted to humans through Aedes mosquito bites. Thus, it is highly prevalent in about 100 countries in South East Asia, Eastern Mediterranean regions, Africa, and South & North America [12-14]. If an infected patient is bitten by a mosquito, it can further spread the disease to others. Therefore, it is crucial to diagnose dengue fever as promptly as possible and to isolate the patient to mitigate further spread of the disease. Dengue virus can affect virtually anyone; however,

majority of the outbreak occurs in children or young adults. In the present study, the mean age (standard deviation) was observed to be 23.6 ± 10.35 years. This finding is in line with previously published literature [15-17]. Since, men are more outgoing and travel more than female, it is not surprising to observe that the majority of the patients with dengue fever in the present study were men i.e. about three-fourth patients. This is further reinforced by a local study of Khan E. et al, where it was observed that 64% of the patients that were hospitalized between the years 2003 and 2007 were male [9].

The present study reported that 3/4th of the patients belonged to the urban areas while, only 1/3rd patients were living in a rural setting. Historically, dengue fever was considered to be an urban associated disease; however, in a recent study evaluating the geospatial emergence of dengue fever, it was observed that the odds of contracting dengue fever was higher in the rural areas compared to the urban regions [18]. In our study however, only one-third population was from rural areas. This could be because inaccessibility of patients to the tertiary care set-up, non-affordability of diagnostic tests, means of travelling, or accommodation issues.

In the present study, almost one-half the patients, who were employed, had an outdoor job involving field work or a lot of travelling. This is consistent with the fact that dengue fever is spread through the bite of mosquito, therefore any work involving a lot of travelling and field work may expose the individual to *Aedes* mosquitoes especially in dengue endemic areas [19].

It is alarming to see that in our study, dengue fever cases are tackled all around the year despite the fact that in many countries peak of such cases are observed in rainy seasons. Nevertheless, this finding is in line with a study from North India where dengue fever patients were seen throughout the year [20]. This trend may be explained by the hyper infectivity of the virus and the co-circulation of all four serotypes. In our study, we found that even though the majority of the patients had mild to moderate dengue fever however, there were still significant cases of severe dengue fever with signs of shock and multiple organ failure. It is recommended that the clinicians should consider dengue fever as a differential among patients with febrile illnesses to catch the infection early in the course before it is complicated by shock or hemorrhage. Majority of the patients with severe dengue fever in our study were presented with thrombocytopenia and monocytosis. In contrast, it was reported that leukopenia was more frequently seen in patients with mild to moderate dengue

fever. The patients who had severe dengue fever were critically ill and were managed in the intensive care unit. Despite our best efforts, many critical patients were unable to survive.

CONCLUSION:

The present study indicates that dengue fever is still a major issue in areas infested with *Aedes* mosquitoes and cause significant burden to the patient and the overall health care. It is highly recommended that the government take proper public health measures aimed to mitigate and prevent the spread of dengue virus. Early identification of patients with dengue at risk of developing hemorrhage is an important clinical objective which may improve prognostic outcome for the patient.

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