Dengue Epidemic 2019–An Experience in Tertiary care Hospitals of Rawalpindi Medical University Pakistan

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Abstract

Objective: To determine the frequency of various dengue virus infections in tertiary care hospitals of Rawalpindi Medical University during dengue epidemic 2019.

Methods: A retrospective hospital data based study was carried out in three tertiary care hospitals (Holy Family Hospital, Benazir Bhutto Hospital and District Head Quarters Hospital) affiliated with Rawalpindi Medical University during dengue epidemic from September-November 2019. The data was gathered pertinent to demographics of dengue patients, frequency of dengue virus infections and length of hospital stay through convenience sampling. The data was analyzed by means of SPSS version 25.0.

Results: Of the total 12192 dengue patients 73.4% were males and majority of the dengue patients (49%) visited Holy Family Hospital. Mean age of the patients was 36±14.6 years and 62.8% patients were residents of Rawalpindi city. About 54.9% patients had dengue fever, while 42.8% and 2.3% patients had Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) respectively. Majority of dengue patients (73.6%) registered in District Head Quarters hospital had Dengue Fever (DF), while mainstream of dengue hemorrhagic fever 47.7% was found in Holy Family Hospital. Only 2.3% patients had Dengue Shock Syndrome About 80.7% patients with dengue fever had NS1 positive 3% of which did not admit in hospital for treatment. IgM and IgG were positive among 47% and 49.2% dengue patients respectively. However, 28.5% dengue patients had both IgM and IgG positive in their blood serum. Of the total 61 (0.5%) deaths about 61% were males and 60.6% of deaths were among diagnosed cases of Dengue Shock Syndrome.

Conclusion: Dengue virus infections are more prevalent among males residing in Rawalpindi and Islamabad. It is deadly but curable. Timely and appropriate management of cases can result in significant reduction of death toll.

Keywords: Dengue Epidemic; Dengue Fever; Dengue Hemorrhagic Fever; Dengue Shock Syndrome; Tertiary Care Hospitals

Introduction

Dengue is a disastrous health problem found to be prevalent worldwide. It is acknowledged globally as one of the emerging infectious diseases [1]. About 128 countries are found to be suffering from this disease. Pakistan is facing a drastic dengue outbreak menace since 2005. Propagation and survival of 4 serotypes of Aedes mosquito in Pakistan is mainly attributed to climatic conditions, urbanization, communication gap and poor surveillance, thus paving the way towards emergence of peak incidence of this disease [2]. Approximately 50% of global population is residing in dengue prone regions and 100 million dengue cases are reported annually [3]. High mortality and morbidity are mainly attributed to dengue hemorrhagic fever and dengue shock syndrome that are the most severe form of this ailment [4]. Dengue disease manifests with varied clinical syndromes. Dengue fever among majority of patients is completely cured without complications [5]. Grave health outcomes are anticipated among cases of dengue hemorrhagic fever and dengue shock syndrome [6]. Even no internationally authorized vaccine is available for its prevention [7]. According to WHO statistics computed during dengue epidemic 2019, about 47,120 confirmed dengue fever cases were reported from all the provinces of Pakistan. Majority of them were from Rawalpindi and Islamabad and about 75 deaths were reported [8]. Even 47 new dengue cases were detected in twin cities of Rawalpindi and Islamabad from 25th November to 3rd December 2019 that constituted approximately 40% of the cases reported during dengue epidemic 2019. The current study is intended to

determine the frequency of dengue virus infections reported in three tertiary care hospitals affiliated with Rawalpindi Medical University. Being public sector healthcare facilities, these hospitals cater and accommodate substantial population of Rawalpindi district. Therefore, research on dengue cases investigated and managed in these healthcare settings will be beneficial to the strategic planners in true sense to mitigate the disease burden in future.

Subjects and Methods

A retrospective hospital data based research was carried out in three tertiary care hospitals affiliated with Rawalpindi Medical University (RMU) through convenience sampling. These hospitals were Holy Family Hospital, Benazir Bhutto Hospital and DHQ Hospital. The study was conducted among total 12192 dengue patients who visited and received consultation in tertiary healthcare settings during 3 months from September-November 2019. Data was collected and studied pertinent to demographics, dengue virus infections, dengue infection markers, duration of hospital stay among dengue patients who visited each of the 3 tertiary hospitals of RMU during dengue epidemic 2019. Data was analyzed by using SPSS version 25.0.

Results

Of the total 12192 dengue patients admitted in tertiary care hospitals of Rawalpindi Medical University, majority (73.4%) were males as shown below in Table 1. Mean age of dengue patients in all three tertiary care hospitals was 36±14.6 years. About 62.8% dengue patients admitted in tertiary care hospitals of RMU belonged to Rawalpindi city followed by 34% from Islamabad. Varied cases of dengue virus infection with respect to each health care facility as well as gender wise is depicted below in Table 2. Mean hospital stay among dengue patients was found to be 1.28± 0.77 days. Of the total 12192 dengue patients who visited tertiary care hospitals of Rawalpindi Medical University, 377 patients got consultation and were investigated. However, these 377 patients did not get admission majority of which (65.2%) patients visited Holy Family Hospital for their health problem. Dengue virus infection among these non-admitted patients visiting tertiary care hospitals of Rawalpindi Medical University was determined as reflected in Table 3. About 3477 dengue patients had both IgM and IgG positive in their sera confirming the chronic or previous occurrence of dengue infection. About 5397 patients (80.7%) presenting with dengue fever had NS1 positive in their sera indicating the presence of dengue virus infection in their blood stream. Frequency of dengue virus serotypes among dengue patients visiting tertiary care hospitals of Rawalpindi Medical University is shown in Table 4. Out of 9846 patients having NS1 positive report, about 7960 (81%) patients stayed in healthcare settings and received managed care for 1-4 days. 21-30 years age group constituted the mainstream of the patients having NS1 and IgM positive among our study subjects as reflected in Figure 1.
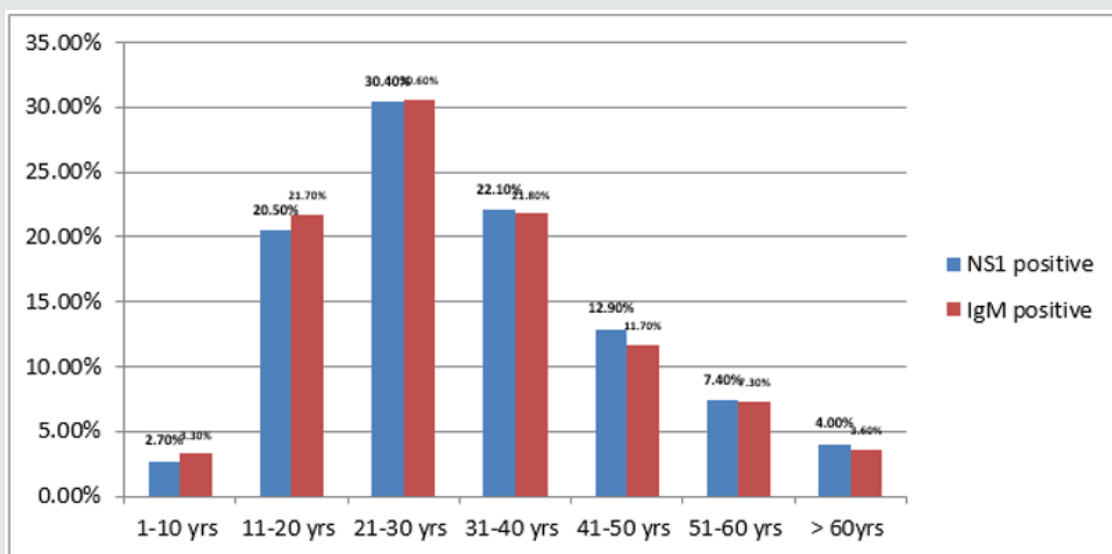

Figure 1: Age distribution of NS1 and IgM positive dengue patients.

Table 1: Gender based distribution of dengue patients in tertiary care hospitals (n=12192).

Treating Hospitals	Males	Females	Total
Holy Family Hospital	4370 (48.83%)	1610 (49.64%)	5980 (49.05%)
Benazir Bhutto Hospital	3003 (33.56%)	1013 (31.24%)	4016 (32.94%)
DHQ Hospital	1576 (17.61%)	620 (19.12%)	2196 (18.01%)
Total	8949 (100%)	3243 (100%)	12192 (100%)

Table 2: Hospital and gender-based distribution of dengue virus infection in tertiary care hospitals of RMU (n=12,192).

Dengue virus infection-Hospital wise				
Hospitals	**DF**	**DHF**	**DSS**	**Total**
Holy Family Hospital	2949 (44.1%)	2852 (54.6%)	179 64%)	5980 (49.05%)
Benazir Bhutto Hospital	2120 (31.7%)	1804 (34.5%)	92 (32.8%)	4016 (32.94%)
DHQ Hospital	1619 (24.2%)	568 (10.9%)	09 (3.2%)	2196 (18.01%)
Total	6688 (100%)	5224 (100%)	280 (100%)	12192 (100%)
Dengue virus infection-Gender wise				
Gender	**DF**	**DHF**	**DSS**	**Total**
Males	4945 (55.2%)	3838 (42.9%)	170 (1.9%)	8953 (100%)
Females	1743 (53.8%)	1386 (42.8%)	110 (3.4%)	3239 (100%)
Total	6688	5224	280	12192

Table 3: Dengue virus infection among non-admitted patients (n=377).

	DF	**DHF**	**DSS**	**Total**
Dengue virus infection among Non-admitted patients	222 (58.9%)	147 (39%)	08 (2.1%)	
	Holy Family Hospital	**Benazir Bhutto Hospital**	**DHQ Hospital**	377
	246 (65.25%)	95 (25.2%)	36 (9.55%)	

Table 4: Dengue infection markers among various dengue virus infections.

Frequency of NS1 among dengue patients (n=12192)			
Dengue virus infection	**NS1 positive**	**NS1 negative**	**Total**
DF	5397 (54.81%)	1291 (55%)	6688
DHF	4208 (42.74%)	1016 (43.3%)	5224
DSS	241 (2.45%)	39 (1.7%)	280
Total	9846 (100%)	2346 (100%)	12192
Frequency of IgM among dengue patients (n=12192)			
Dengue virus infection	**IgM positive**	**IgM negative**	**Total**
DF	3230 (56.2%)	3458 (53.6%)	6688
DHF	2399 (41.8%)	2825 (43.8%)	5224
DSS	114 (2%)	166 (2.6%)	280
Total	5743 (100%)	6449 (100%)	12192
Frequency of IgG among dengue patients (n=12192)			
Dengue virus infection	**IgG positive**	**IgG negative**	**Total**
DF	2939 (49.02%)	3749 (60.51%)	6688
DHF	2922 (48.73%)	2302 (37.15%)	5224
DSS	135 (2.25%)	145 (2.34%)	280
Total	5996 (100%)	6196 (100%)	12192

Table 5: Health outcome of dengue patients in tertiary care hospitals of RMU.

Health outcome of dengue patients-Hospital wise				
Health outcome	**Tertiary care hospitals**			**Total**
	HFH	**BBH**	**DHQ Hospital**	
Survived	5943 (49%)	3997 (32.9%)	2191 (18.1%)	12131 (100%)
Died	37 (60.7%)	19 (31.1%)	05 (8.2%)	61 (100%)
Total	5980	4016	2196	12192
Health outcome of dengue patients-dengue clinical syndrome wise				
Health outcome	**DF**	**DHF**	**DSS**	**Total**
Survived	6684 (55.1%)	5204 (42.9%)	243 (2%)	12131 (100%)

Died	04 (6.5%)	20 (32.8%)	37 (60.7%)	61 (100%)
Total	6688	5224	280	12192
Health outcome of dengue patients-gender wise				
Health outcome	Males		Females	Total
Survived	8912 (73.5%)		3219 (26.5%)	12131 (100%)
Died	37 (60.7%)		24 (39.3%)	61 (100%)
Total	8949		3243	12192

About 44.5% patients out of 9846 had acute infection due to positive IgM report. However, 299 (3%) patients despite of NS1 positive in their sera did not stay in hospital for treatment. Health outcome of our dengue patient's hospital-wise, gender-wise and with respect to dengue clinical syndrome is given in Table 5. Of the total 61 deaths reported among dengue patients, 57.4% patients were residents of Rawalpindi, about 38% belonged to Islamabad and 3.3% were from Attock [9]. Only 01 death from dengue was reported in a resident of Gujar Khan. About 87% of the deaths were reported among those who stayed in hospital with dengue virus infection for 1-4 days as depicted below in Table 6. Majority of dengue fever and dengue hemorrhagic fever cases (30.5%) in our study were 21-30 years of age as depicted in Figure 1. About 19.7 % deaths were reported from each of the two groups of patients i.e., 11-20 years age group and 41-50 years age group as depicted below in Table 7. Health outcome of dengue patients age-wise is shown below in Table 7.

Table 6: Health outcome of dengue patients with respect to hospital stay (n = 11815).

Health outcome	**Duration of hospital stay**			**Total**
	1-4 days	**5-6 days**	**7 days & above**	
Survived	9860 (83.9%)	1515 (12.9%)	379 (3.2%)	11754 (100%)
Died	53 (86.9%)	06 (9.8%)	02 (3.3%)	61 (100%)
Total	9913	1521	381	11815

Table 7: Health outcome among dengue patients-Age wise.

| **Age groups**	**Survived**	**Died**
1-10 years	352 (2.9%)	06 (9.8%)
11-20 years	2488 (20.5%)	12 (19.7%)
21-30 years	3695 (30.4%)	09 (14.7%)
31-40 years	2676 (22%)	10 (16.4%)
41-50 years	1548 (12.8%)	12 (19.7%)
51-60 years	901 (7.4%)	11 (18.1%)
61-70 years	349 (2.9%)	01 (1.6%)
71-80 years	91 (0.8%)	0
81-90 years	31 (0.3%)	0
Total	12131 (100%)	61 (100%)

Discussion

Dengue virus infections are one of the mosquitos borne diseases that are escalating worldwide. Dengue hemorrhagic fever and dengue shock syndrome are primarily associated with grave health scenario and considerable burden on healthcare resources [10]. Being epidemic in Pakistan, dengue disease entails great attention of policy makers to control the resulting mortality and morbidity [11]. Of the total 12192 dengue cases retrospectively reviewed in tertiary care hospitals of Rawalpindi Medical University during dengue epidemic 2019, majority of the patients (30.4%) were from 31-40 years age group. Median age of the dengue patients was 36±14.6 years. In accordance with WHO criteria, dengue fever was confirmed among 6688 patients (54.8%) while DHF was diagnosed among 5224 patients (43%). There were only 280 (2.2%) confirmed cases of DSS in tertiary care hospitals of RMU. Mean length of hospitals stay was reported to be 1.28±0.67 days. Contrary to the results of our study, majority of the dengue cases (88.1%) examined in tertiary care hospital of Malaysia were diagnosed as DF while only 11.1% and 0.8% cases were confirmed as DHF and DSS respectively. Mean hospital stays among dengue patients seeking health care services in Malaysian hospital was 4.88±2.74 days [12]. The increased frequency of DHF and DSS in our tertiary care hospitals in comparison with those of Malaysia might be poor observance of hygienic practices in our country, lack of awareness and delay in seeking health care services for unusual symptoms. Short duration of hospital stays among our dengue patients as compared to those of Malaysian

patients should also be given due consideration as this factor may result in non-compliance and transmission of infection to healthy population. Majority (73.4%) of dengue patients enrolled in our study were males and 54.8% suffered from dengue fever. Total deaths comprised 0.5% of the total dengue patients who were diagnosed and managed in tertiary care hospitals of RMU. Like our study, another national research carried out in 2014 by [13] revealed that most of the dengue patients (79%) were males and deaths comprised 0.6% of the confirmed dengue cases [13]. On the other hand, approximately equal proportion of dengue cases were notified gender-wise in a Malaysian research done on retrospective hospital record based data and deaths were 1.2% [14]. This

difference in statistics between Malaysia and Pakistan might be due to climatic and cultural differences. As the climate of Pakistan is favorable for breeding and propagations of mosquitoes [15,16] so the underlying reason for maximum male population presenting with dengue virus infections in addition to their outdoor working might be their negligence in protection from mosquito biting. An international research concluded that escalated dengue fever cases among males of any population were due to avoidance or delay in pursuance of healthcare services with unusual symptoms [17]. This aspect should be studied in depth to decline the sufferings and death toll among male population.
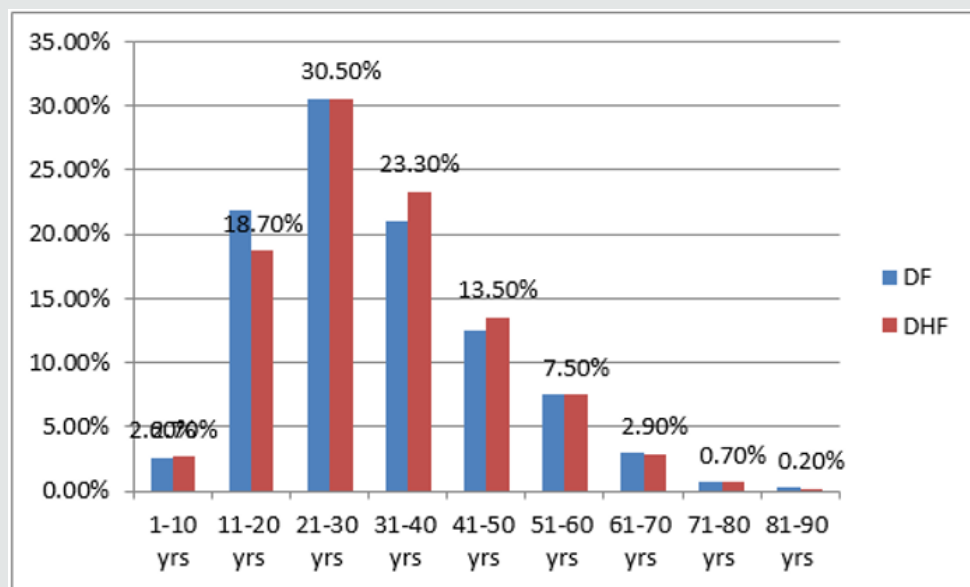
Figure 2: Frequency of dengue virus infections among different age groups.

Majority of dengue patients who were registered in tertiary care hospitals of RMU had dengue fever (54.9%) followed by 42.8% cases of dengue hemorrhagic fever. Mainstream of DF and DHF was reported in age group of 21-30 years (Figure 2). Approximately 99.5% dengue patients presenting in our tertiary care hospitals were survived. Likewise, another national study carried out in various tertiary care hospitals of Pakistan depicted increased propensity of DF and DHF cases among 21-30 years age group [13]. This age group was also observed to be among the affected population in other South Asian regions of the world [18,19]. Although 73% of dengue fever cases were confirmed during dengue epidemic 2015 in Northern India but again the same age group constituted the chief component of sick population [20]. Special attention should be paid to this age group that mainly constitutes the economically independent population of a nation. The current study exposed the high frequency of NS1 and IgM positivity among 21-30 years age group of dengue patients that was confirmed in pathology laboratories of our tertiary care hospitals of Rawalpindi (Figure 1). The same results were also reported in a research carried out in 2014 by reviewing the laboratory reports of the dengue patients from various cities of Pakistan [13]. About 73% males in our study were confirmed to have dengue virus in their sera and acute viral

infection. Greater viral infectivity among males is an aspect that should be given due consideration by our strategic planners to overcome the problem and prevent occurrence of dengue epidemic in future.

Conclusion and Recommendations

Dengue infection is more common among males of Rawalpindi city. Early diagnosis and symptomatic treatment of dengue cases at Primary health care level can not only drastically reduce the burden on tertiary health care facilities but also mitigate the severity of disease. Hematologic profile and co-morbidity among dengue patients should be scrutinized to rule out the factors attributing to severity of disease.

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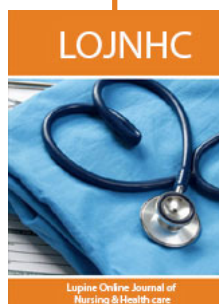
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