Original Article

DENGUE CASES REPORTED DURING 2015-17 IN A TERTIARY CARE HOSPITAL OF ISLAMABAD

Abdul Wali Khan[1], Shahid Hanif[2], Shagufta Zafar Qureshi[3], Zakir Hussain[4]

[1-4]Federal Government Polyclinic Hospital Islamabad
Correspondence: Abdul Wali Khan, Email: khanzadaamc@yahoo.com

Abstract

Background: Dengue has emerged as a vector-borne disease with an increase in number of cases with multiple outbreaks throughout Pakistan and hospitalization each passing year, thus stretching available health resources in Pakistan.
Methods: This was a descriptive cross-sectional study involving 233 dengue fever indoor cases. Complete clinical findings were recorded followed by laboratory and other diagnostic tests.
Results: Most of the cases were admitted from peri-urban areas of Islamabad with symptoms of fever. Seasonal patterns of typical post-monsoon and clusters of cases from low socio-economic backgrounds from areas of Bhara Kau, Bari-Imam, Sohan and G6 and G-7 sectors were found. Platelets and WBCs counts were found on the lower side of the normal values. IgM and IgG and NS1 tests were performed. Affected age group) was young (20-40 years) and male gender being more exposed to vector.
Conclusion: Dengue has emerged in the poor peri-urban areas of Islamabad typically in post-monsoon seasons reaching peak during the months of September , gradually declining and waning off in the month of December. A combination of clinical symptoms and diagnostic tests IgM, IgG and NS1 could greatly help in early diagnosis and treatment of cases thus minimizing compilations and mortality.
Key words: Dengue, hospital surveillance, ns1, vector aedes agypti, igm, igg

Introduction

Dengue is a vector-borne viral disease affecting 300-500 million people globally in more than 128 countries, making half of the world-population at risk of getting the infection (1, 2). Due to lack of availability of an effective vaccine and proven anti-viral specific medications, dengue has emerged a public health challenge and an enormous burden on available resources (3, 4). In Pakistan, dengue has emerged and is rapidly spreading to the non-endemic areas resulting in an increase in hospitalization due to complications. Previous studies in Pakistan have mostly focused on outbreaks and prevalence while very little in Pakistan is known about the linkage of socio-demographic determinants, clinical manifestations and laboratory biomarkers as part of hospital-based surveillance. It is critical to assess dengue cases based on geographical and demographic distribution and as well as by the clinical and laboratory findings simultaneously.

The vector for dengue is a female Aedes aegypti mosquito (5) and also to a lesser extent Aeds albopictus mosquito (6). Causative agent is flavivirus (RNA virus) and the virus has four antigenic distinct serotypes (DEN 1- 4) (7, 8). More than 90% of infection is asymptomatic or having mild self-limiting fever and only in 5% the infection can lead to severe dengue hemorrhagic fever or further to dengue shock syndrome (9). Complicated cases can result in fatal outcome and death and currently there is a surge in complications in indoor patients (10). Up to 14.9% of indoor patients need admission in intensive care unit (ICU) and 1.5% die due to severe complications and delay in treatment (11). Globally more complications and fatalities have been reported in tropical and as well as sub-tropical countries (12).

Dengue's symptoms are usually non-specific and associating fever, aches and fatigue are often present in other endemic infections, thus posing a challenge in differential diagnosis (4). However, a combination of clinical findings and diagnostic tests has proven quite beneficial in timely diagnosis of dengue fever (13). Currently, available antigen NS1 and other antibodies tests (IgM and IgG) have been proven quite useful thus timely supportive and rehydration therapy could greatly reduce mortality in indoor patients (14, 15). The aim of this study was to determine socio-demographic determinants and seasonal patterns of dengue based on clinical and laboratory findings in admitted cases for the year 2016 and 2017 in a tertiary care hospital of Islamabad.

Methodology

As part of the hospital-based surveillance; data was collected from indoor-patients admitted in Federal Govt. Polyclinic (PGMI) Hospital Islamabad, for the year 2015, 2016 and 2017. Total 233 cases were included in this study. Both male and female patients above the age of 13 years were included. Informed consent was taken prior to data collection. The study was approved by the Ethical Review Committee of Federal Govt. Polyclinic (PGMI), Islamabad. As part of the hospital based surveillance, these cases were admitted in isolation beds reserved for dengue fever cases. Cases were confirmed either on the basis of laboratory or clinical findings. Complete history including the presenting complaints e.g. fever, headache, rash, bleeding etc. were documented. As a part of hospital protocol ; complete blood tests including white blood cells and platelets were performed and these tests were repeated on the next days. Furthermore, Antigen test NS1 and Elisa tests for IgM and IgG were also perfromed. Serum samples for NS1 antigens were taken immediately after admission of suspected or probable dengue fever cases. Dengue Early Rapid (Panbio,USA) was used immediately after admission of patients. This test can identify dengue virus NS1 antigen in serum, plasma or whole blood specimens with a high degree of sensitivity and specificity. Results were interpreted within 15-20 minutes.

Data were entered into spread sheet and later on analyzed in SPSS (IBM SPSS Statistics Version 20). Geographical mapping of the cases from respective areas/union councils was done using Epi-Info (Version 7). P value below 0.05 was considered as significant.

Results

The most frequent presenting complaints were mostly fever94% (n=219;) of cases. This was accompanied by other symptoms such as headache, body-aches 80% (n=200;), rash and epistaxis. Only 1.3%(n=3) () subjects had history of previous dengue fever (Table 1)

Blood tests for platelets and WBCs count were performed. Serological tests for IgM and IgG antibodies and NS1 for antigens were done. Mean for platelets (N221) and WBCs (N217) was 84679.17±65513.93 and 6263.65±9029.20, respectively. NS1 Antigen test was done in 176 subjects and 89.2% (n=157) () patients were found positive for NS1. Similarly, IgM was of 92 patients was done and IgG of 87 cases, which was positive in 66.3% and 42.5% cases respectively, table 1.

Table 1: Demographic data, clinical, laboratory and serological findings among dengue cases, mean±SD, number (percent)

Socio-demographic variables	Number (Percentages)	Mean ± SD	95% Confidence Interval
Age	233	33.97±16.51	31.84-36.10
Sex Male	152 (65.2)		
Female	81 (34.8)		
Clinical Findings			
Fever	219 (94)	1.08±0.27	1.05-1.12
Duration fever (Presenting time)	227 (97.4)	5.17±1.88	4.92-5.41
Other symptoms (headache, bodyches, rash etc.)	200 (80)		
Warning signs	27 (11.6)	0.12±0.32	0.07-0.16
History of previous dengue fever	3 (1.3)	1.99±0.11	1.97-2.00

Laboratory Findings	Number	Mean ± SD	95% Confidence Interval
Platelets	221	84679.17±65513.93	75993.94-93364.40
WBCs	217	6263.65±9029.20	5055.54-7471.77

Serological Findings	Total	Positive n (%)	Negative n (%)	95% CI
NS1	176	157 (89.2)	19 (10.8)	1.06-1.15
IgM	92	61 (66.3)	31 (33.7)	1.24-1.44
IgG	87	37 (42.5)	50 (57.5)	1.47-1.68
Both IgM & IgG	88	20 (8.6)	68 (29.2)	1.82-2.09

Geographic distribution of the dengue fever cases shows that 25.3%) (n=59; came from Bhara Kahu, Bari Imam 9.9% (n=23;), Sohan 7.7%) (n=18; and Sectors G-7 15% (n=35;) and G-6 10% (n=24;). During 2016 and 2017 limited outbreaks were reported from Barakau and Sohan (union councils ,Tehsils Villages???). From other rural areas of Islamabad 16.3%(n=38) () cases were admitted. 8.2%(n=19) () cases came from other areas of District Rawalpindi. These included areas near Faizabad and Iqbal Town areas of Islamabad, which are contiguous to Islamabad District area from where cases were reported (figure 1).

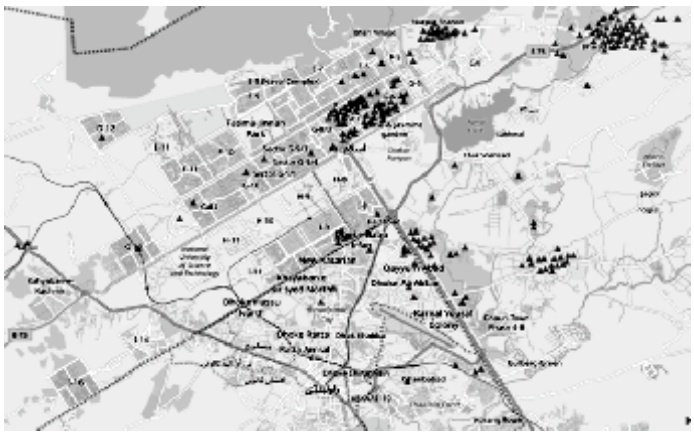

Figure 1: Geographical mapping of cases from areas of Islamabad and adjacent Rawalpindi areas (clusters of cases were reported from Bhara Kau, Bari Imam, Sohan and G-7 and G-7 Sectors

Patients were admitted in September and the reached peak in the month of October and gradually declined in November and December in each year in 2016 and 2017, respectively (figure 2). .

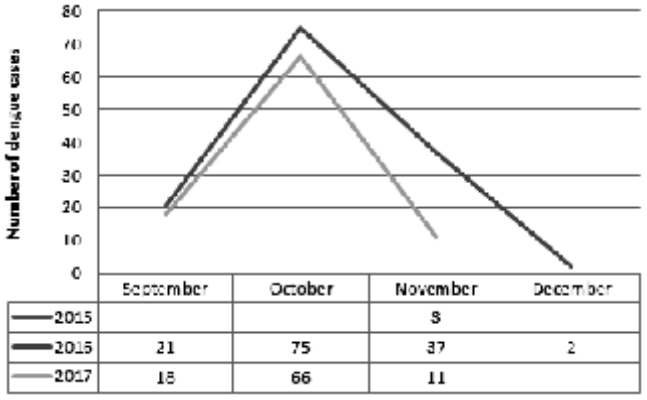

Figure 2: Seasonal patterns of dengue (cases reached at peak in October and then decline in December)

Total number of subjects included in this study were 233 including 65.2 %(n=152) males and 34.8 %(n=81) females. Mean age was 33.97±16.51 (Table 1). However, the most affected age group was between 20 - 40 year (119 cases) figure 3.

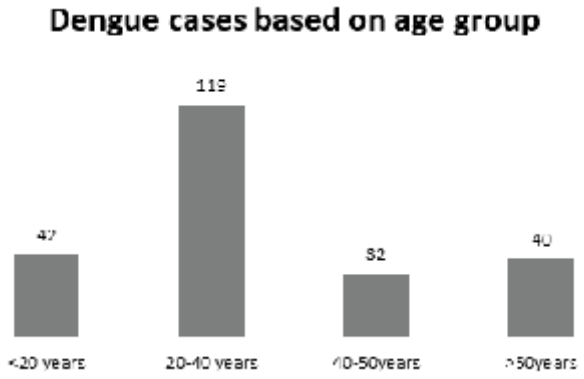

Figure 3: Affected age (more cases reported between 20-40 year age group)

Discussion

Mean age of the cases was 33.97 OR 34 and majority of the cases (65.2%) were male. The possible explanation is that cases between 20-40 years of age are more engaged in outdoor activities and are more likely to be exposed to the infected vector. The same is for male gender. This is also reported by a study conducted in Pakistan (16), and reported age 32, as peak group and as well as reported affected male gender 61%. Furthermore, in this study it was also observed that with the passage of time, the age group could also affect people having age in second decade and as well as more female gender would be affected by dengue.

Cluster of cases were reported from Bhara Kau, Bari-Imam, Sohan and Sectors G-7 and G-6, as shown in the map. Peri-urban areas and low socioeconomic conditions and as well as lack of proper waste disposal except the Sectors G 7 and 6 could be responsible. Multitude of factors including lack of proper waste disposal, low knowledge, poor background were also reported as complex interplay of factors (17). In Asia (India, Sri Lanka, Myanmar, Thailand, Philippines and Indonesia) in study (18) also addressed eco-bio-social dimensions in urban and peri-urban areas focusing the vector through socio-cultural, local and environmental interventions.

Dengue has been called disease of rainy season (19) and usually outbreaks occur after monsoon (post-monsoon) in Pakistan. Cases are rarely reported before monsoon. In this study the number of cases started in September month for both 2016 and 2017 and it reached its peak in the month of October. It decreased in month of November and December. This is quite typical and consistent with other studies (16, 20, 21) in this region. The reason is that in this month the humidity and temperature level are optimal for the vector to grow. In Islamabad where the dengue typically cases are reported in these months since September till December (average temperature 27-12 °C and humidity precipitation 98 -37 mm). The relative temperature (15-32°C) and humidity (30-90 percent) effects are necessary for spread/tethered flight of Aedes aegypti mosquito, vector for dengue (22). However, in KP cases start from August, reaching peak in September and thus gradually then declining (23). The reason is KP is also the optimal temperature for the vector. Nevertheless, globally areas with suitable temperature and humidity round the year, dengue is present throughout the year (24).

All patients presented typical symptoms of dengue e.g. high grade fever, bodyaches, headache and other symptoms such as rash, epistaxis, gum bleeding etc. Blood tests for platelets and WBCs were found low and were consistent with other studies such as in a study conducted in Karachi (20), where they reported thrombocytopenia <100,000/mm3 and in our study the average value was < 84680/mm3. Here WBCs were also lower than the normal limit. In this study the sensitivity of IgM was 66.3%, which is also higher at earlier stage of disease. Sensitivity of IgG was 42.5%. Sensitivity of both IgM and IgG was 8.6%. In a study conducted in Khyber Pakhtunkhwa (KP) Pakistan in 2011 (23), the combine sensitivity of both IgM and IgG was found to be 3.75% nearer to our finding. Similarly in the study conducted in KP the sensitivity of IgM (39.35%) was more than IgG (22.42%) (23). IgM was also found in highest proportion of patients in other area e.g. Karachi, Pakistan (16) and as well as in India (25). In FGPC the NS1 was available round the clock. NS1 has been used globally as a sensitive test, in the acute phase of dengue infection and thus this can greatly help in early diagnosis and subsequent treatment and as well as awareness for other subjects (4). NS1 antigenemia is at peak within first 2-4 days of infection and then

gradually wanes and also diminishes earlier in secondary infection (26, 27). Here the sensitivity was 89.2%, which is the range of sensitivity NS1 test, in other developing countries in South America, where it was described to be between 85-96% (4). However, in a study In Mexico, where the sensitivity of NS1 was found to be 12.3% (28). In other study (29), the sensitivity was found to be 87% within first 3 days of fever and then decline to 70% after 12 days. Thus our findings are compatible with these studies.

Conclusion

Due to a surge in number of cases in Islamabad and the limited outbreaks from Bhara Kau, Bari-Imam and Sohan areas, the disease could emerge as full outbreak thus affecting the twin cities of Islamabad and Rawalpindi. Awareness, anticipatory approach about the vector (Aedes agypiti) and early diagnosis of cases are warranted.

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