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Prevalence of dengue virus outbreak in district Swat Khyber Pakhtunkhwa, Pakistan

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Abstract

Dengue is an epic health problem in Pakistan since December 2013 affecting 2.5 billion people worldwide. In August 2013, outbreak of dengue was occurred in District Swat of Khyber Pakhtunkhwa which has so far caused 37 deaths. In this study 5190 patients were screened for DENV NS1 and specific antibodies using SD Dengue Dou strips. Out of which 3611 were found to be positive for DEN NS1 males and 1579 positive DEN NS1 for females. All Dengue virus positive samples were screened by specific antibodies. In current study, 935 patients have IgM positive and 63 were positive for IgG. Dengue virus males patients were more affected as compared to females. The highest rate of Dengue patients were recorded in the age between 14-30 years especially male. Dengue was more affected Mingora and surrounding area in Swat. In September more people were affected from Dengue. Those patients whose platelets were below 20000 were more near to death

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Introduction

Dengue, a major health concern of tropical and subtropical regions is the most prevalent mosquito borne viral disease of the world (Guzman and Kouri , 2002). The virus is transmitted by mosquito Aedes aegypti, which is its primary vector, but it can also be transmitted by Aedes albopictus (Strode *et al.,* 2012). The spectrum of disease manifestations is broad, ranging from asymptomatic or mild infection, through varying degrees of thrombocytopenia and vascular leakage that is typical of dengue hemorrhagic fever (DHF), to a severe shock syndrome and multi-organ failure(Halstead, 2007). During the last decade the severity, magnitude and distribution of dengue outbreaks have been appallingly high in South Asian countries (Gupta and Reddy, 2013), Bangladesh (Raheel *et al.,* 2013) and Pakistan (Rasheed *et al.,* 2013). DENVs are members of the family Flaviviridae and genus flavivirus and have four serotypes DENV-1, DENV-2, DENV-3 and DENV-4. In humans disease severity varies between primary and secondary DENV infections and perhaps also between different dengue virus serotypes (Vaughn *et al.,* 2000). The first confirmed dengue outbreak case occurred in the southern Pakistan city of Karachi in 1994 (Chan *et al.,* 1995). Dengue showed reactivation in 2010, especially in Punjab, Sindh and some cities in the Khyber Pakhtunkhwa regions after massive floods occurred during the same year, while in the 2011 outbreak, DENV-2 and DENV-3 were the most prevalent serotypes but also with a lower incidence of DENV-4 (Koo *et al.,* 2013). While 8,343 cases have been registered from the Swat, Shangla and Bisham districts with official and unofficial death tolls of 37 (District Health Office (DHO) of Swat) (Express Tribune: October 22, 2013) and 57 respectively reported up to the 18th October 2013. While DHF/DSS usually occurs during secondary DENV infection (Guzman *et al.,* 2013) many patients died during apparent primary DENV infections in Swat when DENV infections were first reported in Swat during 2013 (Relief Web , Oct 2013).

The diagnosis is labeled as primary infection if there is detection of dengue virus IgM antibodies within 3-5 days after the onset of infection of the disease, which can persist up to 5 months. The condition is said to be secondary if dengue IgG antibodies are detected with peak levels at two weeks after the symptoms. Late primary and early secondary infection is observed by detection of both IgM and IgG antibodies (WHO, 1999).

This study aimed to find out the prevalence rate of dengue, age and sex wise distribution, month wise and area wise distribution and platelets count of dengue patients during the first outbreak occurred in District Swat.

Material and Methods

Study Area

The current study was carried out District Swat Khyber Pakhtunkhwa, Pakistan. Swat is a district with a population of 12576025 (Anonymous, 1998) and now a day's more than 2 million people located in the central north of Khyber Pakhtunkhwa province of the Islamic Republic of Pakistan.

This study was performed to identify the DENV serotypes Prevalence in patients from Swat during the on-going 2013 DENV outbreak.

Sampling

A total of 5190 samples were collected from clinically diagnosed dengue patients at Saidu Sharif Teaching Hospital (STH), Swat.

DENV NS1 glycoprotein and anti-DENV IgM and IgG screening

Sera isolated from all 5190 clinically diagnosed dengue patients were screened for dengue virus DENV NS1 glycoprotein and specific antibodies (IgM and IgG) and using SD Dengue Duo strips following the manufacturer's instructions (Standard Diagnostics, Korea).

Results

5190 patients' serum samples collected to check the

dengue infection in District Swat. The results indicated that 3611 (69.58%) out of 5190 are positive DENV NS1 for males and 1579 (30.42%) out of 5190 are positive DENV NS1 for females patients. All Dengue virus positive samples were screened by specific antibodies. In this study, 935 patients have IgM positive and 63 were positive for IgG. The individuals belonged to various age groups. The highest prevalence rate for DENV NS1 was 52.54% recorded in the age of (14-30). The results indicated that prevalence of DENV NS1 in males was more than females.

Table 1. Age wise distribution of positive samples.

S.NO	Age group	Positive samples	Percentage (%)
1	1-13	474	9.13
2	14-30	2727	52.54
3	31-60	1792	34.53
4	>60	197	3.80

Sex wise distribution

The sex wise results revealed that males are more infected as compared to females 3611 and 1579 respectively as shown in table 2 and figure 2.

Tables 2. Sex wise distribution of positive samples.

S.NO	Sex	Positive samples	Percentage (%)
1	Male	3611	69.58
2	Female	1579	30.42

Area wise distribution

The area wise distribution Dengue virus was more effected Mingora and surrounding area 3124 positive cases occur and less cases reported from Mian Dam which was 6. The 309 cases out of district are positive. The other area with respective to NS1 positive are shown as below in table 3.

Month wise distribution

The spreading and severity of Dengue fever with respective to patients were highly recorded in September and October 2013 2924 and 1303 respectively while in November low No. of cases 84 were reported (Table 4 and Figure 4).

Table 3. Area wise distribution of positive samples.

S. No	Area	NS1 Positive cases
1	Mingora and surrounding area	3124
2	Saidu Sharif	472
3	Out of district	309
4	Rahimabad	251
5	Kabal	167
6	Charbagh	165
7	Qamber	163
8	Manglawar	124
9	Balogaram	85
10	Udigram	61
11	Kalam	55
12	Barikot	48
13	Spal Bandai	43
14	Matta	38
15	Madyan	29
16	khuwazakhela	22
17	Banjot	14
18	Bahrain	14
19	Main Dam	6

Table 4. Month wise distribution of positive samples.

S. NO	Month	Positive samples
1	August	879
2	September	2924
3	October	1303
4	November	84

Platelets status of dengue patients

The result shows that majority of the patients 1579 have platelets counts <100000 as shown in table 5 and figure 5.

Table 5. Platelets status of infected patients.

S. No	Platelets status	cases
1	Patients with PLT<100000	1579
2	Patients with PLT<50000	632
3	Patients with PLT <20000	153

Discussion

The first cases reported at 14 august 2013 and last case confirmed at 18 November 2013 it took approximately 100 days. The highest OPD on single Day recorded as 1635 on 16 September and highest indoor admission on single day patients was 140.

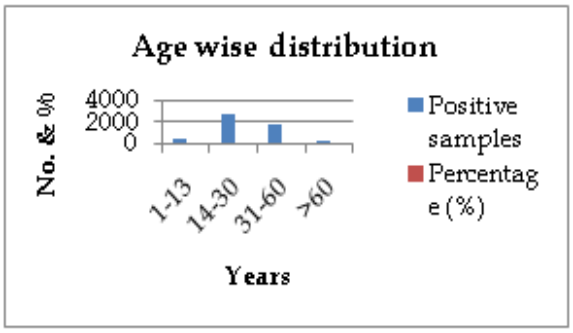

Fig. 1. Age wise distribution of positive samples.

A major outbreak of dengue started in district Swat of Khyber Pakhtunkhwa which has so far caused 37 deaths which have platelets less than 20000 and patients 153. There were 110 hemorrhagic patients reported from August to September.

In 2005 Karachi outbreak 4,500 dengue cases were registered. Over 21,204 people were reportedly infected in the country in 2010 (Khan and Hasan, 2012). The 2010-11 DENV out-break resulted in 18,000 cases nationwide. In 2011, a major outbreak of dengue occurred in Lahore with 16,000 cases and 350 deaths (Bhutt, 2010).

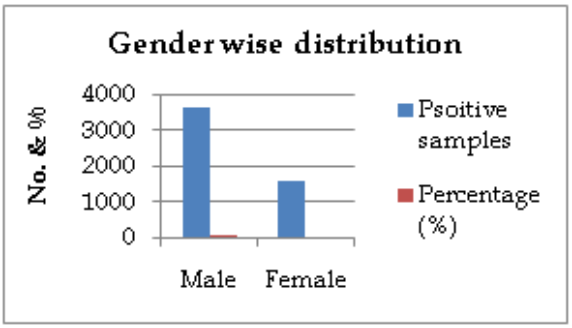

Fig. 2. Sex wise distribution of positive samples.

The mortality rate of Swat was therefore considerably lower than the 2002-2011 out-break in Lahore which may have been due to many people in Lahore already being infected with at least DENV serotype during experiencing several mini DENV out-breaks from 2005 to 2009. Since all the four DENV serotypes were reported during the 2011 outbreak (Koo *et al.,* 2013). Unfortunately, there is no effective prevention as there are no specific vaccines available. The major prevention is to keep drainage system and also put some kerosene oil especially in drainage effectively so that no stagnant pools and ponds stay for long-periods after rain and there is poor management from the Govt side and as well as from the media side. There is no special management (Syed *et al.,* 2010). Two life threatening complications are dengue hemorrhagic fever and dengue shock syndrome. Main reason for hemorrhagic is low platelet counts and increased vascular permeability. The later causes plasma leakage and decreased circulating volume. Management is largely supportive with symptomatic treatment, blood transfusions and fluid resuscitation.

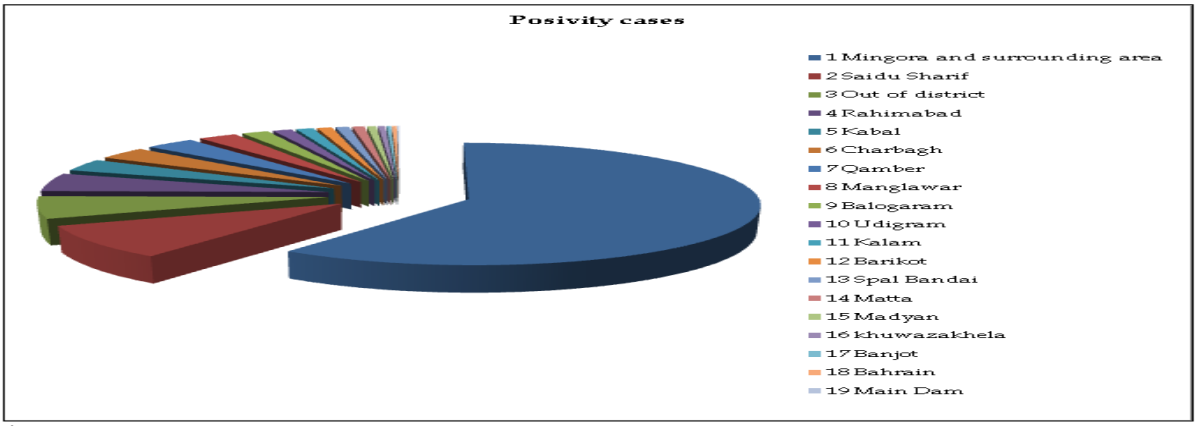

Fig. 3. Area wise distribution of positive samples.

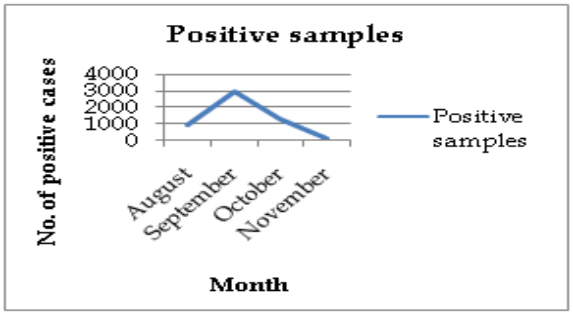

Fig. 4. Month wise distribution of positive samples.

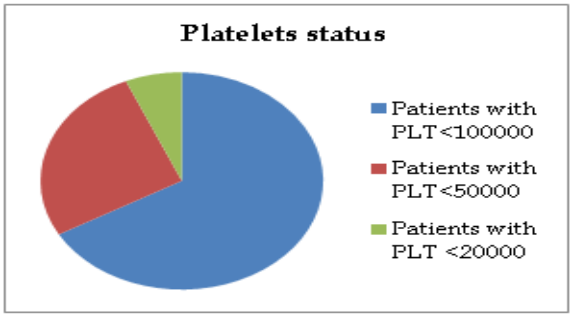

Fig. 5. Platelets status of infected patients.

Dengue is a terrible malady and studying is much more complicated. The study reveals that highest DENV NS1 was observed in the age of 14-30 years. Our result shows that in swat the males are more affected as compared to females. The most affected area in swat was Mingora, Malook Abad and surrounding area such as Watky, Bagh Mahla, Haji Baba, Saidu Sharif, Nawaikaly and Amankot. In September dengue cases were more registered as compare to August, October and November. A major outbreak of dengue started in Swat district of Khyber Pakhtunkhwa which has so far caused 37 deaths which have platelets less than 20000 and patients 153. The 110 hemorrhagic patients reported from August to November. Once the clinical sign of Dengue appears we should be go to hospital and consult doctor.

Future Recommendation

1. There should be strong administration and monitoring team in the Govt sector.
2. New doctors, laboratory technician should be taken especially in teaching hospitals.
3. Raise of funds separately should be given to dengue unit and researcher project.
4. Govt should spray before when the weather become hot, mean before March and April.
5. Those pipes which are inside in house steel made should be repaired in due time.
6. Water storage container should be checked in time due to water leakage.
7. Refrigerator, air condition should be dry in time.
8. Media should be play pivotal role and as well as social media like cables, internet, face book etc.
9. Awareness among people should be a separate community inside the more affected regions they should aware the layman in society.
10. NGO involvements should be introduced, they should work collaborate with government entities.

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