Lab Based surveillance of Dengue Hemorrhagic Fever during 2006 Epidemic in Lahore
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Abstract
Dengue haemorrhagic fever (DHF) is an acute viral disease which is worldwide in distribution. It is caused by four serotypes of Dengue viruses, members of flaviviruses, which are immunologically distinct and does not provide cross protectivity. A lab based surveillance was started on the indication of disease occurrence in Lahore. This epidemic investigation comprises 395 suspected DHF patients with IgG and IgM captured ELISA against Dengue virus 2 and serotype, Lab based data derived from the provincial referral Lab present in a public hospital of Lahore. Among the suspected patients 65.2% (n=257) were male and 34.8% (n=137) were female. There were 38.2% (n=151) patients non-reactive while 28.4% (n=112) were exposed to Dengue virus and 33.4% (n=132) were confirmed dengue patients. It was noted that epidemic started from mid of August and get terminated in the mid of January while the secular trends show that most of (60-70%) cases occur in November as per recorded.

Key words: DHF, cross-protectivity, DENV 2.

Introduction
Dengue haemorrhagic fever (DHF) is an acute febrile disease caused by any of the four serotypes of dengue virus (DENV 1, DENV 2, DENV 3 and DENV 4), belonging to flaviviruses. It is a public health problem of growing importance in areas where the insect vector, Aedes aegypti mosquitoes are present (1). Although most DENV infections are characterized as mild illnesses with low mortality, however many countries report increasing incidences with high mortality and type of signs and symptoms (2). Immunity against any of the four serotypes can not provide the cross protectively against each other and further more in the absence of vaccine the primary prevention is only possible through the vector surveillance and its control. All ages and both sexes are susceptible to the DENV infection.

Several dengue virus epidemics or pandemics have been reported worldwide, in Pakistan it is suspected several time in the past but confirmed in 1994 in Karachi, when during the investigation of acute phase sera from 16 patients in one hospital were tested by IgM captures ELISA. The results showed that 15 patients had IgM DENV 2 (3,4,5).

Material and Methods
The study was conducted in a provincial reference Lab for DHF diagnosis of a public hospital in Lahore. Blood samples of clinically suspected and admitted patients and/or referred from private practitioners and family physicians are/were tested by using IgM and IgG captured DENV 2 in a time frame of five hours since its receipt since 2006 to date. The test was performed by using IgG and IgM- ELISA kits of NOVATEC (Nova Tec Immundionagnostica GmbH, Dietzenbach, Germany). Statistical analysis was performed using the epidemiological parameters like incidence rate, bar graphs were made by using SPSS software (version; 16)

Results
The blood samples of the suspected patients of dengue haemorrhagic fever are tested for the detection of IgG and IgM against the DENV 2 serotypes. A total of 395 samples were analysed and observed that among the suspected patients 65.2% (n=257) were male and 34.8% (n=137) were female. There were 38.2% (n=151) patients non-reactive while 28.4% (n=112) were exposed to Dengue virus and 33.4% (n=132) were confirmed dengue patients (figure 1). The age of the dengue patients ranged from 3 months baby through 80 years old subjects. There was an increasing trend in the incidence of the dengue fever up to the age of thirty years followed by a sudden decline in all the higher age groups (figure 2). The disease was more prevalent in males as compared to females (Figure 3). The secular trend revealed that in each year more than 60% dengue fever patients were reported during month of November. The occasional cases start coming from mid August and epidemic terminates in mid of January.
Figure 1. ELISA detection results by using antigen DEN-2 against IgM and IgG

Figure 1. Comparision of age groups of Male and Female population suffering in Dangue Fever
Discussion
This is a report on the Lab based surveillance of a public hospital where most of the patients from Lahore city or its suburbs. Either the blood samples of the suspected patients were referred for diagnosis by the private practitioners or the samples were referred by the consultant physicians of the admitted patients in hospital. Epidemic is characterised by a significant rise in the number of cases with respect to time place and person (6). The cases started appearing from mid August 2008 through November 2008. There was enough rainfall in summer 2006 which might be attributed to the water available in different types of vessels in the effected houses which is the prerequisite for the increase in the vector population. The availability of fresh water favours in the increase in the vector population i.e *Aedes aegypti* in contrast to the anopheles a malarial mosquito which primarily reproduces in the stagnant water particularly during the rainy season.

Patients were tested by ELISA in which IgM reactive were considered as confirmed patients while IgG positive were considered exposed to infection and in recovery phase (7, 3, 8). The patients which were non-reactive for both IgM and IgG were considered as negative for DHF. This investigation confirmed that dengue virus was responsible for the 2006 outbreak of DHF starting from mid August 2006 and terminated in the mid of January 2007. In Lahore there was substantial evidence of exposure to mosquitoes, and the serological tests demonstrated IgM against dengue virus, which is a highly sensitive marker of acute dengue infection (6). The epidemiology of dengue virus infection are/were not well reported in Pakistan. This is a confirmed epidemic of its nature in severity and number in Lahore. The outbreaks since 1994 and 1995 clearly document the presence of dengue viral infections in Pakistan, most probably due to increased rainfall in Karachi that resulted in an increase in mosquito populations. No information on the mosquito species and/or other vector/reservoir involved at that time is available. Later on the most common vector of DHF was found to be *Aedes aegypti*. Dengue is endemic in the neighbouring countries like India and Sri Lanka, and the presence of more than one dengue serotype, of DHF is migrating outside Pakistan epidemic dengue hemorrhagic fever is also increasingly reported (8, 10, 11). In 1996, an epidemic of DHF in India resulted in at least 227 deaths and more than 4700 persons being admitted in Delhi government hospitals (12, 13,14). Most previous episodes of DHF in India have also been reported (12, 8). In tropical and subtropical Asia where dengue is reported, changing lifestyles, urbanization, explosive population growth, destruction of city water supplies, migration, and increased air travel are some of the reasons cited for increases in the prevalence of dengue infections and areas occupied by *Aedes aegypti* in the post-World War II era.18-20, In Pakistan, with similar social
and economical changes take place, little information is available regarding prevention and control vector surveillance.

This study confirmed the presence of epidemic of DHF in Pakistan and suggests that there are be more than one serotypes present in Lahore. Visitors to Pakistan should be warned about the possibility of dengue infection and encouraged to use mosquito repellents. Clinicians in Pakistan should consider dengue in their differential diagnosis of patients presenting with fever or hemorrhage of unknown cause. This could lead to improved clinical and virologic surveillance for dengue. As there is no vaccine available against this disease and in the absence of sentinel surveillance efforts to decrease breeding places of *Aedes aegypti*, community participation in capping, cleaning, or emptying water containers and eliminating hidden fresh water in the storage tanks. Addition of larvicidal agents to stored water in the containers at house may control the dengue fever right in the beginning of an out break.

References