

# Prevalence of Dengue Fever in Rawalpindi, Islamabad - A Cross Sectional Study

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## ABSTRACT

**Background:** Dengue is an important vector borne viral disease of public health significance .Dengue fever is on the rise in Pakistan with considerable morbidity and mortality in recent outbreaks .We undertook the study to analyze the prevalence of Dengue fever in Rawalpindi and Islamabad region.

**Objectives:** The object of our study was to estimate the burden of dengue fever in Rawalpindi and Islamabad region. Another aim of our study was to evaluate and if possible alleviate the anxiety associated with dengue fever. We wanted to find out the factual prevalence of the disease. We aimed to determine the most common age group and gender of the illness as well.

**Study Design:** Cross Sectional Study.

**Place and Duration of Study:** This study was conducted in Benazir Bhutto Hospital (BBH) and Pakistan Institute of Medical Sciences (PIMS) in Rawalpindi and Islamabad from 1<sup>st</sup> September to 15<sup>th</sup> November 2011.

**Materials and Methods:** People of all ages and both sexes with suspicion of Dengue were included in the study.

**Results:** A total of 16616 people turning up at these hospitals were tested for Dengue virus. Only 2269 were positive for disease (13.6%). Male to female ratio came out to be 2.1:1 and maximum number of cases belonged to age group 21-30 years.

**Conclusion:** The number of cases turning up with Dengue suspicion is out of proportion to actual disease burden. Thus we need to alleviate the anxiety associated with the disease. There is a genuine need for strict adherence to preventive control measures and research needs to be undertaken in order to reduce the mortality and morbidity associated with the Dengue.

**Key Words:** Dengue Fever, Prevalence, Aedes Aegypti.

## INTRODUCTION

Dengue is the most important arthropod-borne viral disease of public health significance. Dengue infection is one of the most rapidly expanding diseases known to mankind with an estimate of 50 million new cases worldwide annually.

The first definitive case of dengue fever was reported by Benjamin Rush in 1789 and he called it the break bone fever. However it was first recognized in its present day form as the dengue fever caused by dengue virus in 1950s.<sup>1</sup> WHO currently estimates there may be 50 million dengue infections worldwide every year.<sup>2</sup> It is currently endemic in more than 100 countries.

The principal vector for DEN is Aedes aegypti, a highly urbanized, daytime biting mosquito that breeds in stored water<sup>3</sup>. These mosquitoes normally bite during daylight and take multiple blood meals from one or more human subjects. These vectors are very efficient in transmitting dengue virus because of their breeding sites, which are the houses or outdoor places including artificial containers and construction sites.

Dengue infection can cause a spectrum of illness ranging from mild, undifferentiated fever to illness up to 7 days' duration with high fever, severe headache, retro-orbital pain, arthralgia and rash, but rarely causing death. Dengue Haemorrhagic Fever (DHF), a deadly complication, includes haemorrhagic tendencies,

thrombocytopenia and plasma leakage. Dengue Shock Syndrome (DSS) includes all the above criteria plus circulatory failure, hypotension and low pulse pressure. Dengue fever (DF) is an arthropod-borne disease caused by any of the four serotypes of dengue virus (DEN), a member of the family Flaviviridae. Dengue virus (DV) is an envelope, single-stranded, positive RNA virus<sup>4</sup>. There are four dengue viruses designated as DENV-1, -2, -3 & -4 which are serologically related but are antigenically and genetically distinct<sup>5</sup>. In South East Asia, the average number of cases of DHF per year has increased from 10,000 in the 1950s to over 200,000 in the 1990s.

Thus, dengue virus remains a major cause of morbidity and mortality in tropical areas<sup>6</sup>. WHO declares dengue and dengue haemorrhagic fever to be endemic in South Asia, Dengue outbreaks with multiple serotypes can lead to dengue shock syndrome as well.<sup>7</sup> DF outbreaks have been reported from Pakistan in 1994, 1995, and 1997<sup>8-10</sup>. Thereafter, few sporadic cases were reported until the winter of 2006 when an outbreak occurred, followed by another from September to November in 2007 that caused significant morbidity and mortality. Evidence suggests that the overall burden of disease, as well as its severity, is on the rise in Pakistan. In Asian countries where DHF is endemic, the epidemics have become progressively larger in the last 15 years. In 2005, dengue was the most important mosquito-borne

viral disease affecting human<sup>11-13</sup>. Since dengue virus is endemic in Pakistan, circulating throughout the year with a peak incidence in the post monsoon period, we undertook our research in the same period. This would enable us to study the illness when it is at its peak.

## MATERIALS AND METHODS

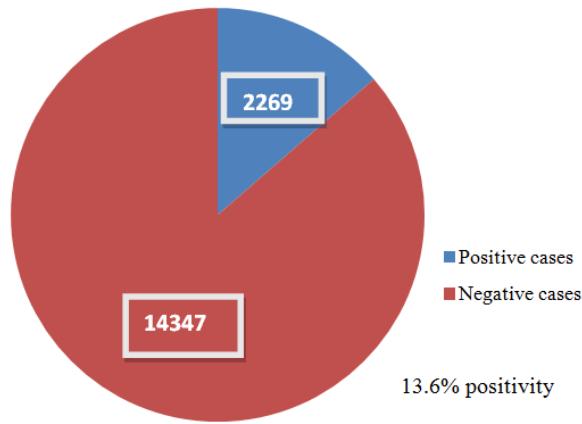
People of all ages and both sexes turning up at Benazir Bhutto Hospital (BBH) Rawalpindi and Pakistan Institute of Medical sciences (PIMS) Islamabad with Dengue suspicion were included in the study. The criteria for positivity was serum IgM, serum IgG levels along with clinical symptomatology. Temperature changes on monthly basis were also recorded.

## RESULTS

A total of 16616 people turning up at the hospital were tested for dengue virus. However only 2269 were positive for the disease. Out of these, 12938 turned up in Rawalpindi region (BBH) and only 3678 were from Islamabad (P.I.M.S). These figures show that the turn out and prevalence of dengue in Rawalpindi is higher than that in Islamabad. BBH (Pindi) was also catering for Chakwal, and other suburbs. Percentage positivity of our study came out to be 13.6%. Using the seroprevalence data, the force of infection was estimated to be 11.7% per year in another study.

These have been shown in a Pie chart figures:

**Pie Chart No.1: Total cases = 16616**

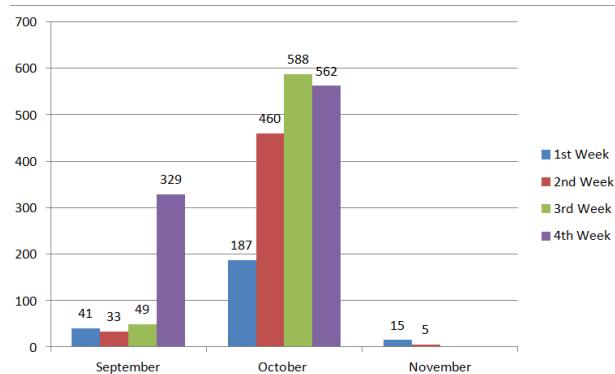


Maximum numbers of cases were seen in 3<sup>rd</sup> week of October 2011 shown graphically. The average temperatures recorded in September were 21-33 degrees Celsius, in October 15-31 degrees Celsius and in November 8-25 degrees Celsius. As the temperatures fell in November, the number of cases also reduced.

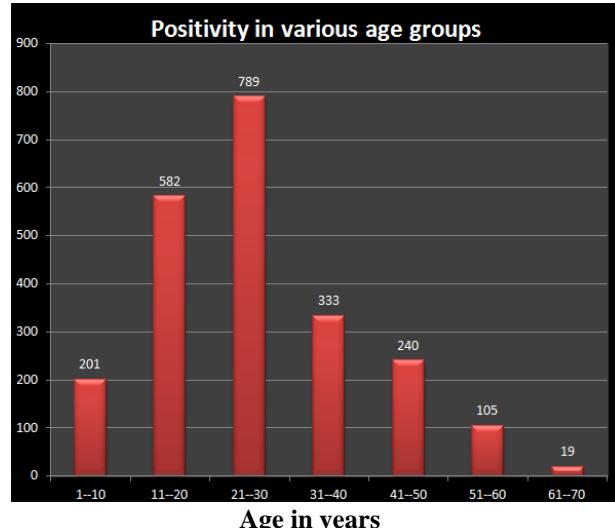
**Gender ratio:** Out of a total of 2269 patients 1544 were males and 725 were females. The ratio comes out to be 2.13:1. This fact is also supported by other studies conducted in South East Asia<sup>14</sup>.

**Pie Chart No.2: Week wise positivity of Dengue cases**

### Positive cases



**Pie Chart No.3: No. of Positive cases**



Maximum number of cases were found in the age group 21-30 years, the second most frequent group was age 11-20 years.

## DISCUSSION

Pakistan experienced major epidemics of dengue fever last year thus it is imperative to evaluate the burden of disease. Our study shows 13.6 percent positivity, another researcher reports 11.7% positivity of the disease per year.<sup>15</sup>

Our study points out to another aspect of dengue fever. We conclude from our results that there is too much anxiety and panic associated with the disease because 16616 patients turned up with dengue suspicion and only 2269 were positive (so every fever is not dengue fever) and one should not panic too much.

During the past century, surface temperatures have increased by a global average of 0.75°C. Temperature increases of this magnitude may be associated with substantial increases in dengue epidemic potential<sup>16</sup>. In keeping with this study our results show that the

number of cases decreased with the fall in temperature in November when the number dropped to 20 only. Since the epidemics of dengue have been commonly associated with the rainy season<sup>17</sup>.

We decided to undertake our study in the post monsoon period. Our study shows 452 cases in September, 1797 in October and with the fall in temperature there is a significant decrease in the number of dengue patients in November.

Our results show that maximum number of patients fall in the age range 21-30 years. In Singapore (1982) most of the patients were older than 15 years of age. In Indonesia (1975-1984) majority of patients were young adults. Bangladesh (2000) reports highest proportion of cases in the 18-33 years age group. Our results are comparable to the above mentioned studies. Since maximum number of patients were seen in the age group 21-30 years. However Puerto Rico (1995) shows 10-19 years to be the commonest age group<sup>18</sup>. There is an age shift from children to adults. Initially dengue fever was acknowledged to be a childhood disease but over time there is increasing evidence that older age groups are more commonly affected. Many studies in Southeast countries where dengue has been epidemic for several years show a clear cut age shift<sup>18</sup>.

One possible reason for higher incidence in this age group could be that repeated DEN infections lead to sequential augmentation of the immune system<sup>19</sup> so that the severe infections, more probable in older patients, are more likely to come to medical attention as opposed to milder ones in the younger age group.

Hospital-based studies have similarly reported increasing infection rates among adults, mentioning that it is contrary to the popular belief that dengue is a paediatric disease<sup>20,21</sup>. Our study shows a male predominance which is similar to the studies by other researchers who have reported male to female ratio of 1.9:1, 1:0.57, 2.5:1, 1:0.25, 1.5:1, 1.5:1 in south east asia.<sup>22,23</sup> However South American and a Mexican study shows that the disease is more common in females as compared to males<sup>24,25</sup>. Understanding male-female differences in infection rates and severity of disease is important for public health control programmes.

Studies by Kabra, Halstead and Shekhar show that the severity of the illness is higher among females despite higher incidence in males<sup>4</sup>.

Dengue virus infection is increasingly recognized as one of the world's emerging infectious diseases. About 50-100 million cases of dengue fever and 500,000 cases of Dengue Hemorrhagic Fever (DHF), resulting in around 24,000 deaths, are reported annually<sup>2</sup>.

Certain demographic and societal changes are thought to be associated with the reappearance of lethal dengue infection over the past 50 years<sup>26</sup>. The factors responsible for such an enormous expansion are rapid population growth, peri-urbanization with

inadequate public health systems, lack of vector control, climatic variability and rainfalls, and increased travel (especially air travel) to endemic areas<sup>27</sup>. Due to these factors, there is an increase in the reportable cases of dengue infection. Half the world's population lives in countries endemic for dengue, underscoring the urgency to find solutions for dengue control. The consequence of simple DF is loss of workdays for communities dependent on wage labour. The consequence of severe illness is high mortality rates, since tertiary level care required for DHF/DSS management is beyond the reach of most of the persons at risk.

## CONCLUSION

The number of cases turning up with Dengue suspicion is out of proportion to actual disease burden. Thus we need to alleviate the anxiety associated with the disease. There is a genuine need for strict adherence to preventive control measures and research needs to be undertaken in order to reduce the mortality and morbidity associated with the Dengue

## Acknowledgements:

We would like to Acknowledge relevant doctors at Pakistan Institute of Medical sciences (PIMS), Benazir Bhutto Hospital Rawalpindi (BBH) for their kind help. Special thanks to Dr. Tahir Ali Chaudhary (Margalla institute of Health Sciences Rawalpindi)

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