Seroprevalence of Dengue Viral Infection in Healthy Population residing in Rural Areas of District Rawalpindi

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Background: This current study is perhaps the first study of its type in any rural area of Pakistan. It was carried out on healthy population resident of different villages of Tehsil Kahutta, District Rawalpindi. Although Dengue Viral Infection was believed to be only present in urban and semi urban areas.

Hypothesis: Dengue viral infection is prevalent in rural areas of District Rawalpindi.

Aims and Objectives: 1. To find out the prevalence of Dengue viral infection (IgG) in rural areas. 2. To highlight subclinical cases of Dengue Viral Infection.

Study Settings: Pathology (Microbiology) Department, Benazir Bhutto Hospital, Rawalpindi.

Study Design: Descriptive Cross Sectional Study.

Study Duration: 7 Months.

Sample Size: 96 Samples.

Inclusion Criterion: 1. Individuals who have never suffered from Dengue infection.
2. Both male and female population of any age group.
3. Must be the resident of rural area.

Exclusion Criterion: 1. Individuals who have a strong history of Dengue infection.
2. Individuals who have a strong history of immunization for Japanese encephalitis, Yellow fever, and Tick borne encephalitis. Thus to prevent erroneous results because of cross reacting antibody formation.

Methodology: A Systematic Random Sampling procedure was adopted. A written informed consent form and bio data proforma filling were the pre requisites of study. Than 3ml of venous blood sample was drawn from every participant. Finally ELISA test was done to detect the presence of IgG Anti Dengue Antibodies.

Results: Out of 96 participants, 13 (13.5%) were found to be positive for IgG Anti Dengue Antibodies presence.

Conclusion: Dengue viral infection is prevalent in rural areas of District Rawalpindi.

Introduction

Dengue viral infection is an emerging Global health problem. It infects about 50 to 100 million people annually. Aedes aegypti mosquito is the principle vector for disease transmission. There are 4 circulating serotypes i.e. DEN 1 to 4. These are responsible for specific antibody production. Thus most cases of severe Dengue Fever, Dengue Hemorrhagic Fever and Dengue Shock Syndrome results because of cross reacting antibody formation in secondary infection. The cross reacting antibodies are different from those of primary ones. The severity of disease ranges from asymptomatic, subclinical Dengue infection to Dengue Hemorrhagic Fever and Dengue Shock Syndrome.

The Global prevalence of Dengue fever has grown dramatically in recent decades. It affects the tropical and subtropical regions of the world, especially involving the urban and semi urban areas. It has taken an endemic form in more than 100 countries of South East Asia, Africa, America, Eastern Mediterranean regions and Western Pacific. The contributing factor for disease spread includes lack of community awareness and health
education. The rapid means of urbanization has generated the slum and shanty towns. Inadequate Aedes mosquito control, decreased use of DDT, increased means of air travel and transport availability, all adds to promote disease spread. Moreover, lack of communication between government, health administrators, epidemiologists and infection disease control units are also additional factors for existing problem. In the absence of vaccine and specific antiviral treatment, Dengue prevention and control is primarily dependent upon the reduction in vector mosquito population. Thus the morbidity and mortality rates can be reduced to great extent.

**Materials and Methods**

This descriptive cross sectional study was carried out in the Microbiology Department of Benazir Bhutto Hospital, Rawalpindi. The duration of study was 7 months i.e 1st April to 30th October 2009. The permission of study was taken from the Ethical Review Committee of Rawalpindi Medical College. A written informed consent and biodata proforma filling were the pre requisites for every participant. A biodata proforma was designed to get adequate information regarding personal profile, travel history, mosquito interaction, presence of any constitutional symptoms and the sewerage systems in surroundings.

The rural areas for sampling were randomly selected villages of Tehsil Kahutta, District Rawalpindi. Than the participants selection was done by systematic random procedure of the specific area. After that, the selected individuals were contacted one by one. They were introduced about the aim and proceedings of the study in detail. The participants were given adequate information about the existing problem of Dengue infection in Pakistan and world wide.

The next step for every participant was 3ml of venous blood sample collection aseptically. The samples were labeled and sealed properly in plastic bags. Finally transported to the Pathology Department, Benazir Bhutto Hospital, Rawalpindi for further proceedings.

The clotted samples were centrifuged at 3000 rpm for 5 minutes to separate serum. The separated serum was ultimately used in 3rd generation ELISA to detect IgG antibodies against Dengue virus. It is 97.5% sensitive and 97.9% specific for the said infection.

The test was done in batches of 10 along with the positive and negative control samples to maintain quality of results. Thus the chances of false positive results can be reduced.

**Table I: Distribution of Study Population**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Gender</th>
<th>Total No.</th>
<th>Total No. of positive cases of Dengue Virus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>48</td>
<td>n=8</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>48</td>
<td>n=5</td>
</tr>
<tr>
<td>3</td>
<td>Total</td>
<td>96</td>
<td>n=13</td>
</tr>
</tbody>
</table>

**Table II: Significant Associations of Dengue Viral Infection**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Significant associations</th>
<th>Males (n)</th>
<th>Females (n)</th>
<th>Total (n)</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mosquito Interaction</td>
<td>6</td>
<td>5</td>
<td>11</td>
<td>84.6%</td>
</tr>
<tr>
<td>2</td>
<td>Poor Sewerage</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>69.2%</td>
</tr>
<tr>
<td>3</td>
<td>Travel History</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>30.7%</td>
</tr>
<tr>
<td>4</td>
<td>Mild Constitutional Symptoms</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>23.0%</td>
</tr>
</tbody>
</table>

**Results**

The results were categorized as positive, negative and intermittently positive on the basis of cut off values. Out of 96 healthy individuals (48 males and 48 females) 13.5 % (n=13) were found to be positive for IgG anti Dengue antibodies (16.6 % males and 10.4 % females). Table I shows the incidence of anti-Dengue virus antibodies in the male and female subjects.

The mean age of the participants was 22.2 years.

**Discussion**

This is perhaps the first study of its type in any rural area of Pakistan. The results of the study are rather alarming showing the presence of Dengue viral infection in rural areas besides the urban ones. 13.5 % of healthy participants’ residents of rural area are suffering from the primary Dengue infection. Although some of them had significant history of travel. Rest of them were having significant mosquito interaction and poor sewerage systems in their surroundings.
In developing countries like one of ours, this preventable disease is one of the significant causes of increase morbidity and mortality rates. The mortality rate might exceed 15% from Dengue Hemorrhagic Fever and Dengue Shock Syndrome. The major problem behind this existing situation is the absence of tetravalent vaccine and anti viral therapy. Otherwise the situation may become uncontrollable in the years to come.

The establishment of tetravalent vaccine regime and/or goal of fight against Dengue should be the need of the time. All these collaborated efforts can be helpful to control the disease. However the ultimate control units and community members is an urgent need of the time. Thus showing a relationship between Dengue, mosquito interaction and travel history. Presences of mild constitutional symptoms are suggestive of subclinical existence of primary Dengue Infection.

Although the present report is limited in terms of scope and the population studied. The results are significant enough to call for more extensive serological surveys and selective surveillance to assess the real extent of disease burden due to Dengue virus infection and to adopt appropriate measures for its prevention and control.

**Conclusion**

Dengue viral infection is prevalent in rural areas of Pakistan besides the urban ones. Most of the selected participants had a history of significant travel history. Thus showing a relationship between Dengue, mosquito interaction and travel history. Presences of mild constitutional symptoms are suggestive of subclinical existence of primary Dengue Infection.

References