ANALYTICAL STUDY OF VIRAL FEVER CASES ADMITTED IN A TERTIARY CARE HOSPITAL, NELLORE, A.P.

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ABSTRACT

BACKGROUND

Viral fevers are the cause for admission in the hospital during certain seasons of the year. Commonly, the hospitalisations often increase in the monsoon period during the months of July to November in most of the regions across the world due to seasonal changes. The vector-borne diseases especially Malaria, Dengue increase with changes in the humidity, temperature, rainfall and pooling of water in the households. In this present study, an attempt is made to find out the probable cause of fever among admitted cases of viral fever.

MATERIAL AND METHODS

This study was a retrospective study carried out in the Paediatric Department at a newly commissioned Medical College Hospital at Nellore, Andhra Pradesh, during August 2015 to November 2015 as obtained from the medical records and admission registers.

RESULTS

Of the total 596 cases, 201 children were with a diagnosis of viral fever. There was a male preponderance which was however not statistically significant. The viral fever cases accounted for 6% and 43.8% of the total admitted cases in the months of August and October 2015 respectively. Laboratory investigations revealed thrombocytopenia in 57.5% of the children and leucopenia in only 5.5% of them. NS1 antigen testing in 17 cases showed 88.8% positivity. IgM antibody against Dengue in 109 cases showed positivity in 37.6% of cases. Thrombocytopenia was more frequently seen among children admitted in PICU. There was a correlation of thrombocytopenia and positivity of either NS1 antigen or Dengue IgM antibody.

CONCLUSION

In view of these findings, it can be concluded that the surge in viral fever cases may be probably due to Dengue fever.

KEYWORDS

Viral Fevers, Thrombocytopenia, NS1 antigen, IgM Antibody.


INTRODUCTION

There are seasonal outbreaks in disease occurrence depending upon the endemic conditions and environmental influences. In developing countries, infectious diseases contribute to significant morbidity and mortality. Climate plays an important role in the transmission of infectious diseases and its impact can be attributed to the human behaviour, the disease pathogen and the vector.¹,²

Though respiratory infections and diarrheal diseases are the common causes of mortality and morbidity in children under five years, viral fevers are also the cause for admission in the hospital during certain seasons of the year. Commonly, the hospitalisations often increase in the monsoon period during the months of July to November in most of the regions across the world due to seasonal changes.³ Community acquired pneumonia has a seasonal peak in hospitalisations during winter, spring and the months of December and January.⁴ The vector borne diseases especially Malaria and Dengue increase with changes in the humidity, temperature, rainfall and pooling of water in the households. Despite panic like situation in outbreaks, medical professionals attempt to find out the aetiology of the outbreak, which though possible may not be feasible due to deficiency in the diagnostic facilities. In this present study, an attempt is made to find out the probable cause of fevers that occurred in the months of October and November 2015 in the district of Nellore in comparison to the months of August and September 2015.

METHODS

This study was a retrospective study carried out in the Paediatric Department at a newly commissioned Medical College Hospital at Nellore, Andhra Pradesh, with overall 750 beds and 100 paediatric beds. The data collection and analysis of results was carried out from December 2015 to February 2016. All the admitted children with a diagnosis of viral fever during August 2015 to November 2015 were included in the study. The information regarding age, gender, laboratory investigations were analysed to study the probable cause and its effect among admitted children and their outcome. The
details were retrieved from the medical records and admission registers.

RESULTS

A total of 596 children were admitted for various ailments during the period between August and November 2015 in Department of Paediatrics at Government General Hospital, Nellore attached to AGSR Government Medical College, Nellore. Out of the total 596 cases admitted, about 201 cases were diagnosed to be suffering from viral fever based on clinical criteria. Out of these total 201 cases, analysis of the age and gender distribution of children showed no gender discrimination in care seeking behaviour among parents. Majority of the children were above the age of 5 years. Overall, there is preponderance of male children (53.2%) compared to female children (46.8%). In all the age groups also, a higher proportion of male children was found compared to that of female children. However, the differences in the proportions of gender among various age groups was not statistically significant (P=0.08; NS) (Table 1 and Fig 1).

The number of cases per month revealed that viral fever cases accounted for only 6% of the total in the month of August and peaked in the month of October to 43.8%. This sudden increase in the cases is mainly attributed to an epidemic of viral fevers in the surrounding areas. Proportionately, the outpatient department of paediatrics has also seen a surge in the cases to three fold (Table 2 and Fig 2).

Out of a total of 201 cases, blood analysis for leucopenia and thrombocytopenia was done in 145 suspected individuals. It was found that out of these 145 cases, leucopenia was found in 8 cases (5.5%), thrombocytopenia in 75 cases (51.7%), while in 5 cases (3.4%) both leucopenia and thrombocytopenia was found. Investigation for NS1 antigen was done in 17 cases (8.5%), out of which 15 cases were positive (88.2%). Investigation for IgM antibodies against dengue was done in 109 cases (54.2%), out of which 41 cases (37.6%) were positive. The summary of the investigative findings are as depicted in Table 3.

Analysis of platelet count and its co-relation with NS1 antigen positivity and IgM antibodies against Dengue was carried out. It was found that the thrombocytopenia was found to be significantly higher in those cases with NS1 Ag positivity or IgM positive cases and also in the group of cases in whom either NS1 Ag or IgM is positive or both. Thus, NS1 Ag and IgM positivity was significantly associated with thrombocytopenia (Table 4).

The mean platelet count was found to be lower in those with ICU admission (95.711) compared to those without ICU admission (1,24,880), but the difference however was not statistically significant (P=0.08; NS) (Table 5).

To conclude, the occurrence of more cases of viral fever during the rainy season co-relates to increased incidence of the same due to seasonal changes. Further, during an outbreak in focal areas, the possibility of common viral fevers that had existed in the previous year should be kept in mind. The availability of the appropriate investigations during the outbreaks without loss of continuity shall enable us to know the incidence, involvement if any of other systems and the serotype of the dengue. The data can be utilized to take steps to prevent, limit the mortality or to control the outbreak.

<table>
<thead>
<tr>
<th>Month</th>
<th>No. of Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 2015</td>
<td>12</td>
<td>6.0</td>
</tr>
<tr>
<td>September 2015</td>
<td>24</td>
<td>11.9</td>
</tr>
<tr>
<td>October 2015</td>
<td>88</td>
<td>43.8</td>
</tr>
<tr>
<td>November 2015</td>
<td>77</td>
<td>38.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>201</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 1: Age and Gender Distribution of Children

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Parameter</th>
<th>No. of Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total Number of Viral Fever Cases</td>
<td>201</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>Blood Investigation done for Leucopenia and Thrombocytopenia</td>
<td>145</td>
<td>72.1</td>
</tr>
<tr>
<td>3</td>
<td>No. of cases with Leucopenia</td>
<td>8/145</td>
<td>5.5</td>
</tr>
<tr>
<td>4</td>
<td>No. of cases with Thrombocytopenia</td>
<td>75/145</td>
<td>51.7</td>
</tr>
<tr>
<td>5</td>
<td>No. of cases with both Leucopenia and Thrombocytopenia</td>
<td>5/145</td>
<td>3.4</td>
</tr>
<tr>
<td>6</td>
<td>Investigation done for NS1</td>
<td>17/201</td>
<td>8.5</td>
</tr>
<tr>
<td>7</td>
<td>No. of cases with NS1 Positivity</td>
<td>15/17</td>
<td>88.2</td>
</tr>
<tr>
<td>8</td>
<td>No. of cases investigated for IgM</td>
<td>109/201</td>
<td>54.2</td>
</tr>
<tr>
<td>9</td>
<td>No. of cases with IgM positivity</td>
<td>41/109</td>
<td>37.6</td>
</tr>
</tbody>
</table>

Table 3: Summary of Certain Laboratory Findings

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Group Investigated</th>
<th>No. of Cases Investigated</th>
<th>No. of Cases Positive</th>
<th>%</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NS1 Ag Positive</td>
<td>15</td>
<td>11</td>
<td>73.3</td>
<td>0.003; S</td>
</tr>
<tr>
<td>2</td>
<td>IgM Positive</td>
<td>41</td>
<td>23</td>
<td>56.1</td>
<td>0.005; S</td>
</tr>
<tr>
<td>3</td>
<td>Either NS1 Ag or IgM Positive</td>
<td>55</td>
<td>33</td>
<td>60.0</td>
<td>&lt;0.001; S</td>
</tr>
</tbody>
</table>

Table 4: Analysis of the Thrombocytopenia among NS1 or IgM Positive Cases

<table>
<thead>
<tr>
<th>ICU Admission</th>
<th>No. of Cases</th>
<th>Platelet Count Mean</th>
<th>SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>59</td>
<td>95,711</td>
<td>82,439</td>
<td>0.08; NS</td>
</tr>
<tr>
<td>No</td>
<td>142</td>
<td>1,24,880</td>
<td>1,16,463</td>
<td></td>
</tr>
</tbody>
</table>
DISCUSSION

An epidemic is the occurrence of more cases of disease than expected in a given area or among a specific group of people over a particular period of time. In contrast, a cluster is an aggregation of cases in a given area over a particular period without regard to whether the number of cases is more than expected. Outbreaks of fever due to various aetiologies occur during the months of July to November in various regions all over the world. Whenever there is a sudden surge in the children attending the outpatient clinics, it is indicative of the impending rise in hospitalisation of the sick children. In the present study, it was found that viral fever is the most common cause of hospitalisation during the months of October and November in contrast to August and September months. Kalyani and Shankar also found viral fever to be the commonest cause of disease burden. In order to identify the most probable cause of these viral fevers during the present study, the causative agents in the previous years have been considered.

In view of the rainy season and with the occurrence of Dengue or Chikungunya outbreaks in and around the region in the past, the possibility of Dengue was considered based on the symptoms. The common symptoms in the present study among viral cases were fever, myalgias, headache, vomiting followed by recovery or progress to severe Dengue, which includes Dengue Shock Syndrome and Dengue Haemorrhagic Fever. As per the WHO guidelines, the symptoms mentioned above correlate to the classification as probable Dengue. In older children, retro-orbital pain is also a significant symptom. The laboratory investigations in the present study revealed that about 51.1% cases had thrombocytopenia and a few cases had leucopenia. Laboratory diagnosis of confirming dengue is by detection of virus, viral nucleic acid, antigens or antibodies or both. During the early stages, virus isolation or antigen detection is helpful in diagnosis. NS1 is a marker of acute dengue infection, which is a non-structural protein detected in both primary and secondary infection cases during first 6 days of the illness. Dengue specific IgM antibody starts rising from 3-5 days of the onset of illness and peaks by 2 weeks after onset and persists till 3 months. IgM ELISA offers reliable diagnosis as done in the current study.

Dengue serotype confirmation is done by RT PCR (reverse transcriptase), which allows for a rapid identification. There are four distinct serotypes of dengue, which can cause infection (DENV-1, DENV-2, DENV-3 and DENV-4). In India, all four serotypes are identified of which the most widespread are DENV-1 and DENV-2. Dengue infection on recovery provides lifelong immunity against that particular serotype. Cross-immunity is only partial. There is an increased risk of development of severe dengue with subsequent infections by other serotypes. Irrespective of the serotypes of dengue virus, it was found that the NS1 antigen rises in the early phase of infection.

In the present study, NS1 antigen detection and IgM antibody levels to dengue infection were determined depending on the availability of the kits. The NS1 antigen was found to be positive in 15 of the 17 cases tested and IgM positivity was 41 of the 109 cases tested. In a study by Kassim et al, it was found that a combination of NS1 antigen and serology detection against dengue was comparable to PCR and serology. They concluded that the diagnostic efficiency in early diagnosis of dengue can be enhanced by combining NS1 antigen with serology. In a study by Datta and Wattal, it was found that NS1 antigen assay has high specificity in diagnosing dengue fever and dengue haemorrhagic fever during the first 4 days of illness. It was also noted that NS1 antigen and IgM positivity to thrombocytopenia was analysed and it was found that the degree of thrombocytopenia was higher wherever either of the above was positive. It was observed that high titre of NS1 antigen in the first 3 days of fever correlated with platelet count of less than one lakh and DHF. In a study by Paranavitane et al, it was concluded that NS1 antigen has been associated with severe dengue. Hence, the positivity to NS1 antigen should alert the treating clinician to closely monitor these children for early detection of the complications.

Thrombocytopenia was more commonly seen among children who were admitted in intensive care unit in comparison to those in the paediatric wards. Thrombocytopenia is defined as a platelet count below 1,50,000/cumm. Dengue is mostly a self-limiting illness diagnosed clinically and confirmed by laboratory investigations. Mortality is high among severe dengue.

In the present study, 2 children died due to severe dengue. As per WHO, 100 countries were found to be endemic for dengue. South East Asia and Western Pacific account for >70% of the disease burden. An estimated 390 million dengue infections occur per year, of which clinically manifested cases were about 96 million. Dengue is transmitted by the bite of a female Aedes aegypti mosquito, which is a daytime feeder with peak time of biting being early in the morning and in the evening before dusk. It breeds in fresh water and in water stored for drinking, bathing and in rain water collected in containers around the households. Urbanisation, limited flight range of the vector facilitates the outbreaks of infection during seasonal variation and these outbreaks can be explosive.
common. Dengue is an RNA virus with a peak incidence during the rainy season. There is a co relation between incidence of dengue cases and high larval index of Aedes aegypti during the same time. Anticipation of the possibility, early detection and confirmation may reduce the mortality in children.1 When cases are reported with similar symptoms in a cluster or different areas in a district, adequate measures can be taken to control by taking anti larval measures, vector control and reducing the transmission. It has been found in a study by Wongleun et al that higher incidence of dengue corresponded with increased Aedes larvae.2 In dengue endemic areas, the children are most affected.3 Worldwide, dengue virus is the most widespread of the arboviruses in the tropical and subtropical regions. There has been progress in prevention and control of infectious diseases with improvement of environmental conditions, hygiene, sanitation and use of vaccines.4 There is a seasonal rise in cases mostly during rainy season, which was noted in our study with more cases requiring admission during the months of October and November.

Development of climate-based dengue early warning systems may in future predict the probable epidemics and measures can be taken to contain the situation.5 Strengthening of the surveillance system for communicable and non communicable diseases shows the seasonal trends. This knowledge may allow the administrators to take measures in preventing the occurrence and to contain the outbreaks in future.6 Seasonal variation of communicable diseases is commonly observed in various parts of the world. This present study highlights the need to investigate when more cases are reported than the previous months and to keep in mind the pattern of fevers, environmental conditions and the possibility of vector borne diseases while investigating.

Limitation of the Study
Dengue virus isolation or serotype identification could not be done in the cases of viral fever due to lack of availability of the appropriate diagnostic facilities. The serology and NS1 antigen tests were done in few cases.

REFERENCES