A Comparative Study of Primary & Secondary Dengue in a Tertiary Care Centre

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ABSTRACT

Asia has been the area of highest dengue endemicity with all the dengue serotypes circulating in most countries. This leads to the high prevalence of secondary dengue infections in these areas; India being one among these. As secondary infections lead to complications more frequently than primary, it is essential that we distinguish the two groups of population. In this study a comparison of clinical & laboratory parameters of these groups are attempted. Headache, abdominal pain, vomiting, malena, pleural effusion, ascites, elevated SGOT, elevated haematocrit & thrombocytopenia were found in higher proportions in secondary dengue, which was statistically significant. Complications (DHF: dengue haemorrhagic fever & DSS: dengue shock syndrome) were also more in secondary dengue cases.

Key-words: primary & secondary dengue, clinical & laboratory parameters.

INTRODUCTION

The first major epidemic of dengue in India dates back to 1780, in Madras, from where it spread all over the country. [1] Analysis of dengue epidemics in Kerala illustrates that most of the cases had erupted in the mountainous environs of the Western Ghat ranges, the epicentre being Kottayam. [2] Dengue virus was first isolated in Kerala in 1979, in Trichur. [3] Cyclic dengue epidemics have been occurring since 2001. All the 4 dengue virus serotypes had been detected in Kerala in various epidemics. Complications (DHF: dengue haemorrhagic fever & DSS: dengue shock syndrome) usually accompany secondary dengue virus infections. [4] In this study a comparison of clinical features of primary & secondary dengue is attempted.

MATERIALS & METHODS

The study period extended from 16th August 2008 to 15th August 2009 (1 year). Patients admitted with suspected Dengue fever, satisfying the WHO criteria for dengue, in Department of Paediatrics and Department of Medicine, Government Medical College, Thiruvananthapuram were included in the study. 2126 blood samples were collected. IgM & IgG Dengue ELISA was done with the sera. Patients presenting with fever less than 4 days were chosen for molecular diagnosis (Polymerase Chain Reaction). This was done at Rajiv Gandhi Centre for Biotechnology. IgM and IgG ELISA were also done with the samples. IgM antibody was detected using Capture ELISA, NIV Pune & IgG
using IVD Microwell ELISA. The aim of the study is to compare clinical and laboratory parameters in primary and secondary dengue.

**SAMPLE SIZE & SAMPLING**

Sample size was fixed according to the formula, 
\[
\frac{(1.96)^2 \times P \times (1-P)}{L^2}
\]

- **P** = Prevalence
- **Q** = 1 - **P**
- **L** = Precision (20% of **P**)

The sample size was fixed as 150. 150 primary & 150 secondary were selected randomly. The 300 participants were further evaluated with the help of a proforma.

**Statistical Analysis**

Data was entered in Microsoft Excel format and analysed using SPSS V13. The data was compiled to form proportions and compared using Chi-square tests.

**RESULTS**

Of the 2126 samples 685 tested positive for dengue, 269 (39.27%) primary and 416 (60.73%) secondary. The serotype of the virus involved in this outbreak was found to be Dengue virus serotype 1.

The randomly selected 300 samples were studied in detail using proforma & the clinical & lab parameters of primary & secondary dengue were compared.

All the patients presented with fever. 43 (14.2%) of the total had rash. Headache was a common symptom in 57 (37.7%) primary & 74 (48.7%) secondary. 65 (21.5%) of the total study subjects had bodyache, 113 (37.3%) had myalgia and 33 (10.9%) had arthralgia. 18 (5.9%) of the subjects had retroorbital pain. Vomiting was noted in 37 (24.5%) primary & 68 (44.7%) secondary. 26 (17.2%) primary & 39 (25.7%) secondary dengue had abdominal pain.

Bleeding manifestations noted were purpura, petechiae, epistaxis, bleeding gums, ecchymosis, menorrhagia, hematuria, hematemesis, malena etc. One patient had subconjunctival haemorrhage and one with secondary dengue had retinal bleeding.

68 (22.4%) of the total subjects had clinical / sonological evidence of hepatomegaly. This included 29 primary & 39 secondary cases. 33 (10.9%) subjects had splenomegaly; 13 primary & 20 secondary. Myocarditis was documented in 8 (2.6%) cases. 3 (2%) each had pleural effusion & ascites in the primary dengue group. This was 19 (12.5%) & 22 (14.5%) respectively in the secondary cases. 2 (0.7%) with secondary dengue had pericardial effusion.

**TABLE 1:** Distribution of different signs, symptoms & laboratory findings in primary & secondary dengue

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>PRIMARY</th>
<th>SECONDARY</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rash</td>
<td>23</td>
<td>20</td>
<td>0.362</td>
</tr>
<tr>
<td>Headache</td>
<td>57</td>
<td>74</td>
<td>0.035</td>
</tr>
<tr>
<td>Bodyache</td>
<td>32</td>
<td>33</td>
<td>0.512</td>
</tr>
<tr>
<td>Myalgia</td>
<td>56</td>
<td>57</td>
<td>0.518</td>
</tr>
<tr>
<td>Arthralgia</td>
<td>16</td>
<td>17</td>
<td>0.308</td>
</tr>
<tr>
<td>Retro orbital pain</td>
<td>12</td>
<td>6</td>
<td>0.109</td>
</tr>
<tr>
<td>Vomiting</td>
<td>37</td>
<td>68</td>
<td>0.0001</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>26</td>
<td>39</td>
<td>0.049</td>
</tr>
<tr>
<td>Malena</td>
<td>7</td>
<td>21</td>
<td>0.006</td>
</tr>
<tr>
<td>Hepatomegaly</td>
<td>29</td>
<td>39</td>
<td>0.113</td>
</tr>
<tr>
<td>Splenomegaly</td>
<td>13</td>
<td>20</td>
<td>0.139</td>
</tr>
<tr>
<td>Myocarditis</td>
<td>2</td>
<td>6</td>
<td>0.143</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>3</td>
<td>19</td>
<td>0.0001</td>
</tr>
<tr>
<td>Ascites</td>
<td>3</td>
<td>22</td>
<td>0.0001</td>
</tr>
<tr>
<td>Skin/ mucosal bleeding</td>
<td>12</td>
<td>22</td>
<td>0.052</td>
</tr>
<tr>
<td>Leucopenia</td>
<td>30</td>
<td>22</td>
<td>0.073</td>
</tr>
<tr>
<td>Raised SGOT</td>
<td>96</td>
<td>134</td>
<td>0.006</td>
</tr>
<tr>
<td>Elevated haematocrit</td>
<td>29</td>
<td>50</td>
<td>0.010</td>
</tr>
<tr>
<td>Thrombocytopenia (&lt;100000)</td>
<td>75</td>
<td>108</td>
<td>0.0001</td>
</tr>
<tr>
<td>Complications (DHF/DSS)</td>
<td>9</td>
<td>48</td>
<td>0.0001</td>
</tr>
</tbody>
</table>
DISCUSSION

150 cases each of primary & secondary dengue were studied in detail & a comparison of clinico-laboratory parameters was attempted between the two.

43 (14.2%) had rash with no significant difference between the two study groups. This may be because of the complexion which makes it difficult to interpret rash. Headache was significantly higher in secondary dengue (p value 0.036) (figure 1).

Vomiting was noted in 37 (24.5%) primary & 68 (44.7%) secondary cases which were statistically significant (p value 0.0001). 26 (17.2%) primary & 39 (25.7%) secondary complained of abdominal pain. This was statistically significant (p value 0.049). Similar findings were noted in several studies; the variables seen in higher proportion in secondary dengue cases. [5]

No difference was noted in the two study groups in terms of myalgia, body ache & arthralgia, though some studies have reported a higher incidence of myalgia in secondary dengue. [6] Chitsanu et al reported that myalgia is found in equal proportions in both groups. [5] Bleeding manifestations like petechiae/ecchymosis showed no preponderance in primary/secondary.

Malena was seen in 7 (4.6%) primary & 21 (13.8%) secondary dengue (p value 0.003). Malena was one of the commonest presentations in a study in Delhi. [7] Palmar erythema, facial puffiness, itching & retro orbital pain was seen in equal proportion in the two groups. Retroorbital pain was noted in equal proportions in primary & secondary dengue in other studies as well. [8]

Hepatomegaly & splenomegaly (clinical/sonological) had no association with the dengue type. Other studies have also reported similar findings. [5]

Proportion of pleural effusion & ascites was significantly higher in secondary dengue (p value 0.0001). A study conducted at Dhaka showed higher proportions of pleural effusion & ascites in secondary dengue. [9]

Thrombocytopenia, platelet counts less than 100,000, was noted more in secondary dengue (p value 0.0001) (figure 2). So many studies document this finding. [10] Haematocrit values > 40 was observed in 29(19.2%) primary & 50(32.89%) secondary cases, which was statistically significant (p value 0.01). Chitsanu et al. showed that haematocrit values are significantly lower in primary dengue fever. [5]

Leucopenia of <3000 was observed in 30(20.5%) primary & 22(14.6%) secondary dengue.
secondary. 48(32.9%) primary & 40(26.5%) secondary dengue cases had a total leucocyte count between 3000 & 4500. Though leucopenia is more associated with primary dengue, it was not statistically significant. Significant leucopenia was a feature of primary dengue in one study. [5]

Elevated levels of SGOT were noted more in secondary dengue, which was statistically significant (p value 0.006). SGOT values have been shown to be elevated in dengue fever, independent of SGPT values. [11, 12] No significant association was documented between dengue types & total protein/albunim.

9 cases of primary dengue had DHF/DSS, which included 3 adults. Complications in adults following primary dengue have been reported earlier. [13] 48 of secondary dengue had DHF/DSS (figure 3)

CONCLUSION

Headache, abdominal pain, vomiting, malena, pleural effusion, ascites, elevated SGOT, elevated haematocrit & thrombocytopenia were found in higher proportions in secondary dengue, which was statistically significant. Leucopenia was observed more in primary dengue cases, though not statistically significant. Clinical symptoms like myalgia, bodyache and arthralgia were found to be equally distributed among the two study groups. Complications (DHF: dengue haemorrhagic fever & DSS: dengue shock syndrome) were more in secondary dengue cases.

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