Concurrent Infection with Dengue and Chikungunya in Malaria Patients

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Abstract: Vector borne diseases like Dengue, malaria and chikungunya are endemic in India. Dual infections of chikungunya and dengue are becoming more common in India and there were earlier case reports of dengue, chikungunya and malaria co-infection. This is a study describing presence of two viral infections along with vector borne parasitic infection in a single patient with overlapping clinical symptoms. The clinical features common to all the three diseases are prolonged fever, backache, joint pain, rash, headache, running nose and epistaxis causing challenge in diagnostic segregation based on the symptoms alone. This study is a cross sectional randomised sample study of 40 children with sudden onset of fever presented with or without rash, thrombocytopenia and splenomegaly. Data was collected in Months of 1st June to 30th October 2018 from RIMS, RANCHI, JHARKHAND. Hence forth the above study showed that Patient with triple infections and co-infections had better prognosis.

I. Introduction

Vector borne diseases like Dengue, malaria and chikungunya are endemic in India. Dual infections of chikungunya and dengue are becoming more common in India (1,2), and there were earlier case reports of dengue, chikungunya and malaria co-infection (3) including in RIMS. In India, the first case of concurrent infections with dengue, chikungunya and malaria was published by Hati et al (4) in 2016. This is a study describing presence of two viral infections along with vector borne parasitic infection in a single patient with overlapping clinical symptoms. The clinical features common to all the three diseases are prolonged fever, backache, joint pain, rash, headache, running nose and epistaxis causing challenge in diagnostic segregation based on the symptoms alone. The current study aims to build growing awareness and education about the co-infections among physicians for further diagnosis and management.

II. Material And Methods

This cross sectional randomised sample study was carried out on patients of Department of Paediatrics at Rajendra Institute Of Medical Sciences, Bariatu, Ranchi, Jharkhand From June 2018 To October 2018. A total 40 subjects (both male and females) of aged < 19, years were for in this study.

Study Design: cross sectional randomised sample study.
Study Location: This was a tertiary care teaching hospital based study done in Department of Paediatrics and Neonatology at Rajendra Institute Of Medical Sciences, Bariatu, Ranchi, Jharkhand
Study Duration: June 2018 To October 2018.
Sample size: 40 patients.
Subjects & selection method: The study population was drawn from all febrile patients who presented to OPD and Ward of Department of Paediatrics and Neonatology with fever >7 days and were positive for malaria (Pv, Pf or PanPf) not cured with antimalarial from June 2018 To October 2018. Patients were divided into four groups as follows:
Group A - MALARIA MONOINFECTION
Group B - MALARIA, CHIKV AND DENV COINFECTION
Group C - MALARIA AND DENV COINFECTION
Group D - MALARIA AND CHIKV COINFECTION

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Inclusion criteria:
1. All febrile patients [ >7days] positive for malaria (Pv,Pf or PanPf) coming in OPD and ward of RIMS, Ranchi, Jharkhand.

Exclusion criteria:
1. All febrile patients [ <7days] positive for malaria (Pv,Pf or PanPf).

Limitations:
1. Small number of sample size.
2. Even smaller number of coinfected samples.
3. Prevalence of coinfection might be different in larger sample size.

Procedure methodology:
• After written informed consent from parents was obtained, blood sample were sent to look for presence of malarial parasite then dengue(dengue IgM [NIV Pune kit]) and chikungunya (Chikungunya IgM [NIV Pune kit]) serology positive cases.

Statistical analysis:
Data were not statistically significant.

III. Result
Out of 40 malaria positive samples, 5 sample were positive for triple infection of MALARIA, CHIKV AND DENV. 3 samples were positive for coinfection of MALARIA AND DENV. None with MALARIA and CHIKV coinfection.

Clinical characteristics of patients with malaria monoinfections and coinfections were similar. only 1 of them presented with rash.
All other associations were not statistically significant.

FIGURE - Characteristics of patients infected with chikungunya virus, dengue virus, or both, in malaria positive patients.

<table>
<thead>
<tr>
<th>TOTAL SAMPLE(40)</th>
<th>MALARIA MONOINFECTION</th>
<th>MALARIA, CHIKV AND DENV</th>
<th>MALARIA AND DENV</th>
<th>MALARIA and CHIKV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>32/40</td>
<td>5/40(12.5%)</td>
<td>3/40(7.5%)</td>
<td>0</td>
</tr>
<tr>
<td>SEX</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MALE</td>
<td>14</td>
<td>2/5</td>
<td>2/3</td>
<td>0</td>
</tr>
<tr>
<td>FEMALE</td>
<td>18</td>
<td>3/5</td>
<td>1/3</td>
<td>0</td>
</tr>
<tr>
<td>AGE[Y]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5</td>
<td>15/32</td>
<td>3/5</td>
<td>1/3</td>
<td>0</td>
</tr>
<tr>
<td>5-10</td>
<td>11/32</td>
<td>1/5</td>
<td>2/3</td>
<td>0</td>
</tr>
<tr>
<td>10-15</td>
<td>3/32</td>
<td>0/5</td>
<td>0/3</td>
<td>0</td>
</tr>
<tr>
<td>15-19</td>
<td>3/32</td>
<td>1/5</td>
<td>0/3</td>
<td>0</td>
</tr>
<tr>
<td>SIGN AND SYMPTOMS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEVER</td>
<td>32/32</td>
<td>5/35[100%]</td>
<td>3/3[100%]</td>
<td></td>
</tr>
<tr>
<td>RASH</td>
<td>1/32</td>
<td>1/5</td>
<td>0/3</td>
<td></td>
</tr>
<tr>
<td>THROMBOCYTOPENIA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>2/5</td>
<td>2/5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>0</td>
<td>3/5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>IMPAIRED CONSCIOUSNESS/COMA</td>
<td>8/32</td>
<td>3/5</td>
<td>0/3</td>
<td></td>
</tr>
<tr>
<td>CONVULSIONS</td>
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<td>1/5</td>
<td>0/3</td>
<td></td>
</tr>
<tr>
<td>NAUSEA</td>
<td>12/32</td>
<td>3/5</td>
<td>1/3</td>
<td></td>
</tr>
<tr>
<td>VOMITING</td>
<td>10/32</td>
<td>3/5</td>
<td>1/3</td>
<td></td>
</tr>
<tr>
<td>HEADACHE</td>
<td>12/32</td>
<td>3/5</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>JOINTPAIN</td>
<td>3/32</td>
<td>1/5</td>
<td>0/3</td>
<td></td>
</tr>
<tr>
<td>DEATH</td>
<td>1/32</td>
<td>0/5</td>
<td>0/3</td>
<td></td>
</tr>
</tbody>
</table>
IV. Discussion

The first case of coinfection with dengue and malaria by P. falciparum was published by Charrel et al. (5) in 2005 and Hati et al. (1) in 2012.

Bhalla et al. (6) reported first case of concurrent infection of dengue and malaria in India in 2005.

- Patient with triple infections and co-infections had better prognosis.
- Clinical characteristics of patients with malaria monoinfections and coinfections were similar.
- All had longer febrile period.
- Coinfections are associated with MODERATE to severe thrombocytopenia.
- Only 1 of them presented with rash.
- All associations were not statistically significant.

Antibody mediated cross antigen reduction theory

- Usually in dengue infection, we see that presence of Antibody against one strain cause enhancement of antigen of 2nd strain leading to more severe infection and death of patient. This is called Antibody mediated antigen enhancement phenomenon.
- In our study, patient suffering from 3 diseases simultaneously survive without any sequelae of adverse outcome. This observation prompted us to speculate whether a phenomenon Antibody mediated cross antigen reduction taking place or not?
- This observation need further research and peer review to finally quantify the phenomenon.

V. Conclusion

- Mosquitoborne infections are important public health concerns worldwide.
- Thus, there is a great need to increase the awareness and education about the coinfections among physicians for diagnosis and management.
- Failure to delay to recognize the concurrent infections can delay the initiation of proper therapy resulting in increased morbidity and mortality.
- Hence this study emphasizes the need for multidimensional diagnostic approach.

References