Co-Existence of Dengue Fever And Malaria In Patients Presenting With Febrile Illness

Muhammad Samsoor Zarak¹, Jaffar Khan², Maham Malik³, Noman Ul Haq⁴, Aqeel Nasim⁴, Sohail Riaz⁴, Muhammad Saood⁴, Salia rakar¹, Hamaiyal sana¹, Zara Arshad¹ and Asad Ullah⁵

Abstract

Objective: To determine the co-existence of dengue fever and malaria in patients presenting with febrile illness.

Introduction: Malaria is world’s most widespread infection. It occurs throughout most of the tropical regions of the world. Plasmodium falciparum predominates in Africa, plasmodium vivax is more common in Central America, plasmodium malariae is found in most endemic areas, especially throughout Africa, plasmodium ovale is unusual outside of Africa and comprises <1% of isolates. The rationale of this study is to confirm co-infections (malaria and dengue) in our setup in order to treat and prevent complications of co-existing disease. Secondly, both diseases are associated with bleeding disorder hence by making proper diagnosis we can prevent risk of bleeding.

Material And Methods: A cross sectional study was done at Department of Medicine, Shaikh Zayed Medical Complex, Lahore. The time frame of the study was from 5-10-2016 to 5-4-2017. This study a total of 150 patients were observed. By taking all aseptic measures 3ml blood was taken in three bottles (one CBC and two serum bottles). One serum bottle was clearly marked with hospital number and patient name and sent to the outside laboratory in order to check Anti Brucella antibodies, typhidot test and Paul Bunnell and Monospot test of Infectious mononucleosis. 2nd serum bottle was clearly marked with hospital number and patient name and sent to the laboratory in order to check dengue virus antigen, dengue serology, CBC bottle was sent to check malaria parasite by making thick and thin films. Results: In the present study mean age of study patients was 40.02 ± 14.4 years. The female and male gender proportions were 61% and 39% respectively. Our study concludes that the co-existence of dengue fever and malaria was 19% in patients presenting with febrile illness.

Conclusion: Our study concludes that the co-existence of dengue fever and malaria was 19% in patients presenting with febrile illness.

Keywords
dengue fever, Malaria, Co- existence

Introduction

Malaria is world’s most widespread infection. It occurs throughout most of the tropical regions of the world. Plasmodium falciparum predominates in Africa, plasmodium vivax is more common in Central America, plasmodium malariae is found in most endemic areas, especially throughout Africa, plasmodium ovale is unusual outside of Africa and comprises <1% of isolates.¹

According to the latest estimates, there were about 219 million cases of malaria in 2010 and an estimated 660,000 deaths. Malaria mortality rates have fallen by more than 25% globally since 2000 and by 33% in the WHO African region. Most deaths occur among children in Africa where a child dies every minute from malaria. The disease remains one of the most important causes of human morbidity and mortality with enormous medical, economic and emotional impact in the world. In most African countries, the number of cases reported annually decreased by 50% between 2000 and 2010.²

More than 75% of total area of Ethiopia is malarious, making malaria the leading public health problem in Ethiopia. Individuals with poor socio-economic status are positively associated with malaria infection. Improving the housing conditions has reduced the risk of malaria in Ethiopia.³

95 million of Pakistan’s 181 million people are at risk from malaria, which resulted in a suspected 4.5 million cases of the disease in 2008. Only 59,284 of these cases were confirmed however, and due to the lack of effective monitoring and evaluation systems, it is unknown how many deaths are linked to malaria.⁴ Some estimates true disease burden as larger as between 500,000 and 1.6 million cases a year.⁵ The disease is estimated to account for 6% of all outpatient attendances and 18% of admissions.⁶

Dengue is a fast spreading arthropod borne viral disease associated with a significant public health impact. Dengue fever had a sporadic distribution in the 19th century.

References:

1. Bolan Medical College, Quetta, Pakistan.
2. Department of Clinical Pathology, Cincinnati children’s hospital, Cincinnati Ohio USA.
3. Information Analyst at Duke University, USA.
4. Department of Pharmacy Practice, University of Baluchistan, Pakistan.
5. Department of Pathology, Augusta University, USA.
Today approximately 500,000 patients suffer from dengue hemorrhagic fever and dengue shock syndrome, whereas, 20,000 acquire disease annually. The global burden of the disease is suspected to parallel that of malaria and tuberculosis, imposing grave economic challenges for communities and governments. In Pakistan, the first serologically confirmed case of dengue fever was reported in the city of Karachi in 1994. The numbers of cases have subsequently increased from 4,500 cases reported in Karachi in 2005 to 21,204 cases in the country in 2010. Lahore alone confirmed 14,000 cases and 300 deaths from dengue fever in 2011. Some people believe that these figures do not depict the actual burden of disease in the country, the true burden being more than reported.

A study by Arslan showed, seropositivity f or dengue virus in Pakistan was found in 71.5% patients. However they did not find significant statistical association of seropositivity with demographic variables.

In general, malaria is a protozoa infectious. The pathogen is one of five human pathogenic species of Plasmodium. The mosquito vector is Anopheles. Whereas dengue is a viral infection. The pathogen is dengue virus. The mosquito vector is aedes aegypti. Both diseases can cause acute febrile illness. However, malaria can be chronic while dengue cannot. The clinical feature of both diseases most of the times are overlapping. The specific triads of dengue, atypical lymphocytosis, hemoconcentration and thrombocytopenia might be a clue for differential diagnosis of dengue infection.

A study by Shazia et al.co-infections (Dengue and Malaria) were diagnosed in 5 (5.6%) of cases. Mean (±SD) age of 5 positive cases of co-infection was 37.8 (±8.3) years. Another study by Carme et al in French Guiana, the specific rate of concurrent malaria and dengue infection from overall febrile patients was equal to 0.99%. The percentage of dual dengue and malaria in Karachi was 23% in 2009.

The rationale of this study is to confirm dual infections (malaria and dengue) in our setup in order to treat and prevent complications of co-existing disease. Secondly, both diseases are associated with bleeding disorder hence by making proper diagnosis we can prevent risk of bleeding.

Material And Methods

Settings
Department of Medicine, Shaikh Zayed Medical Complex, Lahore.


Study Design
cross sectional study

Sample Size Sample size has been calculated with WHO sample size calculator according to following assumptions: Confidence level = 95% Population proportion 23% Absolute precision = 9%. Total sample size was 146 patients. Round off 150.

Inclusion criteria Patient of both genders, age more than 14-60 years having high grade fever for at least 7 days.

Exclusion criteria Patients already having a disease which may cause febrile illness like Gastroenteritis was excluded on the basis of detail history, clinical examination and stool R/E. Typhoid fever was excluded on the basis of detail history, clinical examination and by doing, blood cultures. Respiratory tract infections that was excluded on the basis of detail history, clinical examination and by doing chest X-ray. Urinary tract infections that were excluded by doing urine R/E. Infectious mononucleosis that was excluded by doing Paul Bunnel and Monospot test. Brucellosis that was excluded by doing anti Brucella antibodies.

Data Collection
Before initiating study enrollment, an ethical approval for the study was gained from the hospital ethics committee. After fulfillment of the study inclusion criteria the patients were selected from the wards of General Medicine department. After taking informed consent from the patients they were enrolled in study. History was taken in detail from the patients and a thorough examination was performed. The purpose of the study was explained to the patients. The patients were informed that the clinical feature of both diseases most of the times are overlapping, so we are performing the tests of both diseases. By taking all aseptic measures 3ml blood was taken in three bottles (one CBC and two serum bottles). One serum bottle was clearly marked with hospital number and patient name and sent to the outside laboratory in order to check Anti Brucella antibodies, typhidot test and Paul Bunnel and Monospot test of Infectious mononucleosis. The second serum bottle was clearly marked with hospital number and patient name and sent to the laboratory in order to check dengue virus antigen, dengue serology, CBC bottle was sent to check malaria parasite by making thick and thin films. The aim of checking complete blood count is to keep an eye on patient’s hemoglobin and platelets count. The reports were prepared by consultant Biochemist and consultant Hematologist. The reports were collected by postgraduate trainee. The results were written on specially designed proforma. All the study information were recorded on a specifically designed proforma

Data Analysis
Data was entered and analyzed on computer-based statistical software SPSS version 16. Frequencies and percentages were calculated for categorical variables like gender, occupation, educational status, monthly family income and malaria, co infection of . Mean and standard deviations was calculated from continuous numerical variables like age. The results were described and also presented as tables and graphs. Effect modifiers like age, gender, occupation, educational status and monthly family income and malaria were controlled by stratification. Post stratification chi-square test was applied. P value ≤ 0.05 was significant.

Results
In our study 150 patients presenting with febrile illness for 7 days were enrolled. The mean age of study patients was 40.02 ± 14.4 years ranging from 14 to 60 years. Most of the patients almost 80% were below 50 years of age. While
about 20% were above 50 years of age. The female gender was predominant with 61% proportion compared to males who were 39% in the current study. (Table 1) (Figure II)

**Table 1. AGE DISTRIBUTION (n = 150)**

<table>
<thead>
<tr>
<th>Age categories (years)</th>
<th>FREQUENCY</th>
<th>PERCENTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 to 20</td>
<td>19</td>
<td>12.6%</td>
</tr>
<tr>
<td>21 to 30</td>
<td>31</td>
<td>20.6%</td>
</tr>
<tr>
<td>31 to 40</td>
<td>27</td>
<td>18%</td>
</tr>
<tr>
<td>41 to 50</td>
<td>43</td>
<td>28.6%</td>
</tr>
<tr>
<td>51 to 60</td>
<td>30</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Figure 1. GENDER DISTRIBUTION (n = 150)**

In our study 36% of the patients were illiterate, 38(26%) patients had primary education, 18(11.5%) patients had secondary education, 13(8.5%) patients had intermediate education, 12(8%) patients were graduates while 15(10%) patients were post graduates. The family income of patients was < Rs. 10000/= in 110 (73.5%) cases while the 40 (26.5%) of the study patients had income more than Rs. 10000/=. Most of the patients 126 (84%) were enrolled form the outpatient department in our study while 24(16%) came from inpatient department. 92 (62%) patients had low education status. (Table 2,3)

![Gender distribution](image)

**Table 2. EDUCATION STATUS (n = 150)**

<table>
<thead>
<tr>
<th>Place of residence</th>
<th>Number of Diabetic Patient</th>
<th>%age of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>54</td>
<td>36%</td>
</tr>
<tr>
<td>Primary</td>
<td>38</td>
<td>26%</td>
</tr>
<tr>
<td>Secondary</td>
<td>18</td>
<td>11.5%</td>
</tr>
<tr>
<td>Intermediate</td>
<td>13</td>
<td>8.5%</td>
</tr>
<tr>
<td>Graduation</td>
<td>12</td>
<td>8%</td>
</tr>
<tr>
<td>Post Graduation</td>
<td>15</td>
<td>10%</td>
</tr>
</tbody>
</table>

**Table 3. DISTRIBUTION OF FAMILY INCOME (n = 150)**

<table>
<thead>
<tr>
<th>FAMILY INCOME</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low income Families (&lt; Rs. 10,000)</td>
<td>110</td>
<td>73%</td>
</tr>
<tr>
<td>High income Families (&gt; Rs. 10,000)</td>
<td>40</td>
<td>27%</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Table 4. OCCUPATION (n = 150)**

<table>
<thead>
<tr>
<th>OCCUPATION</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>outdoor</td>
<td>105</td>
<td>70%</td>
</tr>
<tr>
<td>indoor</td>
<td>45</td>
<td>30%</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Table 5. CO INFECTION (n=150)**

<table>
<thead>
<tr>
<th>CO INFECTION</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>28</td>
<td>19%</td>
</tr>
<tr>
<td>No</td>
<td>122</td>
<td>81%</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>100%</td>
</tr>
</tbody>
</table>

Chi Square test was applied in which P value was 0.0260

**Table 6. STRATIFICATION OF CO INFECTION W.R.T GENDER DISTRIBUTION (n=150)**

<table>
<thead>
<tr>
<th>CO INFECTION</th>
<th>MALE</th>
<th>FEMALE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>16(11%)</td>
<td>12(8%)</td>
<td>28</td>
</tr>
<tr>
<td>No</td>
<td>42(28%)</td>
<td>80(53%)</td>
<td>122</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>92</td>
<td>150</td>
</tr>
</tbody>
</table>

Chi Square test was applied in which P value was 0.0129

**Table 7. STRATIFICATION OF CO INFECTION W.R.T EDUCATION LEVEL (n=150)**

<table>
<thead>
<tr>
<th>CO INFECTION</th>
<th>illiter-</th>
<th>pri-</th>
<th>sec-</th>
<th>inter-</th>
<th>Post</th>
<th>grad-</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>9</td>
<td>10</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>No</td>
<td>45</td>
<td>28</td>
<td>16</td>
<td>13</td>
<td>6</td>
<td>14</td>
<td>122</td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>38</td>
<td>18</td>
<td>13</td>
<td>12</td>
<td>15</td>
<td>150</td>
</tr>
</tbody>
</table>

Chi Square test was applied in which P value was 0.0056
The mean age of study patients was 40.02 ± 14.4 years. The female dengue and malaria in Karachi was 23% in 2009. While patients was 46.02 ± 11.12 years. The percentage of dual by Tahir et al. (57%).

Another study by Carme in French Guiana, the prevalence of co-infections (Dengue and Malaria) were diagnosed in 5 (5.6%) cases. Mean (±SD) age of 5 positive cases of co-infection was 37.8 (±8.3) years. Contrary to this, in our study, where 150 patients were studies. The mean age of study patients was 40.02 ± 14.4 years ranging from 14 to 60 years. The female were more likely to have co-existed infection 16 (57%).

A study by Aliya et al.18 that was done in sindh province of Pakistan, of the total, 349 (69.8%) were males and 151 (30.2%) females. Dengue serology was positive in 16 (3.2%); 81(16.2%) had malaria parasite slide positive; 403 (80.4%) had none of two findings. Co-existence of both dengue and malaria was nil among the whole sample. In males, 67 (13.4%) had malaria, while 11 (2.2%) had dengue. In females, 14 (2.8%) had malaria, while 5 (1%) suffered from dengue fever.

Contrary to this, in our study, where 150 patients were studies. The mean age of study patients was 40.02 + 14.4 years ranging from 14 to 60 years. The female were predominant 61% compared to males 39%. Among the 150 patients, 68 (45%) had malaria only, 54 (36%) had dengue fever only, 28 (19%) had co existed infections. In our study we found out that females 16 (57%) were more likely to have co-existed infection compared to males 12 (43%). Patients having low education status had more likely to have co-existed infection compared to patients having high education status. Middle Aged patients had more likely to have co-existed infection compared to teenage and old ages.

Dengue and malaria have increased the overall burden of communicable diseases in Pakistan. Coexistence of these two preventable diseases is very important to understand as they have entirely different treatment protocols. Simultaneous presence of both viruses in one individual can easily be ignored. In our study, the coexistence frequency was zero per cent which contradicts the results of other studies 1%19 and 23.21%.20

A study by Abbas et al.21 conducted a case series on clinical features, diagnostic techniques and management outcome of patients having dual dengue and malaria infection in Karachi in 2007-08. Out of 114, antibody titer immunoglobulin (IgM) found positive in 78 (69.64%) patients among which 26 (23.21%) were concomitantly positive for malarial parasite (group A); 52 (46.42%) patients were dengue IgM positive and malarial parasite (MP) negative (Group B); 34 (30.35%) were MP and dengue IgM negative, but were strongly suspected for DHF and malaria on clinical and haematological basis (Group C). The platelet count was markedly low in 84.61% of patients of group A; 57.69% of group B; and 94.11% of group C. Leukopenia was found in 34.61% patients of group A; 57.69% of group B; and 94.11% in group C. Contrary to Abbas et al study, in which frequency of dual nature of dengue and malaria was found to be 23.21%, our study included 150 study patients, 68 (45%) had malaria only, 54 (36%) had dengue fever only, 28 (19%) had co existed infections. Females 16 (57%) were more likely to have co-existed infection compared to males 12 (43%). Patients having low education status had more likely to have co-existed infection compared to patients having high education status. Middle Aged patients had more likely to have co-existed infection compared to teenage and old ages.

Discussion

Malaria is world’s most widespread infection. It occurs throughout most of the tropical regions of the world. According to the latest estimates, there were about 219 million cases of malaria in 2010 and an estimated 660 000 deaths. Malaria mortality rates have fallen by more than 25% globally since 2000 and by 33% in the WHO African region. 95 million of Pakistan’s 181 million people are at risk from malaria, which resulted in a suspected 4.5 million deaths. Malaria mortality rates have fallen by more than 23.21%.

Another study by Shazia et al.15 co-infections (Dengue and Malaria) were diagnosed in 5 (5.6%) of cases. Mean (±SD) age of 5 positive cases of co-infection was 37.8 (±8.3) years. Contrary to this, in our study, where 150 patients were studies. The mean age of study patients was 40.02 + 14.4 years ranging from 14 to 60 years. The female were predominant 61% compared to males 39%. Patients having low education status had more likely to have co-existed infection compared to males 12 (43%). Patients having low education status had more likely to have co-existed infection compared to patients having high education status. Middle Aged patients had more likely to have co-existed infection compared to teenage and old ages.

A study by Tahir et al.17 done in Karachi, the mean age of study patients was 46.02 + 11.12 years. The percentage of dual dengue and malaria in Karachi was 23% in 2009. While in our study, where 150 patients were studied. The mean age of study patients was 40.02 + 14.4 years. The female were predominant 61% compared to males 39%.28 (19%) patients had co existed infections. Female gender and middle aged people were more likely to have co-existed infection 16 (57%).

A study by Aliya et al.18 that was done in sindh province of Pakistan, of the total, 349 (69.8%) were males and 151 (30.2%) females. Dengue serology was positive in 16 (3.2%); 81(16.2%) had malaria parasite slide positive; 403 (80.4%) had none of two findings. Co-existence of both dengue and malaria was nil among the whole sample. In males, 67 (13.4%) had malaria, while 11 (2.2%) had dengue. In females, 14 (2.8%) had malaria, while 5 (1%) suffered from dengue fever.

Contrary to this, in our study, where 150 patients were studies. The mean age of study patients was 40.02 + 14.4 years ranging from 14 to 60 years. The female were predominant 61% compared to males 39%. Among the 150 patients, 68 (45%) had malaria only, 54 (36%) had dengue fever only, 28 (19%) had co existed infections. In our study we found out that females 16 (57%) were more likely to have co-existed infection compared to males 12 (43%). Patients having low education status had more likely to have co-existed infection compared to patients having high education status. Middle Aged patients had more likely to have co-existed infection compared to teenage and old ages.

Dengue and malaria have increased the overall burden of communicable diseases in Pakistan. Coexistence of these two preventable diseases is very important to understand as they have entirely different treatment protocols. Simultaneous presence of both viruses in one individual can easily be ignored. In our study, the coexistence frequency was zero per cent which contradicts the results of other studies 1%19 and 23.21%.20

A study by Abbas et al.21 conducted a case series on clinical features, diagnostic techniques and management outcome of patients having dual dengue and malaria infection in Karachi in 2007-08. Out of 114, antibody titer immunoglobulin (IgM) found positive in 78 (69.64%) patients among which 26 (23.21%) were concomitantly positive for malarial parasite (group A); 52 (46.42%) patients were dengue IgM positive and malarial parasite (MP) negative (Group B); 34 (30.35%) were MP and dengue IgM negative, but were strongly suspected for DHF and malaria on clinical and haematological basis (Group C). The platelet count was markedly low in 84.61% of patients of group A; 57.69% of group B; and 94.11% of group C. Leukopenia was found in 34.61% patients of group A; 57.69% of group B; and 94.11% in group C. Contrary to Abbas et al study, in which frequency of dual nature of dengue and malaria was found to be 23.21%, our study included 150 study patients, 68 (45%) had malaria only, 54 (36%) had dengue fever only, 28 (19%) had co existed infections. Females 16 (57%) were more likely to have co-existed infection compared to males 12 (43%). Patients having low education status had more likely to have co-existed infection compared to patients having high education status. Middle Aged patients had more likely to have co-existed infection compared to teenage and old ages.

Dengue and malaria have increased the overall burden of communicable diseases in Pakistan. Coexistence of these two preventable diseases is very important to understand as they have entirely different treatment protocols. Simultaneous presence of both viruses in one individual can easily be ignored. In our study, the coexistence frequency was zero per cent which contradicts the results of other studies 1%19 and 23.21%.20

A study by Abbas et al.21 conducted a case series on clinical features, diagnostic techniques and management outcome of patients having dual dengue and malaria infection in Karachi in 2007-08. Out of 114, antibody titer immunoglobulin (IgM) found positive in 78 (69.64%) patients among which 26 (23.21%) were concomitantly positive for malarial parasite (group A); 52 (46.42%) patients were dengue IgM positive and malarial parasite (MP) negative (Group B); 34 (30.35%) were MP and dengue IgM negative, but were strongly suspected for DHF and malaria on clinical and haematological basis (Group C). The platelet count was markedly low in 84.61% of patients of group A; 57.69% of group B; and 94.11% of group C. Leukopenia was found in 34.61% patients of group A; 57.69% of group B; and 94.11% in group C. Contrary to Abbas et al study, in which frequency of dual nature of dengue and malaria was found to be 23.21%, our study included 150 study patients, 68 (45%) had malaria only, 54 (36%) had dengue fever only, 28 (19%) had co existed infections. Females 16 (57%) were more likely to have co-existed infection compared to males 12 (43%). Patients having low education status had more likely to have co-existed infection compared to patients having high education status. Middle Aged patients had more likely to have co-existed infection compared to teenage and old ages.

A retrospective study22 was carried out by Jimmy H et al. by testing blood and serum samples on 1,740 patients who consulted the emergency department of Cayenne Hospital seeking
treatment for fever compatible with malaria and/or dengue during a 1-year period. Diagnosis of malaria was done by thick and thin film stained by Giemsa, as was done in their study. Dengue was diagnosed by serologic (IgM) testing and positive cases were confirmed by positive virologic diagnosis. Of the 1,723 patients, 393 (22.8%) had smear-positive malaria. Dengue was detected in 238 case-patients (13.8%); among these, 73% (174/238) were confirmed by positive virologic diagnosis, whereas 27% were probable dengue cases. Concurrent dengue (early dengue cases [EDC] and late dengue cases [LDC]) and malaria were confirmed in 17 of the 1,723 patients (1%), corresponding to 7.1% (17/238) of dengue cases and 4.1% (16/393) of malaria cases. In our study, Among the 150 study patients with febrile illness 68 (45%) had malaria only, 54 (36%) had dengue and malaria were confirmed in 27 (7.4%) patients. There were 27 (5.8), 340 (72.5) and 102 (21.7%) patients in Groups A, B, and C respectively. The study concluded that clinical features of concurrent infection were more like dengue than malaria. Unlike malaria, the outcome of concurrent infection was good. Among the 150 study patients of our study, 68 (45%) had malaria only, 54 (36%) had dengue fever only, 28 (19%) had co-existed infections. The first case of concurrent dengue and Plasmodium falciparum was published by Charrel et al. in 2005 where the concurrent infection was diagnosed in patients, those returning to France after 18-day travel to Guinea, Senegal, and Sierra Leone. It was followed by a case report of concurrent dengue with Plasmodium vivax in 2006 while Bhalla et al. reported the first case from India in 2006. To the best of our knowledge, this is the second paper from India of mixed infection of dengue and malaria in India. During the study period, 367 dengue patients were admitted. Concurrent infection of dengue and malaria was found in 27 (7.4%) patients. 

According to Carme et al. in French Guiana the specific rate of concurrent malaria and dengue infection from overall febrile patients was equal to 0.99, which indicates that there is high chance of concurrent infection in that setting. It would be expected therefore that since both infections are endemic in our area, coexisting malaria and dengue infection could be common. However, there is little published evidence of such dual malaria and dengue infections despite both diseases being coendemic in South Asian region. Malaria and dengue are difficult to differentiate clinically as is emphasized by this case, yet the treatment of the illnesses is different and delay in appropriate therapy can be devastating, especially in malaria.

**Conclusion**

Our study concludes that the co-existence of dengue fever and malaria was 19% in patients presenting with febrile illness.

**Recommendations**

As endemic areas of malaria and dengue overlap to a large extent in South Asia and acquisition of both mosquito-borne infections concurrently is quite possible. We suggest that such concurrent infections should always be kept in mind by the physician while encountering such clinical situations as such mixed infections are likely to occur more frequently than reported in the available literature.

**References**


20. Charrel R, Abboud M, Durand JP. Dual infection by dengue virus and Shigella sonnei in patient returning from India.,


29. T BNSPPS. The usefulness of a new rapid diagnostic test, the First Response® Malaria Combo (pLDH/HRP2) card test, for malaria diagnosis in the forested belt of central India, Malar J;12:208–23.


31. Carme B, Matheus S, Donutil G. Concurrent dengue and malaria in cayenne hospital, French Guiana,;