the completion and revisions. All authors approved the final version of the paper.

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CONFLICTS OF INTEREST

Dr VT Guinto is a past member of the Editorial Board of the International Journal of Gynecology & Obstetrics.

REFERENCES


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Obstetrics

Co-infection of malaria and dengue in pregnant women with SARS-CoV-2

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KEYWORDS: Co-infection; COVID-19; Dengue; Low-resource settings; Malaria; Pregnancy; SARS-CoV-2 infection

Many low- and middle-income countries (LMICs) experience high rates of malaria and other neglected tropical diseases (NTDs), such as dengue.1 The COVID-19 pandemic complicates these matters further as COVID-19 in pregnant women is associated with an increased risk of preterm birth, and in some LMICs it is associated with a higher risk of maternal death.2 Furthermore, the clinical presentations of malaria and dengue strongly overlap with that of COVID-19, therefore posing an additional challenge for differential diagnosis. The PregCovid registry (https://pregcovid.com), registered with Clinical Trials Registry India (no. CTRI/2020/05/025423), is currently accumulating data from various regions in Maharashtra, India. The present study reports the clinical presentations, management, and outcomes of three pregnant women with COVID-19 who also had co-infections of malaria, and one with dengue, admitted to BYL Nair Hospital in Mumbai, India.2 Baseline characteristics, clinical presentation, hematological parameters, and subsequent management are shown in Tables 1 and 2. The study was approved by the Ethics Committees of TNMC (No. ECARP/2020/63) and ICMR-NIRRH (IEC no. D/ICEC/Sci-53/55/2020). Informed consent was waived for this study.

The results of this study raise concerns pertaining to the health of pregnant women with co-infections of malaria and dengue in endemic regions. Our observations reveal that pregnant women with suspected COVID-19 infection can present with the same clinical symptoms associated with dengue or malaria. However, in cases of co-infection, the symptoms do not aggravate or present...
differently. This is clinically challenging because laboratory results take time to acquire; therefore, management is highly dependent on the presenting symptoms. With the availability of universal screening for SARS-CoV-2 in pregnant women nearing delivery, cases of asymptomatic pregnant patients with COVID-19 are being reported increasingly in our hospital. Some of these women may remain asymptomatic throughout their pregnancy, while others might show mild to moderate symptoms at some point of their pregnancy. The present case series shows that patients with mild to moderate symptoms of COVID-19 are problematic because co-infections can be misdiagnosed easily as late-onset COVID-19 presentation, whereas they may be presentations of dengue or malaria, which

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Socio-demographic, clinical characteristics, and treatment of pregnant women with COVID-19 and dengue/malaria.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
<td>Patient 1</td>
</tr>
<tr>
<td>Age, years</td>
<td>22</td>
</tr>
<tr>
<td>Socio-economic status</td>
<td>Low</td>
</tr>
<tr>
<td>Gravida (G)/parity (P)/living children (L)</td>
<td>Primigravida</td>
</tr>
<tr>
<td>Gestational age</td>
<td>37 weeks 6 days</td>
</tr>
<tr>
<td>Dengue/malaria reports</td>
<td>Positive for dengue NS1 antigen</td>
</tr>
<tr>
<td>Indication for COVID-19 RT-PCR testing</td>
<td>Universal testing</td>
</tr>
<tr>
<td>Comorbidities</td>
<td>None</td>
</tr>
<tr>
<td>Obstetric outcome</td>
<td>PROM x 2 days, labor augmentation, VD, low birth weight (2.2 kg)</td>
</tr>
<tr>
<td>Complication</td>
<td>None</td>
</tr>
<tr>
<td>Ultrasoundography</td>
<td>Intrauterine fetal growth restriction</td>
</tr>
<tr>
<td>Symptoms and signs of Dengue/Malaria/COVID-19</td>
<td>Mild fever for 4 days, no petechiae, No bleeding tendencies</td>
</tr>
<tr>
<td>Blood transfusion</td>
<td>No</td>
</tr>
<tr>
<td>Treatment</td>
<td>Antibiotics, hydration therapy</td>
</tr>
<tr>
<td>Duration of hospital stay</td>
<td>9 days</td>
</tr>
</tbody>
</table>

Abbreviations: COVID-19, coronavirus disease 2019; CS, Cesarean section; ICU, Intensive care unit; IRI, Influenza‐like illness; IUFD, intrauterine fetal demise; PCV, Packed cell volume; POC, products of conception; PROM, premature rupture of membranes; RT PCR, Reverse transcriptase polymerase chain reaction; SARS-CoV-2, Severe acute respiratory syndrome coronavirus 2; VD, Vaginal delivery.

*The patient suffered from extra hepatic portal venous obstruction, chronic liver disease, and multiple splenic artery pseudo-aneurism with mild portal biliopathy after a 3-year history with bicytopenia (thrombocytopenia and leucopenia). She had undergone endoscopic variceal ligation at 20 weeks of gestation for persistent hematemeses.
require a completely different clinical management protocol to COVID-19. Misdiagnosis could have life-threatening consequences for the patient and their fetus. Indeed, one of the patients who had both SARS-CoV-2 and malaria experienced fetal demise and had to undergo abortion (Patient 2). If malaria had been diagnosed earlier, the pregnancy might have been saved. In the other three cases, the co-infections were not life-threatening and had no major complications. This could be attributed to the fact that the patients presented in a timely manner and were under constant observation.

We recommend that physicians and obstetricians be vigilant in order to enable early identification of co-infections such as malaria and COVID-19. All symptomatic COVID-19 cases with fever should be investigated for other common infections in endemic regions, both in the general population and in pregnant women, to avoid complications. Healthcare centers should have appropriate and ample provisions of medicine and equipment to manage cases of co-infection. Referral links should also be established with neighboring tertiary hospitals that treat pregnant women with COVID-19.

Currently, healthcare systems are overburdened by the management of COVID-19, especially in low-resource settings. The strain on healthcare systems is further exacerbated when infections such as malaria or dengue occur concurrently with SARS-CoV-2 infection in pregnant women complicated by COVID-19. Because COVID-19 is continuing to spread in the rural and tribal parts of India, the management and diagnosis of co-infections is of high clinical importance.

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The authors acknowledge the Director General, ICMR and Network of National Registry of Pregnant women with COVID-19 in India (PregCovid Registry, CRN/2020/05/2423). The team, TNMC, Gynecology at TNMC, were also acknowledged by ICMR for their contributions. This manuscript bears no ICMR-FCU/RA/976/09-2020.

Acknowledgments

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Table 2: Laboratory findings of the pregnant women admitted with COVID-19 and dengue/malaria.

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</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin (g/dl)</td>
<td>11.4</td>
<td>10.5</td>
<td>10.4</td>
<td>10.4</td>
<td>10.8</td>
<td>10.4</td>
<td>10.9</td>
<td>10.5</td>
<td>10.5</td>
<td>10.1</td>
<td>11.3</td>
<td>11.3</td>
<td>&gt;11</td>
</tr>
<tr>
<td>Total leucocyte count (mL)</td>
<td>12.8</td>
<td>12.9</td>
<td>12.0</td>
<td>11.2</td>
<td>11.4</td>
<td>11.4</td>
<td>10.9</td>
<td>10.5</td>
<td>10.1</td>
<td>11.3</td>
<td>11.3</td>
<td>11.3</td>
<td>11.3</td>
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<tr>
<td>Platelet count (mL)</td>
<td>343 000</td>
<td>343 000</td>
<td>351 000</td>
<td>351 000</td>
<td>351 000</td>
<td>351 000</td>
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<td>351 000</td>
<td>351 000</td>
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<td>351 000</td>
</tr>
<tr>
<td>Aspartate transaminase (U/L)</td>
<td>35 130</td>
<td>35 130</td>
<td>35 130</td>
<td>35 130</td>
<td>35 130</td>
<td>35 130</td>
<td>35 130</td>
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<td>35 130</td>
<td>35 130</td>
<td>35 130</td>
</tr>
<tr>
<td>Alanine aminotransferase (U/L)</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
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<td>59</td>
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<td>59</td>
</tr>
<tr>
<td>Serum bilirubin (mg/dl)</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
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<tr>
<td>D-dimer (ug/ml)</td>
<td>0.73</td>
<td>0.73</td>
<td>0.73</td>
<td>0.73</td>
<td>0.73</td>
<td>0.73</td>
<td>0.73</td>
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<td>0.73</td>
<td>0.73</td>
<td>0.73</td>
<td>0.73</td>
</tr>
<tr>
<td>Blood group and Rh type</td>
<td>A positive</td>
<td>AB positive</td>
<td>A positive</td>
<td>A positive</td>
<td>A positive</td>
<td>A positive</td>
<td>A positive</td>
<td>A positive</td>
<td>A negative</td>
<td>A negative</td>
<td>A negative</td>
<td>A negative</td>
<td>A negative</td>
</tr>
</tbody>
</table>

Author Contributions

RG and NM were responsible for the study concept and design. SK, SS, AN, and NM contributed to the acquisition of the study data. RG, NM, and DM were responsible for the drafting of the manuscript. Critical revision of the manuscript for important intellectual content was provided by SK, SS, AN, NM, and RG. RG and NM were responsible for the study concept and design. SK, SS, AN, and NM contributed to the acquisition of the study data. RG, NM, and DM were responsible for the drafting of the manuscript. Critical revision of the manuscript for important intellectual content was provided by SK, SS, AN, NM, and RG. RG and NM were responsible for the study concept and design. SK, SS, AN, and NM contributed to the acquisition of the study data. RG, NM, and DM were responsible for the drafting of the manuscript. Critical revision of the manuscript for important intellectual content was provided by SK, SS, AN, NM, and RG. RG and NM were responsible for the study concept and design. 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was performed by RG, NM and DM. NM and RG contributed to sta-
tistical analysis. BG, NM and SM provided administrative and technical
or material support. All authors contributed to the analysis and inter-
pretation of the data, and reviewed and approved of the final version
of the manuscript.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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tive challenges for establishing obstetric services, and experience of deliv-
ering over 400 women at a tertiary care COVID-19 hospital in India.

SUPPORTING INFORMATION

Additional supporting information may be found online in the
Supporting Information section at the end of the article.

File S1. TNMC ethical approval.

File S2. NIRRH ethical approval.

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Obstetrics

Evaluation of psychological impact, depression, and anxiety
among pregnant women during the COVID-19 pandemic in
Lahore, Pakistan

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Muhammad Ikram1 | Muhammad Suhail3

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KEYWORDS: Anxiety; COVID-19; Edinburgh Postnatal Depression Scale; K10 scale; Perinatal depression; Pregnancy; Psychological impact

The substantial burden of the COVID-19 pandemic has led to
increased feelings of fear and uncertainty. The contagious nature and
high mortality associated with the disease has caused psychological
distress, depression, stress, and anxiety among the general population,
including pregnant women.1,2 The COVID-19 pandemic affects preg-
nant women’s perceptions, appetite, psychosocial behavior, and sleep
patterns, which in turn may impact the physical and cognitive develop-
ment of their newborn babies.3 This has resulted in myriad issues for
overburdened health systems trying to provide appropriate medical
and mental health care.4–6 Pakistan, a low-income country, has been
slow to recognize maternal health conditions; therefore, these are
unrecognized and undertreated.7,8 The present study highlights socio-
demographic factors, psychological impact, levels of depression (no
depression, possible depression, and maximum depression) and anx-
xiety, lack of appetite, and sleep disturbances among pregnant women
in Lahore, Pakistan, during the COVID-19 pandemic.

A descriptive cross-sectional study on pregnant women visiting
the Outpatient Department (OPD) of Obstetrics and Gynecology,
Shaikh Zayed Hospital, Lahore, was conducted from August 6–20,
2020; a consecutive sampling technique (non-probability) was used.