Impact of COVID-19 on pregnant women with Rheumatic heart disease or Peripartum cardiomyopathy

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PII: S0301-2115(21)00036-1
DOI: https://doi.org/10.1016/j.ejogrb.2021.01.024
Reference: EURO 11863
To appear in: European Journal of Obstetrics & Gynecology and Reproductive Biology

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Received Date: 4 January 2021

Please cite this article as: Tilve A, Mahajan NN, Pandey A, Jnanananda B, Gadekar S, Mahale SD, Gajbhiye RK, Impact of COVID-19 on pregnant women with Rheumatic heart disease or Peripartum cardiomyopathy, European Journal of Obstetrics and Gynecology and Reproductive Biology (2021), doi: https://doi.org/10.1016/j.ejogrb.2021.01.024
Article Category: Brief Communication

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Title: Heart Disease with COVID-19

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Declaration of Interest: The authors have no conflicts of interest relevant to this article.

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Word Count: 600

Declarations of interest: None

Trial Registration: PregCovid study is registered with Clinical Trial Registry of India (Registration no: CTRI/2020/05/025423)

Highlights
Countries with endemic RHD should make provision of cardiac assessment to improve RHD diagnosis and strengthen system.

Significant challenges faced by these women with Heart Diseases during COVID-19 pandemic,

Difficulties in secondary prophylaxis and access to health care leading to additional risk for adverse pregnancy and neonatal outcomes.

Holistic approach is needed to medically complicated pregnancies with COVID-19 and multidisciplinary coordination resulted in excellent maternal outcomes despite the trying conditions of the early stages of the pandemic.

**Keywords:** Rheumatic Heart disease; Cardiomyopathy; COVID-19; Peripartum period; SARS-CoV-2 infection.

**Dear Editor,**

We observed that, little is still known about the impact of the SARS-CoV-2 infection on pregnant women with heart disease (HD). Aim of our study was to investigate the impact of COVID-19 on pregnancy and neonate retrospectively at BYL Nair Charitable Hospital (NH), a dedicated COVID-19 hospital [1] in women with HD in Mumbai, India. In the initial phase of COVID-19 pandemic of 6 months, NH received five RT-PCR confirmed COVID-19 pregnant women with heart disease [Rheumatic HD (RHD; n=3), Peripartum Cardiomyopathy (PPCM; n=2)], out of 879 COVID-19 pregnant and post-partum women (Table 1). To address if COVID-19 poses additional risk in pregnancy with HD, we compared outcomes in uninfected pregnant women with HD (n=43) in pre-pandemic period from the same center (Table S1). We found around 1% of heart disease in pregnant women with COVID-19. Adverse
outcomes such as preterm delivery, PPROM, low birth weight, neonatal death were observed in pregnant women with HD (RHD/PPCM) and COVID-19. Pre-term delivery was nearly three times higher in women with HD and COVID-19 (95% CI 0.33-20.48). PPROM/PROM was observed 14 times higher in women with HD and SARS-CoV-2 infection (95% CI 0.69-283.79). Preterm vaginal delivery was reported in one woman with RHD and COVID-19 (Case-2) and her new-born required neonatal intensive care due to low birth weight.

Pregnant woman with RHD and COVID-19 presented with fever, cough with expectoration, breathlessness, tachycardia with normal oxygen saturation. This suggests some diagnostic overlap between SARS-CoV-2 infection and new or recurrent acute respiratory failure with HD.[2] Two women with RHD were on secondary prophylaxis with penicillin in our study group. During the period of lockdown when there were transportation restrictions, the pregnant women with RHD faced several challenges in accessing the healthcare. Therefore, secondary prophylaxis must be ensured to all patients with RHD and more specifically to pregnant women by the public and private healthcare providers. Pregnancy is a state that is particularly susceptible to respiratory diseases like COVID-19 due to a compensated respiratory alkalosis with metabolic acidosis.[3] Despite this, both the cases with PPCM described in this report did not have worsening of PPCM due to COVID-19.

We faced multiple challenges because of COVID-19 status and comorbidities of the women presented in this report. During the early phase of pandemic, there was a delay in receiving appropriate treatment as all these women were denied treatment in multiple hospitals before being referred to our dedicated COVID-19 facility at NH. This observation suggested the significant challenges faced by these women, who are also likely to face difficulties in secondary prophylaxis and access to health care leading to additional risk for adverse pregnancy and neonatal outcomes.
One woman with PPCM (Case-5) had multiple congenital anomalies at 21-weeks pregnancy but was denied medical termination of pregnancy (MTP) in multiple hospitals. MTP Act in India permits the termination until 20-weeks. For a woman with less than average means and education there still exists considerable difficulty to get the adequate and appropriate medical assistance so as to terminate a grossly anomalous pregnancy. This lacuna in the health care system (time sensitive abortion services) resulted in the emotional trauma of not only carrying the pregnancy to term but which was later complicated by the development of PPCM and getting infected with SARS-CoV-2.

In the context of the COVID-19 pandemic, our study generated an evidence of impact of COVID-19 on pregnant women with RHD with COVID-19. Therefore, countries with endemic RHD with higher COVID-19 burden should make provision of cardiac assessment on ultrasound to improve RHD diagnosis and strengthen the healthcare system for multi-speciality management of pregnant women with RHD and COVID-19.

**Declaration of Competing Interest**

The authors have no conflicts of interest relevant to this article.

**Funding**

The study is funded by intramural grant of ICMR-NIRRH (MS/RA/951/07-2020)

**Acknowledgements**

The authors acknowledge the network of National Registry of Pregnant women with COVID-19 in India (PregCovid Registry, CTRI/2020/05/025423). The Dean, TNMC, Faculties, Resident doctors in the Department of Obstetrics and Gynaecology, Cardiology at TNMC, Mumbai are sincerely acknowledged. RG lab is funded by grants from Indian Council of
Medical Research (ICMR). RG is an awardee of the DBT Wellcome India alliance clinical and public health intermediate fellowship (Grant no. IA/CPHI/18/1/503933). Dr Periyasamy Kuppusamy (NIRRH) is acknowledged for assistance in statistical analysis.

**Author Contributions:**

NM and RG had full access to all data and take responsibility for data integrity and the accuracy of the analysis. NM and RG were responsible for study concept and design. NM, RG, SM supervised the study. AT, BJ, NK and SG acquired the data. All authors interpreted the data. RG and NM performed statistical analysis. NM, SM, and RG provided administrative, technical and material support. NM and AT drafted the manuscript. RG, NM and DM revised the manuscript. All authors approved the manuscript.

**References**


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<tr>
<th>Parameters</th>
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<td>23.1</td>
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<td>Universal Testing</td>
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<td><strong>Clinical</strong></td>
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<tr>
<td>Asymptomatic/Symptomatic (Mild/Moderate/Severe)</td>
<td>Symptomatic Mild cough with expectoration and breathlessness b</td>
<td>Asymptomatic Mild (palpitations and dyspnoea)</td>
<td>Symptomatic Mild MS, moderate MR, trivial AR Severe TR</td>
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<tr>
<td>Fever</td>
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<td>Cough</td>
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<td>11.1</td>
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<td>9800</td>
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<td>Severe MS, moderate MR, trivial AR Severe TR</td>
<td>Moderate MS severe PAH LVEF 60%</td>
<td>Dilated LV, severe generalised LV hypokinesia, LVEF 20%, LV diastolic dysfunction, LV non-compaction, Mild MR, Mild PAH, Mild TR, RVSP 48mmhg</td>
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<td>98</td>
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<td>-</td>
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Table 1: Demographic, epidemiological, clinical characteristics and management of pregnant women with RHD or PPCM and COVID-19
presented in the labour suite with a fully dilated cervix and delivered vaginally immediately on arrival, on the stretcher; increased in intensity since 5 days but she had similar complaints since long before pregnancy.

SARS-CoV-2, Severe Acute Respiratory Syndrome Corona virus 2; RT-PCR, Reverse Transcriptase Polymerase Chain Reaction; COVID-19, coronavirus disease 2019; PROM, premature rupture of membranes; PPROM, preterm premature rupture of membranes; NICU, neonatal intensive care unit; NND, neonatal death; RHD, rheumatic heart disease; PPCM, peripartum cardiomyopathy; MS, mitral stenosis; MR, mitral regurgitation; TR, tricuspid regurgitation; LA, Left Atrium, LV-Left ventricular; PAH, pulmonary artery hypertension; MVOA, Mitral Valve Orifice Area; LVEF, left ventricle ejection fraction; AR, aortic regurgitation; RVSP, right ventricular systolic pressure; ARDS, Acute Respiratory Distress Syndrome.