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Original Research Article

## Study of maternal and foetal outcome in COVID-19 anaemic patients during COVID pandemic in a tertiary centre

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### ABSTRACT

**Background:** The haemoglobin concentration is one of the most critical indicators of the blood's oxygen-carrying ability. Due to the hypermetabolic condition produced by infection, anaemia in COVID-19 positive pregnant women might result in tissue hypoxia due to increased peripheral tissue oxygen demands. Complications such as multi-organ failure and acute respiratory distress syndrome can worsen the prognosis. Since hemoglobin is necessary for tissue oxygenation, anaemia may have a substantial impact on the prognosis of COVID-19 pneumonia, where tissue hypoxia develops as a result of disease pathogenesis. Aim of the current study was to study the effect of COVID-19 on pregnant women with anaemia in pregnancy, including symptoms and foetomaternal outcome in patients admitted to a tertiary care facility.

**Methods:** Observational study done on pregnant females in labour and post-delivery patients who were diagnosed with COVID-19 infection using the SARS COV-2 nasopharyngeal reverse transcriptase polymerase chain reaction (RT-PCR) from 1<sup>st</sup> April 2020 to 30<sup>th</sup> June 2021. The required demographic, clinical details and haemoglobin levels were obtained, and selected participants were followed up until they were discharged.

**Results:** In our study, out of 58 women, who had anaemia in pregnancy with COVID-19 infection delivering 59 neonates (1 set of twins), 55.5% were in the age group of 25-35 years, 77% reached full term pregnancy and 67% were multigravida. 51.7 % patients were transferred from periphery hospitals. Delivery was by caesarean section in 61% and 39% delivered vaginally. 38.8% neonates delivered had birthweight of <2.5 kg out of which 20% had intrauterine growth restriction and 22.4 % were preterm. 3.4% stillbirth were reported. No maternal deaths were reported.

**Conclusions:** From our study, maternal and neonatal outcome were unaffected by anaemia in COVID-19 pregnant women. Severely anaemic patients with comorbidities should be transferred to centres with appropriate neonatal intensive care facilities for delivery.

**Keywords:** COVID-19, COVID-19 in pregnancy, Anaemia in pregnancy, Anaemia, COVID-19 and anaemia

### INTRODUCTION

The COVID-19 pandemic was first identified in Wuhan, China, in December 2019 as a cluster of pneumonia.<sup>1</sup> The term Coronavirus disease 2019 (COVID-19) was coined by the World Health Organization to describe this

disease. SARS-CoV-2 has been found to cause disease in the same way as the SARS Coronavirus, with potential damage to vital organs such as the lung, heart, liver, and kidney, and infection poses a substantial risk to patients due to the high prevalence of pneumonia.<sup>2</sup> Coronavirus has been attributed to two major epidemics in the last two

decades: severe acute respiratory syndrome (SARS) and Middle-East respiratory syndrome (MERS). A novel Coronavirus mutation (titled SARS-CoV-2) was found as the cause of Coronavirus 2019 (COVID-19), a severe respiratory illness characterised by dyspnea and fever, towards the end of 2019.<sup>3</sup> COVID-19 infection began as an epidemic in China and has since spread to a vast number of nations, with the number of cases increasing everyday. On the 30th of January 2020, COVID-19 was designated as a public health emergency of international concern (PHEIC).<sup>4</sup> On January 30, 2020, India reported the first COVID-19 case.<sup>5</sup> The world health organization declared it as a COVID-19 pandemic on March 11, 2020.<sup>6</sup> Pregnant women are at the same risk as the general population for contracting SARS-CoV-2, and more than two-thirds of pregnant women who have been diagnosed have had no symptoms. Cough and fever are the most common COVID-19 symptoms in pregnant women. COVID-19 infection is known to produce severe hypoxemia, which contributes to the severity of illness. Hypoxia is caused by a variety of factors, including a mismatch in ventilation and perfusion, intravascular thrombi, and reduced diffusion capacity.<sup>7</sup> Anaemia can exacerbate the already impaired tissue perfusion in the presence of hypoxia. In this study, we have studied maternal and foetal effects of anaemia in COVID-19 positive pregnant females. The results of retrospective observational study of anaemic pregnant women infected with COVID-19 at a tertiary care centre describe the obstetric and neonatal outcome in anaemic patients in COVID-19 infection during pregnancy.

### Aim

The aim of the current study was to investigate the maternal and foetal outcomes of pregnant women infected with COVID-19 with anaemia.

## METHODS

### Study design

Single centre retrospective observational study was conducted at Lokmanya Tilak municipal medical college and general hospital (Mumbai, India), a tertiary care referral hospital. The study included women with anaemia during pregnancy who were admitted for delivery and screened for SARS-CoV-2 using RTPCR via a nasopharyngeal (NP) swab from April 1, 2020 to June 30, 2021. This study included 58 cases of anaemic patients with COVID-19 infection who were hospitalised to a tertiary care general hospital.

### Parameters

Variables like age, parity, referred or transferred cases, duration of pregnancy, haemoglobin levels, requirement of blood transfusion, co-morbid condition, mode of delivery and fetal outcome were noted. All pregnant women were tested for COVID-19 using the RTPCR

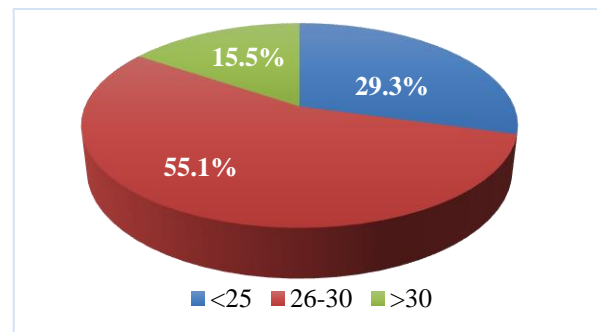
technique. Maternal risk factors, mortality and morbidity in anaemic COVID-19 infected individuals, and foetal outcome were the key outcome measures investigated. Selected study participants were followed up until discharge. Patients with ectopic pregnancy and those with multiple co-morbid conditions were excluded in the study.

### Statistical analysis

All of the factors were examined and analysed using percentages. Because this was an observational study, the maternal and neonatal parameters were determined using descriptive statistics such as percentages and proportions, and no statistical tests were used.

## RESULTS

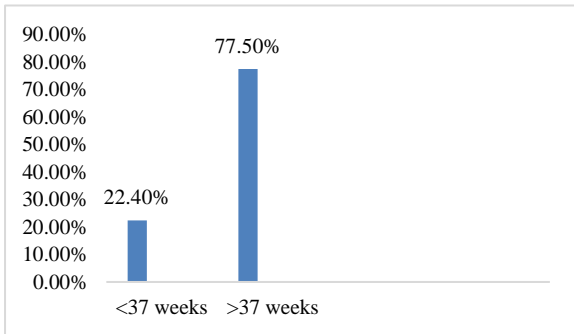
This retrospective study was conducted at a tertiary care centre on anaemic COVID-19 positive patients over a span of 15 months. 58 cases among COVID-19 positive patients had anaemia. Maximum number of study subjects were in the age range of 25-30 years which accounted for 55.1% (32 patients) followed by <25 years in 29.3% (17 patients) and 15.5% above 30 years (9 patients) (Figure 1).



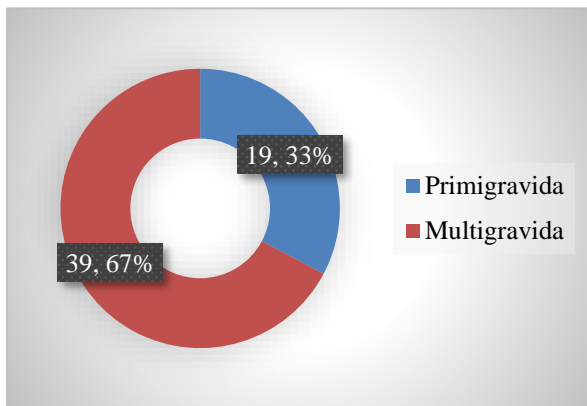
**Figure 1: Age-wise distribution.**

Gestational week wise distribution of anaemic patients is shown in (Figure 2). Majority of the pregnancies reached full term gestation i.e 77.5% (45 patients) and 22.4% (13 patients) were preterm deliveries. Gravida wise distribution is depicted in (Figure 3). Majority of the subjects were multigravida 67% (39 patients) and 33% (19 patients) were primigravida. Total number of patients transferred from peripheral hospital to our hospital and patients registered in our hospital is shown in (Figure 4). 51.7% (30 patients) were transferred from other hospital. 48% (28 patients) were registered in our hospital. Distribution according to degree of anaemia is depicted in (Figure 5). Maximum patients were in the moderate anaemia group with 75.8% (44 patients) followed by mild anaemia in 17.2% (10 patients). Around 6.8% (4 patients) had severe anaemia. Patients who required blood transfusion or parenteral iron and oral iron preparations is shown in (Figure 6). All patients in mild anaemia group were managed by oral iron preparation. In patients with

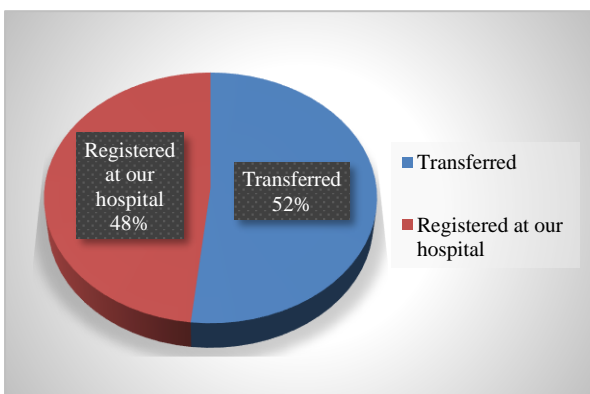
moderate anaemia, 15.5% (9 patients) required blood transfusion, 27.6% (16 patients) required parenteral iron. All patients were advised oral iron preparation after 6 weeks of parenteral iron therapy. In patients with severe anaemia, all 4 patients were transfused packed red cells followed by parenteral iron preparation 24 hours later in 2 of the patients. All patients were advised oral iron preparation later.



**Figure 2: Gestational age in weeks-wise distribution.**



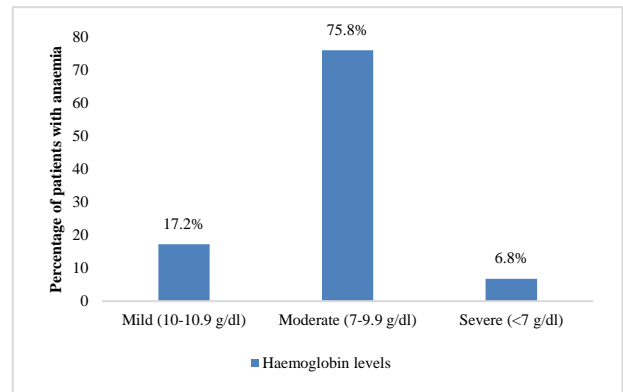
**Figure 3: Gravida-wise distribution.**



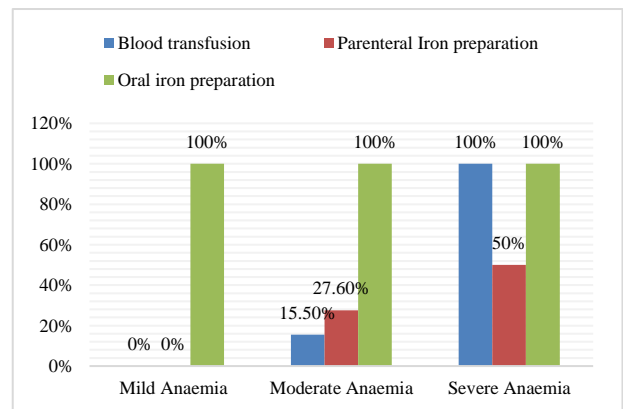
**Figure 4: Transferred patient wise distribution.**

Birth weight wise distribution is depicted in (Figure 7). 47% (27 neonates) were in the birth weight of 2.6 to 3 kg. 32% (19 neonates) were in the birth weight range of 2.1 to 2.5 kg. 14% (8 neonates) had birth weight more than 3 kg and 3.4% (2) had birth weight in the range of 1 to 1.5

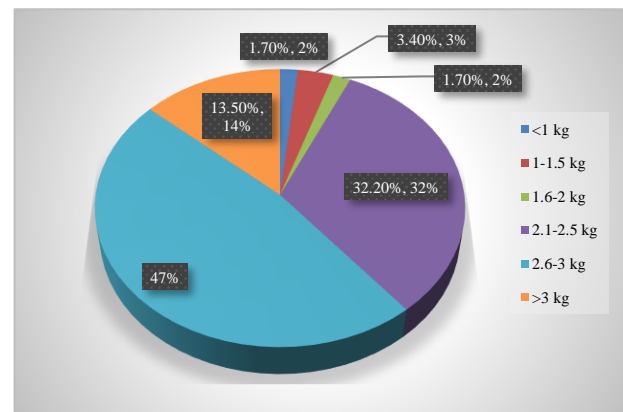
kg. 1.7% (1 neonate) had birth weight less than 1 kg and 1.7% (1 neonate) had birth weight between 1.6 to 2 kg. About 38.9% (23 neonates) were low birth weight and 60.9% (36 neonates) were normal weight. 1 patient had twins. 3.4% patients had IUFD (2 stillborn). 20% (12 neonates) were intrauterine growth restricted. Total 61% (35) patients were delivered by lower segment caesarean section for maternal and fetal indications and 39 % (23 patients) were delivered by vaginal delivery (Figure 8).



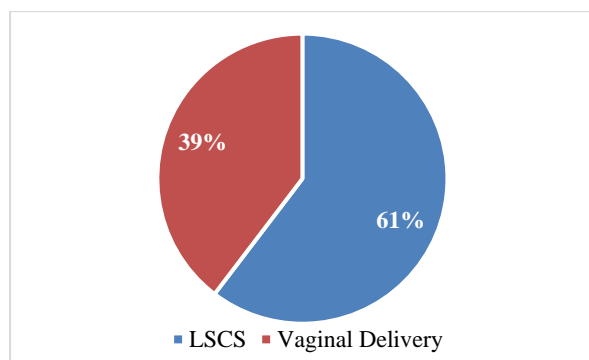
**Figure 5: Distribution according to degree of anaemia.**



**Figure 6: Patients requiring blood transfusion, parenteral iron preparation and oral iron preparation in mild, moderate and severe anaemia.**



**Figure 7: Birth weight-wise distribution.**



**Figure 8: Mode of delivery-wise distribution.**

## DISCUSSION

According to WHO, Anemia is defined as a blood hemoglobin (Hb) concentration below 110 g/l.<sup>8</sup> According to data from the World Health Organization (WHO)/world health statistics, 36.5 percent of pregnant women globally had anaemia in 2019.<sup>9</sup> India has a prevalence of 50% for anemia in pregnancy according to WHO, global health observatory data repository/world health statistics.<sup>9</sup> Anemia is a common cause of maternal death in underdeveloped countries, accounting for around half of all maternal deaths, with India accounting for roughly 80% of maternal deaths in South Asia. In India, the prevalence of anaemia in pregnant women has decreased slightly from 58 % in the NFHS-3 (National family health survey-2005-06) to 50 % in the NFHS-4 survey (2015-16).<sup>10</sup> Increased demand for iron for the growing foetus and placenta; and increased red blood cell mass (with expanded maternal blood volume in the third trimester) are common causes of iron deficiency anaemia during pregnancy, which is exacerbated by other factors such as childbearing at a young age, recurring pregnancies, short durations between childbirths, and lack of accessibility to maternity services and supplementation. Anemia during pregnancy is defined as a haemoglobin (Hb) level of less than 10.9 g/dl, according to the Indian council of medical research.<sup>11</sup> During the course of COVID-19 infection, iron metabolism is known to be disrupted. Anemia may occur as a result of iron-restricted erythropoiesis caused by changes in iron metabolism. In the course of the disease, ferritin acts as an acute phase reactant, reducing iron availability.<sup>12,13</sup>

In our study of 58 women, who had anaemia in pregnancy with COVID-19 infection delivering 59 neonates (1 set of twins), 55.5% were in the age group of 25-35 years, 77% reached full term pregnancy and 67% were multigravida. As our hospital caters to largest slum population in India and is at the crossroads of eastern and western express highway, our hospital gets maximum number of referrals from other periphery hospitals. 51.7% patients were transferred from periphery hospitals. 75.8% patients were in the moderate anemia group. All patients in mild anaemia group were managed by oral iron

preparation. In patients with moderate anaemia, 15.5% required blood transfusion, 27.6% required parenteral iron. All patients with severe anemia were transfused packed red cells. 50% were given parenteral iron. Caesarean section was done in 61% and 39% delivered vaginally. 60.9% neonates delivered were normal weight neonates. 38.8% neonates delivered had birth weight of <2.5 kg out of which 20% had intrauterine growth restriction and 22.4% were preterm. 3.4% stillbirth were reported. No maternal deaths were reported.

No study has been done in anaemia in pregnancy in COVID-19 as of now. According to a study done on anaemia in COVID-19 hospitalized patients by Rajanna et al severe anaemia attributed to a worse prognosis in the form of higher mortality in COVID-19 patients.<sup>14</sup> Taneri et al showed that haemoglobin levels were considerably lower in individuals with severe COVID-19 compared to mild to moderate instances in a meta-analysis.<sup>15</sup> This study was done on general population. More studies need to be done on anaemia in pregnancy in COVID-19 patients. In our study, no evidence of increased mortality and morbidity and adverse foetal outcome related to COVID-19 infection was found. All our patients were asymptomatic and were incidentally detected to be COVID-19 positive by RTPCR done on admission to hospital.

## CONCLUSION

As most of our patients were asymptomatic mild cases of COVID-19, maternal and neonatal outcome were unaffected by COVID-19 infections. Intra-uterine growth restriction was noted in neonates and is a consequence of anaemia itself. Further studies are needed to prove association of anaemia and COVID-19 causing maternal and fetal adverse effects. All pregnant women must be closely monitored during booking maternity visits, and their haemoglobin levels must be raised optimally before delivery. Severely anaemic patients with comorbidities should be transferred to higher centres with appropriate blood bank & neonatal intensive care facilities for delivery.

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*Ethical approval: The study was approved by the Institutional Ethics Committee*

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