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Original Research Article

Feto-maternal outcome in COVID-19 positive patients with hypertensive disorders in pregnancy

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ABSTRACT

Background: Since the first confirmed case in December 2019, the data pertaining to the COVID-19 pandemic has been rapidly evolving. In current study, the relation of COVID-19 and its effect on pregnant women with hypertensive disorders in pregnancy, including symptoms and foetomaternal outcome were studied.

Methods: Women with hypertensive disorders in pregnancy consecutively admitted for delivery and tested via nasopharyngeal swab for SARS-CoV-2 using reverse transcriptase polymerase chain reaction (RT-PCR) from 1 April 2020 to 30 September 2020 were included in the study.

Results: In our study, 56 women having hypertensive disorders in pregnancy with COVID-19 infections delivering 60 babies (4 twins), 46.43% were in the age group of <25 years, 51.78 % were <37 weeks gestation. Delivery was by caesarean section in 76.78%. Out of these, 33.92% patients required ICU admission. 40% babies delivered had birth weight of <2.5 kg out of which 13.33% had IUGR and 26.66% were preterm. There was 13.33% stillbirth and 6.66% neonatal deaths. 4 maternal death has been reported.

Conclusions: With the current data available it does not appear that pregnant women are at increased risk of severe infection than the general population, but clinicians should be aware of high-risk groups. Women will need to be monitored in their booking maternity units and should be transferred to centres with appropriate neonatal intensive care facilities for delivery. In pregnant women with COVID-19 infection, if maternal illness is not severe, the considerations should be based more on obstetric indications for delivery.

Keywords: Coronavirus, Pre-eclampsia, COVID-19, Hypertensive disorders in pregnancy

INTRODUCTION

Coronavirus is a positive-stranded ribonucleic acid (RNA), enveloped virus of the family of *Coronaviridae* which causes respiratory and gastrointestinal infections ranging from mild, self-limiting conditions to more serious disorders such as viral pneumonia with systemic complications.¹ In the last 2 decades, coronavirus has been responsible for 2 large epidemics: the severe acute

respiratory syndrome (SARS) and the middle east respiratory syndrome (MERS). Towards the end of 2019, a novel mutation of coronavirus (labelled as SARS-CoV-2) was identified as the cause of a severe respiratory illness called coronavirus 2019 (COVID-19), which typically presents with breathlessness and fever.² Starting as an epidemic in China, COVID-19 infection has rapidly spread in large number of countries and the number of affected cases continues to rise significantly on a daily

basis. COVID-19 was declared as public health emergency of international concern (PHEIC) on 30 January 2020.³ India reported its first case of COVID-19 on 30 January 2020.⁴ WHO announced by press conference on 11 March 2020 that it is a COVID-19 pandemic. It is well known that pregnant women are predisposed to a more severe course of pneumonia because of physiologic maternal adaptations to pregnancy with subsequent higher maternal and fetal morbidity and mortality.⁵ But there is a lack of data in the literature about the effect of CoV infections during pregnancy, thus limiting both counselling and management of these patients.

We report the results of a prospective observational study among all pregnant women with hypertensive disorders in pregnancy with COVID-19 infections admitted to labour and delivery units at tertiary care centre. We describe the clinical presentation, obstetric and neonatal outcomes in patients with hypertensive disorders in pregnancy associated with COVID-19 at the time of delivery.

Aims and objective

The aim of this study was to describe maternal and fetal outcomes of pregnant women with hypertensive disorders with COVID-19 infection and to prevent maternal mortality and morbidity by knowing prognostic factors and by prompt intervention.

METHODS

Study design

Prospective observational analytical study conducted at Lokamanya Tilak municipal medical college and general hospital (Mumbai, India), a tertiary care referral hospital. Women with hypertensive disorders in pregnancy consecutively admitted for delivery and tested via nasopharyngeal (NP) swab for SARS-CoV-2 using RT-PCR from 1 April 2020 to 30 September 2020 were included in the study.

A total number of 56 cases of hypertensive disorders with COVID-19 positive admitted to tertiary care general hospital were taken into this study.

Parameters studied

Variables like age, parity, duration of pregnancy, comorbid condition, mode of delivery and fetal condition were noted. COVID-19 testing of all the pregnant women using RTPCR method was done. The primary outcome measures studied were their risk factors, mortality and morbidity in pregnant women with hypertensive disorders infected with COVID-19 was noted.

Statistical analysis

All the parameters were studied and analyzed on the basis of percentages. As this was a purely observational study, the maternal and neonatal parameters were analyzed using descriptive statistics like percentages and proportions were calculated and no statistical test was applied.

RESULTS

The study was conducted at a tertiary care centre over a span of 6 months. 56 cases of COVID-19 positive patients had hypertensive disorders.

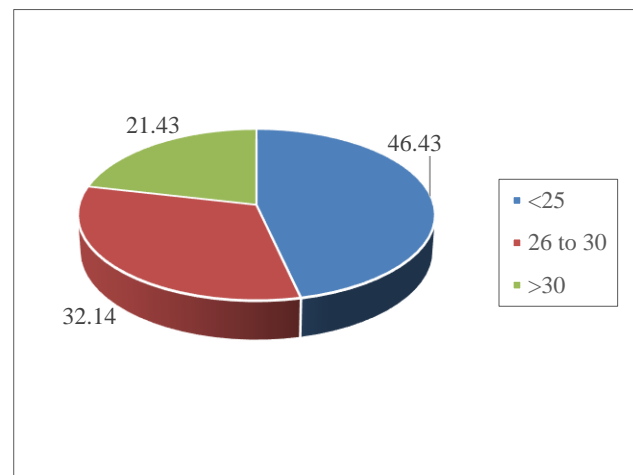


Figure 1: Age-wise distribution.

Majority of the study subjects were in the age range of <25 years followed by 26- 30 years and a very few in the range of more than 30 years.

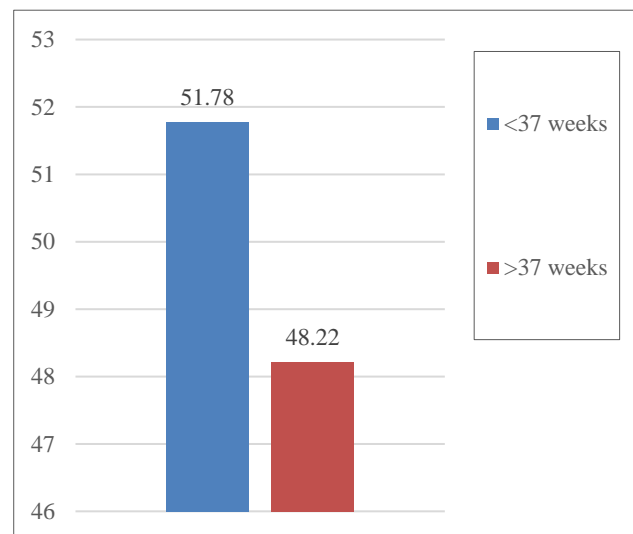


Figure 2: Gestational weeks-wise distribution.

Majority of the study subjects were having gestational weeks of less than 37 weeks.

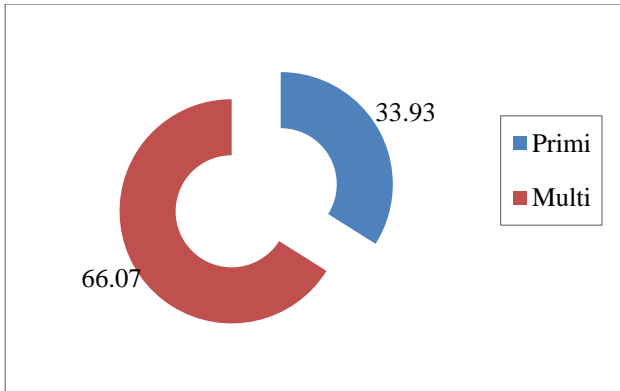


Figure 3: Gravidity-wise distribution.

Majority of the subjects were multi gravida.

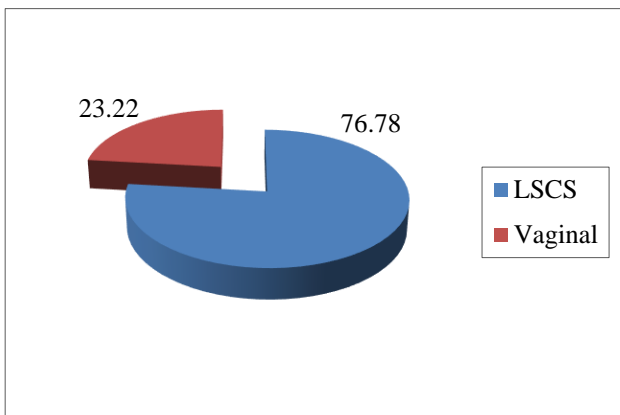


Figure 4: Mode of delivery - wise distribution.

About 62.5% of the cases delivered by C-section, 37.5% cases delivered vaginally.

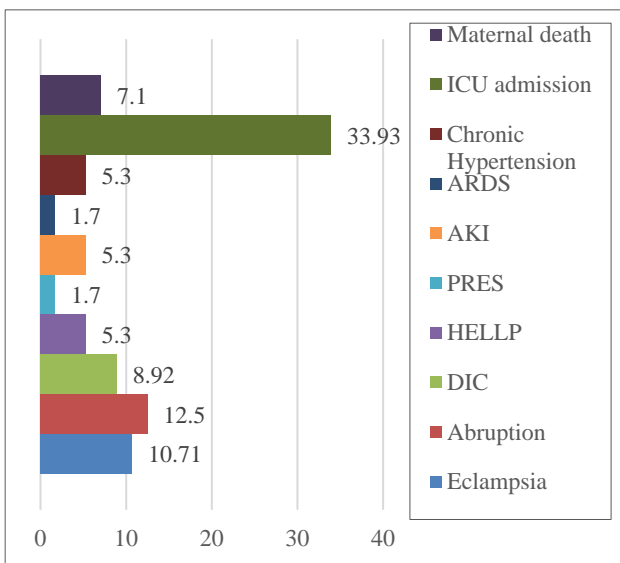


Figure 5: Maternal complications - wise distribution.

About 10.71 % had eclampsia, 12.5% had abruption placenta, 8.92% had DIC, 5.3% had HELLP, 5.3% had

acute kidney injury, 1.7% had ARDS and 1.7% had PRES. 5.3% had chronic hypertension; further, 19 patients needed ICU admission with ventilatory support; about 7.1% was the rate of maternal deaths in our study.

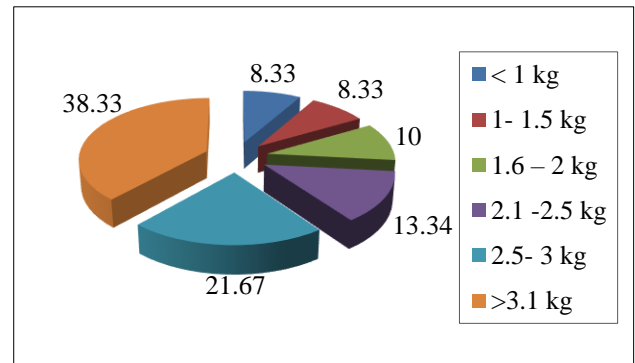


Figure 6: Birth weight wise distribution (n=60)*.

About 40% of the babies were low birth weight and 60% were normal birth weight; *4 cases had twins.

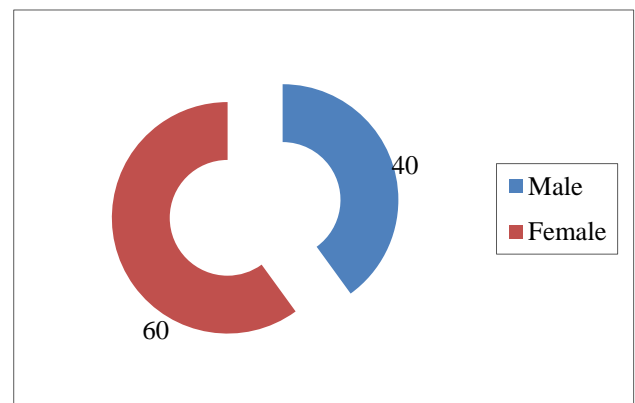


Figure 7: Gender wise distribution (n=60)*.

Majority of the babies were female in our study (60%); *4 cases had twins.

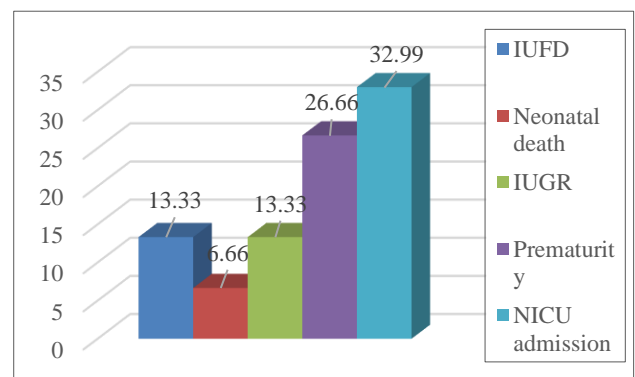


Figure 8: Neonatal complications wise distribution (n=60)*.

Among the 60 births, 13.33% were still birth, 6.66% of them did not survive, 13.33% had IUGR, 26.66% were

premature and 20 % had to be admitted in NICU for treatment after delivery; *4 cases had twins.

DISCUSSION

Hypertensive disorders complicate 5 to 10% of all pregnancies and along with haemorrhage and infection, they form the deadly triad that increases maternal morbidity and mortality rates.

Pre-eclampsia is one of the hypertensive disorders of pregnancy that developed after 20th gestational week with proteinuria and represent one of the leading cause of maternal and fetal morbidity and mortality.⁶ Our knowledge is restricted that termination of pregnancy is the only curative treatment, as we know little about its exact aetiology. Previous reports record that maternal infections, especially viral, contributing to the development of preeclampsia via suboptimal trophoblastic invasion and inducing maternal systematic inflammatory response.⁷

It is reported that pregnant women are at high risk of severe morbidity and mortality from respiratory infections, such as H1N1 and *Varicella* pneumonia. This includes a higher risk of severe illness when infected with viruses from the same family as COVID-19 and other viral respiratory infections, such as influenza.² With regard to currently available limited data on COVID-19, it does not indicate that pregnant individuals are at an increased risk of infection or severe morbidity (e.g. need for intensive care unit (ICU) admission or mortality) compared with nonpregnant individuals in the general population. An intense inflammatory response has been reported as one of the key features of severe COVID-19 and as there is relative immunosuppression in pregnancy this may partly explain why severe respiratory symptoms do not develop in many pregnant women. However, pregnant patients with comorbidities may be at increased risk for severe illness consistent with the general population with similar comorbidities.

Angiotensin-converting enzyme 2 (ACE2) protein, the human homolog of ACE that plays important roles in regulating blood pressure, act as a receptor for coronavirus to mediate its damaging effects.⁸ ACE2 is expressed in excess amounts through human placenta in the syncytiotrophoblast, cytotrophoblast, endothelium and vascular smooth muscle of villi. Its main function is to regulate blood pressure and fetal development. Possible COVID-19 intrauterine infection may alter the expression of ACE2 and develop pre-eclamptic state via raised angiotensin II level in the placental villi leading to vasoconstriction and restricted fetal blood flow. That may give possible explanation for raised incidence of preterm and low birth weight in COVID-19 positive pregnant women.⁹ However, further confirmatory studies are recommended. Khan et al in 2020, in their systemic review about positive COVID-19 pregnant women,

showed a rate of 29.1% preterm birth and 16.4% low birth weight among their babies.¹⁰

Additionally, there are great similarities between COVID-19 positive patients and preeclamptic women at immunological and laboratory basis. COVID-19 is characterized by increase pro-inflammatory cytokines such as interleukin (IL)-2, IL6, IL-7 and tumour necrosis factor- α (TNF α). Also, it is recommended to screen all COVID-19 severe patients using laboratory markers of hyper inflammation as increased serum ferritin and low platelet count.¹¹ Systematic review about maternal serum cytokines in pre-eclampsia revealed significant increase of maternal IL-6, IL-10 and TNF α compared with normotensive pregnant women.¹² Finally, thrombocytopenia (less than 100,000/ml) is independent risk factor for severity in pre-eclampsia and for great interest is one of defining criteria for cytopenia in H-score that used to asses severity of COVID-19 patients.^{6,11}

From report of 56 women, who had hypertensive disorders in pregnancy with COVID-19 infections delivering 60 babies (4 set of twins), 46.43% were in the age group of <25 years, 66.07% were multigravida, 51.78% were <37 weeks gestation. Delivery was by c-section in 76.78% and by vaginal delivery in 23.22%. Out of these, 33.92% patients required ICU admission, 10.71% had eclampsia and 12.5% had abruption. 8.92% patients developed DIC, 5.3% had HELLP syndrome, 5.3% AKI and 5.3% had chronic hypertension. 1.7% patient had ARDS and 1.7% PRES. 40% babies delivered had birth weight of <2.5 kg out of which 13.33% had IUGR and 26.66% were preterm. There was 13.33% stillbirth and 6.66% neonatal deaths. 4 maternal death has been reported.

There is a need for systematic data reporting on women affected by COVID-19 and their pregnancies to provide an evidence base for management, treatment and prevention and to target limited resources during the outbreak.

CONCLUSION

To conclude with, we still have limited knowledge about the full immunological aspects of preeclampsia. Further studies are recommended to show the association between COVID-19 and development of hypertensive disorders in pregnancy and worsening of the symptoms.

On a daily basis the evidence on this novel infection is changing. Our primary responsibility is to ensure all women have access to safe maternity services which includes remaining up to date with the evidence for the treatment of COVID-19 in the pregnant population and ensuring strict infection control measures to prevent the spread of disease within our own units. We must also be aware of those that are potentially vulnerable during this time, both patients and colleagues and we must ensure adequate supports are available to them during these

uncertain times. Women will need to be monitored in their booking maternity units and should be transferred to centres with appropriate neonatal intensive care facilities for delivery. In pregnant women with COVID-19 infection, if maternal illness is not severe, the considerations should be based more on obstetric indications for delivery.

This is truly uncharted territory and at present, there is no cure or vaccine for this disease and we are faced with the prospect of having to co-exist with this virus until an effective treatment option is found. We must prepare and plan on how we can begin to re-establish our gynaecology and fertility services to ensure that all women receive the necessary care they need in these unusual times.

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Ethical approval: Not required

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