Original Research Article

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COMPARATIVE STUDY –FETOMATERNAL OUTCOME IN COVID 19 PREGNANCIES BETWEEN FIRST AND SECOND WAVE

[1]Dr. Aarthi Rajendran, [2]Dr. Rajni Parikh, [3]Dr. Payal Patel
[1]Senior Resident, [2]Associate Professor, [3]2nd Year Resident
Department of Obstetrics and Gynecology, SIR T Hospital, Bhavnagar, Gujarat.

Corresponding author: **Dr. Aarthi Rajendran**
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Abstract

Background: Many countries have seen a two-wave pattern in reported cases of coronavirus disease-19 during the 2020 pandemic. Empirical data show that the characteristics of the effects of the virus do vary between the two periods. Differences in age range and severity of the disease have been reported, although the comparative characteristics of the two waves still remain largely unknown. This study helps in the comparison between the characteristics and severity between first and second wave.

Methods: This study is prospective and comparative study based on compiled clinical and outcome data for pregnant women infected with COVID-19 between April 2020 to October 2020 and March 2021 to July 2021 at our tertiary level hospital. A laboratory confirmed case of COVID-19 is defined as a positive result by quantitative reverse transcriptase polymerase chain reaction (qRT-PCR) assay of maternal pharyngeal and nasopharyngeal swab specimen.

Results: In our hospital, a total of 89 pregnant women were admitted in our tertiary hospital, out of which 53 of the patients were antenatal women of which 15 of the women died, 32 patients were admitted during third trimester and labour and 4 patients were delivered outside and referred here. This study, the most common age group affected was only between 20-30 years same as that of the first wave, preterm deliveries was found to be higher. The second wave had higher incidence and severity of cough (40%), fever (43%), diarrhea (28.12%) and dyspnea (38%). It also suggests that the caesarian rates(62%) were found to be higher in covid 19 patients and maternal mortality rate(25%) was also found to be higher thereby indicating the need for vaccination to reduce the severity and mortality in the upcoming waves.

Conclusion: The result of the present study suggests that the second wave among the pregnant women was found to be more severe when compared to the first wave because of the new variants. Because of this we as obstetricians and health care workers has to insist upon the vaccination during pregnancy thereby preventing the severity of the disease and reducing the maternal mortality.

Key words: covid 19, fetomaternal outcome, maternal mortality.

Introduction

Many countries have seen a two-wave pattern in reported cases of coronavirus disease-19 during the 2020 pandemic. Empirical data show that the characteristics of the effects of the virus do vary between the two periods. Differences in age range and severity of the disease have been reported, although the comparative characteristics of the two waves still remain largely unknown.

Those characteristics are compared in this study using data from our institute of the first period, between April 2020 to October 2020 conducted by Dr Dhanya et al[1]. Corresponding to the entire first wave, and the second, between March 2021 to July 2021, corresponding to part of the second wave. Sixty nine patients were hospitalized in covid ob-gy department during the first period, and 89 during the second period. Patients in the second wave were younger and the duration of hospitalization and case fatality rate were higher than those in the first wave.[2] In the second wave, there were more adults of age 30 -40years, and pregnant and post-partum women[2].The most frequent signs and symptoms in both waves were fever, dyspnea, pneumonia, and cough, and the most relevant comorbidities were cardiovascular diseases, type 2 diabetes mellitus, and chronic neurological diseases. Patients from the second wave more frequently presented renal and gastrointestinal symptoms were more often treated with non-invasive mechanical ventila- tion and corticoids, and less often with invasive mechanical ventilation, conventional oxygen therapy and anticoagulants. Several differences in mortality risk factors were also observed. These results might help to understand the characteristics of the second wave and the behavior and danger of SARS-CoV-2 in the fetomaternal outcome in Sir T hospital Bhavnagar. On March 11, 2020 World Health Organization (WHO) declared corona virus disease (COVID-19) a public health emergency of international concern since its outbreak in Wuhan, China.3

Coronaviruses are enveloped, single-stranded positive-sense RNA viruses and are the largest family in the order Nidovirales[2]. Pangolins, palmcivets, raccoon dogs, and bats are the natural hosts of different Coronavirus subfamilies, and ingestion of these animals is considered the main route

for transmission to humans[4]. The upper and lower respiratory systems and intestinal systems of humans and a variety of other animals are targeted by Coronaviruses[4].

SARS-COV-2 appeared as zoonotic infections, and the viruses achieved person-to-person transmission through inhalation of infected droplets and respiratory secretions. Respiratory system involvement has been the common feature of all three Corona- virus outbreaks that caused the classic triad of symptoms in symptomatic cases: fever, cough, and dyspnea. However, the range of the clinical pictures of SARS-COV-2, SARS-COV, and MERS-COV infections varies from asymptomatic or mild, flu-like symptoms to severe broncho- pneumonia with acute respiratory distress syndrome (ARDS) and multi-organ failure, which may result in mortality[5,6].

Normal pregnancy is characterized by immune tolerance and is associated with suppression of inflammatory and immune responses to protect the fetus from the mother's immune system[7]. It is well known that pregnancy-related immune suppression makes mothers more vulnerable than non-pregnant women to several viral infections, including SARS-COV, hepatitis E virus, influ- enza, and herpes simplex virus[7,8]. Furthermore, changes in pulmonary function during pregnancy, including decreased total lung capacity and functional residual capacity, may cause susceptibility to viral pneumonia[9,10].

Protection of the lives of mothers and babies is one of the millennial developmental goals of the World Health Organization (WHO)[10], and understanding of the feto-maternal effects of emergent Coronavirus outbreaks should be of great concern to all healthcare providers. In this context, this study focuses on determination of feto-maternal outcome of covid 19 infected pregnancies.

Further studies are needed to confirm our findings.

Materials and Methods

Present study was conducted at SIR T HOSPITAL, BHAVNAGAR.

This study is prospective and comparative study based on compiled clinical and outcome data for pregnant women infected with COVID-19 between April 2020 to October 2020 and March 2021 to July2021 at our tertiary level hospital. A laboratory confirmed case of COVID-19 is defined as a positive result by quantitative reverse transcriptase polymerase chain reaction (qRT-PCR) assay of maternal pharyngeal and nasopharyngeal swab specimens.

All the mandatory safety precautional measures- personal protective equipment (PPE) including jumpsuit,gloves,N-95 mask, splash resistant face shield, goggles were used by all the health care professionals in labor wards and operation theatres. Separate premises were assigned as donning and doffing areas.

Inclusion criteria

A laboratory confirmed positive case of COVID-19 infection in pregnant women in third trimester, in labour, and covid 19 positive patients where in test was done in last 7days of expected date of delivery is compared between the 1st and 2nd wave.

Exclusion criteria

Pregnancy with clinical signs and symptoms similar to SARS-CoV-2 but nasopharyngeal and pharyngeal swab were reported negative were excluded from this study.

Complete history, contact history, obstetric history, clinical symptoms, signs, specific obstetric condition, laboratory investigations, treatment measures, complications and outcome data was collected. All laboratory investigations and radiologic assessments were performed according to the clinical care needs of the present pregnancy. Laboratory investigations included complete blood cell count (CBC), liver function test (LFT), renal function test (RFT), C-reactive protein (CRP), d –dimer, coagulation profile, IL-6 was sent. Data on pregnancy and neonatal outcome, including gestational age at delivery, mode of delivery, indication for cesarean delivery, complications, neonatal birth weight and neonatal intensive care unit (NICU) admission were analyzed. Neonatal pharyngeal and nasopharyngeal swab samples were collected immediately after delivery in the NICU and tested for SARS-CoV-2 using qRT-PCR.

Results

During the first wave even asymptomatic mother were advised compulsory admission in our hospital. But during the second wave only symptomatic women were admitted and the private hospitals also started to take up the covid a positive patient which was not there during the first wave. Also due to the increasing trend of telemedicine only high risk pregnant mothers was referred to our hospital.

Table1:

Age (in years)	First wave(n=47) Dhanya et al[1]	Second wave(n=32)
<20years	7(15%)	10(31%)
20-30years	30(64%)	18(56%)
>30years	10(21%)	4(13%)

In this study, the most common age group affected was only between 20-30 years same as that of the first wave.

Table 2:

Gestational age	First wave(n=47) Dhanya et al[1]	Second wave(n=32)
Term	40(85%)	15(47%)
Preterm	7(15%)	17(53%)
Gravida		
Primi	20(40%)	12(38%)
Multi	27(60%)	20(62%)

In our comparison, the first wave affected 85% of the term pregnant women and 15% was of preterm but the second wave had higher preterm deliveries when compared with the first wave.

As per gravidity multigravida was mostly affected when compared to primigravida in both the waves.

Generally during 1st pregnancy people were more conscious, and also due to the responsibilities of previous children multiparous patient may not be able to isolate themselves properly.

Table 3:

History of contact with covid 19 patient	First wave(n=47) Dhanya et al[1]	Second wave(n=32)
Yes	37(79%)	10(32%)
No	10(21%)	22(68%)
Clinical features related to covid 19		
Cough	38(81%)	13(40%)
Fever	20(42.5%)	14(43%)
Diarrhea	12(25.5%)	9(28.12%)
Sore throat	10(21.2)	3(9%)
Myalgia	8(17%)	2(6%)
Dyspnea	3(6.3%)	12(38%)
Asymptomatic	9(19%)	12(38%)

In the first wave almost 79% of the patients were found in contact with the covid 19 patient but in the second wave only 32%was found to be in contact. **This conclude the fact that covid 19 is an airborne infection.**
In the first wave 81% of the patients had developed cough, 42.5%of the patients had fever, 25.5% of the patients had diarrhea, 21.2% of the patients had sore throat, 17% of the patients had myalgia, 6.3% of patients had dyspnea and 19.9% were asymptomatic

In the second wave 40% of the patients had developed cough, 43%of the patients had fever, 28.12% of the patients had diarrhea, 9% of the patients had sore throat, 6% of the patients had myalgia, 38% of patients had dyspnea and 38% were asymptomatic.Most of the patients developed cough, fever, diarrhea and dyspnea which was found to be more severe than the previous wave.

Table 4: Other comorbidities associated with the patient

Comorbidities	First wave(n=47) Dhanya et al[1]	Second wave(n=32)
Anaemia Moderate Severe	7(14%)	5(15%)
	3(6%)	3(9.3%)
PIH Mild	6 (12%)	8(25%)
	9(19%)	1(3%)
GDM	1(2%)	0(0%)
OVERT DM	2(4%)	0(0%)
Hypothyroid	3(6%)	0(0%)
ITP	1(2%)	0(0%)
Wound gap	2(4%)	0(0%)

In the first wave 14% of the patients had developed moderate anaemia 6% had developed severe anaemia, 12%of the patients had mild PIH, 19% of the patients had severe pregnancy indued hypertension, 2% of the patients had gestational diabetes mellitus ,4% of the patients had overt diabetes mellitus, 6% of the patients had hypothyroidism, 2% of patients had idiopathic thrombocytopenia and 4% of the patirnts developed severe hypertension.

In the second wave 15% of the patients had developed moderate anaemia 9.3% had developed severe anaemia, 25%of the patients had mild PIH, 3% of the patients had severe pregnancy indued hypertension and none of them found to have other comorbidities like GDM, Overt DM, hypothyroid, ITP and wound gap. **This suggests that during this wave patients even without co morbidities were affected in a severe manner.**

Table 5: Laborotory findings:

Laboratory findings	First wave(n=47) Dhanya et al[1]	Second wave(n=32)
Total leukocyte count		
Reduced	0(0%)	0(%)
Normal	30(64%)	14(44%)
Increased	17(36%)	18(56%)
Neutrophilic lymphocyte ratio		
Increased	28(60%)	18(56%)
Normal	19(40%)	(44%)
C-Reactive protein		
Increased	34(72%)	29(90%)
Normal	13(28%)	3(10%)
D – dimer		
Increased	10(21%)	25(78%)
Normal	37(79%)	7(22%)

In the first wave , 64% of the patient's total leukocyte count was found to be normal , 36% of the patients had increased Tlc and none of the patients had reduced count.Neutrophilic lymphocyte ratio was found to be increased in 60% of the patients and 40% of the patirnts had normal neutrophilic lymphocyte ratio. In most of the patients (72%) c –reactive protein was found to be increased.In the first wave d dimer was dound to be normal in 79% of the patients and only in 21% was found to be increased.

In the second wave, 44% of the patient's total leukocyte count was found to be normal, 56% of the patients had increased Tlc and none of the patients had reduced count. **Most of the patients had increased tlc**. Neutrophilic lymphocyte ratio was found to be increased in 56% of the patients and 44% of the patirnts had normal neutrophilic lymphocyte ratio and was similar to the first wave. In most of the patients (90%) c –reactive protein was found to be increased.In the second wave d dimer was found to be increased in 78% of the patients and only in 22% was found to be normal

Table 6: Fetomaternal outcome

Fetomaternal outcome	First wave(n=47) Dhanya et al[1]	Second wave(n=32)
Gestational age		
Term	40(85%)	15(47%)
Preterm	7(15%)	17(53%)
Mode of delivery		
Normal delivery	15(32%)	12(38%)
Lscs	32(68%)	20(62%)
Neonatal outcome		
Live birth	45(95%)	23(72%)
IUFD	2(5%)	9(28%)
Still birth	0(0%)	0(0%)
Neonates infection rate:		
Live birth (n=45)		
Infected with covi 19	1(6%)	3(13%)
Not infected with covi19	44(94%)	20(87%)
Mortality		
Maternal mortality	3(6%)	8(25%)
Neonatal mortality	0(0%)	2(6%)

In the first wave, 85% of the patients delivered in term and 15% of the patients delivered in preterm. Whereas during the second wave 47% of the patients delivered in term and 53% of the patients delivered preterm.In the second wave preterm delivery was found to be higher during the second wave.

Speaking of mode of delivery of the patients lower segment cesarian rates was found to be higher in both the waves corresponding to 68% and 63% in the first and the scond waves respectively.

Neonatal outcome in the first wave was found to be 95% live birth and 5% was intrauterine fetal death. During the second wave 72% was found to be live birth and 28% was found to be intrauterine fetal death. Intrauterine fetal death was found to be higher in the second wave.

Out of the live births in the first wave only 6% of the neonates were infected with covid 19 and 13 % of the neonates were infected during the second wave.

During the first wave maternal moratlity was found to be 6% and 25 % during second wave indicating the second wave was severe affecting the pregnant women leading to higher maternal mortality rate.

Neonatal mortality during second was found by 6% while 0 % when compared with the first wave.

Discussion

In our hospital, a total of 89 pregnant women were admitted in our tertiary hospital, out of which 53 of the patients were antenatal women of which 15 of the women died ,32 patients were admitted during third trimester and labour and 4 patients were delivered outside and referred here. **During the first wave even asymptomatic mother were advised compulsory admission in our hospital. But during the second wave only symptomatic women were admitted and the private hospitals also started to take up the covid positive patients which was not there during the first wave, due to the increasing trend of telemedicine only high risk pregnant mothers was referred to our hospital.**

Thereby the data above indicates that severity of the disease to be higher than that of the first wave.

Table 1 suggests that in this study, the most common age group affected was only between 20-30 years same as that of the first wave.

Table 2 suggests that in our comparison, the first wave affected 85% of the term pregnant women and 15% was of preterm but the second wave had higher preterm deliveries when compared with the first wave.As per gravidity multigravida was mostly affected when compared to primigravida in both the waves.

Table 3 suggests that **most of the patients developed cough, fever, diarrhea and dyspnea which was found to be more severe than the previous wave**

Table 4 suggests that pregnant women with comorbidities with anaemia, pregnancy induced hypertension diabetes

mellitus, immunocompromised patients were at higher risk and was affected more in both the waves.

Table 5 suggested that in the first wave , 64% of the patient's total leukocyte count was found to be normal , 36% of the patients had increased Tlc and none of the patients had reduced count. Neutrophilic lymphocyte ratio was found to be increased in 60% of the patients and 40% of the patients had normal neutrophilic lymphocyte ratio. In most of the patients (72%) c –reactive protein was found to be increased.In the first wave d dimer was dound to be normal in 79% of the patients and only in 21% was found to be increased. In the second wave, 44% of the patient's total leukocyte count was found to be normal, 56% of the patients had increased Tlc and none of the patients had reduced count. **Most of the patients had increased tlc**. Neutrophilic lymphocyte ratio was found to be increased in 56% of the patients and 44% of the patients had normal neutrophilic lymphocyte ratio and was similar to the first wave. In most of the patients (90%) c –reactive protein was found to be increased.In the second wave d dimer was dound to be increased in 78% of the patients and only in 22% was found to be normal.

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During the first wave maternal moratlity was found to be 6% and 25 % during second wave indicating the second wave was severe affecting the **pregnant women leading to higher maternal mortality rate.**

Neonatal mortality during second was found by 6% while 0 % when compared with the first wave.

Conclusion

1. In pregnancy, due to the physiological alterations in cardiovascular, respiratory and immune system, the pregnant women are at greater risk and vulnerable to become the victims of pathogens, especially in the case of outbreak like SARS-CoV-2
2. The result of the present study suggests that the second wave among the pregnant women was found to be more severe when compared to the first wave because of the

new variants. The present data seems to be less because during the second wave covid 19 pregnant women were taken in by the private hospitals and most of the high risk patients was only referred to our hospital.

3. **Because of this we as obstetricians and health care workers has to insist upon the vaccination during pregnancy thereby preventing the severity of the disease and reducing the maternal mortality**.

4. Currently, the whole world is in the middle of the second or perhaps the third wave and the results of our study indicate that the characteristics of the infection may vary over time. We believe that the most important conclusion of our work is that we must remain vigilant in the constant study of the characteristics of the disease, to be able to modify treatments quickly, if necessary, and disseminate our results to the scientific community and society as soon as possible for coordinate and global action.

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