

## Impact of Covid-19 Pandemic on Maternal Health and Fetal Outcome in a North East Population of India

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### Abstract:

**INTRODUCTION:** It is well known that Covid 19 pandemic had significant impact on the lives of people worldwide and anxiety, depression, stress, lack of adequate antenatal care can have significant adverse pregnancy outcome.

**BACKGROUND:** to look for any significant increase in incidence of adverse maternal and fetal outcome during covid 19 pandemic

**METHODS:** the study was conducted in one of the busiest hospitals of Jorhat, Assam. It is a hospital based case control observational study. Babies born during the COVID 19 pandemic were enrolled as cases and one year before the pandemic were enrolled as controls. Maternal factors(PIH, premature delivery, PROM and foetal distress) and foetal factors(low birth weight, small for gestational age) were studied in both the groups. Data was analysed statistically using SPSS.16

**RESULTS:** It was observed that there was significantly increased risk of PIH( $p=0.013$ ), foetal distress( $p=0.008$ ), premature delivery( $p=0.005$ ), low birth weight( $p=0.002$ ) in pregnant women who delivered babies during the pandemic as compared to those prior to the pandemic. However, there was no significant increase risk of PROM ( $p=0.668$ ), small for gestational age( $p=0.668$ ) in cases.

**CONCLUSION:** We found that COVID 19 pandemic has significant effect on the health of mother and the baby. This can be attributed to increased level of anxiety, depression, stress and also relatively decreased antenatal care among the pregnant women during the pandemic. These problems can be solved by raising health awareness among the pregnant women to continue their routine antenatal check-up and counselling them to control their negative emotions by behavioural therapy.

**Keywords:** COVID19 pandemic, anxiety, stress, pregnant women, low birth weight

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### I. Introduction :

It is a well known fact that anxiety, depression and stress among pregnant women can have adverse outcome on both the mother and the baby. Covid-19 pandemic has caused profound stress and fear among all the people of the world. Similarly improper antenatal care can lead to adverse pregnancy outcomes. Anxiety, fear and stress during pregnancy can produce effects on the maternal-fetal-placental systems. This can then have adverse influence on fetal development and also have effects on the initiation of labour via maternal, fetal, and placental hormonal changes<sup>(1)</sup>. Depression in the third trimester is related to an increase in negative pregnancy outcomes, including an increased risk of low birth-weight newborns, preterm delivery, preeclampsia and small-for-gestational-age newborns<sup>(2)</sup>.

COVID-19 was identified in late 2019 but it quickly became a global pandemic by March of 2020. A rapid rate of transmission and a lack of preparedness to prevent and treat this virus has led to profound stress, and fear among the people globally<sup>(3)</sup>. Covid-19 pandemic may cause an unidentified impact on the mental health of pregnant women. No studies have been done till now to see whether the impact of Covid-19 pandemic has led to any adverse maternal and fetal health outcome. So in this study we have tried to find out whether Covid-19 pandemic has led to any adverse effect on the mother and the baby.

### AIMS AND OBJECTIVES:

- 1/ to look for any increase in incidence of adverse maternal outcome during Covid-19 pandemic
- 2/ to look for any increase in incidence of adverse fetal outcome during Covid-19 pandemic

## II. Materials And Method:

Place of Study: the study was conducted in one of the busiest hospitals of Jorhat, Assam

Study Design: Hospital based case control observational study

Duration of Study : 2 years ( November 2018 – October 2020)

Method of study: Babies are grouped into two categories – cases and controls. Maternal and neonatal care was given according to standard hospital protocol.

Cases: Babies born during Covid-19 pandemic from December 2019 to October 2020 were enrolled at birth

Control: Babies born prior to the onset of pandemic from November 2018 to November 2019 were enrolled using the hospital record information.

Exclusion criteria:

- 1/ Mothers with multiple pregnancies
- 2/ Neonates with life threatening congenital anomalies
- 3/ Mothers with diabetes
- 4/ Mothers with hypertension prior to onset of pregnancy.
- 5/ Mothers with any known mental health disorder like depression, anxiety
- 6/ Mothers with any chronic disease or on any long term medications
- 7/COVID-19 positive pregnant women

Neonates were enrolled using hospital record information. Verbal consent was obtained from mothers by contacting them using the information from hospital record. Institutional ethics committee clearance was obtained. Gestational age was calculated from maternal LMP or New ballard score was done if it was not available. Birth weight was taken in an electronic weighing scale with an accuracy of  $\pm 5$  gm and appropriateness of weight, small for gestational age or large for gestational age was determined by plotting in Fenton's chart. Pregnant women in the cases group were asked about their fear, anxiety, stress and depression status about the COVID-19 pandemic.

### Variables studied included

1/ Maternal factors: maternal factors studied in cases and control were

- a) Pregnancy induced hypertension (PIH)
- b) Premature rupture of membrane(PROM)
- c) Fetal distress
- d) Premature delivery

2/ Fetal factors: fetal factors studied in cases and controls were

- a) low birth weight
- b) appropriateness of gestational age

**STATISTICAL METHODS** : The data obtained was tabulated and analysed statistically using social science system version SPSS.16

## III. Results And Observations:

**TABLE 1: COMPARISON OF MATERNAL FACTORS IN CASES AND CONTROLS**

VARIABLES	SUBGROUPS	CASES n=715	CONTROLS n=711	P VALUE
PIH	PRESENT	76(60.8%)	49(39.2%)	<b>0.013</b>
	ABSENT	639(49.1%)	662(50.9%)	
PROM	PROM POSITIVE	102(48.8%)	107(51.2%)	0.668
	PROM NEGATIVE	613(50.4%)	604(49.6%)	
FETAL DISTRESS	PRESENT	114(59.1%)	79(40.9%)	<b>0.008</b>
	ABSENT	601(48.7%)	632(51.3%)	
PREMATURE DELIVERY	TERM DELIVERY	633(49.0%)	660(51.0%)	<b>0.005</b>
	PRETERM DELIVERY	82(61.7%)	51(38.3%)	

Total 1426 patients were enrolled in the study of which 715 were cases and 711 were controls.

All pregnant women among the cases group were aware about the ongoing COVID-19 pandemic and all expressed some concern about the pandemic. They said that lockdown, fear of getting the disease, social isolation has affected their lives to a great extent and they were stressed, anxious or depressed; though their level were not measured separately.

Analysis of data showed that there was significantly increased risk of PIH( $p=0.013$ ), fetal distress ( $p=0.008$ ), premature delivery ( $p=0.005$ ) in cases as compared to controls group . However, there was no significant increased risk of PROM ( $p=0.668$ ) in cases. Among the cases 10.6% pregnant women had pregnancy induced hypertension, 15.9% pregnant women had fetal distress and 11.4% women had premature delivery

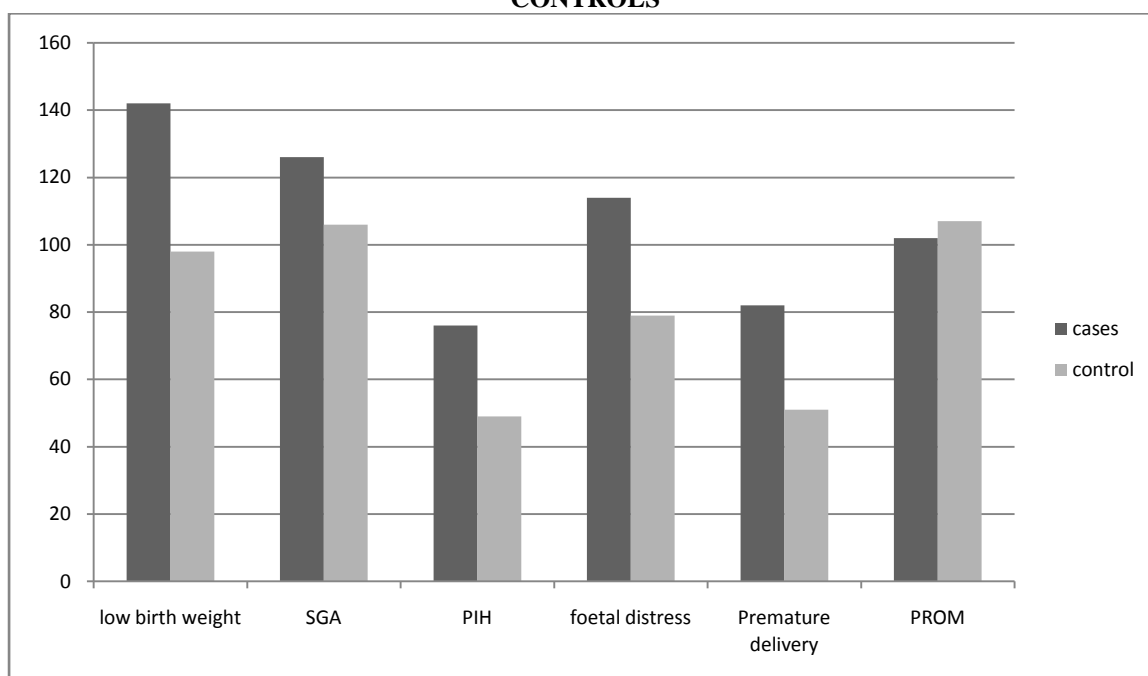
before 37 completed week whereas, in control group 6.9% pregnant women were found to have PIH, 11.1% had fetal distress, 7.1% had premature delivery.

**TABLE 2: COMPARISON OF FETAL FACTORS IN CASES AND CONTROLS**

		CASES n=715	CONTROLS n=711	p value
LOW BIRTH WEIGHT	< 2.5 kg	142	98	<b>0.002</b>
	≥ 2.5 kg	573	613	
APPROPRIATENESS OF GESTATIONAL AGE	AGA	580	595	0.376
	SGA	126	106	
	LGA	9	10	

Analysis of data showed that there was significantly increased risk of low birth weight( $p=0.002$ ) in cases as compared to controls group . However, there was no significant increase in risk of small for gestational age ( $p=0.668$ ) in cases. Among the cases 19.8% babies were low birth weight, 17.6% were small for gestational age whereas, in control group 13.7% were low birth weight and 14.9% were small for gestational age

**FIGURE 3: FIGURE SHOWING MATERNAL AND FETAL FACTORS IN CASES AND CONTROLS**



From the above figure we can see that the incidence of low birth weight, small for gestational age, pregnancy induced hypertension, fetal distress, premature delivery were increased in cases, though the increase in incidence of SGA in cases was not significant statistically( $p=0.376$ ). The incidence of premature rupture of membrane was higher in control group but it was not statistically significant( $p=0.668$ )

#### IV. Discussion

In our study we have found that pregnancy during the Covid-19 pandemic has significant correlation with increased risk of pregnancy induced hypertension, fetal distress, premature delivery among the pregnant ladies and that of low birth weight in babies. Though the incidence of small for gestational age was increased in babies born during the pandemic the result was not statistically significant. The incidence of premature rupture of membrane was found to be lower in pregnant women during the pandemic but the result was not statistically significant to draw any conclusion.

COVID-19 pandemic has caused profound stress, depression and anxiety among all the people worldwide. . Due to rapid rate of transmission, the lack of preparedness to prevent and treat this virus has led to profound stress, and fear among the people<sup>(3)</sup>. Lockdown during the pandemic led to disruption of the routine antenatal care. Many women feared to come out of their homes to take routine antenatal check up in hospital due to fear of getting the virus transmission. Social isolation led to disrupted routines and social lives<sup>(4)</sup>.

Consequently, all these can affect the general well being and mental health of the mother leading to adverse effect on the mother and the baby.

Data on COVID-19 infection and its complications during pregnancy is limited<sup>(5)</sup>.

Tiffany *et al* in their study have found depression during pregnancy can lead to elevated maternal cortisol which can lead to premature delivery and low birth weight of the baby<sup>(6)</sup>. In our study we have found that there is significant increase in incidence of premature delivery and low birth weight among the babies that were born during the pandemic. This may be attributed to increased stress, anxiety, fear and depression during the pandemic as well as relatively decreased antenatal care during the pandemic.

Teixeira JMA *et al* have found in their study positive correlation between maternal anxiety during pregnancy and increased uterine artery resistance index<sup>(7)</sup>. Harrington K *et al* in their study have found that high uterine artery resistance is associated with underweight for gestational age babies and pre-eclampsia<sup>(8)</sup>. In our study we have found significant increase in incidence of pre-eclampsia in pregnant women during the pandemic. This can be attributed to increased anxiety and fear among the pregnant women and relatively decreased antenatal care during the pandemic. In our study though the incidence of small for gestational age was increased among the babies but the result was not statistically significant.

Michael T. Kinsella *et al* in their study have found that maternal stress, depression and anxiety increases the risk of foetal distress<sup>(9)</sup>. The effect of maternal mood on fetal activity was strengthened when measurements of anxiety were included concurrently with depression<sup>(10)</sup>. Maternal stress has also been shown to have significant association with increased fetal motor activity at 24, 30, and 36 weeks gestation<sup>(11)</sup>. In our study we have found significantly increased incidence of fetal distress among the pregnant women during the pandemic which was one of the important reasons for emergency Caesarean section. This increased incidence can be attributed to increased maternal stress, depression and anxiety during the pandemic.

Fatemeh Effati-Daryani *et al* in their study have found decreased incidence of depression, stress and anxiety among Iranian pregnant women during the outbreak of COVID-19 due to successful training in controlling negative emotions during crisis by health centers and mass media<sup>(12)</sup>. Thus altered mental health of pregnant women during the pandemic can be decreased by proper counselling and behavioural therapy.

Several previous studies have shown that COVID-19 pandemic has increased the risk of anxiety, stress, fear and depression among people globally and that stress, anxiety, depression, fear in pregnancy can lead to adverse outcome on both the mother and the baby. But no study have been done till now to see whether the level of stress, anxiety, depression and fear among pregnant women during the pandemic is significant enough to cause adverse effect on the mother and child. Our study is the first study which has showed that altered mental health and relatively decreased antenatal care during the pandemic has caused significant effects on the mother and the baby.

Our study has one limitation, in our study presence of anxiety, depression and stress due to the prevailing pandemic was asked only verbally but no scale was used to measure the level or score of depression, anxiety and stress. This was done because we used the control group from hospital health record in whom depression, anxiety and stress were not measured using any scale. To counterbalance this limitation we used two groups in the same setting one before the pandemic and one during the pandemic. With the inclusion and exclusion criteria both the groups were matched and were nearly identical with the cases group facing all the problems due to the pandemic in addition.

## V. Conclusion

In our study we tried to find out that without actually contracting COVID-19 whether the circumstances arising due to the pandemic have any significant effect on the health of mother and the baby. We found that during the pandemic there was significant increase in the incidence of pregnancy induced hypertension, foetal distress, premature delivery and low birth weight. This can be attributed to increased level of anxiety, depression and stress among the pregnant women due to the pandemic and also relatively decreased antenatal care because of their fear to come out of their homes for the routine antenatal check up. These problems can be solved to a great extent by raising health awareness among the pregnant women, educating them how they can come out of their houses for routine health check up even during the pandemic by wearing masks and maintaining social distancing. However, it is equally important to counsel the pregnant women to be calm and control their negative emotions like anxiety, fear and depression by behavioural therapy.

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