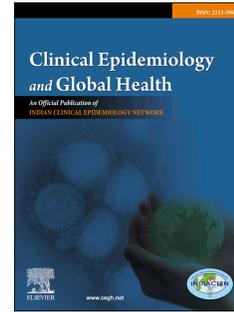


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Impact of covid 19 pandemic on severe maternal outcomes -An observational study from a referral institute of India

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TITLE: Impact Of Covid 19 Pandemic On Severe Maternal Outcomes -An Observational Study From A Referral Institute Of India.

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ABSTRACT:

INTRODUCTION: Covid 19 pandemic has taken the world by storm. As far as maternal health is concerned, it has been affected both directly and indirectly. Not only are the women getting affected by COVID disease but also the health services are suffering in terms of availability, approachability and access. The study aimed to analyze the change in the trends of maternal near and maternal mortality comprising severe maternal outcome (SMO) between 2019 and 2020 in the department of obstetrics and gynaecology of our hospital due to COVID pandemic. **METHODS:** This retrospective study was conducted in the Obstetrics and Gynaecology department of Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh. The maternal death review data and maternal near miss statistics were analysed. This included assessing the change in the number of maternal deaths and obstetric near miss, their respective causes, and case fatality rate specific to COVID during pregnancy. **RESULTS:** The total births decreased from 6056 in 2019 to 4140 in 2020 whereas women with severe maternal outcomes increased from 4.6% in 2019 to 6.5% in 2020 (p value < 0.001). The incidence of nearmiss increased significantly from 3.5% in 2019 to 5.1% in 2020 (p value < 0.0001) and maternal mortality ratio increased from 1122 per 1 lakh births to 1425 per 1 lakh births. Haemorrhage was the most common cause of maternal near miss with 45.8% in 2019 and an increase to 50.2% in 2020. The percentage of illiterate patients with near miss statistically reduced in 2020 (p value- 0.004). Average hospital stay also reduced from 16.5 +/- 2.1 days to 12.6 +/- 6.3 days (p value < 0.0001). The average time taken to reach the hospital, however, increased from 27 +/- 3 hours to 36 +/- 4 hrs (p value < 0.0001). The rate of direct maternal deaths increased from 45.6 % to 52.5 % between 2019 to 2020 (p-value-0.434). **CONCLUSION:** Covid 19 pandemic has affected both maternal mortality and morbidity. Keeping the current situation in mind, it becomes increasingly important to develop patient education via electronic media and teleconsultations. One- stop portals and helplines which involve multidisciplinary teams should be available to all such pregnancies.

KEY WORDS: COVID-19, severe maternal outcome(SMO), maternal mortality, maternal near miss(MNM).

INTRODUCTION:

Covid 19 pandemic has taken the world by storm. As far as maternal health is concerned, it has been affected both directly and indirectly. Not only are the women getting affected by COVID disease but also the health services are suffering in terms of availability, approachability and, access. Several non-emergent health facilities had been suspended for varying periods during the nationwide lockdown in the year 2020. The second wave of COVID 19 had gripped the nation, the effect of which will be evident in the time to come.

WHO recommends that countries should closely monitor the trends of Severe maternal outcomes (SMO) to identify preventable causes as well as system- and provider-related failures behind that¹. SMO is defined as a maternal near miss or a maternal death. A detailed analysis of these pregnant women who suffer from severe maternal outcomes will help to identify the gaps and deficiencies in the provision of adequate care, thereby accelerating the reduction of mortality and morbidity during this COVID pandemic.² The study aimed to analyze the change in the trends of SMO between 2019 and 2020 in the department of obstetrics and gynaecology of our hospital due to COVID pandemic.

METHODOLOGY:

This retrospective study was conducted in the Obstetrics and Gynaecology department of Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh. Our institute performs regular notification and audit of all maternal deaths and maternal near miss twice a month and annually. All maternal deaths are recorded, reported and Maternal Death Surveillance and Review (MDSR) forms are filled and analyzed. Similarly, maternal near miss (MNM) reporting is done according to Government of India (GOI) guidelines.³ PGIMER, Chandigarh, is a tertiary care centre in north India. It caters to the high-risk referrals of the neighboring states of Punjab, Haryana, Himachal Pradesh, Jammu and Kashmir, Uttarakhand, and Uttar Pradesh, so the mortality and near miss statistics represent all these states.

This analysis was performed specifically to study the effect of COVID 19 pandemic on maternal health parameters. This included assessing the change in the number of maternal deaths, number of obstetric near miss, their respective causes, and case fatality rate, specific to COVID during pregnancy. The residual morbidity was

noted at the time of discharge. It was defined as a patient getting discharged with some morbidity remaining of her disease process.

RESULTS:

As shown in table 1 the total number of births in 2019 was 6056 which drastically reduced to 4140 in the year 2020. This is contrasting to the annual birth rate at PGIMER has been over 5000 for the last 10 years. However, the women with severe maternal outcomes increased significantly from 4.6% in 2019 to 6.5% in 2020 (p value < 0.001). The incidence of near miss also increased significantly from 3.5% in 2019 to 5.1% in 2020 (p value < 0.0001). The mater mortality ratio increased from 1122 per 1 lakh births to 1425 per 1 lakh births.

Table 2 shows a cause-wise comparison of the maternal near miss cases. Haemorrhage was the most common cause of maternal near miss with 45.8% in 2019 and an increase to 50.2% in 2020. This was followed by hypertension which was seen in 16.4% of cases in 2019 at 17.1 % cases in 2020. Sepsis accounted for 11.2 % of cases of maternal near miss in 2019 and 10.4% in 2020. The percentage of medical disorders slightly reduced from 12.6% to 9.9 % between 2019 and 2020. The percentage of liver disorders and other disorders has remained almost the same. Although, none of these changes noted are statistically significant they represent a characteristic pattern. Amongst the women developing maternal near miss 6 women had a COVID +ve status. Although , the COVID positive status was incidental and did not lead to the maternal near miss complication.

Table 3 compares the characteristics of maternal near miss patients admitted in the year 2019 and 2020. In 2019, the percentage of illiterate patients with near miss was 27.1% which reduced to 15.5 % in the year 2020 (p value < 0.004) which is statistically significant. Similarly, 38.3 % of patients admitted with maternal near miss were Below Poverty Line (BPL) in the year 2019 which reduced to 20.8 % in 2020 (p value < 0.0001) which is also statistically significant. Average hospital stay also reduced from 16.5 +/- 2.1 days to 12.6 +/- 6.3 days (p value < 0.0001). The residual morbidity at discharge was seen in comparatively more patients increasing from 7.9% in 2019 to 11.8% in 2020 (p value > 0.05) which is not statistically significant. The average time taken to reach the hospital, however, increased from 27 +/- 3 hours to 36 +/- 4 hrs (p value < 0.0001). ICU admissions were comparatively less, reducing from 31.3% to 23.2% (p value > 0.05) although not statistically significant.

Table 4 compares the direct and indirect maternal deaths in the 2 years. The rate of direct maternal deaths increased from 45.6 % to 52.5 % between 2019 to 2020 (p-value-0.434), with reduction in the indirect maternal deaths from 38.2% to 25.4% (p-value-0.123). The brought dead patients increased from 5.9% in the year 2019 to 11.9 % in the year 2020.

Of the near miss cases, 4 women, and among maternal deaths, 6 women were associated with COVID positive status. However, amongst these only one maternal death was due to COVID pneumonia and associated acute respiratory distress syndrome (ARDS). This patient who was gravida 2 with one living issue was referred to our institute at 8 weeks of gestation with ARDS. She had spontaneous abortion during the hospital stay. As the pregnancy was very early gestation, we do not assume that it could have attributed to the worsening and death of the lady. In the rest COVID was coincidental. The overall case fatality rate of COVID 19 infection was 0.62 %.

DISCUSSION:

Pregnancy has its own risks to the mother and her baby. Obstetricians regularly face the challenge of managing and saving two lives simultaneously both of whom have a long life expectancy. An unfavourable outcome of a pregnancy is unacceptable to the family and society. This puts a lot of pressure and stress on the existing maternal services.

In low-income countries, even before COVID 19, it was a difficult task to provide adequate coverage for antenatal checkups, obstetric emergencies, universal institutional deliveries, and respectful maternity care. The covid-19 pandemic has widened this gap and exposed several lacunae of healthcare systems worldwide, but more so in low- and middle-income countries.⁴

A trend of decreased number of total births has been seen in our centre in the year following the COVID pandemic. This may be attributed to the nationwide lockdown which prevented patients from reaching the

hospital in time for delivery. Secondly, there is an immense fear of contracting the disease from the hospital which has also prevented patients from seeking care in hospital settings.⁵

Although the Government of India released its guidelines on telemedicine and its application in providing medical care, it is unclear how much it has been of help to the pregnant population. Physical contact with the doctors has reduced over the past 1 year. The high-risk pregnant population could have been the worst sufferer because of this. Many of the women with disorders like complex cyanotic heart disease, placenta accreta, uncontrolled diabetes, and severe preeclampsia require prolonged hospitalization for stringent maternal and fetal monitoring. We saw a one-third reduction (by around 33%) in hospital births in 2020. Kumari et al⁶ noted a 49.8% reduction in the number of admissions as compared to the previous year. In-hospital mortality also increased in their study.⁶

We compared the various causes of maternal near miss in the 2 years. Haemorrhage remains the most common cause of maternal near miss in our setup. The difference is in the percentage of maternal near miss caused by haemorrhage which was 45.6% in 2019 and increased to 52.7 % in 2020. This may again be attributed to a lack of timely intervention in patients having postpartum haemorrhage which may be due to the inability of the patient reaching the hospital or delay inpatient transfer from one hospital facility to another. This is also corroborated by the increase in time taken to reach the hospital by 33.3 %. This is an important finding as haemorrhage is an important cause of preventable death and our aim should be to bring these causes to a minimum.

The number of illiterate and poor patients reaching the hospital reduced in the year 2020. This also may be due to the lack of means and financial resources in these patients hindering them from reaching the appropriate healthcare facility. These findings were also noted by Kumari et al.⁶ The overall number of patients reaching the hospital also reduced even when they wanted to seek help as they were concerned about COVID 19 exposure in the hospital.⁵

The average hospital stay has reduced in the year 2020, this may be attributed to the encouragement of early discharge to prevent COVID 19 infection of patients and overcrowding in the hospital. This helps in preventing the further spread of COVID 19. This also explains the increase of residual morbidity at discharge. The average time taken to reach the hospital considerably increased as most Indians use public transport for reaching the hospital in emergencies.⁷ This lack of availability of transport facilities during the year 2020 also explains the increase in the number of brought dead patients in our centre. This observation may also be attributed to the fear of contracting COVID 19 in hospitals has prevented patients from coming to hospitals till the disease severity worsened considerably.

The case fatality rate of COVID 19 in pregnancy was 0.62 % in our centre which is less as compared to a study in Mexico which showed a case fatality of 2.3%⁸. Out of total of 162 women who tested positive for Covid 19, we noted 6 maternal deaths. Only 1 maternal death can be attributed to covid 19 infection.

The percentage of direct maternal death increased from 45.6% to 52.5%. Although it was not statistically significant (p value > 0.05) the numbers represent a disturbing trend. Souza et al⁹ have described the “Obstetric transition” which portrays a trend where countries are gradually shifting to low mortality, predominantly from indirect causes of maternal deaths, non-communicable diseases, advanced maternal age from an era of high maternal mortality predominantly from direct obstetric causes. These are indicative of widespread availability of antenatal care and institutionalization of maternity care. Depending on various parameters, the countries have been divided into 5 stages with stage V being where all preventable deaths are avoided and means advancing of health system. COVID 19 pandemic has increased the percentage of direct maternal deaths which clearly implies a reverse obstetric transition and how this disease has negatively impacted our maternity health care.

CONCLUSION:

Covid 19 pandemic has affected both maternal mortality and morbidity. The percentage of patients developing severe maternal outcomes has increased, especially, the patients developing SMO due to postpartum haemorrhage has increased. COVID has led to change in many hospital practices including the timing of

referrals, discharges, etc. The pandemic is expected to rise further with every wave affecting people in very large numbers. Keeping the current situation in mind, it becomes increasingly important to develop patient education via electronic media and teleconsultations. One-stop portals and helplines which involve multidisciplinary teams should be available to all such pregnancies.

ETHICAL APPROVAL AND CONSENT TO PARTICIPATE:

Not applicable.

CONSENT FOR PUBLICATION:

Not applicable.

AVAILABILITY OF DATA AND MATERIALS:

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

COMPETING INTEREST:

The author declare that they have no competing of interests.

FUNDING:

None.

AUTHOR CONTRIBUTIONS:

GT collected and analysed the patient data and wrote the manuscript. PS, AA and VJ reviewed and edited the manuscript. All authors read and approved the final manuscript.

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Table .1 Comparison of severe acute maternal outcome between pre COVID and COVID-19 era.

	2019	2020	p-values
Total births	6056	4140	
Total SMO	282(4.6%)	270(6.5%)	<.0001**
Total MNM cases	214(3.5%)	211(5.1%)	<.0001**
Total maternal deaths	68(1,122 per 100,000 births)	59(1,425 per 100,000 births)	0.176128

Table .2 Comparison of relative distribution of causes of maternal near miss.

	2019(n= 214)	2020(n=211)	p-values
Haemorrhage	98(45.8%)	106(50.2%)	0.359397
Hypertension	35(16.4%)	36(17.1%)	0.841481
Sepsis	24(11.2%)	22(10.4%)	0.791337
Medical disorders	27(12.6%)	21(9.9%)	0.386476
Liver disorders	18(8.4%)	15(7.1%)	0.617075
Others	12(5.6%)	11(5.3%)	0.8624960

Table . 3 Comparison of patient characteristics of maternal near miss.

		2019(n=214)	2020(n=211)	p-values
Educational qualifications	Literate	156(72.9%)	178(84.5%)	0.004**
	Illiterate	55(27.1%)	18(15.5%)	<.0001**
Economic status	Not BPL	132(61.7%)	167(79.2%)	<.0001**
	BPL	72(38.3%)	17(20.8%)	<.0001**
Average hospital stay		16.5 +/- 2.1 days	12.6 +/- 6.3 days	<.0001**
Time taken to reach hospital from illness to current hospital		27 +/- 3 hours	36 +/- 4 hours	<.0001**
ICU admission		67(31.3%)	49(23.2%)	0.061369
Residual morbidity at discharge		17(7.9%)	25(11.8%)	0.177313

Table . 4 Comparison of direct and indirect maternal deaths.

	2019	2020	p-values
Total maternal deaths	68	59	
Direct maternal deaths	31(45.6%)	31(52.5%)	0.434
Indirect maternal death	26(38.2%)	15(25.4%)	0.123
Unrelated	04(5.9%)	04(6.8%)	1
Unknown	03(4.4%)	02(3.4%)	1
Brought dead	04(5.9%)	07(11.9%)	0.3445