

IMPACT OF COVID-19 PANDEMIC ON MATERNAL MORTALITY RATIO IN A TERTIARY CARE HOSPITAL OF RAJASTHAN: A RETROSPECTIVE ANALYSIS

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ABSTRACT

Objectives: Pregnancy and delivery are an important risk factor for COVID-19. The present study was carried out to see the impact of COVID 19 on maternal mortality ratio (MMR).

Methods: This retrospective study was performed in the Department of Obstetrics and Gynaecology, Mahila Chikitsalya, and SMS Medical College Jaipur from January 2018 to December 2021. Data were collected from the hospital records and MMR was calculated for every year. The causes of death were also recorded and changing trends were noted.

Results: In the present study, the MMR for the years 2018, 2019, 2020, and 2021 were 159.03, 112.72, 354.58, and 603, respectively, which reflects enormous increase in MMR during COVID pandemic years (2020 and 2021). Before the pandemic (2018 and 2019), maximum deaths were from direct obstetric causes (77.35%) while 22.64% maternal deaths were from indirect causes. During COVID pandemic a large percentage (53.12%) of maternal deaths were due to indirect obstetric causes, COVID pneumonitis (ARDS) being the most common cause of death.

Conclusions: There was 3.59 times increase in MMR during COVID-19 pandemic in our institute. COVID pneumonitis was responsible for significant number of maternal deaths.

Keywords: Maternal mortality ratio, COVID pneumonitis, Pandemic.

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INTRODUCTION

A respiratory disease pandemic (COVID-19 pandemic) caused by the emergence and global spread of the novel corona virus SARS-CoV-2, starting in December 2019, had already killed 6,307,021 people and overall affected 532,887,351 people worldwide until June 14, 2022 [1]. Various risk factors such as old age (above 60 years), diabetes, hypertension, heart disease, obesity, pneumopathies, and immunodeficiency were found to be associated with more complications and deaths among COVID-19 affected patients worldwide and these were observed in various epidemiological and clinical studies done worldwide [2-5]. At the beginning of pandemic, pregnant women without co-morbid conditions were not considered at greater risk for COVID-19 infection and its related complications but later on when the diseases had spread globally, many studies have reported severity of corona disease in pregnant women and few have reported even abortion and deaths among the pregnant women without comorbidities [6,7].

A new World Health Organization epidemiologic alert was released to encourage member countries to implement measures to ensure optimal medical attention for pregnant women and promote maternal mortality prevention awareness [3].

Maternal mortality ratio (MMR) has decreased from 122 in year 2015-17 to 113 in year 2016-18 in India. With this persistent decline, India is on track to achieving the target for MMR of 70/lakh live births by 2030. However, COVID-19 pandemic has become extra burden to this target and may negatively influence the evolution of this indicator in India. This study was aimed to evaluate the impact of COVID-19 pandemic on MMR in a tertiary care hospital of Rajasthan and also changes in trend of MMR.

METHODS

This retrospective study was performed in the Department of Obstetrics and Gynaecology, Mahila Chikitsalya, SMS Medical College,

and Jaipur from January 2018 to December 2021. Data were collected for this retrospective study from the hospital records after obtaining permission from Head of the institute. The details of number of live births and maternal deaths from January 2018 to December 2021 were collected.

MMR was calculated by dividing the number of maternal deaths by the number of live births, multiplied by 100,000, for each year. The MMR was plotted on the time curve annual from 2018 to 2021. The primary outcome of our study was to evaluate the impact of COVID-19 pandemic on MMR. The secondary outcomes were to assess the causes of maternal mortality and the various socio-demographic factors associated with the maternal deaths.

Statistical analysis

Categorical variable were expressed as frequency and percentage and analyzed using Chi-square test. $p=0.05$ or lower was considered statistically significant. EPI INFO version 7.2.1.0 statistics software was used for all of the statistical analysis.

RESULTS

In the present study, the MMR for the years 2018, 2019, 2020, and 2021 were 159.03, 112.72, 354.58, and 603, respectively, which reflects enormous increase in MMR during COVID pandemic years (2020 and 2021). The number of deliveries during the COVID pandemic years (2020 and 2021) had decreased markedly in our hospital; as our hospital was declared COVID dedicated hospital and the non-infected women preferred to deliver in safer non-COVID areas (Table 1 and Fig. 1)

The socio-demographic profile showed that most of the maternal deaths belonged to age group 21-30 years (65.19%). About 69.61% patients were from rural background and 64.64% belonged to lower middle class. About 75.69% mothers were multiparous and 75.13% were not registered for antenatal checkup (Table 2).

During 2018 and 2019 maximum deaths were from direct causes (77.35%) while 22.64% maternal deaths were from indirect causes. Main direct causes were hemorrhage (48.78%), hypertensive disorders of pregnancy (36.58%), and sepsis (5.66%). During COVID pandemic (2020 and 2021), 53.12% maternal deaths were due to indirect causes while 46.87% maternal deaths were from direct obstetric causes. Main direct obstetric causes were hemorrhage (40%), hypertensive disorders of pregnancy (38.33%) and sepsis (10%). There was no statistically significant difference in the direct obstetric causes of mortality during pre-COVID and COVID pandemic periods ($p=0.716$) (Fig. 2 and Table 3).

During 2018–2019, 22.64% maternal deaths were because of indirect causes. Most common indirect cause was severe anemia followed by heart disease, chronic lung disease, aspiration pneumonitis, anaphylaxis, jaundice, and disseminated intravascular coagulation (DIC). About 53.12% maternal deaths were due to indirect causes during COVID pandemic (2020–2021). The most common indirect cause of maternal death was acute respiratory distress syndrome (COVID pneumonitis) followed by severe anemia. Other causes were heart disease, chronic lung disease, DIC, hepatic failure, CKD, and aplastic anemia. There was a statistically significant difference in the indirect causes of maternal mortality during pre COVID and COVID pandemic periods ($p<0.001$) (Table 4).

Table 1: Year-wise distribution of live births, maternal deaths, and MMR

Year	2018	2019	2020	2021
Live birth	19,493	19,516	12,127	14,096
Maternal death	31	22	43	85
MMR	159.03	112.72	354.58	603

Table 2: Distribution of maternal deaths according to socio-demographic parameters

Socio-demographic parameter	n (%)
Age	
<20 years	21 (11.60)
21–25 years	57 (31.49)
26–30 years	61 (33.70)
31–35 years	31 (17.12)
>35 years	11 (6)
Residence	
Rural	126 (69.61)
Urban	55 (30.38)
Socioeconomic status	
Lower	49 (27.07)
Lower middle	117 (64.64)
Upper middle	15 (8.28)
Parity	
Primigravida	44 (24.30)
Multi-gravida	137 (75.69)
Antenatal booking	
Booked	45 (24.86)
Unbooked	136 (75.13)

Table 3: Direct obstetric causes of maternal deaths for year 2018–2019, 2020–2021

Direct cause of maternal death	Year 2018–19 (pre-COVID)	Year 2020–21 (COVID pandemic)
	n(%)	n(%)
Hemorrhage	20 (48.78)	24 (40)
Hypertensive disorders of pregnancy	15 (36.58)	23 (38.33)
Sepsis	3 (7.31)	6 (10)
Pulmonary thromboembolism	2 (4.78)	6 (10)
Suspected amniotic fluid embolism	1 (2.44)	0
Uterine inversion	0	1 (1.66)
Total	41	60

Chi-square=3.601 with 5 degrees of freedom; $P=0.716$

DISCUSSION

Pregnancy is an important risk factor during COVID-19 pandemic and pregnant women are at increased risk of severe illness from COVID-19. It is important to form guidelines for prevention, treatment, and management of pregnant women during such types of pandemic like COVID-19. In the present study, the average MMR for 2 years before pandemic (2018–2019) was 135.86 and for 2 years during COVID pandemic (2020–2021) was 488.12. In a study conducted by Urmila et al. [8] in same institute earlier observed that the mean MMR was 253.13 during 2007–2016. The present study reflects decrease in MMR during 2018–19 from earlier years, which was observed everywhere in world including India, because of good referral services, implementation of government schemes, and improvement in management technologies. A sharp rise in MMR was noted during COVID pandemic.

The present study shows that most of the patients belong to age group of 21–30 years (65.19%). About 69.61% patients were from rural background and 64.64% belonged to lower middle class. About 75.69% mothers were multiparous and 75.13% were not registered for antenatal checkup. Similar demographic profile of study population was reported by other studies [8-12].

In the period before the pandemic (2018 and 2019) maximum deaths were from direct obstetric causes (77.35%) while 22.64% maternal deaths were from indirect causes. Main direct obstetric causes were hemorrhage, hypertensive disorders of pregnancy and sepsis. Similar findings were reported by other studies [8-13].

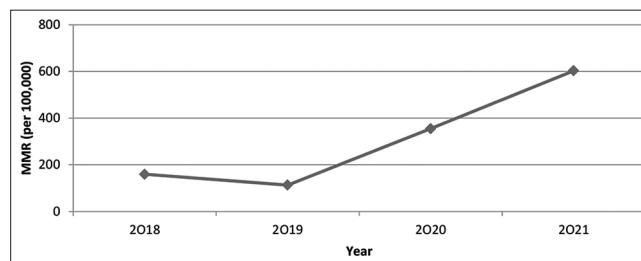


Fig. 1: Year-wise distribution of maternal mortality ratio (2018–2021)

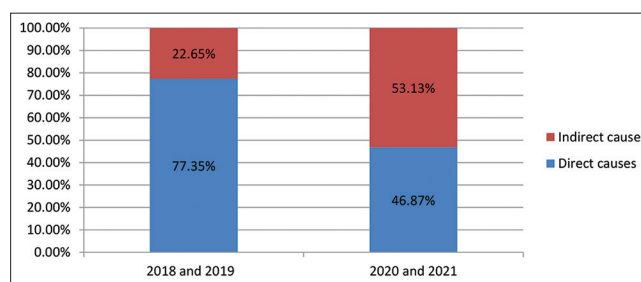


Fig. 2: Causes of maternal mortality (direct obstetric and indirect)

Table 4: Indirect causes of maternal deaths for year 2018-19, 2020-21

Indirect cause of maternal death	2018-19 (pre-COVID)	2020-21 (COVID pandemic)
	n(%)	n(%)
COVID pneumonitis (ARDS)	0	47 (69.11)
Severe anemia	6 (50)	10 (14.70)
Cardiac disease	1 (8.33)	2 (2.94)
Chronic chest diseases	1 (8.33)	5 (7.35)
Other causes	4 (33.33)	4 (5.88)
Total	12	68

Chi-square=23.137 with 4 degrees of freedom; $P < 0.001$ (significant)

In the period during COVID pandemic, there was change in causes of maternal mortality. A large percentage (53.12%) of maternal deaths was due of indirect causes. Main indirect causes were COVID pneumonitis followed by severe anemia.

Mean MMR during the pre-pandemic period (2018 and 2019) was 135.86 and during COVID pandemic period (2020–2021) was 488.12. There was 3.59 times increase in MMR during the COVID pandemic. A significant increase in MMR was also seen in a study conducted in Brazil in 2020 during the COVID pandemic [14]. Another study conducted in Mexico showed that MMR in Mexico increased over 60% in 1 year during the pandemic; COVID-19 was linked to 25.4% of maternal deaths in the studied period. Maternal mortality showed a consistent decline between 2010 and 2019, dropping by an average of 1.15 MMR per year. Therefore, for 2020 the expected MMR=29.8, but the observed MMR= 47.2 in Mexico [15] The present institute was a COVID dedicated hospital which may represent higher mortality as compare to other institutes during pandemic. We recommend more studies to be conducted all over country to see the effect of pandemic over maternal deaths.

CONCLUSIONS

There was increase in MMR by 3.59 times during pandemic in present study. COVID was responsible for significant number of maternal deaths. Results highlighted the lethal effect of pandemic on young reproductive women and need for timely, organized, and efficient maternal and obstetric healthcare at all times, but particularly during a pandemic. Further national and global studies need to be planned to confirm these estimates and to understand the long-term effects of this disease on maternal health.

AUTHORS' CONTRIBUTION

All the authors contributed to the preparation of the final manuscript.

CONFLICTS OF INTEREST

None.

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