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Original Research Article

Study of maternal deaths with COVID-19 infection in a tertiary care centre

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ABSTRACT

Background: COVID-19 has been a major speed braker not only for world economy and development but also for health sector. The susceptible population including elderly, co-morbid adults and pregnant females were likewise affected in both major COVID-19 waves in India. Association between COVID-19 cases and pregnancy has been studied throughout the world. COVID-19 is associated with substantial risk of morbidity and mortality in postpartum patients and their infants world-wide, compared with their not-infected pregnant counter-parts, especially if these individuals were symptomatic or have comorbidities.

Methods: This single-centre prospective observational study, included all consecutive maternal mortalities with COVID-19 infection admitted to Lokmanya Tilak municipal medical college and general hospital (Mumbai, India), a tertiary referral hospital, from 1 April 2020, to June 2021. In this study, a total of 390 patients were included who were found COVID-19 positive during the study period and 17 patients who died during their admission in hospital. The relation of risk factors and demographics were studied for all the patients.

Results: The COVID-19 related maternal mortality was more in women of age group 20-30 years (89%). Most women presented to our centre with complaints of fever, cough, cold or breathlessness (55.5%). Patients who succumbed to COVID-19 were mostly primiparous patients (52.9%) and died within 5 days of delivery (46%). 64% of patients died following 5 days of diagnosis of COVID-19. The co-morbidity present in most patients with COVID-19 associated maternal mortality was pre-eclampsia (31.5%). Most patients were referred with only 17% patients registered at our centre and the type of delay involved in management was mostly Type 1 and 2 (82.2%)

Conclusions: Multi-centre retrospective analysis with larger population size is required in order for this to be statistically significant.

Keywords: COVID-19, Maternal mortality, Pandemic, ARDS, Fever, Virus, Corona

INTRODUCTION

COVID-19 has been a major speed braker not only for world economy, development but also for health sector. The susceptible population including elderly, co-morbid adults and pregnant females were likewise affected in both major COVID-19 waves in India. Association between COVID-19 cases and pregnancy has been studied throughout the world. Women with a COVID-19

diagnosis had a significantly higher risk of severe pregnancy complications such as preeclampsia, eclampsia, HELLP syndrome, ICU admission or referral to a higher level of care, infections requiring antibiotics, preterm birth, and low birth weight, when compared to women without a COVID-19 diagnosis. COVID-19 is linked to a higher risk of morbidity and mortality in postpartum women and their new-borns around the world than in uninfected pregnant women, especially if these

women are symptomatic or have comorbidities.¹ Most pregnant females presenting with COVID-19 were asymptomatic or had mild symptoms, few required critical care. In earlier meta-analysis done in females who succumbed to COVID-19 during/after pregnancy, the main symptoms at the time of admission and the days before were fever and dyspnoea/shortness of breath. Almost 90% of women had a caesarean delivery, and only two vaginal deliveries were recorded. Most of the deaths occurred in the postpartum period.² Earlier studies have revealed increased risk of maternal mortality in COVID-19 patients with ICU admission.³ In this study we will study the association of maternal death with COVID-19

Objectives

Objective of current study was to study demographic and associated factors in a maternal mortality patient with COVID-19 infection.

METHODS

Study type, place and duration

All consecutive pregnant women with COVID-19 infection who died during hospital admission were included in this single-centre prospective observational analysis. This study was done at Lokmanya tilak municipal medical college and general institution in Mumbai, India, a tertiary care referral hospital that is currently leading the way in the COVID-19 pandemic management. The study period was from 1 April 2020 to 30 July 2021.

Selection criteria

Pregnant women with quantitative real-time polymerase chain reaction (PCR) or dual fluorescence PCR-confirmed SARS-CoV-2 infection visiting the hospital in the out-patient department undergoing admission and visiting the emergency department met the eligibility requirements.

Procedure

Data on number of COVID-19 positive patients and maternal mortality were analysed. Total 460 women were tested COVID-19 positive during this time period out of which 230 (50%) had lower segment caesarean section, 156 (33.9%) patients had full term normal delivery, and remaining 18 (3.9%) had check curettage for incomplete or missed abortions, 5 patients (1.1%) had exploratory laparotomy for ruptured ectopic pregnancy. 18 (3.9%) antenatal admissions and 31 (6.7%) admissions in the gynaecology ward. In this study, a total of 17(3.7%) patients are included who died with COVID positive status during their course of admission.

Statistical analysis

All of the factors were examined and analysed on the basis of percentages. The maternal factors were analysed using descriptive statistics, i.e. percentages and proportions were determined, and no statistical test was used because this was a strictly observational study.

RESULTS

Age wise distribution

Most of the patients 8 (47%) belong to age group of 20 to 25 years, while 7 (42%) were in age group of 25-30 and 2 (11%) were in age group of 30 and above. There was no patient less than 20 or above 35 years of age (Figure 1).

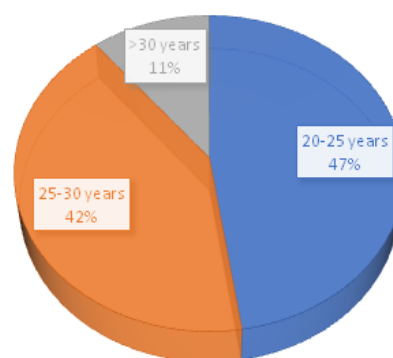


Figure 1: Age wise distribution.

Residence wise distribution

Majority of the study population resided in urban area 13 (76.4%) while 4 (23.5%) were in rural area (Figure 2).

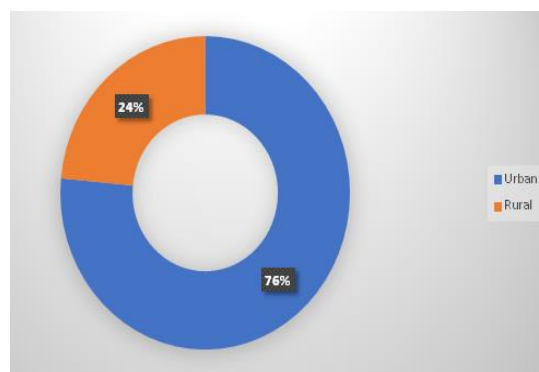


Figure 2: Residence wise distribution.

Referral

Out of the 17 patients, only 3 (17.6%) patients were registered at our centre, 13 (76.4%) were referred from other centres and 1 patient (5.8%) was unregistered (Figure 3).

Gravida and parity wise distribution

Most of the patients who succumbed to COVID 19 were primiparous patients 9 (52.9%), 2 (11.7%) were primigravida (ANC), 3 (17.6%) were P2L2, 1 (5.8%) was P2L1IUFD1, 1 (5.8%) was P2NND2 and 1 (5.8%) was P3L3 (Figure 4).

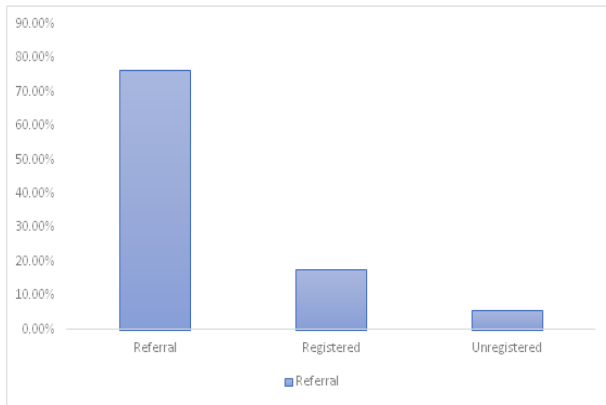


Figure 3: Pattern of referral in the study sample.

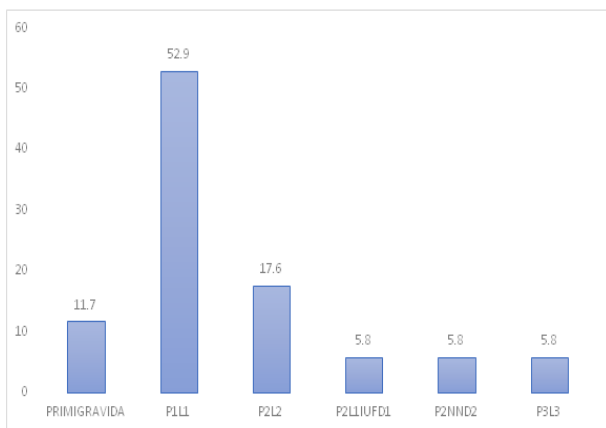


Figure 4: Gravida and parity wise distribution.

Route of delivery of patients

As shown in (Table 1), 53.3% patients included in the study had emergency lower segment caesarean section.

Table 1: Route of delivery.

Route of delivery	N	%
LSCS	8	53.3
Vaginal delivery	4	26.6
Abortion	2	13.3
Instrumental delivery	1	6.1

Place of delivery

Total 11 (73.4%) COVID-19 patients in this study were referred after being delivered outside while only 4 (26.6%) patients were delivered at our centre (Figure 5).

Interval between delivery and death

Total 7 (46%) patients died within 5 days of delivery, 3 (20%) died 6-10 days after delivery, 3 (20%) died 11-15 days after delivery while 2 (13%) patients died after surviving for more than 15 days after delivery (Figure 6).

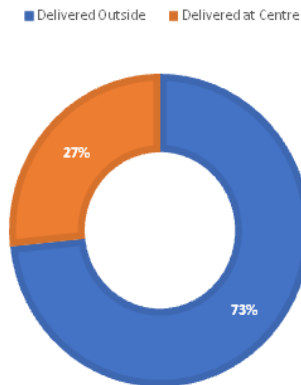


Figure 5: Distribution of place of delivery.

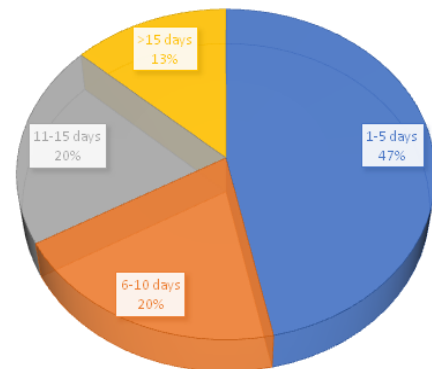


Figure 6: Interval between delivery and death.

Interval between admission and death

The majority of patients (9, 53%) died within five days of being admitted. Total 4 (23.5%) patients died within 6-10 days; 2 (11.7%) patients died within 11-15 days while 2 (11.7%) died after 15 days (Figure 7).

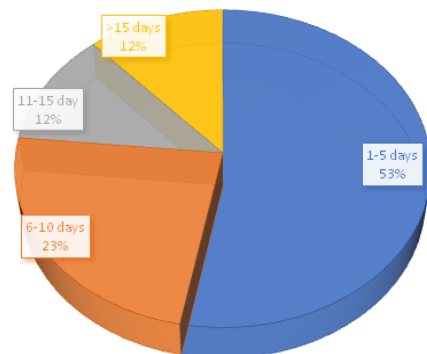


Figure 7: Interval between admission and death.

Interval between diagnosis of COVID-19 and death

Interval between COVID-19 positive report and death of patients is less than 5 days in maximum patients (11, 65%). 2 (11%) patients died between 6-10 days, 1 (6%) died from 11- 15 days and 2 (12%) patients succumbed after 15 days. In one patient (6%), the report was traced after death of the patient (Figure 8).

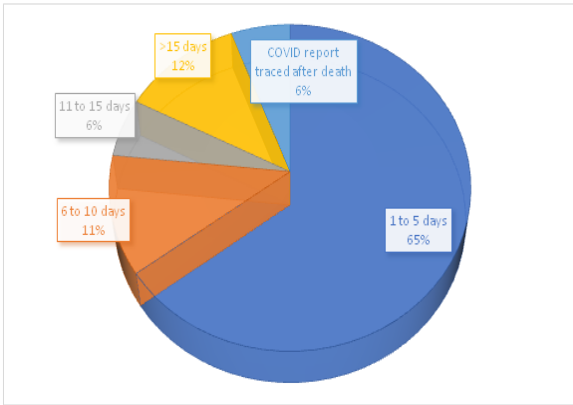


Figure 8: Interval between diagnosis of COVID 19 and death.

Distribution of COVID 19 maternal deaths

Maximum number of COVID-19 positive maternal deaths occurred during the month of May 2020 (4, 23.4%) (peak of COVID-19 1st wave) and September 2020 (5, 29.4%) (secondary peak of COVID-19 in 2020). 2 (11.7%) deaths occurred in July 2020, 1 death (5.8%) each in April, June and August 2020. The number of cases drastically reduced in 2021 during the 2nd major COVID-19 wave in March 2021 with only 3(17.5%) maternal mortality cases reported in 2021- 1 (5.8%) in June 2021 and 2 (11.7%) in April 2021 (Figure 9).

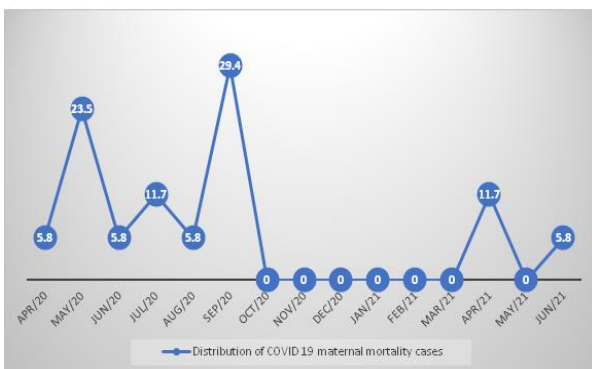


Figure 9: Timeline of COVID-19 maternal mortality case distribution.

Presenting complaints

In our study, majority of patients came with the complains of fever, cough, cold (5, 25.9%) or breathlessness (5, 29.6%). Some patients were referred

from other centres in view of anuria (3, 11.6%), sepsis (1, 3.7%) or seizure (1,3.7%). 2 patients (7.4%) had pain in abdomen while 2(7.4%) had nausea with vomiting (Figure 10).

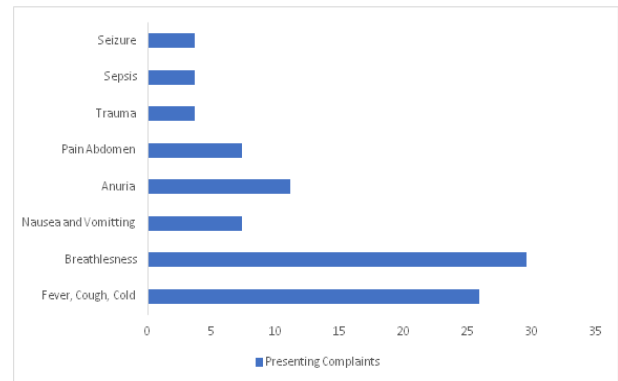


Figure 10: Presenting complaints in maternal mortality patients with COVID-19.

Co morbidity

The most significant association is that with pre-eclampsia (6, 31.5%). 3 (15.7%) patients suffered from sepsis, 2 (10.5 %) patients had tuberculosis, 2 (10.5 %) patients had hepatitis while 1(5.2%) had syphilis, 1(5.2%) had GDM, 1 (5.2%) had pneumonia, 1(5.2%) had rectus sheath hematoma, 1 (5.2%) had trauma and 1 (5.2%) suffered from AKI (Figure 11).

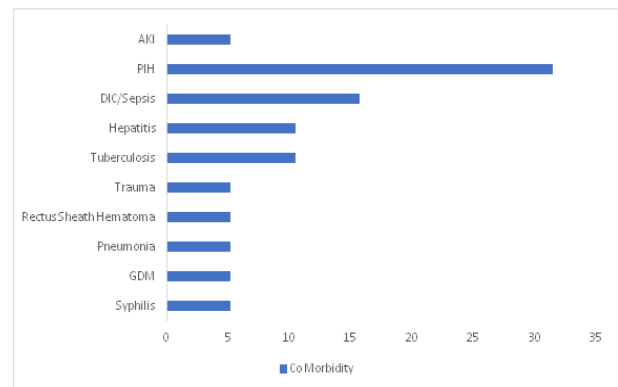


Figure 11: Co-morbidities in maternal mortality patients with COVID-19.

Types of delay

The type of delay involved is signified in (Figure 12). Type 1-delay of patient in seeking help, type 2-delay in referral of patient to higher centre, type 3-delay in tertiary centre for initiating treatment/management. In this study it is seen that type of delay in management of patients was mostly type 1 (7, 47%) and type 2 (6, 30%), in 1 patient (6%) combined type 1 and type 2 delay was present, while only in 1 case (6%), type 3 delay was present. Thus, type 1+ type 2 delay was present in 83% patients.

DISCUSSION

The COVID-19 related maternal mortality was more in women of age group 20-30 years (89%). Most women presented to our centre with complaints of fever, cough, cold or breathlessness (55.5%). Patients who succumbed to COVID-19 were mostly primiparous patients (52.9%) and died within 5 days of delivery (46%). The comorbidity present in most patients with COVID-19 associated maternal mortality was pre-eclampsia (31.5%). Most patients were referred with only 17% patients registered at our centre and the type of delay involved in management was mostly type 1 and 2(82.2%). SARS-CoV-2 is a novel coronavirus strain that causes COVID-19. It was originally discovered in Wuhan, China, near the end of 2019.⁴

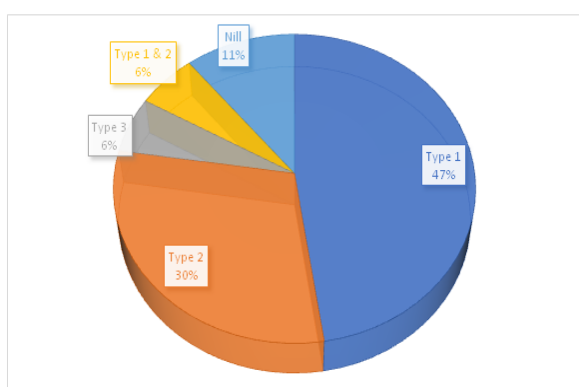


Figure 12: Types of delay that may be involved in maternal mortality.

In the present study, we see that how COVID-19 has accelerated the maternal death in a tertiary care centre. The maximum number of COVID-19 related maternal death co-insides with the peak COVID-19 cases demographically seen at that time. There are lesser number of cases seen in 2021 which may denote effective vaccination drives and low exposure to mothers due to increased knowledge of the disease. The uncertainty regarding the treatment of COVID-19 infection during 2020 was also eliminated in 2021 leading to proper guidelines specially in pregnant females leading to better treatment of patients and thus lower maternal mortality resulting from it. There is also an urban rural divide that can be seen which is mainly attributed to the location of study centre which is located in an urban area (junction of Eastern and Western Express highway) and receives patients from adjoining areas. The time between detection of COVID or interval between delivery and death is less than five days in majority of the cases showing the aggressive nature of the virus.

Most patient who died due to COVID-19 in this study came initially with complaints of fever, cough, cold or breathlessness which is the most common presentation of this viral infection. This finding is consistent with the finding of other studies.² The majority of COVID-19-

infected pregnant women experience mild to moderate flu-like symptoms. Other symptoms include cough, fever, shortness of breath, headache, anosmia, and loss of taste.⁵ Early detection of risk factors and early referral still stays a major goal in prevention of maternal mortality in all cases whether or not from COVID-19 as we can see the type of delay is mostly that of level 1 and 2. While pregnant women are not inherently more susceptible to viral infections, physiological changes in their immune systems during pregnancy have been linked to more severe symptoms.^{6,7} In this study it can be seen that COVID-19 related maternal mortality is more in patients having pre-eclampsia, which is proved by several other studies in the past.⁸ COVID-19 has been linked to more severe symptoms such as pneumonia and significant hypoxia among the elderly, immunocompromised, and individuals with chronic illnesses such as diabetes, cancer, or chronic lung disease.⁵ Thus the same is true with pregnant females where the maternal mortality can be directly linked to the number of co morbidities already present in the women.

CONCLUSION

Although the majority of COVID-19 positive mothers were discharged without major complications, severe maternal mortality was reported as a result of COVID-19. The mortality rates of COVID-19 are comparable with that of non-COVID-19 patients. Furthermore, based on the above findings, the mortality rate in this study appeared to be higher in COVID-19 infection with pre-eclampsia. Multi-centre retrospective analysis with larger population size is required in order for this to be statistically significant.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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