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Impact of the COVID-19 pandemic on mode of delivery

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ABSTRACT

Aims: The first case of COVID-19 was reported on March 11th, 2020, in Turkey, and the measures taken by the state to prevent the spread of the virus were put on hold by March 2022. The purpose of this study is to present information with special focus on mode of delivery among pregnant women during COVID-19 pandemic. We aimed to assess the effect of pandemic on the rates of normal vaginal delivery and C-section.

Methods: This is a restrospective cohort study including all pregnant women at more than 20 weeks of gestation admitted to labour and delivery unit in an academic tertiary care hospital. Records of patients two years before the pandemic and two years of the pandemic were extracted. The number of pregnants admitted to the labour and delivery, the mode of delivery, selected method of anesthesia, total expenses of the patients, the length of hospital stay, indications for cesarian section were compared between the two periods.

Results: A total of 9048 patients were identified, of which 4745 were before the pandemic and 4303 during the pandemic. The most striking finding was the decrease in C-section rates during pandemic which was mostly due to decrease in number of primary C-sections. The length of hospital stay was shorter during pandemic as well. The mean age, route of anesthetics, surgery length did not differ between the two groups.

Conclusion: The available evidence on COVID-19's potential impact on C-section rates is conflicting. Some suggest that there might be evidence indicating a possible link between COVID-19 and increased rates of C-section. However, this study showed that when all the deliveries are included pandemic caused a significant decrease in the rates of primary C-section which might be due to decreased interventions of the healthcare professionals.

Keywords: COVID-19, cesarean rate, vaginal delivery, birth outcomes, maternal health

INTRODUCTION

In December 2019, the novel coronavirus SARS-CoV-2 made its initial appearance in Wuhan, demonstrating both the potency and transmissibility to trigger a global pandemic. Within the first 6 months, there were over 6 million confirmed infections worldwide.[1] On March 11, 2020, Turkey reported its first case of coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). By April 2020, due to increasing numbers of cases strict regulations were applied to prevent the spread of the disease. Our hospital was selected as a pandemic hospital as being one of the biggest medical facilities in Istanbul. Most of the elective medical services were put on hold and all the units were rapidly adapted to care for patients with COVID-19. However, obstetric and delivery units continued to provide care to their patients. In response to the exponential increase in COVID-19 cases in Turkey, Ministry of Health adopted universal testing of all patients admitted to the hospitals, including pregnant patients regardless of the existence of the symptoms. Therefore, Turkey's obstetric population is unique in that virtually all were tested thereafter.

In March 2020, the Journal of the American Medical Association published the initial case report regarding potential vertical transmission of COVID-19 infection.[2] This report described the situation of a newborn born to a mother with COVID-19. Conversely, prior to the publication of this case report, all of the limited studies released had indicated the lack of vertical transmission.[3,4] Amidst this period of uncertainty, numerous associations issued statements on this matter. National and international scientific communities responded in line with this.[5,6] The International Federation of Gynecology and Obstetrics (FIGO) and the Royal College of Obstetricians and Gynaecologists (RCOG) both emphasize that the presence of COVID-19 should not impact the choice of delivery method,

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unless there is an urgent need due to severe respiratory issues.[7,8] Significantly, there was a lack of substantial evidence indicating any reasons to avoid vaginal delivery. The consensus among experts has echoed this discovery.[9,10] However, data on the impact of COVID-19 on pregnancy outcomes demonstrated an increase in the rate of caesarean delivery and prematurity.[11-13] A national cohort study from United Kingdom showed an increase in morbidity due to COVID-19 among pregnant women with medical comorbidities or ethnic minorities.[14] In addition, the rate of prematurity and caesarean delivery were greater compared to the control group.

We report our results of a retrospective study among all the pregnant women admitted to labour and delivery unit from 2018 to 2022 in a tertiary center. The results of obstetric outcomes during the two years of pandemic were compared with the results before the pandemic.

METHODS

The study was carried out with the permission of İstanbul Kartal Dr. Lütfi Kırdar City Hospital Clinical Researches Ethics Committee (Date: 27.07.2022, Decision No: 2022/514/222/29). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

We conducted a retrospective cohort study of consecutive pregnant women at more than 20 weeks of gestation admitted to labour and delivery unit in an academic tertiary care hospital. Because the study was designed retrospectively, no written informed consent form was obtained from patients. Medical records were subtracted starting from March 2018 to March 2020. We aim to compare the obstetric outcomes of deliveries during the two years before pandemic and during the two years of COVID-19 pandemic. Universal testing for SARSCoV-2 was implemented starting from 24 March 2020. A nasopharyngeal (NP) swab for SARS-CoV-2 testing using a reverse transcription polymerase chain reaction (RT-PCR) assay was performed to all the women admitted to labour and delivery.

After the COVID-19 outbreak, upon presentation to the labour and delivery unit, women were evaluated for symptoms of disease including self-reported fever, cough, sore throat, rhinorrhea, shortness of breath or myalgias. The ones with a confirmed SARS-CoV-2 test were admitted to a special unit within labor and delivery. Our hospital was selected as one of the pandemic hospitals. All the elective interventions were put on hold and mainly served in the units that were converted to COVID-19 units. Ministry of Health did not indicate early discharge during the pandemic. For women and neonates with clinical stability, our hospital system offered discharge at 24 hours after vaginal delivery and 48 hours after caesarean delivery.

Upon approval of the Local Ethics Committee (Local Ethics Committee protocol number:2022/514/230/3), demographic (age, ethnicity, insurance status), clinical, obstetric data were abstracted from the electronic medical record for each woman. Data was collected starting from March 2018 to March 2022. The first two years represent the time before pandemic. The last two years include the time of COVID-19 pandemic. We compared the number of pregnants admitted to the labour and delivery before and during the pandemic. The mode of delivery, selected method of anesthesia, total expenses of the patients, use of antibiotics, the length of hospital stay, indications for cesarian section were compared between the two periods. The primary question of the study was whether obstetric management of the patients was altered based on outbreak of COVID-19 pandemic.

We used descriptive statistics to examine the differences between the two groups (before COVID-19 pandemic and during the pandemic). T test was used to compare means for numerical variables, and chi-square test was used to compare ordinal and nominal categorical variables. All data were analysed using SPSS 20.

RESULTS

A total of 9048 patients were identified, of which 4745 were before the pandemic and 4303 during the pandemic. The mean age in both groups were similar; 28,65 years old before the pandemic and 28.20 during the pandemic. Even though, women who did not have any insurance constitutes a small fraction of the patients, number of pregnant women who had no insurance were doubled during the pandemic.

The mean operation time before the pandemic and during pandemic did not show any significant difference. The length of stay in the hospital was longer before the pandemic. The mean time for hospital stays before and during the pandemic were 1.84±1.64 days and 1.76±0.92 days, respectively (p=0.004). When the route of administration of anesthetic were compared, we did not find any significant difference in both groups. Finally, the hospitalization expenses were significantly different between the groups (**Table 1**).

The rates of C-sections in our hospital were between 40-50%, irrespective of the COVID-19 pandemic (**Figure 1**). Of 4745 deliveries before the pandemic 2212 were C-section and 2533 were vaginal deliveries. Primary C-section rates were also extracted. C-section rates were 46.6% and within these patients 29.76 % of them were primary C-section.

During the first wave of pandemic in April 2020, the number of the deliveries were decreased by almost five folds which might be contributed to the recognition of our center as a pandemic hospital and the excessive anxiety among the pregnant women. During the first wave, the number of C-sections exceeded the number of vaginal deliveries (Figure 2).

However, during the pandemic, rates of vaginal deliveries were found to be significantly higher than the C-section rates except the first wave as mentioned before. The rates of primary C-sections were also decreased during the pandemic (21.9%) compared to data from 2018 and 2019 (29.76%). Among the pregnant patients who had a confirmed COVID-19 infection primary and total C-section rates were higher, 15.52% and 61.6%, respectively. Of 9048 patients, there were 5 maternal deaths, all of them due to critical COVID-19 infection. During the pandemic, emergency C-section rates decreased compared to pre-pandemic period (Table 2).

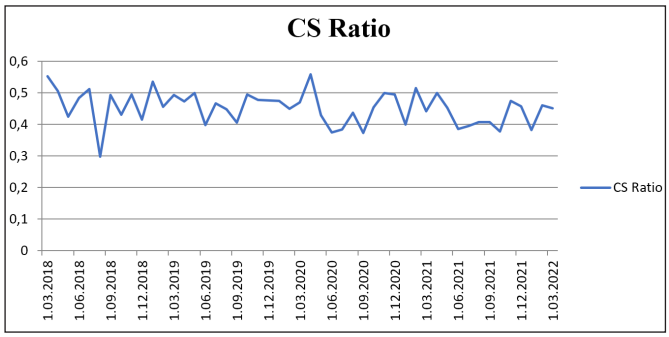

Figure 1. The trend in the CS ratio by time. The CS ratio has fluctuated almost between 0.4 and 0.5 during the period of 2018-2022 (the mean is 0.45).

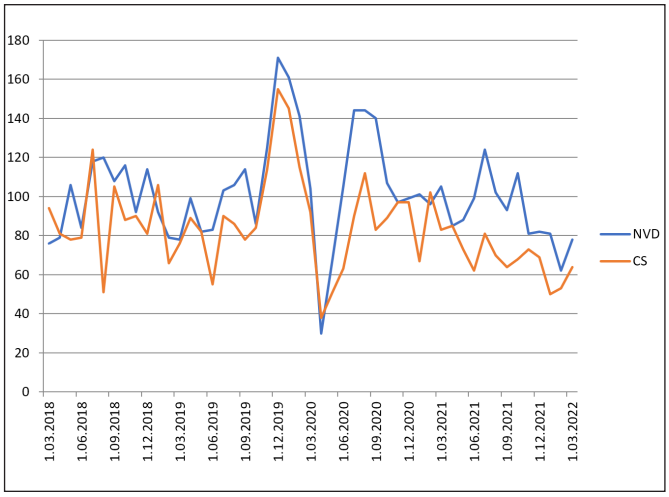

Figure 2. The trend of NVD and CS between March 2018 and March 2022. The number of NVDs were generally higher than the number of C-sections, regardless of pandemic. During the pandemic, the gap between the NVD and C-section increased in terms of numbers.

Table 1. Baseline Demographics. Data are mean±SD or n (%) unless otherwise specified.

Characteristic	Before COVID-19 (n=4.745)	During COVID-19 (n=4.303)	Total (n=9.048)	p-value
Age (y)	28.65±5.93	28.20±5.99	28.4±5.97	
Insurance				< 0.000
No Insurance	17 (0.36)	36 (0.84)	53 (0.59)	
Public Insurance	4.353 (91.74)	4.027 (93.59)	8380 (92.62)	
Private Insurance	375 (7.90)	240 (5.58)	615 (6.80)	
Operation time	47.59±84.96	44.88±129.90		0.237
Hospitalization after delivery	1.84±1.64	1.76±0.92		0.004
Total Expense	901.27±2.534.31	1.386.86±1.507.95	1.132.22±2.123.09	< 0.000

Table 2. Mode of Delivery. Data are mean±SD or n (%) unless otherwise specified.

Characteristic	Before COVID-19 (n=4.745)	During COVID-19 (n=4.303)	Total (n=9.048)	p-value
Previous cesarean birth	1545	1458	3003	
Anesthesia				0.077
General	531 (11.2)	371 (8.6)	902 (9.97)	
Epidural	7 (0.1)	12 (0.3)	19 (0.21)	
Spinal	1513 (31.9)	1182 (27.5)	2695 (29.78)	
No anesthesia	2694 (56.8)	2738 (63.6)	5432 (60.04)	
CS Emergency				< 0.000
Emergency	3649 (76.90)	2945 (68.44)	6594 (72.88)	
Elective	1096 (23.10)	1358 (31.56)	2454 (27.12)	
Delivery Type				< 0.000
NVD Primipar	691 (14.6)	644 (15)		
NVD	1841 (38.8)	1771 (41.2)		
C-section Primipar	652 (13.7)	405 (9.4)		
C-section Primipar	1539 (32.4)	1444 (33.6)		
Multiple	21 (0.4)	27 (0.6)		

DISCUSSION

In the present study, we investigated the impact of COVID-19 pandemic on labor and delivery. Among the 4303 pregnant persons presenting to labor and delivery during the pandemic period the prevalence of COVID-19 infection was 5,09% in our study. There was a slight decrease in the number of deliveries during the COVID-19 pandemic compared to the same months before the pandemic. We found that during the pandemic the number of vaginal deliveries had a higher ratio than the C-sections. However, within the group of women who had infection C-section rates were 62.6%. Interestingly, the number of emergency C-section rates were higher before the pandemic.

The prevalence of COVID-19 infection among the women presenting the labor and delivery reported in this study were somewhat coherent with the previous studies. In a recent review, Jamieson et al.[15] reported a prevalence of COVID-19 ranging from 3-20% . Mutlu et al.[16] reported that the total number of births and vaginal birth rates decreased in the first wave in a tertiary hospital in Turkey. Our results also revealed that during the first wave of the pandemic there was a dramatic decrease in the number of deliveries and rates of vaginal deliveries. This might be contributed to the patients' choice of hospital, since the virus had caused enormous anxiety and patients probably did not prefer a tertiary center for delivery.

Curiously, during the two years of COVID-19 pandemic, when the total number of patients were put in account, rates of vaginal deliveries were higher compared to before pandemic. Primary C-section rates also decreased during the pandemic. Our study showed that, initially, the choice of the hospital was affected by the infection. The decrease in C-section ratios revealed that there might be an alteration in the behavior of the health workers, as well. Healthcare professionals were also anxious because of the infection, which might have resulted in less intervention causing decreased rates of C-sections. This suggests that, during the pandemic, health professionals might prefer vaginal births over cesareans to reduce infection risk. Several studies with conflicting results have been published on this matter.[17-20] Nevertheless, more research is needed to confirm this hypothesis.[21] Since we did not study the behavioral changes of the healthcare professionals in our hospital during the pandemic, our results are certainly not eligible to draw a conclusion on this subject.

This study was conducted in a tertiary hospital in Istanbul, Turkey. During the four years examined in this study, the same group of healthcare professionals were working in the hospital. Standardized healthcare is an important aspect of this study. Moreover, our study covered the longest time of COVID-19 pandemic in Turkey, which results in more reliable comparisons.

Limitations of the study are the fact that the data of the study was collected from a single center which was converted to a pandemic hospital. However, considering the decreased access to healthcare services during pandemic and the size of the sample in this study, our results would still provide insights of the general population.

CONCLUSION

This study aimed to investigate the effect of COVID-19 pandemic on pregnant patients accepted to labor and delivery. Most of the papers in the literature compared the C-section rates within the pregnant patients who had a confirmed positive COVID-19 test. We tried to understand the impact of a pandemic on a special group of patients; pregnant women admitted to the labor and delivery. We found that pandemic caused a decrease in both C-section rates and primary C-section rates. We believe this might be explained in part by the decreased intervention during labor.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of İstanbul Kartal Dr. Lütfi Kırdar City Hospital Clinical Researches Ethics Committee (Date: 27.07.2022, Decision No: 2022/514/222/29).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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