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Effect of Sars-Cov-2 Pandemic On Obstetric Management And Pregnancy Complications In Healthy Women

Sars-Cov-2 Pandemisinin Sağlıklı Kadınlarda Doğum Yönetimine ve Gebelik Komplikasyonlarına Etkisi

ABSTRACT

Objective:

We aimed to investigate the effect of the Sars-cov-2 pandemic on obstetric management and pregnancy complications in healthy pregnant women without Sars-cov-2 infection.

Material and Methods:

A total of 750 pregnant women who delivered singleton infants after 11 March 2020, the date when the World Health Organization (WHO) declared a pandemic, formed the study group, while 750 pregnant women who gave birth before this date formed the control group. The study included pregnant women who were found to have no infection clinically or by Sars-cov-2 serology testing. The groups were compared in terms of demographic characteristics, type and duration of delivery, gestational age, indication for cesarean section, and pregnancy complications.

Results:

The median±IQR gestational age at delivery was 38±2 weeks in pregnant women who gave birth during the pandemic and 39±1 weeks in women who gave birth before the pandemic (p<0.001). Fetal birth weight was lower during the pandemic (Mean±SD: 3078±688) compared to the pre-pandemic period (Mean±SD: 3182±633) (p=0.002). The rate of primary cesarean section increased during the pandemic compared to the pre-pandemic period (61.2-50.8%, p=0.002). The rate of cesarean section due to maternal anxiety and failure to progress in labor indications was higher during the pandemic compared to the pre-pandemic period (24.3% vs. 10%, p=<0.001 and 18.3% vs. 10.4%, p=0.002, respectively). The time to delivery (vaginal or cesarean section) of patients admitted for vaginal delivery was shorter during the pandemic compared to the pre-pandemic period (Mean±SD: 9.09±3.85 vs. 10.13±3.75, p<0.001). Furthermore, the time to the diagnosis of failure to progress in labor was shorter in patients during the pandemic compared to the pre-pandemic period (Mean±SD: 3.56±3.04 vs 13.70±8.76, p<0.001). There was no increase in negative obstetric outcomes during the pandemic.

Conclusions:

Even if the pregnant women who presented for delivery during the pandemic were healthy pregnant women who did not have Sars-cov-2 infection, they experienced differences in their obstetric management compared to the pre-pandemic period. We believe that the results of this study will be useful in the future pandemics.

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Key Words:
Sars-cov-2, Covid-19, Pandemic, Cesarean, Delivery, Maternal anxiety

ÖZ

Amaç:
Sars-cov-2 pandemisinin, Sars-cov-2 enfeksiyonu tespit edilmeyen sağlıklı gebelerde doğum yönetimi ve gebelik komplikasyonları üzerine etkisini araştırmaktır.

Gereç ve Yöntemler:
Dünya sağlık örgütü (DSÖ)'nün pandemi ilan ettiği tarih olan 11 Mart 2020 tarihinden sonra tekil doğum yapan 750 gebe çalışma grubunu, önce doğum yapan 750 gebe kontrol grubunu oluşturdu. Klinik veya Sars-cov-2 seroloji testi ile enfeksiyon tespit edilmemiş gebeler çalışmaya dahil edildi. Gruplar demografik özellikleri, doğum şekli ve süresi, doğum haftası, sezaryen endikasyonu, gebelik komplikasyonları yönleri ile karşılaştırıldı.

Bulgular:
Pandemi dönemindeki gebeler Median±IQR 38±2 hafta'da, pandemi öncesinde gebeler ise Median±IQR: 39±1 hafta'da doğum yapmışlardır (p<0,001). Pandemi dönemindeki fetal doğum ağırlığı (Mean±SD:3078±688), pandemi öncesindeki fetal doğum ağırlığından (Mean±SD: 3182±633) daha düşük saptanmıştır (p=0,002). Primer sezaryen oranı pandemi döneminde, pandemi öncesine göre artmıştır (% 61,2-% 50,8, p=0,002). Pandemi döneminde maternal anksiyete ve ilerlemeyen doğum eylemi endikasyonu nedenli sezaryen, pandemi öncesi döneme göre yüksektir (Sırasıyla; 24,3% vs 10%, p=<0,001 ve 18,3% vs 10,4%, p=0,002). Vajinal doğum için yatırılan hastaların doğuma (vajinal ya da sezaryen) kadar geçen süre pandemi döneminde, pandemi öncesi döneme göre daha kısadır (Mean±SD: 9,09±3,85 vs 10,13±3,75, p<0,001). Yine vajinal doğum sürecinde ilerlemeyen doğum eylemi saptanan ve sezaryene alınan hastaların ilerlemeyen doğum tanı anına kadar geçen süre pandemi döneminde, pandemi öncesi döneme göre de daha kısadır (Mean±SD: 3,56±3,04 vs 13,70±8,76, p<0.001).

Sonuç:
Pandemi döneminde doğum için başvuran gebeler Sars-cov-2 enfeksiyonu tespit edilmemiş sağlıklı gebeler olsa dahi doğum süreçlerindeki yönetimlerinde pandemi öncesine göre farklılıklar yaşamışlardır. Bu çalışmanın sonuçlarının gelecek pandemilerde faydalı olacağına inanmaktayız.

Anahtar Kelimeler:
Sars-cov-2, Covid-19, Pandemi, Sezaryen, Doğum, Maternal anksiyete

INTRODUCTION
Restrictive measures to prevent the Sars-cov-2 pandemic and transmission of infection are in effect. Pregnant women represent the most vulnerable population among adults during the Sars-cov-2 pandemic due to changes in physiology and immune system during pregnancy (1). The Centers for Disease Control and Prevention (CDC) reported that hospitalization for Sars-cov-2 infection occurred in 31.5% of pregnant women compared with 5.8% of non-pregnant women (2). Moreover, studies have also demonstrated that adverse psychological outcomes such as anxiety and depression, which have already increased during pregnancy, have increased even more during the Sars-cov-2 pandemic (3-5). However, the pandemic has also led to negative psychological consequences among healthcare workers and physicians due to the risk of infection (6). Obstetrics associations and experts around the world have made some preventive recommendations for pregnancy follow-up and obstetric management during the pandemic (7-10). Surveys conducted among pregnant women, physicians, and healthcare professionals have shown that all of these have caused changes in preferences for pregnancy follow-up and obstetric management, as well as type of delivery (3-6,11).

The direct effect of Sars-cov-2 on pregnancy outcomes and obstetric management of pregnant women with infection has been investigated in many previous studies (12-16). The aim of this study is to investigate the effect of the Sars-cov-2 pandemic on obstetric management and pregnancy complications in healthy pregnant women without Sars-cov-2 infection.

MATERIAL and METHODS
Our study was designed as a retrospective cohort study. Prior to the study, research permission for Coronavirus was obtained from the Clinical Research Ethics Committee of the University of Health Sciences Antalya Training and Research Hospital (approval no: 2022-121) and the Ministry of Health of the Republic of Turkey. After obtaining written permission from the hospital management, electronic hospital data were examined. The study was performed in accordance with the ethical standards described in the declaration of Helsinki.

The World Health Organization (WHO) declared the novel coronavirus (COVID-19) outbreak a global pandemic on March 11, 2020 (17). WHO has issued a call to all countries of the world in order to mitigate the impacts of the pandemic and control the virus (17). Therefore, selecting pregnant women who gave birth on or after March 11 as the study group and pregnant women who gave birth on or before March 10 as the control group, our study aimed to create two groups with the closest delivery dates in the entire study population. In this way, time-dependent differences between the study group and the control group were minimized. These two groups were compared with each other in terms of obstetric outcomes, obstetric management, and type of delivery (vaginal delivery or cesarean section). Considering the negative obstetric outcomes in the calculation of the sample size, it was calculated that a total of 1484 participants, 742 for each group, were required for a 98% confidence interval with an alpha value of 0.05. To reach this value, the prospective cohort study of Sahin et al. was considered, with a generally accepted pregnancy complication rate of 8% and a complication rate of 12.4% for pregnant women with Sars-cov-2 in our country (12). Accordingly, it was planned to include 750 patients for each group in the study. In this case, the entire study population was reached by searching

pregnant women who gave birth between January and May 2020. The study included women with a singleton pregnancy who gave birth after 20 weeks of gestation and who were found to have no infection clinically or by Sars-cov-2 serology testing. Gestational age was determined according to the first day of the last menstrual period of the pregnant women. For patients who could not remember their last menstrual period, gestational age was calculated based on the earliest obstetric ultrasound performed. Demographic characteristics such as age, gravida, and parity of all pregnant women were recorded. Indications for cesarean section, follow-up times in the delivery room for vaginal delivery, and types of delivery (vaginal delivery, cesarean section) were recorded. Obstetric complications recorded were placenta previa, hypertensive disorders of pregnancy, preterm labor, preterm premature rupture of membranes (PPROM), intrauterine growth restriction (IUGR), perinatal mortality and fetal anomalies.

Statistical Analysis

SPSS version 23.0 for Windows (SPSS, INC., Chicago, IL) software was used for all statistical analyses. Continuous variables were presented as mean or median values. Categorical variables were expressed as numbers and percentages. To examine differences between groups, Mean±Standard deviation (SD) values were compared using the t-test of independent samples, while Median±Interquartile range (IQR) values were compared using the Mann-Whitney U test of independent samples. Categorical variables were also compared using the Chi-square test to examine differences between groups. The cases where the type I error level was below 5% were interpreted as statistically significant diagnostic value of the test.

RESULTS

The study included a total of 1500 patients, 750 of whom gave birth in the pre-pandemic period and 750 of whom gave birth during the pandemic. The results regarding the characteristics and delivery characteristics of the patients who gave birth before and during the pandemic are presented in Table I. The median±IQR gestational age at delivery was 38±2 weeks in pregnant women who gave birth during the pandemic and 39±1 weeks in women who gave birth before the pandemic (p<0.001). Fetal birth weight was lower during the pandemic (Mean±SD: 3078±688) compared to the pre-pandemic period (Mean±SD: 3182±633) (p=0.002).

The rate of cesarean section increased during the pandemic compared to the pre-pandemic period (62.43% vs. 56.4%, p=0.018) (Table I).

Table I: Comparison of characteristics and delivery characteristics of patients who gave birth during the pandemic and the pre-pandemic period.

Charecteristics	Parameters	Period		Univariate analysis
		Pre-pandemic	Pandemic	p value
Age (years)	Mean±SD	28.65±6.21	28.45±6.55	0.544
Gravidity	Median±IQR	2±2	2±2	0.872
Parity	Median±IQR	1±2	1±2	0.720
Gestational age at delivery (weeks)	Median±IQR	39±1	38±2	<0.001
Fetal birth weight (gr)	Mean±SD	3182±633	3078±688	0.002
Mode of delivery	Vaginal delivery Cesarean delivery	327 (43.6) 423 (56.4)	282 (37.6) 468 (62.43)	0.018

Abbreviations: SD; standard deviation, IQR; Interquartile range

The rate of primary cesarean section increased during the pandemic compared to the pre-pandemic period (61.2-50.8%, p=0.002). Moreover, some changes were identified in cesarean section indications (Table II). The indication for cesarean section due to maternal anxiety was higher during the pandemic compared to the pre-pandemic period (24.3% vs. 10%, p=<0.001). The rate of cesarean section performed with the indication of failure to progress in labor was higher during the pandemic compared to the pre-pandemic period (18.3% vs. 10.4%, p=0.002). The time to delivery (vaginal or cesarean section) of patients admitted for vaginal delivery was shorter during the pandemic (n=395) compared to the pre-pandemic period (N=409) (Mean±SD: 9.09±3.85 hours vs. 10.13±3.75 hours, p<0.001). Furthermore, the time to the diagnosis of failure to progress in labor was shorter in patients during the pandemic (n=71) compared to the pre-pandemic period (n=41) (Mean±SD: 3.56±3.04 hours vs. 13.70±8.76 hours, p<0.001). There was no increase in adverse obstetric outcomes during the pandemic period (Table II).

Table II: Comparison of cesarean section indications, obstetric outcomes and delivery follow-up times of patients who gave birth during the pandemic and the pre-pandemic period.

Indication for cesarean section		Period		Univariate analysis
		Pre-pandemic	Pandemic	p value
Previous cesarean history	+	208 (49.2)	181 (38.8)	0.002
	-	215 (50.8)	285 (61.2)	
Maternal anxiety	+	32 (10)	95 (24.3)	<0.001
	-	289 (90)	296 (75.7)	
Failure to progress in labor	+	40 (10.4)	72 (18.3)	0.002
	-	345 (89.6)	321 (81.7)	
Fetal distress	+	44 (9.8)	43 (8.4)	0.462
	-	405 (90.2)	467 (91.6)	
Makrosomia	+	48 (6.4)	36 (4.8)	0.174
	-	700 (93.6)	714 (95.2)	
Malpresentation	+	25 (3.3)	23 (3.1)	0.769
	-	725 (96.7)	727 (96.9)	
Placenta previa	+	10 (1.3)	5 (0.7)	0.194
	-	740 (98.7)	745 (99.3)	
Hypertensive disorders of pregnancy	+	15 (2)	18 (2.4)	0.597
	-	735 (98)	732 (97.6)	
Preterm labor	+	66 (8.8)	82 (10.9)	0.166
	-	684 (91.2)	668 (89.1)	
PPROM	+	14 (1.9)	20 (2.7)	0.298
	-	736 (98.1)	730 (97.3)	
IUGR	+	22 (2.9)	19 (2.5)	0.635
	-	728 (97.1)	731 (97.5)	
Fetal anomaly	+	10 (1.3)	6 (0.8)	0.315
	-	740 (98.7)	744 (99.2)	
Perinatal mortality	+	8 (1.1)	5 (0.7)	0.403
	-	742 (98.9)	745 (99.3)	
Time to delivery (hours)	Mean±SD	10.13±3.75	9.09±3.85	<0.001
Time to the diagnosis of failure to progress in labor (hours)	Mean±SD	13.70±8.76	3.56±3.04	<0.001

Abbreviations: PPROM; Preterm premature rupture of membranes, IUGR; intrauterine growth restriction, SD; standard deviation. Some patients had more than one indication for cesarean section.

DISCUSSION

This study showed the significant effects of the Sars-cov-2 pandemic on obstetric management and practices in healthy pregnant women without Sars-cov-2 infection. In brief, gestational age at delivery was earlier, fetal birth weight was lower, and the rate of cesarean section was higher during the pandemic. In addition to the higher rate of primary cesarean section, the rate of cesarean section due to maternal anxiety and failure to progress in labor was higher in this group. The time to vaginal delivery and the time to the diagnosis of failure to progress in labor were also shorter during the pandemic compared to the pre-pandemic period.

These results of our study are believed to be due to the changes in practices and attitudes due to the psychological impacts of the pandemic on pregnant women, physicians, and other healthcare providers. The increased rate of cesarean section due to maternal anxiety may be attributed to the psychological effects of the pandemic on pregnant women during the delivery process. The earlier gestational age during the pandemic period without difference in the rate of preterm birth shows that a hastier approach has been adopted in practice for term pregnant women. The lower fetal birth weight during the pandemic period compared to the pre-pandemic period may be due to the earlier gestational age of term pregnant women at delivery. Similarly, the shorter delivery time of pregnant women after admission during the pandemic period and the shorter time to the diagnosis of failure to progress in labor suggest that the pandemic imposed psychological effects on both physicians and patients. During the pandemic, there has been a decrease in hospital visits and a shortening in treatment processes in terms of patient management and physician practices as a result of anxiety. These preferences are likely to cause changes in the timing of delivery and preference for delivery type during the pandemic.

It has been reported that 90% of the world's population was subjected to travel restrictions in order to prevent the spread of infection within the month the pandemic was declared (17). In the same period, in our study period, obstetric societies and expert opinions recommended close follow-up and monitoring of pregnant women and fetuses during the prenatal period, testing suspected patients for Sars-cov-2, and individualized delivery management in order to prevent the negative consequences of Sars-cov-2 (7-10). Moreover, it has been stated that prenatal examinations can be postponed in the early period of the pandemic, but some precautions should naturally be taken for pregnant women who are due to give birth such as measurement of the body temperature of every pregnant woman who presents for delivery, evaluation for symptoms, and questioning of contact history, and in the presence of these risk factors, microbiological testing of pregnant women, including Sars-cov-2 (10). Studies have shown that the practices during the Sars-cov-2 pandemic lead to negative psychological effects on pregnant women and physicians.

A previous study conducted in our clinic revealed that 63.9% of pregnant women had pandemic-related anxiety and 85.2% of them did not attend their routine pregnancy follow-ups on time due to the risk of infection (4). A similar study reported that pregnant women felt anxious even when they visited the hospital for follow-up due to the risk of disease transmission during the Sars-cov-2 pandemic, with an increase in the preference for cesarean delivery instead of vaginal delivery (3). It was stated that 90% of obstetricians preferred a cesarean delivery due to the high risk of Sars-cov-2 transmission during the pandemic (5). Changes in attitudes to obstetric practice due to human factors are also present in the reports of the American College of Obstetrics and Gynecologists (ACOG), stating that the causes and frequency of cesarean sections vary between regions, which may be due to patient preferences and practice variation among hospitals, systems, and healthcare providers (18). As the type of delivery may vary depending on the human factor, our study showed differences in the physician and patient preferences regarding the labor follow-up for delivery and in the choice of mode of delivery during the pandemic compared to the pre-pandemic period. These human factor-related consequences are likely to be due to the negative psychological impacts of the pandemic on both pregnant women and physicians.

An important point is that Sars-cov-2 infection may be asymptomatic or present with mild symptoms. The fact that Sars-cov-2 infection is not always symptomatic has caused challenges in the recommendations and practices of the national health policies, obstetric societies, and experts based on the differentiation of patients with symptomatic risk. Studies have shown that 95% of pregnant women infected with Sars-cov-2 are asymptomatic or have only mild symptoms (13). It was found that only 13.5% of pregnant women studied were Sars-cov-2 positive but asymptomatic (19). A study on pregnant women admitted for delivery showed that 32.6% of pregnant women with Sars-cov-2 were asymptomatic and 71.4% of them were diagnosed only after delivery and discharge (20). Even in the absence of symptoms in pregnant women who present for delivery, the pandemic is likely to cause negative psychological effects on both pregnant women and physicians, resulting in variations in obstetric practices. The fact that most pregnant women who present for delivery give birth and are discharged on the same day, which leads to the concern of transmission from the patient to the physician and other patients before the test result, even though the Sars-cov-2 test is performed, may also have caused variations in obstetric practices. This explains the result of accelerating the process of delivery or preferring cesarean section by physicians and patients. Studies investigating the delivery results of pregnant women with Sars-cov-2 in the early stages of the pandemic have also reported the use of cesarean section as a mode of delivery (14,21,22). As stated in their review, Zaigham et al., reported that 92% of 102 pregnant women diagnosed with SARS-CoV-2 delivered via cesarean section, with the most important indication for cesarean section being fetal distress (14). In fact, the long-term results of the Sars-cov-2 pandemic have shown that the Sars-cov-2 infection does not directly cause negative consequences in pregnant women. The follow-up of 82682 pregnant women in Denmark revealed Sars-cov-2 in 0.51% of pregnant women. This study reported that pregnant women with Sars-cov-2 were not associated with increased maternal or neonatal adverse outcomes compared to uninfected pregnant women (15). A similar study from the USA comparing pregnant women with Sars-cov-2 infection and no infection reported no association between Sars-cov-2 infection and adverse pregnancy outcomes (13).

Our study is an important study demonstrating the effects of the Sars-cov-2 pandemic on obstetric management and pregnancy complications in healthy women. The results of this study showed an increased rate of cesarean section in the early period of the Sars-cov-2 pandemic compared to the pre-pandemic period, an increased frequency of primary cesarean section, an increased rate of cesarean section with indications of maternal anxiety and failure to progress in labor, and shortened times of vaginal delivery and delivery with failure to progress in labor. It was found that pregnant women gave birth in earlier days and neonatal birth weight was lower during the pandemic. There was no increase in obstetric negative outcomes.

CONCLUSION

Pregnant women who present for delivery during the pandemic experienced differences in their obstetric management compared to the pre-pandemic period even if they were healthy pregnant women with no Sars-cov-2 infection. We believe that the results of this study will be useful in the future pandemics.

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Ethics Committee Approval:
Ethical approval was obtained by the ethics committees of Antalya Education & Research Hospital (approval no: 2022-121)

Author Contributions:
Concept- S.F.T., A.U.; Data collection and analysis- S.F.T., A.U.; Literature Search- S.F.T.; Writing- S.F.T.

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

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