Journal of Experimental and Clinical Medicine
https://dergipark.org.tr/omujecm

Research Article

J Exp Clin Med
2022; 39(2): 420-423
doi: 10.52142/omujecm.39.2.21

Effect of inadequate antenatal care during the pandemic on maternal and fetal outcomes

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Received: 23.09.2021 • **Accepted/Published Online:** 16.11.2021 • **Final Version:** 18.03.2022

Abstract

To evaluate the effects of inadequate antenatal care (ANC) caused by the COVID-19 pandemic on pregnant women. In this retrospective study, pregnant women were divided into two groups as those presenting during the pandemic and non-pandemic periods. The pandemic period was selected as March 11, 2020- December 10, 2020 and the pre-pandemic period as March 11, 2019- December 10, 2019 corresponding to the same period a year earlier. Pregnant women receiving ANC three times or less was defined as inadequate ANC. The pregnant women were evaluated in terms of obstetric complications, including premature rupture of membranes, premature birth, placental abruption. gestational diabetes mellitus (GDM), preeclampsia, fetal or neonatal death, and maternal death. The study included 276 patients presenting during the pandemic period and 229 patients presenting during the non-pandemic period. When the pandemic and non-pandemic periods were compared, it was determined that the rates of fetal death, preeclampsia and GDM statistically significantly increased in the former. The rate of adequate ANC was 72.5% (n=166) in the non-pandemic period and 58.3% (n=161) in the pandemic period. When pregnancy complications were compared according to ANC during the pandemic, it was observed that the rates of fetal death, preeclampsia and GDM were higher among the pregnant women with inadequate ANC. Complications due to inadequate ANC may have more significant consequences than complications caused by a possible COVID-19 infection. During the pandemic period, healthcare professionals should ensure that women receive safe and effective care during both pregnancy and childbirth.

Keywords: antenatal care, pandemic period, complications, pregnancy

1. Introduction

Various measures have been taken all over the world including our country to prevent the spread of coronavirus disease (COVID-19), which has led to inadequate provision of many services, especially healthcare services. However, with the onset of the COVID-19 pandemic, presentation of pregnant women to obstetrics outpatient clinics has decreased due to the fear of contracting the virus and lack of information.

Health risks faced by women during pregnancy and childbirth need to be minimized, and it is known that these risks can be prevented with high-quality antenatal care (ANC) (1). ANC should be started from the first trimester and continued at regular intervals until the end of pregnancy. Receiving ANC at least four times increases the likelihood of receiving effective maternal health interventions during the antenatal period (2). In addition, ANC is important in reducing perinatal and maternal mortality and morbidity (3). Most risk factors can be detected in the follow-up sessions undertaken in the first trimester, and complications can be prevented with ANC provided in the early period (4-6). Complications due to inadequate ANC may have more significant consequences than those caused by a possible COVID-19 infection. Therefore, in this study, we aimed to evaluate the effects of inadequate ANC caused by the pandemic on pregnant women.Case Presentation

2. Material and Methods

2.1. Study design and participants

This retrospective study was conducted in the Obstetrics and Gynecology Clinic of a university training hospital. Study parameters were evaluated in two periods: pandemic and non-pandemic. The pandemic period was selected as March 11, 2020- December 10, 2020 and the non-pandemic period as March 11, 2019- December 10, 2019 corresponding to the same period a year earlier. Pregnant women at 24 and 40 weeks of gestation were included in the study. This study followed the principles of the Declaration of Helsinki and was approved by Clinical Research Ethical Committee of Aksaray University Faculty of Medicine with a protocol number of 2020/13-42. Pregnant patients under 18 or above 45 years, those with a history of recurrent miscarriage, diabetes, teratogenic drug use or trauma, pregnant women with a previous history of COVID-19 and those with known fetal chromosomal and/or structural anomalies were excluded from the study.

2.2. Data collection

Clinical data were obtained by reviewing the electronic database of the hospital. Age, gestational week, gravida, parity, single or multiple pregnancy history, vital findings at the time of presentation, maternal diseases, mode of delivery, risk

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factors during pregnancy, pregnancy outcomes and complications, obstetric ultrasonography results (presence of retroplacental bleeding, location of the placenta, fetal position, and fetal viability), cardiofetal findings, and the number of ANC visits during pregnancy were recorded.

2.3. Definitions

Stillbirth was defined as babies born without a heartbeat after 24 weeks of gestation, premature birth as delivery before 37 weeks of gestation, premature rupture of membranes (PROM) as the rupture of the membrane before regular contractions occurred, placental abruption as the partial or complete separation of the placenta during the prenatal period. Inadequate ANC visits was defined as the number of visits being less than four or/ and the first ANC visit was delayed (> 3 months) (7).

Table 1. Distribution of demographic characteristics and outcomes of pregnant women according to the evaluated periods

Variables	Non-pandemic period (n = 229)	Pandemic period (n = 276)	P value
Maternal age (years)	27.2 ± 3.6	26.7 ± 4.8	0.561
Parity			
Nulliparous	64 (27.9%)	81 (29.3%)	0.729
Multiparous	165 (72.1%)	196 (71.0%)	0.797
History of stillbirth	19 (8.3%)	28 (10.1%)	0.477
Adequate prenatal care	166 (72.5%)	161 (58.3%)	<0.001
Gestational age at delivery	38.3 ± 2.4	38.1 ± 2.2	0.893
Mode of delivery			
C/S (n = 1069)	442 (41.3%)	627 (58.7%)	<0.001
NSD (n = 1501)	820 (54.6%)	681 (45.4%)	<0.001
Preterm labor	56 (24.5%)	66 (23.9%)	0.889
Placental abruption	9 (3.9%)	10 (3.6%)	0.857
PROM	83 (36.8%)	103 (37.3%)	0.796
Fetal death	5 (2.2%)	16 (5.8%)	0.043
Neonatal death	1 (0.4%)	2 (0.7%)	0.570
Maternal death	0	1 (0.4%)	0.547
Preeclampsia	12 (5.2%)	29 (10.5%)	0.031
GDM	6 (2.6%)	19 (6.9%)	0.028
SGA (<10th percentile)	14 (6.1%)	20 (7.2%)	0.613

Data are presented as mean ± standard deviation, **C/S:** cesarean delivery, **NSD:** normal spontaneous delivery, **PROM:** premature rupture of membranes, **GDM:** gestational diabetes mellitus, **SGA:** small for gestational age

2.4. Outcome measures

The primary outcome of the study was the presence of obstetric complications, including spontaneous abortion, PROM, premature birth, placental abruption, gestational diabetes mellitus (GDM), preeclampsia, fetal or neonatal death, and maternal death. The secondary outcome was the association between inadequate ANC and obstetric complications.

2.5. Statistical methods

All statistical data were analyzed using SPSS for Windows, version 15.0 (SPSS Inc.; Chicago, IL, USA). First, the descriptive statistics [number (n), frequency (%), mean and standard deviation] of the variables in the study group were calculated. Pearson's chi-square or Fisher's test was used to compare categorical data.

The normality of data distribution tested with the Kolmogorov-Smirnov test. Student's t-test was used to compare normally distributed data and the Mann-Whitney U test to compare non-normally distributed data. A value of $p < 0.05$ was considered statistically significant.

3. Result

The study included 276 patients presenting during the pandemic and 229 patients presenting during the non-pandemic period. The mean age was 27.2±3.6 years for the non-pandemic period and 26.7±4.8 years for the pandemic period. The number of pregnancies, parity, maternal age, and gestational age at delivery did not statistically significantly differ between the two groups ($p>0.05$) (Table 1). We determined that the rate of cesarean delivery increased in the pandemic period compared to the non-pandemic period ($p< 0.001$).

When the non-pandemic and pandemic periods were compared, it was observed that the rates of fetal death, preeclampsia and GDM were statistically significantly increased in the latter ($p=0.043$, $p=0.031$, and $p=0.028$, respectively). However, there was no statistically significant difference in relation to the rates of PROM, preterm delivery and placental abruption. The rate of inadequate ANC was found to be 27.5% (n=63) in the non-pandemic period and 41.7% (n=115) in the pandemic period (Table 2).

When pregnancy complications were compared according to the number of ANC sessions attended, it was found that the rates of fetal death, preeclampsia and GDM were higher among the pregnant women with inadequate ANC (Table 3).

Table 2. Number of ANC sessions attended by pregnant women according to the evaluated periods

Number of ANC	Non-pandemic period (n = 229)	Pandemic period (n = 276)	P value
None	11 (4.8%)	23 (8.3%)	
1-3	52 (22.7%)	92 (33.3%)	0.004
≥4	166 (72.5%)	161 (58.3%)	

Table 3. Comparison of pregnancy complications and ANC rates during the pandemic period

Variables	Pandemic period		
	Adequate ANC (n = 161)	Inadequate ANC (n = 115)	P value
Preterm labor	37 (23.0%)	29 (25.2%)	0.668
Placental abruption	6 (5.2%)	4 (2.5%)	0.328
PROM	56 (34.8%)	47 (40.9%)	0.303
Fetal death	5 (3.1%)	11 (9.6%)	0.024
Neonatal death	1 (0.6%)	1 (0.9%)	0.810
Maternal death	0	1 (0.9%)	0.417
Preeclampsia	9 (5.6%)	20 (17.4%)	0.002
GDM	5 (3.1%)	14 (12.2%)	0.003
SGA (<10th percentile)	11 (9.6%)	9 (5.6%)	0.209

ANC: Antenatal care, **PROM:** Premature rupture of membranes, **GDM:** Gestational diabetes mellitus, **SGA:** Small for gestational age

4. Discussion

According to the guidelines published by the World Health Organization (WHO), there is no significant difference in the prevalence and clinical manifestations of the COVID-19 infection between pregnant and non-pregnant women or women of reproductive age (8). In the literature, although no correlation has been found between the COVID-19 infection and adverse maternal and fetal complications, it has been suggested that inadequate ANC during the pandemic period may be indirectly associated with adverse pregnancy outcomes (9). In the current study, we determined that inadequate ANC was associated with increased fetal death, PROM, preeclampsia and GDM during the pandemic.

Every woman should receive ANC at least four times during her pregnancy, and those with risky pregnancies should attend more ANC sessions. Inadequate ANC due to the pandemic may cause high risk factors (advanced age, hypertension, diabetes, bleeding diathesis, etc.) to be overlooked in pregnant women. Adequate ANC is important for reducing maternal and fetal complications. Previous studies have shown a significant decrease in gynecology and obstetrics outpatient and emergency presentations during the pandemic compared to the pre-pandemic period (10,11). In our study, we found that the rate of ANC decreased during the pandemic. The reasons for inadequate ANC may be due to the restrictions in transportation, inability to make an outpatient clinic appointment, fear of infection of contracting the virus at a healthcare institution, or failure to provide necessary pregnant training due to the pandemic.

GDM screening should be performed at the time of presentation for pregnant women with risk factors (obesity, history of GDM in previous pregnancy, polycystic ovary syndrome, etc.) and at weeks 24-28 for those without such risk factors (12). Failure to detect pregnant women with GDM in the early period may cause maternal and fetal complications. In the current study, we found that the frequency of GDM increased during the pandemic. Fewer visits to the hospital during the quarantine period, sedentary lifestyle, and inappropriate weight gain may have increased the rate of GDM. Dell'Utri et al., who compared the pandemic and non-pandemic periods, reported that the rate of fetal death increased during the pandemic (10). In our study, we determined that the rate of fetal death increased among the patients that received inadequate ANC during the pandemic. Dell'Utri et al. did not evaluate ANC during the pandemic. The reason for the increased fetal death rate during the pandemic may be due to inadequate ANC and pregnant women delaying their hospital visits due to the pandemic. In addition, in the absence of serious complaints, such as bleeding and pain, a symptom such as decreased fetal movement may have been overlooked despite its importance.

Manu Goyal et al. reported that the rate of preeclampsia increased during the pandemic compared to the pre-pandemic period (11). Similarly, in our study, we found that the rate of preeclampsia increased during the pandemic period. Increased stress and anxiety in pregnant women due to the risk of contracting COVID-19 may have indirectly caused an increase in the number of patients developing preeclampsia (13). Pregnancy-related hypertension may not be detected because blood pressure monitoring is not regularly undertaken in pregnant women receiving inadequate ANC. Blood pressure measurement is crucial in every follow-up of pregnant women. In addition, urinary protein measurement during the follow-up

allows for the diagnosis of hypertensive diseases, such as preeclampsia in pregnancy. Early detection and treatment of life-threatening conditions, such as preeclampsia are important to prevent maternal and fetal complications.

This study has certain limitations. First, the retrospective nature of the study limited data to those routinely collected. An important limitation was the exclusion of patients with missing data concerning obstetric outcomes among the women who developed complications. Second, this was a single-center study. Further studies involving multiple centers are needed to confirm our results.

In this study, we found that the rates of preeclampsia, fetal death and GDM increased in pregnant women who received inadequate ANC during the pandemic. Inadequate ANC may present with increased complication rates in pregnancy. During the pandemic, healthcare professionals should ensure that women receive safe and effective care during both pregnancy and childbirth.

Acknowledgements
The authors thank all the participants in this study.

Conflict of Interest Statement
All authors report no conflict of interest.

Financial Disclosure
The authors declared that this study has received no financial support.

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