







The effects of Coronavirus disease-2019 (COVID-19) pandemic on routine antenatal care visits and complications of pregnancy

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SUMMARY

OBJECTIVE: Routine follow-up of pregnancy is a comprehensive care process starting from planning of pregnancy that involves rational and careful use of medical, psychological, and social support. In this study, our objective was to compare the adherence rate to routine antenatal follow-up program during the COVID-19 pandemic with that of previous years among pregnant women, in an effort to shed light on health policies to be developed similar events in the future.

METHODS: This retrospective cross-sectional study was carried out between March 11, 2019, when isolation measures were initiated in the context of precautionary steps taken in Turkey against the COVID-19 pandemic, and June 1, 2020, when the "normalization" was initiated.

RESULTS: During the study period in 2020, the proportion of cesarean sections were higher, 61.1%, as compared to previous years ($p=0.27$). The stillbirths were numerically lower (1.2%, $p=0.77$), but the rate of spontaneous abortions was significantly higher (19.6%, $p=0.009$). The number of follow-up visits per pregnancy was lower than in previous years (3.8, $p=0.02$), although the proportion of patients visiting the outpatient units for regular controls to the overall patient group increased as compared to previous years (52.0%).

CONCLUSION: During the flare-up of the COVID-19 pandemic (i.e. between March and June 2020), the rate of obstetric/neonatal morbidity and mortality except spontaneous abortion was not significantly higher as compared to the corresponding period in previous years. However, considering the potential increase in the risk of obstetric complications during a pandemic, specialized management programs targeting basic pregnancy follow-up services should be developed.

KEYWORDS: COVID-19. Pregnancy. Newborn.

INTRODUCTION

Routine follow-up of pregnancy is a comprehensive care process starting from the planning stage of pregnancy that involves rational and careful use of medical, psychological, and social support for the pregnant women^{1,2}. The objectives of the pregnancy follow-up include the protection and improvement of maternal and neonatal health, and to reduce maternal, fetal, and neonatal morbidity

and mortality through early recognition and management of the health problems that occur before or during pregnancy^{3,4}.

Each year, approximately 600 pregnant women and 2.5 million newborns die in the first month of life⁴⁻⁶. The fact that most of these deaths are due to preventable causes arising during pregnancy and labor is a clear indication of the importance of maternal and fetal follow-up at every level of healthcare.

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Conflicts of interest: the authors declare there are no conflicts of interest. Funding: none.

Received on March 14, 2021. Accepted on March 31, 2021.

While the World Health Organization (WHO) recommends a minimum of four follow-up visits during pregnancy, in our country and most of the developed world, the follow-up visits are periodically performed every four weeks in the first 32 weeks, every two weeks up to week 36, and then once weekly⁷. However, under unexpected conditions such as a pandemic affecting most parts of the society, it has been observed that the regular follow-up assessments of pregnant women may be hampered due to the combined effect of preventive measures taken by the authorities, specific relocation of health resources, and the anxiety and fears experienced with individuals. In countries highly affected by the Ebola pandemic in the past, an 80% reduction in routine pregnancy care together with a decline in vaccination rates were reported⁸.

Following the origin of the deadly pandemic referred to as the “coronavirus disease-2019” (COVID-19), countries and health authorities, and particularly the WHO initiated a series of preventive measures^{9,10}. In this line of activities, the preventive measures implemented in our country included also “provision of prioritized outpatient care to patients with an appointment, while patients without an appointment were asked to re-apply for an appointment unless they require emergency care based on triage results”¹⁰⁻¹². It may be assumed that such measures implemented in our country as well as globally may have an impact on maternal and fetal morbidity and mortality.

The objective of our study was to compare the COVID-19 pandemic era and previous years in terms of the number of pregnant women attending hospital visits as well as the most frequent complications associated with pregnancy.

METHODS

This retrospective cross-sectional study was carried out at the Departments of Gynecology and Obstetrics, Rize Research and Training Hospital and Gynecology and Obstetrics, Rize State Hospital. The study protocol was approved by the Ethics Committee for Non-Interventional Research, Recep Tayyip Erdogan University (permission no: 2020/171). The study was carried out between 11 March 2019, when isolation measures were initiated in the context of precautionary steps taken in Turkey against the COVID-19 pandemic, and 1 June 2020, when the “normalization” was initiated. Data on the total number of pregnancies, number of pregnancy follow-up visits, outcomes of pregnancy, the total number of births, and postnatal clinical course were retrieved from the hospital medical records for pregnant women of all age categories. The data obtained through this method were compared with the corresponding data from 2018 and 2019.

Fetal loss before 20 weeks of gestation was referred to as “spontaneous abortion”, while those occurring after that time were referred to as “stillbirth”.

Statistical analysis

Compliance of numerical variables in the study with normal values was examined by visual and analytical methods, and non-normal distribution parameters were defined by specifying the median and interquartile distribution, and categorical variables by specifying the percentage and number. Kruskal-Wallis test was used to compare variables that were not normally distributed, and chi-square test was used to compare categorical variables. IBM SPSS 21.0 (Chicago, USA) software was used while evaluating the study data. p-value less than 0.05 was considered statistically significant.

RESULTS

In two study centers, a total of 501 births, of which 306 were cesarean sections, were recorded between 11 March and 1 June in 2020. The mean gestational age at birth was 38.0 ± 2.7 weeks [27–41] with a mean birth weight of 3038 ± 627 (835–4450) grams. The female to male ratio was 237:264. No maternal deaths occurred *versus* six stillbirths. Of the overall group of newborns, 115 (23.0%) were admitted to the Newborn Intensive Care Unit (NICU) due to a variety of indications. The mean maternal duration of hospital stay was 1.5 ± 0.6 days (1–3) postnatally. Table 1 shows the outcomes of the pregnancies according to study years.

During the study period in 2020, a total of 1051 pregnant women were identified in Rize province, with a total of 7645 visits to antenatal outpatient units, 3975 of which involved antenatal follow up (visits occurring within 10 days of an antenatal visit were considered control examinations, and thus were excluded from these numbers). The number of follow-up visits per pregnancy was 3.8, which was lower compared to two previous years (8.3 and 8.1, respectively) ($p=0.02$). On the other hand, the proportion of pregnancy follow-up visits to the overall patient group during the study period (52.0%) was higher (37.2 and 39%, respectively) ($p=0.02$). The numerical data for the three-year period regarding the pregnancies and outpatient visits are shown in Table 2.

When the outcomes of pregnancies were examined, the rate of spontaneous abortions in 2020 (19.6%) was significantly higher compared to other years ($p=0.009$). The number of stillbirths was reduced (1.2%), although this reduction was not statistically significant ($p=0.77$). Similarly, the proportion of cesarean sections and infant mortality was higher compared to previous years, but again the differences were insignificant ($p=0.27$ and $p=0.63$). When hospitalizations after birth were

Table 1. Pregnancy results of the cases included in the study by years (March–June period).

	2018		2019		2020	
Total number of births (n)	606		698		501	
Normal birth number (n)	287		383		195	
Number of cesarean delivery (n)	319		315		306	
Hospitalization duration (day)*	1.7±0.4 (1–3)		1.8±0.6 (1–5)		1.5±0.6 (1–3)	
Birth time (week)*	38.3±2.6 (25–41)		38.1±2.5 (27–41)		38.0±2.7 (27–41)	
Sex of the newborn (n)	Girl	Boy	Girl	Boy	Girl	Boy
	311	295	333	365	237	264
Average body weight of the newborn (g)*	3117±664 (875–4200)		3139±684 (870–4450)		3038±627 (835–4450)	
Maternal deaths (n)	0		0		0	
Number of stillbirths (n)	7		10		6	
Number of NICU hospitalizations (n)	149		156		115	
Number of infant deaths (n)	8		4		7	

*Mean±standard deviation (min–max). NICU: neonatal intensive care unit.

considered, NICU admissions occurred at a higher rate in 2020 (23%), compared to previous years, with the difference being statistically insignificant ($p=0.74$). Although infant deaths were also higher (1.4%), the difference again was not statistically significant ($p=0.63$). The statistical data regarding the outcomes of pregnancy are shown in Table 3.

DISCUSSION

During disease outbreaks, health resources are primarily allocated to disease groups that are associated with severe complications in case of delayed diagnosis and treatment^{13,14}. Under such circumstances, usual healthcare may be hampered due to the increased demand for health services, alterations in health management policies, as well as due to the fear/risk of contracting the disease from infected individuals in health facilities. In this study examining the antenatal follow-up and complications of pregnancy during the first three months of the COVID-19 pandemic in our country, although there was a significant reduction in the number of follow-up visits among pregnant women, rate of fetomaternal complications (excluding spontaneous abortion) and cesarean section did not appear to be significantly different.

A special category that should not be overlooked during a pandemic includes pregnant women. Adequate and timely provision of maternal care not only reduces the occurrence of important obstetric complications but also allows early

Table 2. Numerical data of antenatal polyclinic follow-ups by years (March–June period).

	2018	2019	2020	p
Number of Pregnant*	935	1102	1051	0.68
Total number of applications to Antenatal Polyclinic	20875	22861	7645	0.01
Number of controls	7775	8927	3975	0.02
Number of controls per Pregnancy	8.3	8.1	3.8	0.02
Number of controls/total number of Polyclinic Rate (%)	37.2	39.0	52.0	0.06

*Number of pregnancies detected in whole Rize province.

Table 3. Statistical data on the results of pregnancies by years (March–June period).

	2018	2019	2020	p
Abortion rate (%)	17.9	14.1	19.6	0.009
Stillbirth rate (%)	1.2	1.4	1.2	0.77
Cesarian section ratio (%)	52.6	45.1	61.1	0.27
NICU hospitalization rate (%)	24.6	22.3	23.0	0.74
Infant mortality rate (%)	1.3	0.7	1.4	0.63

NICU: neonatal intensive care unit.

identification of congenital malformations^{15,16}. In our study, the attendance rate to outpatient units for antenatal care was lower during the pandemic as compared to the corresponding periods in 2018 and 2019. This lower attendance rate despite the absence of an interruption in outpatient care may be explained by the preference of the study population for not visiting a healthcare facility due to a variety of reasons. Despite the reduced number of follow-up visits per pregnancy, the minimum requirement set forth by the WHO, i.e. four visits, was approached (3.8 follow-up visits per pregnancy in the current study). Also when the patients attending to outpatient units were grouped as those attending for antenatal follow-up and those for other reasons, there was a noticeable increase in the proportion of patients attending for control (52%), suggesting adequate use and proper management of resources during the pandemic. When one considers the fact that pregnant women were asked to attend follow-up visits, particularly during the third trimester or due to increased risk level, it can be assumed that adequate information on the importance of follow-up visits could be conveyed to these pregnant women.

In our study, independent of the COVID-19 infection on maternal and neonatal mortality, there was an increase in the proportion of spontaneous abortions (19.6%) during the pandemic in comparison with the corresponding periods in 2018 and 2019. The participants of this study were under routine follow-up with no COVID-19 diagnosis. This increase in spontaneous abortions may be related to the increased incidence of asymptomatic infections. In addition, the decrease in the number of pregnancy follow-ups may cause an increase in the rate of spontaneous abortion. However, although the link between COVID-19 infection and spontaneous abortions is an interesting research subject, we are unable to reach a definitive conclusion regarding this association as no antibody screening for COVID-19 was done in our patient group.

Previously, a 24% increase in stillbirths was reported during pandemics, due to the limited access to healthcare. Similarly, an increase in maternal mortality was found in that same study¹⁵. On the other hand, no significant differences between the pandemic period and previous years could be detected in terms of maternal and neonatal mortality in our study. We believe that this latter finding may be due to early recognition of high-risk patients during antenatal outpatient visits, rational choice of visit intervals (although they were longer), and presence of adequate healthcare understructure.

In our country, almost all pregnant women opt to deliver in a healthcare facility rather than having home delivery. However, this may be different during a pandemic. Due to the high patient load in larger healthcare centers, patients may be more inclined to receive primary healthcare. Furthermore,

physicians have a general disposition to carry out more cesarean sections to reduce the duration of hospital stay, and may even prefer shorter hospital stay for patients after the delivery^{12,13}. In our study, an insignificant increase in the rate of cesarean deliveries was observed during the pandemic as compared to previous years (61.1%, $p=0.27$). Although the data for cesarean indications have not been presented, factors that may help explain this increase include the willingness for rapid discharge to home, and the urge to stay away from situations with a high risk of virus transmission. The reduction in the postnatal hospitalization time also appears to support this hypothesis. Although the postnatal complication data for mothers is unavailable, the decline in the duration of hospitalization points out the importance of appropriate education and patient management regarding the post-discharge period.

In the current study, there was an insignificant increase in NICU admission rates (23%, $p=0.74$) and infant mortality (1.4%, $p=0.63$) during the pandemic. This association of COVID-19 pandemics with increased NICU admission and infant mortality is obscure. Furthermore, some studies showed a significant decrease in rates of prematurity, with a small increase in stillbirths following the implementation of preventive health policies aimed at alleviating the effects of the COVID-19 pandemic^{17,18}. Possible cited reasons include the preventive measures against the pandemic as well as the personal and physical isolation measures implemented. Similarly, the reluctance of the pregnant women in following regular prenatal visits due to “fear from infection transmission” may represent one of the potential reasons for the very slight increase observed in newborn intensive care unit admissions and deaths in our study.

Although the extent of the effects of the COVID-19 pandemic on healthcare services is yet to be fully defined, media news and published studies suggest that the pandemic may have a significant impact on the health of mothers and babies in the future¹⁹⁻²¹. No maternal deaths have been observed in our study, and no significant increase in neonatal morbidity and mortality was recorded; however, there was a significant decrease in the number of patients attending outpatient units. On the other hand, the fact that routine follow-up of pregnant women and newborns may be interrupted during periods of the pandemic. Routine follow-up is essential, which may require activation of appointment systems specifically suited for certain patient groups, infrastructure for telemedicine, home care for pregnant women, or reduced queue time in hospitals in an effort to protect women representing a risk group. Also, online or media-based educational activities may be organized to inform pregnant women about emergency conditions.

Limitations of our study include the use of data restricted to two centers only in the Rize province of Turkey, as well as

the fact that comparisons were based on the first three-month period during the pandemic. Another limitation relates to the lack of the examination of the socio-cultural reasons for the reduced rates of hospital attendance since the study had a retrospective design. In addition, SARS-CoV-2 PCR analysis was not performed in pregnant women, so a direct relationship cannot be shown between spontaneous abortion and fetomaternal complications and COVID-19 disease. If we knew the SARS-CoV-2 PCR results of cases with spontaneous abortion, we could express more precisely whether there was a relationship between abortion and COVID-19.

In conclusion, this retrospective cross-sectional study showed that the frequency of obstetric/neonatal morbidity and mortality in the first three months of the COVID-19 pandemic were not significantly different as compared to the corresponding periods in 2018 and 2019 except for spontaneous abortion. During the pandemic period, spontaneous abortion rates

increased compared to previous years. Although the number of attending to outpatient units and antenatal follow-up visits were reduced, the recommended number of antenatal controls were carried out, which may be explained based on the quality of the healthcare services provided as well as the presence of adequate health infrastructure. However, large-scale prospective studies examining the short and long-term effects of the interruption of antenatal follow-up visits are required during prolonged periods of outbreaks such as corona that have the potential to transform into a pandemic.

AUTHORS' CONTRIBUTION

YY: Conceptualization. **AYY:** Data curation. **IEY:** Formal analysis. **TA:** Data curation, Formal analysis. **MKK:** Data curation, Formal analysis. **BG:** Writing – original draft, Writing – review & editing. **BY:** Validation.

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