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Epidemiological Investigation of COVID-19 Effects in Pregnant Women and Their Infants

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Abstract: This study was conducted to investigate in pregnant women after being infected with Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) infection and whether any possible complications develop for the pregnant woman and the baby. This study was conducted on 301 pregnant women who were registered and being followed up at the COVID-19 Home Follow-up and Monitoring Coordination Centre. A questionnaire consisting of a Personal Information Form questioning sociodemographic characteristics and questions about the COVID-19 history of the pregnant women during their pregnancies and information about the baby after birth was administered to them by telephone. The mean age of the pregnant women was 30.21±5.34 years and 79 (26.2%) had received COVID-19 vaccine. Preeclampsia was observed in 1.0%, miscarriage in 5.8% and stillbirth in 0.3% of the pregnant women. Two (0.7%) of the babies died after birth. 21.6% of the babies had to be hospitalised due to a health problem. 2.3% of the babies had COVID-19. 12.1% of the babies had respiratory distress and 55.0% had jaundice (32.3% in the first 24 hours). Of the jaundiced babies, 64 (41.3%) received treatment for jaundice. 13.9% of the babies had breastfeeding problems after birth. Developmental delay was found in 3.6% of the babies. There was no increase in the risk of congenital anomalies and miscarriage rates due to COVID-19 in pregnant women, but the incidence of cardiac anomalies increased compared to other anomalies. Abortion rates were higher in vaccinated pregnant women compared to unvaccinated pregnant women. ©2024 NTMS.

Keywords: Pregnancy; COVID-19 Effect; Congenital Anomaly.

1. Introduction

The COVID-19 pandemic, one of the largest pandemics affecting the whole world and spreading rapidly, started in China in 2019. The COVID-19 pandemic caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has affected special groups such as the elderly, pregnant women and individuals with chronic diseases more. It has also increased mortality rates in these groups [1]. COVID-19 has been held responsible for seven million human deaths [2]. Pregnant women are one of the important risk groups. A number of adverse effects including preterm labour, pre-eclampsia (PE) and infant loss have been observed in pregnant women. In addition, vertical transmission is observed between 1.1-3.2% in pregnant women [3]. Although effects such as low birth weight and postnatal respiratory stress have been observed in newborns, it has been reported that the risk of teratogenicity and malformation has not increased [4]. Some studies have reported that prenatal

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exposure to SARS-CoV-2, especially in the third trimester, causes significant neurodevelopmental abnormalities in neonates related with motor function, speech and language [5]. Other studies suggest that SARS-CoV-2 infection during pregnancy may have detrimental effects on fetal brain development [6,7].

It is known that both cardiovascular complications and new-onset hypertension develop more frequently in those with severe COVID-19 disease [7]. It has been reported that a picture similar to preeclampsia due to COVID-19 may occur in pregnant women [8]. In a study, it was found that the rate of PE was around 10% in women who had COVID-19 infection while pregnant, and women with COVID-19 who had a history of chronic hypertension or obesity were more likely to have pre-eclampsia [9]. This study was conducted to investigate which symptoms developed most frequently after being infected with SARS-CoV2 infection in pregnant women who were registered and followed up at the COVID-19 Home Follow-up and Monitoring Coordination Centre, and whether a possible complication developed for the pregnant woman and the baby.

2. Material and Methods

2.1. Research Design and Sample Selection

In the cross-sectional study, the population of the study was 3200 pregnant women registered in the COVID-19 Home Follow-up and Monitoring Coordination Centre in Kütahya. Power analysis using the G*Power 3.1.9 programme showed that a total sample of n:297 individuals would be needed to detect medium effects (d:0.3) with an alpha value of 0.05 and 99% power using the Chi-square test [10]. In order to reach the minimum sample size of 297 without bias in sample selection, the number 330 was reached when the dropout rate formula (N1=n/1-d) was calculated by accepting 10%. Three hundred thirty pregnant women to be sampled were determined by simple random sampling method from the pregnancy lists. Pregnant women under the age of 18 years and over the age of 45 years, and pregnant women with anomalies in their family and themselves were not included in the study because they might affect the risk of anomaly.

The research was conducted on a voluntary basis by telephone between January-December 2022. When the pregnant women who did not accept to participate in the study were excluded, the study was completed with 301 pregnant women. A two-part data collection tool was used in the study prepared in accordance with STROBE criteria. The first part of the data collection tool consisted of a Personal Information Form questioning sociodemographic characteristics and the second part consisted of questions questioning the COVID-19 history of the pregnant women during pregnancy and the information of the baby after birth.

2.2. Statistical Analysis

The study data were analysed using SPSS 24 package programme. Numerical variables were presented as mean±standard deviation, median and quartiles, and categorical variables were presented as number and percentage. Chi-square test was used for categorical variables in the analyses. In all analyses, results were considered significant when $p<0.05$.

2.3. Ethical Issues

The research was conducted with the permission of KSBU Faculty of Medicine Non-Interventional Research Ethics Committee dated 09.02.2022 and decision number 2022/02-24.

3. Results

This study was conducted with the participation of 301 pregnant women. The mean age of the participants was 30.21±5.34 years (min:19 and max:44 years). Of the pregnant women 128 (42.5%) had their first pregnancy, 115 (38.2%) were undergraduate graduates, and 219 (72.8%) were housewives. Of the pregnant women, 33 (11.0%) were smokers and 25 (8.3%) had a chronic disease, the most common of which was hypothyroidism.

Of the pregnant women, 76 (25.2%) were diagnosed with COVID-19 in the 1st trimester, 107 (35.5%) in the 2nd trimester, 118 (39.2%) in the 3rd trimester and 32 (8.1%) had lung involvement. While the variant was uncertain in 121 (40.2%) of the pregnant women, it was Delta in 144 (47.8%), mutant-suspected in 37 (7.6%), English in 11 (3.7%) and SGPH V1 in 2 (0.7%).

When the initial signs and symptoms of COVID-19 were questioned, influenza (n:57; 18.9%), nasal congestion (n:28; 9.3%), fatigue (n:64; 21.3%), myalgia (n:1; 0.3%), loss of smell (n:127; 42.2%), taste disturbance (n:106; 35.2%), cough (n:107; 35.5%), fever (n:65; 21.6%), arthralgia (n:116; 38.5%), chills (n:3; 1.0%), sore throat (n:13; 4.3%), headache (n:24; 8.0%), nausea-vomiting (n:3; 1.0%), shortness of breath (n:18; 6.0%), and other complaints (n:12; 3.8%) were observed (Figure 1). The recovery period was between 1-90 days (mean 13.14±13.09 days). Loss of odour (n:81; 26.9), cough (n:49; 16.3%) and joint pain (n:32; 10.6%) were the most prolonged symptoms. Forty seven (15.6%) of the pregnant women received treatment in the hospital for a mean of 7.64±33.35 days (min:1-max:15 days) during pregnancy. It was observed that 242 (80.4%) of the pregnant women used a drug to prevent coagulation. Heparin 299 (99.6%) and aspirin 1 (0.4%) were the most commonly used drugs to prevent coagulation. In addition, 43 (14.3%) of the pregnant women received antibiotics and 142 (47.2%) received alternative treatment (such as linden tea, vitamin C) for healing or relaxation.

The number of pregnant women vaccinated with the COVID-19 vaccine was 79 (26.2%) [1 dose Sinovac: (8.9%), 2 doses Sinovac: (15.2%), 3 doses Sinovac: (1.3%), 1 dose Biontec: (24.1%), 2 doses Biontec: (46.8%), 3 doses Biontec: (2.5%) 2 Sinovac and Biontec: (1.0%)].

Table 1: Some descriptive characteristics of mothers of babies with congenital problems.

Anomaly	Number of pregnancies	Trimester	Smoking	Chronic Disease	COVID-19 vaccine	COVID-19 Variant
Aortic stenosis (n:1)	2nd pregnancy	2nd trimester (16th week)	None	None	None	Uncertain
Arrhythmia (n:1)	4 or more pregnancies	3rd trimester (38th week)	Yes	Yes	None	Delta
ASD (n:1)	3rd pregnancy	3rd trimester (31th week)	None	None	None	Delta
Hypothyroidism (n:1)	3rd pregnancy	1st trimester (8th week)	None	None	Yes (1 dose of sinovac)	Undetermined
PDA (n:2)	2rd pregnancy (n:1) 3rd pregnancy (n:1)	2nd trimester (24th week) (n:1) and 3rd (36th week) (n:1)	None (n:2)	Yes (n:1) None (n:1)	Yes (2 doz biontec) (n:1) None (n:1)	Delta (n:2)
Polycystic kidney disease (n:1)	1st pregnancy	1st trimester (12th week)	None	None	None	Undetermined
Transposition+VSD (n:1)	2nd pregnancy	3rd trimester (35th week)	None	None	None	Delta
Vitiligo (n:1)	2nd pregnancy	2. trimester (20. Hafta)	Yes	None	None	Delta
VSD (n:2)	1st (n:1) and 2nd pregnancy (n:1)	2nd trimester (20th week) (n:1) and 2nd trimester (23rd week) (n:1)	None (n:2)	None (n:2)	Yes (2 doz sinovac) (n:1) Yes (1 doz biontec) (n:1)	Undetermined (n:2)
Miscarriage (n:18)	1st pregnancy (n:4) 2nd pregnancy (n:3) 3rd pregnancy (n:5) 4 or more pregnancies (n:6)	1. trimester (n:13) 2. trimester (n:5)	Yes (n:1) None (n:17)	Yes (n:4) None(n:14)	Yes (n:9) 2 doz sinovac (n:1) 1 doz biontec (n:2) 2 doz biontec (n:6) None (n:9)	Undetermined (n:6) English(n:1) Delta(n:10) Mutant suspect (n:1)
Dead birth (n:1)	1st pregnancy	3rd pregnancy	None	None	None	Delta
Infant mortality (n:2)	1st pregnancy 4th pregnancy	2nd trimester (n:1) 3rd trimester (n:1)	Yes (n:1) None	None (n:2)	None (n:2)	Indeterminate (n:1) Mutant suspect (n:1)

Of the unvaccinated pregnant women, 148 (66.7%) were not vaccinated due to "concern that it might harm the baby". The reasons for not being vaccinated included the unavailability of the vaccine in health facilities (8.0%), having COVID-19 at the time of considering vaccination (5.4%), being negatively affected by the people around them (5.4%), thinking that COVID-19 was a simple disease (8.6%) and other reasons (5.5%).

The number of pregnant women who stated that they had preeclampsia was 3 (1.0%) and 18 (5.8%) pregnant women had miscarriage and 1 (0.3%) had stillbirth. Of the pregnant women who gave birth (n:282), 205 (72.7%) pregnant women had caesarean section. Two (0.7%) of the babies died after birth. Sixty one (21.6%) of the babies had to be hospitalised due to a health problem. Seven (2.3%) of the babies had COVID-19. In these babies, 34 (12.1%) were found to have respiratory distress. In addition, it was observed that 155 (55.0%) developed jaundice (n:50; 32.3% in the first 24 hours). Of the jaundiced infants, 64 (41.3%) received treatment for jaundice (n:6, 9.4% drug-phenobarbital; n:57, 89.1% radiotherapy; n:1, 1.6% exchange transfusion therapy). Of the babies (n:280), 39 (13.9%) had breastfeeding problems after birth. Developmental delay was found in 10 (3.6%) of the babies. A congenital problem was detected in 11 (3.9%) of the babies born (n:282). In these babies, VSD (n:2); arrhythmia (n:1); ASD (n:1); hypothyroidism (n:1); PDA (n:2); vitiligo (n:1); transposition+VSD (n:1); polycystic kidney disease (n:1) were detected. Table 1 shows the characteristics of the babies with congenital problems and their mothers. Table 1. Some descriptive characteristics of mothers of babies with congenital problems.

Table 2: Distribution of some problems experienced by pregnant women and infants according to the trimester in which pregnant women had COVID-19.

Some characteristics of pregnant women and babies		1st trimester n (%)	2nd trimester n (%)	3rd trimester n (%)	Total n (%)	x^2; p
Miscarriage (n:18)	Yes	13 (17.1)	5 (4.7)		18 (9.8)	7.745; 0.005387
	None	63 (82.9)	102 (95.3)		165 (90.2)	
Eclampsia/preeclampsia	Yes	2 (2.6)	1 (0.9)	0 (0.0)	3 (1.0)	0.187
	None	74 (97.4)	106 (99.1)	118 (100.0)	298 (99.0)	
Infant respiratory distress	Yes	10 (15.9)	9 (8.8)	15 (12.8)	34 (87.9)	0.380
	None	53 (84.1)	93 (91.2)	102 (87.2)	248 (12.1)	
Baby hospitalisation# p:0.004 (a, b); p:0.079 (a, c); p:0.203 (b, c)	Yes	21 (33.3)	15 (14.7)	25 (21.4)		0.019
	None	42 (66.7)	87 (85.3)	92 (78.6)		
Baby problem	Yes	5 (7.9)	9 (8.8)	8 (6.8)	22 (7.9)	0.3033; 0.859
	None	58 (92.1)	92 (90.2)	108 (92.3)	258 (92.1)	
Anomaly	Yes	2 (3.2)	5 (4.9)	4 (3.4)	11 (3.9)	0.795*
	None	61 (96.8)	97 (95.1)	113 (96.6)	271 (96.1)	
Infant jaundice	Yes	38 (60.3)	59 (57.8)	58 (49.6)	155 (55.0)	0.295
	None	25 (39.7)	43 (42.2)	59 (50.4)	127 (45.0)	
Breastfeeding problems	Yes	10 (15.9)	16 (15.8)	13 (11.2)	39 (13.9)	0.542
	None	53 (84.1)	85 (84.2)	103 (88.8)	241 (86.1)	
Weight and development problems	Delay	4 (6.3)	2 (2.0)	4 (3.4)	10 (3.6)	0.347*
	Normal	59 (93.7)	99 (98.0)	112 (96.6)	270 (96.4)	

#a: 1.Trimester; b: 2.Trimester; c: 3.Trimester. *: Exact test.

Of the pregnant women (n:18) in whom miscarriage was observed, 13 (17.1%) had COVID-19 disease in the 1st trimester and 5 (4.7%) in the 2nd trimester. Table 2 shows the distribution of some problems experienced by pregnant women and infants according to the trimester in which the pregnant women had COVID-19.

Of the pregnant women with miscarriage (n:18), 9 had been vaccinated for COVID-19 and the rate of miscarriage among all vaccinated pregnant women was 11.4%. The remaining n:9 pregnant women with miscarriage had not been vaccinated for COVID-19 and the rate of miscarriage among all unvaccinated pregnant women was 4.1%. Of the jaundiced babies (n:155, 100%), 50 (32.3%) had jaundice in the first 24 hours and 105 (67.7%) had jaundice after the first 24 hours. Table 3 shows the distribution of some health problems experienced by pregnant women and infants according to the COVID-19 vaccination status of pregnant women.

Table 3: Distribution of some problems experienced by pregnant women and infants according to COVID-19 vaccination status.

		COVID-19 vaccine (+) n (%)	COVID-19 vaccine (-) n (%)	Total n (%)	x^2; p
Anomaly	Yes	4 (5.7)	7 (3.3)	11 (3.9)	*0.474*
	None	66 (94.3)	205 (96.7)	271 (96.1)	
Miscarriage	Yes	9 (11.4)	9 (4.1)	18 (6.0)	0.026
	None	70 (88.6)	213 (95.9)	283 (94.0)	
Eclampsia/preeclampsia	Yes	2 (2.5)	1 (0.5)	3 (1.0)	0.170
	None	77 (97.5)	221 (99.5)	298 (99.0)	
Infant respiratory distress	Yes	8 (11.4)	26 (12.3)	34 (12.1)	0.852
	None	62 (88.6)	186 (87.7)	248 (87.9)	
Baby hospitalisation	Yes	20 (32.8)	41 (19.3)	61 (21.6)	0.104
	None	50 (71.4)	171 (80.7)	221 (78.4)	
Infant jaundice	Yes	44 (62.9)	111 (52.4)	155 (55.0)	0.126
	None	26 (37.1)	101 (47.6)	127 (45.0)	
Breastfeeding	Yes	12 (17.1)	27 (12.9)	39 (13.9)	0.370
	None	58 (82.9)	183 (87.1)	241 (86.1)	
Weight and development	Delay	3 (4.3)	7 (3.3)	10 (3.6)	0.710
	Normal	67 (95.7)	203 (96.7)	270 (96.4)	

4. Discussion

Patients may experience different symptoms of COVID-19. In COVID-19, especially upper respiratory tract infection symptoms are at the forefront [2]. According to WHO, the most common symptoms in the general population are fever, chills and sore throat. Joint pain, loss of smell and taste are less common symptoms [11]. In a systematic review including pregnant women with COVID-19, the most common symptoms were reported to be fever, cough and muscle pain. Sore throat, runny nose, nasal congestion, loss of appetite, nausea, vomiting, smell and taste disorders are less common [12]. The most common symptoms of COVID-19 in pregnant women who participated in our study were loss of odour, joint pain and cough. The fact that loss of smell and joint pain were observed frequently in our study, which is different from the literature, may be due to the fact that pregnant women did not pay attention to the upper respiratory tract symptoms that developed at the beginning and applied to healthcare institutions late for diagnosis. In this way, the initial symptoms may have been missed.

In a study conducted in the Turkish population and in non-COVID-19 pregnant women, hospitalisation rate was found to be 4% [13]. In our study conducted in pregnant women, it was observed that 15.6% of pregnant women required hospitalisation. In addition, in our study, 14.3% of pregnant women needed to use various antibiotics due to secondary infections developing after COVID-19. Jamieson et al. found that pregnant women with COVID-19 had higher rates of admission to the intensive care unit, more need for invasive ventilation and extracorpuscular oxygenation, and higher mortality rates compared to non-pregnant women [14]. In the COVI-PREG study conducted by Favre et al., it was found that drug utilisation rates increased in pregnant women due to COVID-19 [15]. In the CANCOVID-PREG study conducted in Canada, the risk of hospitalisation of SARS-CoV-2 patients during pregnancy was found to increase significantly when compared with women aged 20 to 49 years diagnosed with SARS-CoV-2 [16]. In our study, similarly, the hospitalisation rates of pregnant women and thus the use of antibiotics and other agents increased. The finding that the hospitalisation rates and treatment needs of pregnant women with COVID-19 were higher than those without COVID-19 is consistent with the literature.

In a study conducted in France, it was found that there was an increase in infant loss rates during the pandemic. It was stated that this may be related to COVID-19 [17]. In a study conducted in England, it was found that miscarriage rates were observed more frequently in women with COVID-19 compared to those without [18]. In Türkiye, miscarriage rates were reported to be 10.4% in the general population and in all gestational months [19]. In the pregnant women who participated in our study, the abortion rate was found to be 5.9% according to all months. According to this result, it can be said that COVID-19 did not increase the miscarriage rates in the pregnant women who participated in our study compared to the general population, and even the miscarriage rates decreased in a part of the Turkish population in this study. According to studies, miscarriages are more common in the first trimester. In the world, the rate of miscarriage after the twelfth gestational week in the general population is around 1 per cent [20]. However, this rate is between 9-20% in the first trimester [21, 22]. In our study, while miscarriage rates were high in the first trimester (17.1%), these rates decreased in the following trimester (2nd trimester) (4.7%). The first trimester miscarriage rates in non-COVID-19 pregnant women are similar to the findings of this study with pregnant women. However, in the second trimester, despite the decreased abortion rates compared to the

first trimester, abortion rates were approximately five times higher than the abortion rates in the general population. The reason for the increased abortion rates in the second trimester compared to the general population should be confirmed by studies to be conducted in different populations.

In its latest update in 2023, the American College of Obstetricians and Gynaecologists Association recommends that pregnant women can be vaccinated in all trimesters, but especially after six months, COVID-19 vaccine should be administered [23]. Rahmati et al. also reported that COVID-19 vaccination during pregnancy is safe and highly effective in preventing maternal SARS-CoV-2 infection during pregnancy without increasing the risk of adverse maternal and neonatal outcomes and reduces stillbirth, preterm births and neonatal intensive care unit admission. In addition, there was no finding that adverse outcome effects such as miscarriage, gestational diabetes, gestational hypertension, heart problems, oligohydramnios, polyhydramnios, unassisted vaginal delivery, caesarean section, postpartum haemorrhage, gestational age at delivery, placental abruption, Apgar score at the fifth minute were high due to vaccination [24]. However, in our study, miscarriage rate was found to be higher in vaccinated pregnant women. In our study, pregnant women were vaccinated for COVID-19 especially in the first trimester. The fact that miscarriages are already high in the first trimester may explain this situation.

The rate of congenital anomaly is found to be around 3-4% in newborns in the community [25]. Whether COVID-19 has an effect on congenital anomaly has been the subject of some studies. For example, in the PAN-COVID study conducted by Mullins et al. it was observed that it had no effect on congenital malformations in newborns born to women affected by SARS-CoV-2 infection during pregnancy [26]. In our study, the rate of congenital anomaly was found to be 3.9% when all trimesters were evaluated together. This finding suggested that infection with SARS-CoV2 did not significantly increase the risk of foetal anomalies. However, it may cause a difference in congenital anomaly rates in pregnant women with COVID-19 infection. In a study conducted by Balcı et al. on babies born to mothers without COVID-19 and in whom fetal malformations were detected, it was found that the most frequently observed fetal anomaly was cardiovascular system anomalies (23.07%) [27]. In our study, cardiovascular system anomalies were observed in 36.36% of the eleven babies with anomalies. It is seen that cardiovascular anomaly continues to be the most common anomaly. However, cardiovascular anomalies increased in babies born to mothers with COVID-19. The increase in this rate may be due to high fever due to COVID-19. The increase in cardiovascular anomalies in babies born to pregnant women with COVID-19 may not be a real increase. The reason for the increase may also be due to the fact that the two studies were conducted at different times and samples.

Preeclampsia is the most common hypertensive disorder in pregnancy and its incidence in pregnancy is 3-8% [28]. In our study, preeclampsia was observed in 3 pregnant women (1.0%). The rate of stillbirth in the world is reported to be approximately 5 per thousand. This rate and its causes may vary according to countries and even regions of countries. Stillbirth rates have been shown to be 0.2% in developed countries, 0.7% in developing countries and 2% in South Africa and some countries in Asia [29]. In our study, stillbirth was observed in 1 (0.3%) of the pregnant women. In our study, 205 (72.7%) of the live births (n:282) had caesarean section. In Türkiye, 60.1 percent of live births and 67.6 percent of live births in the Aegean region including Kütahya are performed by caesarean section [30]. Among the pregnant women who participated in our study, 2 (‰7) of the infants died after birth. The infant mortality rate (per 1,000 live births) in Türkiye was 9.1 ‰ in 2022 [30]. Neonatal jaundice is still an unpreventable condition in 60-80% of newborn babies worldwide [31]. It has been reported that neonatal jaundice is still an important problem in Türkiye. However, there are no clear data on the frequency of neonatal jaundice in Türkiye. One of the criteria for pathological jaundice is clinical jaundice that appears in the first 24 hours of life [32]. In our study, a total of 155 (55.0%) babies were found to have jaundice. Jaundice occurred in the first 24 hours in 50 (32.3%) of these babies. Hospitalisation rates of newborn babies in the first year of life are generally between 4.4-9.5% [33]. The first two reasons for hospitalisation of infants include high fever and fluid dehydration [34]. In our study, 61 (21.6%) of the infants required hospitalisation because of a health problem. Respiratory distress was experienced by 34 (12.1%) of the babies. According to studies, the risk of developmental retardation may occur in babies whose mothers do not have a healthy pregnancy [35]. In our study, developmental delay was found in 10 (3.6%) of the babies. In the CANCOVID-Preg study, it was found that the rates of pre-eclampsia, caesarean delivery and stillbirth increased in SARS-CoV2-infected pregnant women and their babies. It has even been reported that preterm birth and mild disease cases that do not require hospitalisation occur at a high rate [16]. In the PAN-COVID study by Mullins et al. it was observed that SARS-CoV2 infection in pregnant women was associated with preterm delivery. Mullins et al. reported that there was no effect on the birth weight of the newborn in women affected by SARS-CoV-2 infection during pregnancy (26). Worldwide, 15-20% of newborns are born with low birth weight [36]. In some meta-analyses, COVID-19 has been found to be associated with preeclampsia, preterm birth, stillbirth, and hospitalisation in the neonatal intensive care unit [37,38]. In our study, the frequency of preeclampsia, stillbirth, infant death, and neonatal jaundice was found less frequently compared to the data in the world and Türkiye. However, an increase in the frequency of caesarean section and hospitalisation was found.

5. Conclusion

Based on the findings of the study, it was observed that there was no increase in the risk of congenital anomalies due to COVID-19 in pregnant women, but the incidence of cardiac anomalies increased compared to other anomalies. There was no increase in miscarriage rates, but miscarriage rates were higher in vaccinated pregnant women compared to non-vaccinated pregnant women. Infants of pregnant women infected with SARS-CoV2 in the first trimester required hospitalisation at a higher rate than those infected in the second trimester. The most common reason for hospitalisation was respiratory distress.

Limitations of the Study

The limitations of the study is cross-sectional design. Since the study is based on voluntary participation, it may lead to sampling bias. Since the data is collected through a survey, it may cause memory bias. The results of the study cannot be generalized to all of Türkiye, represents only patients in Kütahya.

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Conflict of Interests

The authors declare no conflict of interest.

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Author Contributions

Design: AD, MY, HG; Literature review: AD, MY, HG; Creating a survey: AD, MY; Data collection: AD, HG; Analysis and interpretation: AD, MY; Writing article: AD, MY; Critical evaluation: AD, MY, HG.

Ethical Approval

The research was conducted with the permission of KSBU Faculty of Medicine Non-Interventional Research Ethics Committee dated 09.02.2022 and decision number 2022/02-24.

Data sharing statement

All data relevant to the study are included in the article.

Consent to participate

Consent for the study was obtained from all participants for the study.

Informed Statement

The patient and control group who agreed to participate in the study signed the informed consent form.

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