Pregnancy Outcomes at the Erae of COVID-19

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Abstract:

Background: Pregnant women have been categorized as a vulnerable group during the COVID-19 pandemic. The evidence regarding the impact of infection during pregnancy on the health of expectant mothers and newborns is still unclear, nevertheless. **Aim:** to assess maternal and fetal outcomes of women who were pregnant during COVID19 period (within the year 2020 and 2021). **Methods:** a Retrospective research design was used for this study. **Setting:** The study was conducted at two main areas, the new medical urban center in Walidiyah, and Qolta MCH center. **Sample:** A convenience sample was used that involved 360 women where attending postpartum & family planning outpatient clinics for follow-up and delivered at 2020 or 2021. **Tools:** An structured interviewing questionnaire. **Results:** In terms of maternal outcomes, 73.3% of the women in the study had gestational age of 36 weeks or longer at the time of birth, and 28.9% of them experienced complications. Puerperal pyrexia and postpartum hemorrhage affected 47.1% and 52.9% of them, respectively. About 31.1% and 63.9% of fetuses with weights between 2500-<4000 gm and experienced neonatal complications. About 14.3%, 13.3%, 15.2 and 17.8% of them had low birth weight, NICU admission for treatment, infected with COVID-19 virus and preterm birth respectively. **Conclusion:** During the COVID-19 pandemic, pregnant women were at risk for both maternal and fetal problems. Thus, covid19 pregnant cases need to be regarded as a high-risk Group. **Recommendations:** Collating scientific evidence concerning the pandemic is imperative.

Keywords: Pregnancy, COVID-19 &Outcomes

Introduction:

The severe acute respiratory syndrome coronavirus 2 is the source of the newly-emerging illness COVID-19 (SARS-CoV-2). As of May 2020, there have been approximately 4,000,000 cases and at least 250,000 deaths reported globally, reflecting the rapid increase in cases and deaths since its discovery **(Shi1 et al., 2022).** As of January 3, 2020 and until September 11, 2022, there have been 515,348 COVID-19 verified cases in Egypt, and 24,796 deaths have been reported to the World Health Organization. 98,019,706 vaccine doses had been given **(WHO, 2022).**

Due to the immune system's suppression during pregnancy, pregnant women are more susceptible to COVID19 infection and serious illness. Everyone is susceptible to catching COVID-19, but pregnant women are more likely than the general public to get infected. Due to anatomical changes in the respiratory system during pregnancy, it is easily inhaled by pregnant women and challenging to expel through the use of airborne droplets **(Hassan et al., 2022).**

Severe pneumonia, acute respiratory distress syndrome, heart problems, respiratory tract infections, sepsis, and septic shock are among the complications associated with COVID-19 **(Zhou et al., 2020).**

Pregnancy-related physiological alterations in the pulmonary, coagulation, and cardiovascular systems may increase the risk of morbidity. Therefore, it's important to identify and treat COVID19 issues during pregnancy as soon as possible. Furthermore, co-morbidities (long-term corticosteroid use, HIV infection, chronic hypertension, gestational diabetes, cardiac problems, chronic renal disease, immunosuppression in organ transplant recipients, or cardiac diseases) may increase the risk of more severe clinical symptoms **(Abdelaziz et al., 2022).**

Necrotizing enterocolitis, retinopathy of prematurity, patent ductus arteriosus, anemia, sepsis, bronchopulmonary dysplasia, and hypoxic-ischemic encephalopathy are among the neonatal consequences **(Di Mascio et al., 2020).** Congenital abnormalities: Long-term congenital problems may result from COVID-19, either on its own or in combination with anti-COVID medicines. It has been demonstrated that SARS-CoV-2 can traverse both the blood-brain and placental barriers **(Moriguchi et al., 2020).** In addition, the babies experienced low birth weight, small for gestational age, stillbirth, neonatal mortality, low birth weight, pneumonia, respiratory

distress syndrome, and preterm birth **(Avagliano et al., 2019).**

Pregnant women in the approved age category should be provided the full series of vaccinations, including the mRNA COVID-19 vaccine, during their pregnancy. In general, vaccinations are safe, effective, and immunogenic when given to expectant mothers. It has recently been demonstrated that the COVID-19 immunization is effective in avoiding infection in expectant mothers **(Schalkwyk et al., 2022).**

During the COVID-19 pandemic, nurses continued to play crucial roles and responsibilities. They were actively participated in community monitoring and evaluation in addition to providing hospital patient care. Regardless of their infectious state, nurses must guarantee that every patient receives individualized, superior care. They must also plan for potential COVID-19-related outbreaks, which raise the need for nursing and other healthcare services and could put a strain on systems. **(Ibrahim et al., 2022)**

Significance of the study:

Research on the effects of COVID-19 in pregnant women and their newborns is now of interest. The maternal and perinatal outcomes of pregnant women in middle- and low-income countries who give birth at term are still poorly understood in relation to SARS-CoV **(Gupta et al., 2021).** Health care providers also need to be aware of certain elements of COVID-19 and gestation in order to properly diagnose the condition, evaluate its severity, distinguish specific COVID-19 indications from those of obstetric complications, and choose the most effective course of treatment **(Ibrahim et al., 2022).**

Aim of the study

Pregnancy Outcomes at the Erae of COVID-19 period (within the year 2020 and 2021).

Research Questions:

What are the maternal and fetal outcomes for pregnant women who faced COVID19 periods?

Subjects and Methods:

Four design categories were used to discuss the topic and methodology of the current study: technical, operational, administrative, and statistical.

Technical design:

Research design*:* Retrospective research design was used for this study.

Setting: Two primary locations were used for the study: the Qolta MCH center in the West District and the new medical urban in Walidiyah, which is located in the East District, Assiut Governorate, Egypt.

Subjects:

Sample Type: A convenience sample was used.

Sample size: A sample of 360 women who were delivered in 2020 or 2021 at the MCH center and attended postpartum and family planning outpatient clinics for follow-up. The sample was determined using the Herbert Arkin formula.

$$n = \frac{p(1-p)}{(SE \div t) + [p(1-p) \div N]}$$

n= sample size
N=Population (6560)
T=the standard score corresponding to the level of significance= 1, 96%
SE=error rate=0, 05
P=Property Availability Ratio and Neutral=0, 05
n=360 women

Inclusion criteria:

All women who were delivered in 2020 or 2021 at the MCH center and attended postpartum follow-up or family planning outpatient clinics were included in the sample.

Tools of data collection:

Data collection was obtained by using the following:

Tool (1) a structured interviewing questionnaire was used in this study:

This tool was designed and utilized by the researcher based on literature review and consulting expertise in this area, it was structured to include the following parts:

Part (1): Personal characteristics as: age, level of education, occupation, residence,…etc.

Part (2): data regarding to the last pregnancy conditions as: vaccine status, medical diagnosis of infection COVID19, sings and symptoms,time of vaccination,type of vaccine.

Part (3): Included **maternal and fetal outcomes** as weeks of gestation at delivery, mode of last delivery, and complication occurred after delivery. Apgar score, weight and any complications occurred to neonate.

Tools Validity:

Three professionals in the field of Maternal & Newborn Health Nursing evaluated the tool's content validity and assessed its comprehensibility, relevance, thoroughness, comprehension, application, and ease of use. The required adjustments were also made.

Tools Reliability:

The researcher used tool reliability to verify the instruments' internal consistency. Reliability was verified using Cranach's alpha test. Reliability items devoid of scale and analyses found in the SPSS program were used to measure it. For the structured interviewing questionnaire, it was established at 0.730.

Operational design:
The design involved description of pilot study, filed work, and the preparatory phase.

Pilot study:
To test the clarity of the study tools, a pilot study with 10% (36) of the study population was conducted. Since the tools were not altered, the pilot research sample was drawn from the entire sample.

Preparatory phase:
The tools were developed based on literature, and experts in obstetrics and gynecology assessed them for validation. The researcher examined the relevant literature of the current study on a local and international level utilizing textbooks, papers, and important publications.

Field work:
The study's data collecting ran roughly through four month period, commencing in early December 2022 and ending at the end of March 2023.

Procedures:
▪ The researcher obtained formal permission to conduct the study.
▪ The researcher worked out of the Qolta Center two days a week, on Sunday and Wednesday, at 9 to 11 AM, interviewing two to three women. The other days of the week, the researcher proceeded to the New Medical urban center in Walidiyah, where she interviewed three to five women each day.
▪ After labor, the women who attended postpartum or F.P. clinics were individually met by the researcher.
▪ After confirming occurrence of pregnancy between 2020 and 2021, everywoman was informed about the nature and goal of the study, and consent was acquired for her voluntary participation

▪ The researcher collected data related to personal characteristic, last pregnancy data, and maternal and fetal outcomes

Administrative design:
The new medical urban in Walidiyah, and the Qolta MCH center granted permission. The researcher was able to gather data from the ladies under study in a lawful and organized manner thanks to these approvals.

Ethical considerations:
Official consent was acquired from the Qolta MCH center, the new medical urban in Walidiyah, and the ethical committee of the Assuit University Faculty of Nursing.
▪ Each woman was asked for her informed consent before being added to the study sample and only after being given a concise and understandable description of the study's aim .
▪ The nature of the study and its anticipated results were communicated in a straightforward and clear manner.
▪ They made sure that all information gathered was handled anonymously and with secrecy.
▪ Every pregnant participant in the trial was free to leave at any moment.

Statistical analysis:
The Statistical Package for Social Sciences (SPSS) version 26 was used to analyze the data that had been gathered. Numbers, percentages, averages, standard deviation, and other statistical measures were utilized to portray the data in tables and figures. The Chi square test was employed to determine whether two qualitative variables were related. For statistical significance, a P-value of less than 0.05 was used.

Results:

Table (1): Distribution of the studied women according to their personal data

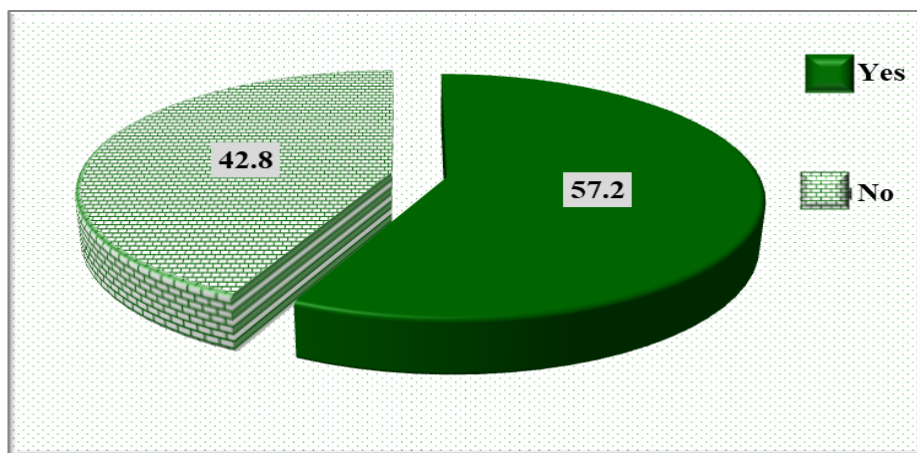| Personal data	N (360)	%
Age/years		
▪ Less than 25 year	123	34.2
▪ 26-35 year	135	**37.5**
▪ 35 or more	102	28.3
Mean±SD of age/years	**27.12±9.25**	
Residence		
▪ Urban area	289	**80.3**
▪ Rural area	71	19.7
Educational level		
▪ Illiterate& read and write	54	15.0
▪ Elementary & preparatory education	43	11.9
▪ Secondary education	159	**44.2**
▪ University or higher	104	28.9
Occupation		
▪ Housewife	217	**60.3**
▪ Employed	143	39.7

Figure (1): Distribution of the studied women according to their history of vaccination during pregnancy against Covid 19 (N=360)
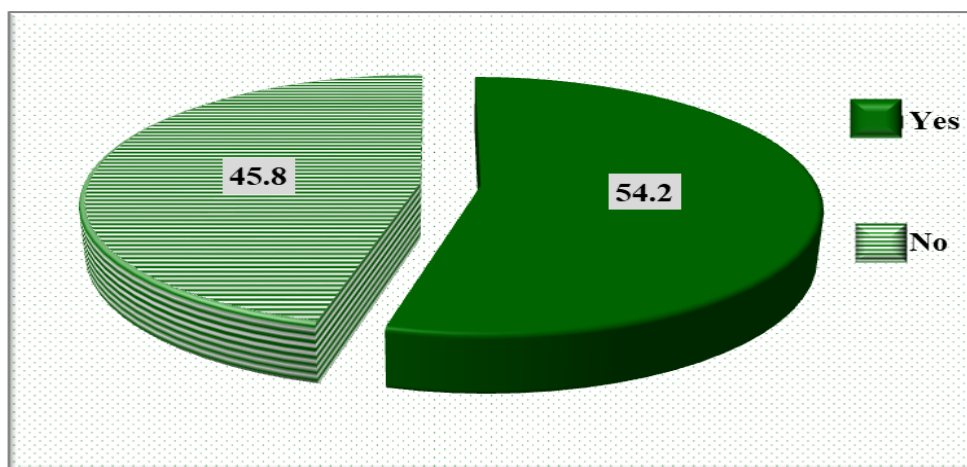

Figure (2) distribution of the studied women according to their infected with COVID19 based on medical diagnosis (N=360)
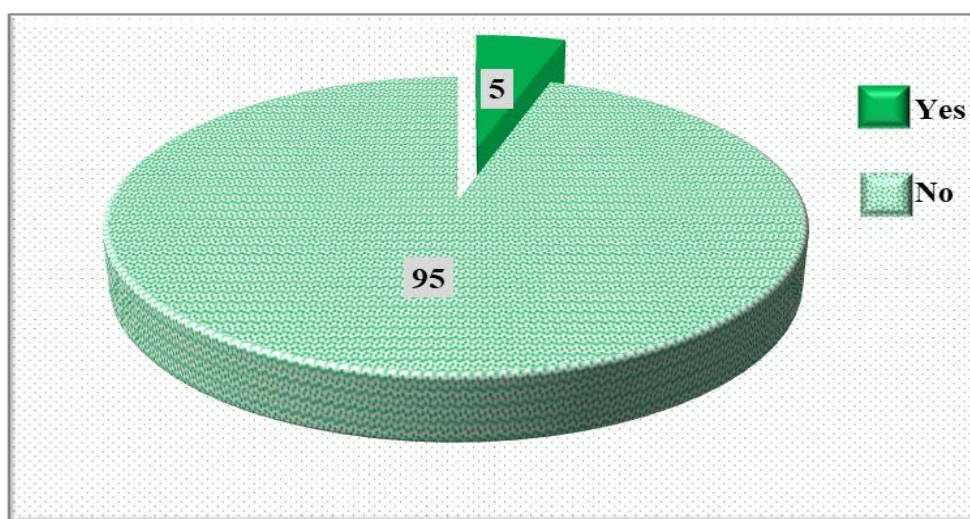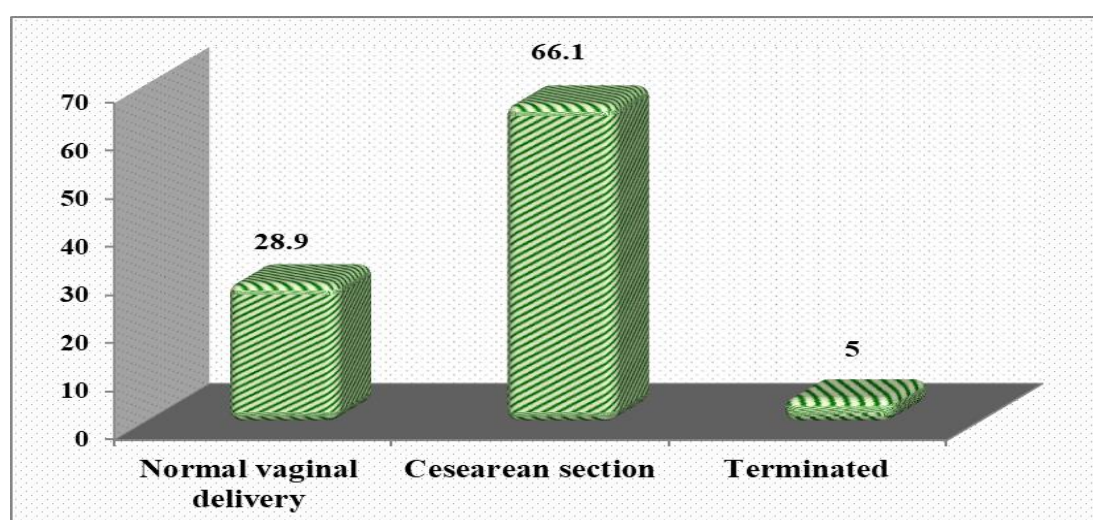

Figure (3): Distribution of the studied women according to history of pregnancy termination (N=360)

Table (2): Distribution of the studied women according to their maternal outcomes

Maternal outcomes	N(360)	%
Weeks of gestation at delivery		
▪ Terminated	18	5.0
▪ < 37 week	78	21.7
▪ 37 and more	264	**73.3**
Mean±SD	**35.73±4.83**	
Complication occurred after delivery		
▪ Terminated	18	5.0
▪ Yes	104	**28.9**
▪ No	238	66.1
If yes, type of complications:	**N and % of complication**	
Obstetric complications		
Postpartum hemorrhage	60	57.6
Puerperal pyrexia	44	42.4

Figure (4) distribution of the studied women according to mode of last delivery (N=360).

Table (3): distribution of the studied women according to their fetal outcomes:

| Fetal outcomes	N(360)	%
Newborn weight --------------------/gm-		
▪ Less than 2500 gm		
▪ 2500-<4000gm	16	4.4
▪ 4000gm or more	316	**87.8**
▪ Terminated	10	2.8
	18	5.0
Complications occurred to neonate:		
▪ Yes	112	**31.1**
▪ No	230	63.9
▪ Termination	18	5.0
If yes, type of complications n=(112):		
Stillbirth	2	1.7
Low birth weight	16	28.**3**
NICU admission for treatment	15	13.**3**
Respiratory distress syndrome	4	3.6
Neonatal death	3	2.7
Congenital anomalies	1	0.91
Infected with covid 19 virus	**17**	**15.**2
Preterm birth	78	**69.6**
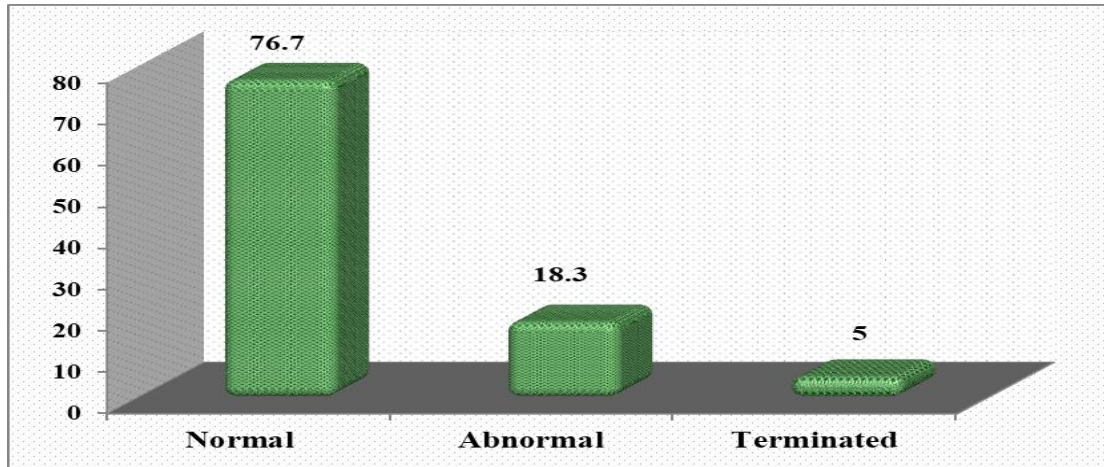
Figure (5): Distribution of the studied women according to fetal Apage score at time of delivery (N=360)
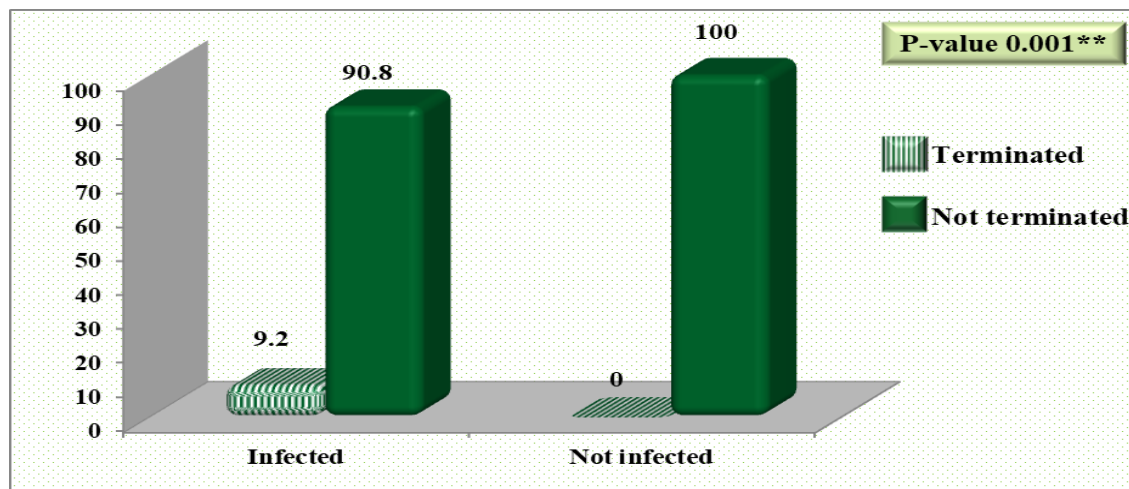
(**) highly statistical significant difference

Figure (6) Relationship between infected with COVID 19 of the studied women and termination of their pregnancy (N=360)

Table (4): Relationship between infected with COVID 19 of the studied women and their maternal outcomes (N=360):

Maternal outcomes	Infected with COVID 19				
	Infected (195)		Not infected (165)		P-value
	N	%	N	%	
Weeks of gestation at delivery					
▪ 34-<3 week	56	28.7	22	13.3	
▪ 36 and more	121	62.1	143	86.7	**0.001****
▪ Terminated	18	9.2	0	0.0	
Mode of last delivery:					
▪ Normal vaginal delivery	21	10.8	83	50.3	
▪ Cesarean section	156	80.0	82	49.7	**0.001****
▪ Terminated	18	9.2	0	0.0	
Complication occurred after delivery:					
▪ Yes	71	36.4	33	20.0	
▪ No	106	54.4	132	80.0	**0.001****
▪ Terminated	18	9.2	0	0.0	

Table (5): Relationship between infected with COVID 19 of the studied women and their fetal outcomes (N=360)

Fetal outcomes	Infected with COVID 19				P-value
	Infected (195)		Not infected (165)		
	N	%	N	%	
Apgar score:					
▪ Normal	133	68.2	143	86.7	**0.001****
▪ Abnormal	44	22.6	22	13.3	
▪ Terminated	18	9.2	0	0.0	
Newborn weight -----/gm-					
▪ Less than 2500 gm	73	37.4	29	17.6	
▪ 2500-<4000gm	102	52.4	128	77.6	**0.001****
▪ 4000gm or more	2	1.0	8	4.8	
▪ Terminated	18	9.2	0	0.0	
Gender					
▪ Male	140	71.8	128	77.6	
▪ Female	37	19.0	37	22.4	**0.021***
▪ Terminated	18	9.2	0	0.0	
Complications occurred to neonate:					
▪ Yes	85	43.6	27	16.4	
▪ No	92	47.2	138	83.6	**0.001****
▪ Termination	18	9.2	0	0.0	

Table (1): Displays personal data of the examined women, and indicated that 37.5% of the studied women had age group from (26-34) year, with mean±SD of 27.12±9.25. Approximately 80.3% of them were city dwellers. In terms of education, 44.2% of them had completed secondary school, while 60.3% were said to be unemployed.

Figure (1): Demonstrates that 42.8% of the women in the study did not obtain a COVID-19 immunization, whereas 57.2% of them did.

Figure (2): Shows that 45.8% of the women in the study did not have a COVID 19 infection, and 54.2% of them had a history of COVID 19 infection based on a medical diagnosis.

Figure (3): Illustrates that 5% of the studied women terminated their pregnancy and 95% of them didn't terminate pregnancy.

Table (2): Finds that 73.3% of the women in the study had gestations of 36 weeks or longer at the time of birth, and around 28.9% of them experienced complications following delivery. Regarding the kind of problems, puerperal pyrexia and postpartum hemorrhage affected roughly 57.6% and 42.4% of them, respectively.

Figure (4): Illustrates that 66.1% of the studied women delivered by CS and 28.9% of them delivered by normal vaginal delivery.

Table (3): Reported fetal outcomes of the examined women, and indicated that 87.8% had a weight from 2500-<4000gm, around 31.1% of them had neonate problem. Regarding the types of difficulties, approximately 69.6%, 28.3%, 13.3%, and 15.2, of them had preterm delivery, low birth weight, NICU hospitalization for treatment, and COVID-19 infection, respectively.

Figure (5): Illustrates that 76.7% of the newborn of studied women had a normal Apgar score and 18.3% of them had abnormal Apgar score.

Figure (6): Reports that there was a highly statistical significant relation between infection with COVID 19 and termination of pregnancy at p-value <0.001.

Table (4): Shows the relation between the COVID-19-positive status of the women in the study and their maternal outcomes. It was discovered that there was a highly significant correlation between the COVID-19-positive status and the weeks of gestation at delivery, the mode of last delivery, and the occurrence of complications after delivery (p-value <0.010).

Table (5): Shows the relationship between the study women's COVID-19 infection and the outcomes of their fetuses, and it found a highly statistically significant relationship between the COVID-19 infection and the fetal Apgar score, newborn weight, and complications that occurred to the neonate at p-value <0.010.

Discussion:
Pregnant women have been categorized as a vulnerable demographic during the COVID-19 pandemic. Still unclear, nonetheless, is the evidence about the impact of infection during pregnancy on the health of the mother and the newborn (**Oh et al., 2023**), so the current study aims to assess maternal and fetal outcomes for women who were pregnant during COVID19 period, within the year 2020 and 2021.

According to the current study, over one quarter of the women under investigation gave birth before 36 weeks of gestation (preterm labor), and over one quarter of them encountered problems after delivery.

More than half of them experienced postpartum hemorrhage, whereas less than half experienced puerperal pyrexia. About one quarter of the women in the survey had a normal vaginal delivery, and around two thirds had a cesarean section.

Similar results were obtained by **Prabhu et al. (2020),** who conducted a study to compare the outcomes of pregnant women with and without coronavirus disease 2019. They discovered that while more than one-sixth of the studied women experienced preterm labor, less than one-fifth of the women experienced postpartum complications, particularly those who were infected with COVID 19. Less than one half of the women in the study gave birth via cesarean section.

Additionally, **(Moza et al., 2023)** reported that more than one quarter of the studied women delivered at weeks of gestation <37, and more than three quarters of them underwent cesarean section delivery. They used their study to investigate the outcomes in SARS-CoV-2-positive cases referred for delivery to a tertiary public hospital in Western Romani. This agreement demonstrates the clear impact of COVID-19 on maternal outcomes.

A different perspective was presented by **Adhikari et al. (2020),** who conducted a study to assess the negative consequences of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections in pregnancy and to describe hospital admission, clinical management, disease progression, placental abnormalities, and neonatal outcomes. They found that less than one-third of the women in the study had a cesarean section (CS) delivery and that less than one-sixth of the women had preterm labor. The difference examined a lower percentage of premature labor and CS that might reappear in a new setting and with exposure to a different variety of COVID-19 at a different period.

In terms of pregnancy termination, actual data show that the majority of the women in the study did not terminate their pregnancies, and less than one-tenth of them did. In a similar vein, **(Youssef et al., 2023)** discovered that less than one tenth of the women in the study had missed an abortion. Additionally, earlier research supported the findings of **Adhikari et al. (2020),** who found that less than one tenth of the women in the study underwent an abortion. This agreement demonstrated that there was exposure to a risk of miscarriage during the COVID-19 timeframe.

On the other hand, **(Ibrahim et al., 2022)** demonstrated that slightly less than one quarter of the women in the study underwent an abortion during the COVID-19 era. This increase in the percentage of abortions may be attributed to a number of factors, including the severity of the COVID strain,

inadequate prenatal care due to the era's fairness, stress, and exposure to fairs for pregnant women.

The neonatal outcomes of the women under study revealed that less than two thirds weighed between 2500-<4000gm, and less than one third experienced neonatal complications. Regarding the kinds of difficulties, less than half of them experienced preterm birth, low birth weight, and NICU admission for treatment due to COVID-19 infection, respectively. consistent with earlier findings, **(Ibrahim et al., 2022),** demonstrated that fewer than one-fifth of the women in the study had low birth weights and were admitted to the NICU for their babies' care. Furthermore, **Naqvi et al. (2022)** discovered that less than one-fifth of the mothers in their study had preterm births or low birth weight babies. Their study aimed to evaluate, on a population basis, the medical care for pregnant women in particular geographic regions of six countries prior to and during the first year of the coronavirus disease 2019 (COVID-19) pandemic in relation to pregnancy outcomes. This agreement clarified the evident impact of COVID-19 on the newborns' health.

An alternative viewpoint was presented by **Elshaikh et al. (2022)** in their analysis of pregnancy outcomes following COVID-19 infection in Egypt. They found that fewer than three quarters of the babies born to the women in their study were admitted to the Neonatal Intensive Care Unit (NICU). This finding differs from previous research on the consequences of COVID-19 infection in pregnant women, which increases the risk of various complications.

Regarding the Apgar score of the delivered baby, the current study shows that less than one fifth of the newborns of the examined women had an abnormal Apgar score, and more than three quarters of the newborns had a normal Apgar score. Similar results were published by **(Akbar et al., 2022).** They conducted their study in a large referral hospital in Indonesia to analyze the clinical manifestations and pregnancy outcomes in COVID-19 maternal cases. They showed that less than one-sixth of the newborns of the studied women had abnormal Apgar scores, and the majority of them had normal scores.

Regarding the gender of the baby, a real study shows that over one quarter of newborns are female and less than three quarters of newborns are male. This was confirmed by **Piekos et al. (2022),** who conducted a study in New York to assess the impact of maternal SARS-CoV-2 infection on birth outcomes and how this is affected by the trimester of pregnancy in which the infection occurs. They found that over 50% of the women in their study gave birth to male children. However, as **(Moza et al., 2023)** made clear, more than half of the babies born to the mothers in the study were female. This discrepancy shows that the

gender of the baby and the COVID-19 timeframe were unrelated.

Regarding the relations between the COVID-19-positive women under study and their maternal outcomes, it was discovered that there are highly significant relations between the COVID-19 infection and the weeks of gestation at delivery, the mode of last delivery, and complications that occurred after delivery. In a similar vein, **Piekos et al. (2022)** also found a statistically significant relation between the COVID-19 infection and the weeks of gestation at delivery. This similarity investigated how COVID-19 infection affected women's delivery times, with infected women potentially giving birth earlier than uninfected ones.

Concerning relations between the COVID-19-positive women under study and the outcomes of their fetuses, it was found that there are highly significant relations between the COVID-19-positive women and the fetal Apgar score, newborn weight, and complications that occurred to the neonate. Additionally, there was a statistically significant relation between the gender of the fetus and COVID-19 infection. In the same vein, **Piekos et al. (2022)** demonstrated a statistically significant correlation between neonatal weight and COVID-19 infection.

The link between having COVID-19 and termination a pregnancy was found to be extremely statistically significant. Also the conclusion reached by **(Villar et al., 2023),** who conducted research to assess the efficacy of the COVID-19 vaccine and investigate its effects on maternal and perinatal outcomes during pregnancy. They discovered a highly statistically significant correlation between COVID-19 infection and pregnancy termination.

Regarding the personal information of the women under investigation, the current study reveals that the majority of the women were urban dwellers and that less than two fifths of the women under study were in the age category of 26–34 years, with a mean±SD of 27.12±9.25. It is reported that slightly over three-quarters of them were unemployed, and less than half of them had completed secondary education. In line with earlier research **(Chapuma et al., 2022),** which shown that of the women analyzed, less than two fifths belonged to the age range of (25–34) years, and more than three quarters of them were urban residents.

Conclusion:

Based on the results of present study, it can be concluded that:

During the COVID-19 pandemic, pregnant women were at risk for both maternal and fetal problems. As such, pregnant COVID-19 sufferers ought to be regarded as a high-risk subset.

Recommendations:

Based on the findings of current study, it was recommended that:

- Gathering scientific data related to the epidemic is essential.
- It is strongly advised to conduct a comprehensive review assessing the maternal and perinatal outcomes among women with COVID-19 diagnoses.
- More investigation was required to examine the COVID-19 vaccine's potential to improve newborn and mother outcomes throughout pregnancy.
- To validate our results, larger sample sizes and more research are needed.

Acknowledgement

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