Alessandro Libretti*, Libera Troìa, Anna Maria Cappello, Carolina Casarotti, Alessia Tony D'Amato, Gloria Dallarda, Matilda Ghio, Anthony Nicosia, Daria Ricci, Federica Savasta, Michela Sonzini, Diletta Villa, Alberto De Pedrini, Daniela Surico and Valentino Remorgida

Pregnancy and neonatal outcomes of SARS-CoV-2 infection discovered at the time of delivery: a tertiary center experience in North Italy

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Abstract

Objectives: Although the knowledge on SARS-CoV-2 infection in pregnancy has greatly improved, there is still a lack of information on its role in the later stages of gestation. The aim of this study is to investigate whether SARS-CoV-2 discovered at delivery is associated with any obstetric or neonatal complications.

Methods: A retrospective case-control study was conducted at Department of Obstetrics, University Hospital Maggiore della Carità, Novara, Italy, from March 2020 to March 2023. Pregnant women admitted were tested for SARS-CoV-2. 168 women resulted positive at the time of delivery; the women were asymptomatic or paucisymptomatic. 170 negative women were selected as controls, selecting, for each SARS-CoV-2 positive patient, the patient who gave birth right before, if negative. Demographic and anamnestic characteristics, pregnancy, labor, and neonatal outcomes were evaluated.

Results: SARS-CoV-2 positive patients were more likely to have gestational diabetes (13.7 vs. 5.3 %) and required less frequently intrapartum analgesia (11.3 vs. 27 %) and labor augmentation (7.3 vs. 16.5 %). Post-partum hemorrhage rate was lower (13.7 vs. 22.9 %) and a shorter length of first and second stage of labor occurred. There were no statistically significant differences between the two groups regarding the mode of delivery and neonatal outcomes.

Conclusions: SARS-CoV-2 positive patients have shorter labor length and a lower incidence of postpartum hemorrhage. Fewer obstetric interventions, as well as less use of intrapartum analgesia and oxytocin, could explain these findings. Moreover, gestational diabetes could increase susceptibility to infection. SARS-CoV-2 infection discovered at the time of delivery in asymptomatic or paucisymptomatic patients does not appear to increase the rate of cesarean delivery or other obstetric complications, and neonatal outcomes have not worsened.

Keywords: Covid-19; asymptomatic Covid-19; labor length; maternal outcomes; neonatal outcomes; SARS-CoV-2

Introduction

The severe acute respiratory syndrome (SARS-CoV-2) has, with an update on the 30th of August 2023, infected almost 770 millions of people worldwide and almost 26 millions of people in Italy alone [1]. The consequent COVID-19 disease caused almost seven millions of death worldwide and more than 190,000 in Italy alone [1]. With a statement of May, the 4th 2023, the World Health Organization (WHO) declared that COVID-19 no longer constitutes a public health emergency of international concern, confirming, *de facto*, the end of the pandemic era [2]. According to previous studies, pregnant women with a positivity to SARS-CoV-2 seems to be particularly at risk when affected by underlying diseases just as for the general population [3]. Moreover, the pregnancy status itself could be responsible of a major susceptibility to the severe form of COVID-19, due to the cardiovascular, pulmonary, hormonal, and immunological changes that accompany pregnancy [4, 5].

Since a stricter follow-up has been recommended for all pregnancies complicated by SARS-CoV-2 infection, many

Alessandro Libretti and Libera Troìa equally contributed to the writing of this article.

***Corresponding author: Alessandro Libretti**, MD, Department of Gynaecology and Obstetrics, University Hospital Maggiore della Carità, Corso Mazzini, 18, 28100, Novara, Italy; and School of Gynaecology and Obstetrics, University of Eastern Piedmont, Novara, Italy, Phone: +39 3475916561, E-mail: libretti.a@gmail.com. https://orcid.org/0000-0001-8478-5471

Libera Troìa, Anna Maria Cappello, Carolina Casarotti, Alessia Tony D'Amato, Gloria Dallarda, Matilda Ghio, Anthony Nicosia, Daria Ricci, Federica Savasta, Michela Sonzini, Diletta Villa, Alberto De Pedrini, Daniela Surico and Valentino Remorgida, Department of Gynaecology and Obstetrics, University Hospital Maggiore della Carità, Novara, Italy; and School of Gynaecology and Obstetrics, University of Eastern Piedmont, Novara, Italy

data on obstetric complications, together with the maternal and neonatal outcomes, has been obtained [6]. SARS-CoV-2 infection is associated with higher composite morbidity, intensive care unit admission and ventilatory support for mothers, hypertensive disorders and preterm delivery [7]. Moreover, neonatal intensive care unit (NICU) admissions rate is higher compared to pregnant women without SARS-CoV-2. Additionally, for what concern the risk of stillbirth, it appears to be predominant for pregnancies affected by the delta variant [7]. The role of the infection in the later stages of pregnancy, especially in paucisymptomatic and asymptomatic women, is controversial albeit some studies recommend, when SARS-CoV-2 infection arises during the third trimester, to hospitalize patients for surveillance of clinical evolution and biological parameters [8]. Plus, the real necessity of SARS-CoV-2 screening at the time of delivery or at the time of hospitalization is under debate while still practiced in some centers, also for patients without any suggestive symptoms.

Considering the paucity of data on SARS-CoV-2 infection at the time of delivery, the primary objective of this study was to assess labor characteristics, along with maternal and neonatal outcomes, in relation to SARS-CoV-2 positivity.

The second objective of this study was to characterize the duration of the first and second stages of labor in the subset of women who delivered vaginally with asymptomatic/paucisymptomatic SARS-CoV-2 infection.

Materials and methods

A retrospective case-control study was conducted at Department of Gynaecology and Obstetrics, University Hospital Maggiore della Carità, Novara, Piedmont, Italy from March 2020 to March 2023.

In line with national guidelines, we tested for SARS-CoV-2 by nasopharyngeal swabs analyzed by isothermal amplification all women admitted to our Obstetrics and Gynaecology departments, since the beginning of the pandemic (starting in March 2020, according to the availability of swabs in our country) to June 2023, when we started to screen only patients with suspect symptoms of COVID-19.

A total of 168 women resulted positive to the screening for SARS-CoV-2 before hospital admission; all patients included in our study were asymptomatic or paucisymptomatic (flu-like symptoms such as mild sore throat, body aching, and mild cough, without clinical signs of moderate or severe infection nor needs of medications or oxygen support) and did not require any further assistance regarding the COVID-19 disease.

A control group of 170 women who tested negative, was selected. Patients composing the control group were selected according to the delivery room registry, selecting, for each SARS-CoV-2 positive patient, the patient who gave birth right before, if negative.

All the patients included were admitted to our department during the selected timeframe with the following diagnosis: latent phase of labor; active phase of labor; pre-labor/premature rupture of membranes; elective induction of labor; elective cesarean delivery. We included both groups of patients vaccinated or not against SARS-CoV-2 because the introduction of vaccines happened during the selected period.

Women with <18 years of age, twins' pregnancies, fetuses with congenital malformations, severe or moderate SARS-CoV-2 infection or other infections diagnosed during pregnancy, were excluded.

Demographic, clinical, pregnancy (including gestational diabetes mellitus, hypertension disorders, thyroid disorders, fetal growth restriction, preterm labor or preterm rupture of membranes, amniotic fluid disorder, intrahepatic cholestasis of pregnancy, and threatened preterm labor), delivery (the need of oxytocin augmentation, the mode of delivery, the average blood loss at delivery and the post-partum hemorrhage rate, the gestational age at delivery, the status of membranes, the positivity to Group B streptococcus at the vaginal–rectal swab, the induction of labor – if occurred –, the meconium-stained amniotic fluid if present, the perineal trauma, the need of manual removal of the placenta, and eventually the post-partum complications), analgesia (the use of intrapartum analgesia), and newborn data were recorded. Specifically, we retrieved data about maternal age, body mass index, ethnic group, parity, gestational age, obstetric history (including recurrent pregnancy loss, defined as two or more miscarriage occurred before 10 weeks of gestation), gynecological disorders (past medical history of fibroids, endometriosis, adenomyosis, cervical pathology, recurrent vaginal infections, ovarian cists or polycystic ovary syndrome) the mode of onset of labor, length of the first stage of labor (from the diagnosis to the complete cervical dilatation of 10 cm; the active first stage was considered as period of time characterized by regular painful uterine contractions, a substantial degree of cervical effacement and more rapid cervical dilatation from 5 cm until full dilatation. The second stage was considered as the period between full cervical dilatation and birth of the baby. The third stage was considered as the period between birth of the baby and the placenta delivery. This is in accordance with World Health Organization), administration of oxytocin during the first stage of labor, length of the second stage of labor (from the full cervical dilatation to the birth of the baby), mode of delivery (cesarean delivery [CS], instrumental delivery, vaginal delivery), total blood loss after delivery, development of severe (third and fourth degree) vaginal tear, the use of episiotomy, newborn weight and sex, APGAR score at the 1st and 5th minute of life, fetal arterial biochemistry, neonatal intensive care unit (NICU) admission. Any information was obtained by reviewing electronic medical charts records.

At the time of active phase of labor (defined as the presence of regular painful contractions and from cervical dilatation greater than 4 cm) all the patients were transferred to the delivery room and followed up one-to-one by a midwife. The standard practice of labor management in our institute includes an onsite senior resident or consultant, a vaginal examination in active labor every 2 h or sooner if necessary, and when medically indicated, liberal use of epidural analgesia, delayed pushing unless woman desires to push, and continuous fetal monitoring during the second stage of labor.

Statistical analysis

The Student's *t*-test was used to compare means of the two groups for normally distributed continuous variables. The Mann–Whitney *U* test was used when continuous variables did not follow a normal distribution. The chi-squared test or Fisher's exact test, where appropriate, were

used for comparisons of categorical variables. The data are presented as mean, standard deviation (SD) or as percentages. Statistical significance was set at a p value<0.05. All statistical analyses were performed using the Graph Pad Prism 6 software.

Results

Maternal characteristics

Demographic, anamnestic characteristics and obstetrical history of the mothers are presented in Table 1. The mean age of patients of both SARS-CoV-2 positive and negative groups was 31 years.

Compared to the group who were SARS-CoV-2 positive, the group who were SARS-CoV-2 negative had two significant associations: more patients who had undergone ART (8.2 vs. 2.4 % p=0.0267) and more patients with gynecologic disorders such as fibroids, endometriosis, adenomyosis, cervical pathology, recurrent vaginal infections, ovarian cists or polycystic ovary syndrome, history of extrauterine pregnancy (3.6 vs. 12.3 % p=0.0042) (Table 1).

No statistically significant differences were found between the two groups in term of nationality, parity, smoke habits, body mass index, gestational weight gain, history of gestational diabetes mellitus or other obstetrics pathologies, rate of recurrent pregnancy loss and previous cesarean delivery.

Table 1: Demographic, anamnestic and obstetrical characteristics of study groups.

	SARS-CoV-2 positive n=168	SARS-CoV-2 negative n=170	p-Value
Nationality			
Italian	106 (63)	112 (65.9)	0.649
Immigrant	62 (37)	58 (34.1)	
Age (years)	31.89 ± 0.44	31.74 ± 0.38	0.795
>35 years	45 (26.8)	52 (30.6)	0.472
Parity			
Nulliparous	66 (39.3)	70 (41.2)	0.740
Multiparous	102 (60.7)	100 (58.8)	
Onset of pregnancy			
Spontaneous	164 (97.6)	156 (91.8)	
ART	4 (2.4)	14 (8.2)	0.027
Smoking	12 (7.1)	21 (12.3)	0.142
Pregravidic BMI (kg/m^2)	23 (20.9–27.6)	22.6 (20.5–26.1)	0.856
BMI at delivery (kg/m^2)	27.4 (24.8–31.2)	27.3 (25–30.5)	0.459
Gestational weight gain (kg)	11 (9–14)	12 (9–15)	0.092
Familiarity for diabetes mellitus	34 (20.2)	34 (20)	1.000
Gynecological disorders[a]	6 (3.6)	21 (12.3)	**0.004**
Previous CS	26 (15.5)	30 (17.6)	0.661
History of miscarriage	48 (28.6)	41 (24.1)	0.388
RPL[b]	14 (8.3)	14 (8.2)	1.000
History of hypertensive disorder during pregnancy	2 (1.2)	1 (0.6)	0.622
History of GDM	1 (0.6)	2 (1.2)	1.000

Data are expressed as mean ± standard deviation or median (IQR) or as absolute number (percentage). ART, assisted reproductive technology; BMI, body mass index; CS, cesarean delivery; GDM, gestational diabetes mellitus; RPL, recurrent pregnancy loss. [a]Fibroids, endometriosis, adenomyosis, cervical pathology, recurrent vaginal infections, ovarian cists or polycystic ovary syndrome, history of extrauterine pregnancy. [b]Three patients had an RPL before 10 weeks of gestation in the group of SARS-CoV-2 positive patients and two in the group of the negative. Values in bold represent the p-values with a significance (<0.005).

Pregnancy complications

Pregnancy complications are presented in Table 2. The overall rate of obstetrical complications was higher for SARS-CoV-2 positive patients (37.5 vs. 26.5 % p=0.0035). Specifically, positive patients had a higher rate of gestational diabetes mellitus (13.7 vs. 5.3 % p=0.0092). Preterm delivery (between 24 and 36 weeks) occurred more frequently in the SARS-CoV-2 group (8.3 vs. 4.1 % p=0.120), although it did not reach statistical significance. Moreover, even when considering deliveries <34 weeks' gestation, no difference was found between the groups (4.2 vs. 2.3 % p=0.378).

No statistically significant differences were found for the rates of hypertension disorders, fetal growth

Table 2: Pregnancy complications.

	SARS-CoV-2 positive n=168	SARS-CoV-2 negative n=170	p-Value
Overall rate of obstetrics complications	63 (37.5)	45 (26.5)	**0.036**
GDM	23 (13.7)	9 (5.3)	**0.009**
Preterm delivery (24 + 0–36+6 ws)	14 (8.3)	7 (4.1)	0.120
(<34 ws)	7 (4.2)	4 (2.3)	0.378
Hypertensive disorders	4 (2.3)	6 (3.5)	0.750
Threatened pre-term labor	4 (2.3)	7 (4.1)	0.542
Thyroid disorders	9 (5.3)	8 (4.7)	0.809
Fetal growth restriction	1 (1.5)	1 (0.6)	1.000
PPROM	3 (1.8)	2 (1.2)	0.684
Amniotic fluid disorders	3 (1.8)	4 (2.3)	1.000
Intrahepatic cholestasis of pregnancy	2 (1.2)	1 (0.6)	0.622

Data are expressed as absolute number (percentage). GDM, gestational diabetes mellitus; pPROM, preterm rupture of membranes; ws, weeks. Values in bold represent the p-values with a significance (<0.005).

restriction, thyroid disorders, preterm labor or preterm rupture of membranes, amniotic fluid disorder, intrahepatic cholestasis of pregnancy, and threatened preterm labor comparing the groups of positive and negative women (Table 2).

Delivery outcomes

Delivery's outcomes are presented in Table 3. SARS-CoV-2 positive patients required less frequently intrapartum analgesia (11.3 vs. 27 % p=0.0003). Regarding the mode of delivery, around 71 % of SARS-CoV-2 positive patients had a vaginal delivery and no differences were found between the two groups in term of rate of non-elective CS (14.3 vs. 15.3 % p=0.878).

The group of negative patients needed more often the use of oxytocin for augmentation (16.5 vs. 7.3 % p=0.0109). In addition, the average blood loss at delivery was lower for positive patients (343.03 ± 336.40 vs. 454.12 ± 373.39 p=0.0045), as was the post-partum hemorrhage rate (defined as >500 cc for vaginal delivery, >1000 cc for CS, 13.7 vs. 22.9 % p=0.0347). No statistically significant differences were found between the two groups for the other parameters analyzed (gestational age at delivery, status of membranes, positivity to Group B streptococcus at the vaginal–rectal swab, induction of labor, meconium-stained amniotic fluid, perineal trauma, the need of manual removal of the placenta, and post-partum complications).

Neonatal outcomes

Neonatal outcomes are presented in Table 4. A higher rate of birth in the occiput posterior position was found for the SARS-CoV-2 positive patients (7.1 vs. 2.3 % p=0.0429). No statistically significant differences were found between the two groups in term of fetal sex, birthweight, APGAR score, NICU admission, umbilical artery blood gas analysis parameters.

Length of labor

Length of labor are presented in Table 5. In average, the first stage of delivery was shorter for the group of positive patients (123.5 ± 9.593 min vs. 157.3 ± 11.35 min p=0.0258). This was more evident for multiparous women (82.35 ± 8.614 min vs. 114.1 ± 12.36 min p=0.0404) for which the second stage of delivery was shorter too (20.14 ± 2.539 min vs. 29.52 ± 3.431 min p=0.0321). No differences in the length of third stage of labor was found between the groups.

Table 3: Delivery outcomes.

	SARS-CoV-2 positive n=168	SARS-CoV-2 negative n=170	p-Value
Gestational age at delivery (weeks)	39 (38–40)	39 (38.2–40)	0.202
Preterm delivery (24 + 0–36 + 6 weeks)	14 (8.3)	7 (4.1)	0.120
Term delivery (37 + 0–40 + 6 weeks)	127 (75.6)	134 (78,8)	0.081
Late term delivery (41 + 0–41 + 6 weeks)	27 (16.1)	29 (17.1)	0.884
PROM	37 (22)	41 (24)	0.898
Meconium-stained amniotic fluid	18 (10.7)	26 (15.3)	0.258
Positive GBS vaginal–rectal swab	25 (14.9)	25 (15.7)	1.000
Induction of labor:	38 (22.6)	30 (17.6)	0.2792
Mode of delivery			
Spontaneous vaginal delivery	113 (67.3)	110 (64.7)	0.732
Vacuum-assisted delivery	6 (3.6)	11 (6.5)	0.319
CS	49 (29.1)	49 (28.8)	1.000
CD			
Elective	25 (51)	23 (46.9)	0.757
Urgent	24 (49)	26 (53.1)	0.878
Indications for urgent CD			
Mechanical/dynamic dystocia	9 (37.5)	10 (38.5)	1.000
Non-reassuring fetal status	7 (29.2)	10 (38.5)	0.620
Induction failure	4 (16.6)	3 (11.5)	0.722
Others	4 (16.6)	3 (11.5)	0.722
Epidural	19 (11.3)	46 (27)	**0.0003**
Oxytocin augmentation	12 (7.3)	28 (16.5)	**0.011**
Perineal trauma			
Episiotomy	5 (3)	7 (4.1)	0.770
OASIS	1 (0.6)	5 (2.9)	0.214
Manual placental removal	3 (1.8)	5 (2.9)	0.723
Blood loss at delivery (ml)	250 (100–437.5)	350 (200–575)	**0.004**
Post-partum hemorrhage	23 (13.7)	39 (22.9)	**0.034**
Post-partum complications	9 (5.3)	5 (2.9)	0.289

Data are expressed as mean ± standard deviation or median (IQR) or as absolute number (percentage). CD, cesarean delivery; GBS, Group B streptococcus; OASIS, severe obstetrical anal sphincter injury; PROM, prelabor rupture of membranes. Values in bold represent the p-values with a significance (<0.005).

Discussion and conclusion

SARS-CoV-2 positive patients had shorter length of labor, a lower incidence of postpartum hemorrhage, and required fewer perinatal interventions. Positive patients were more frequently affected by gestational diabetes. However, asymptomatic or paucisymptomatic SARS-CoV-2 infection discovered at the time of delivery did not appear to increase

Table 4: Neonatal outcomes.

	SARS-CoV-2 positive n=168	SARS-CoV-2 negative n=170	p-Value
Newborn sex			
Male	88 (52.4)	94 (55.3)	
Female	80 (47.6)	76 (44.7)	0.663
Birthweight, (g)	3232 ± 42.28	3260 ± 40.11	0.629
Low birth weight, <2,500 g	14 (8.3)	8 (4.7)	0.193
Macrosomia, ≥4000 g	5 (3)	10 (5.9)	
Apgar score at 1 min	8.54 ± 0.10	8.282 ± 0.10	0.120
Apgar score at 1 min<7	12 (7.1)	19 (11.2)	0.258
Apgar score at 5 min	8.89 ± 0.06	8.89 ± 0.08	0.936
Apgar score at 5 min<7	4 (2.4)	5 (2.9)	1.000
Neonates delivered in persistent OP position	12 (7.1)	4 (2.3)	**0.043**
NICU admission	24 (14.2)	26 (15.3)	0.878
Umbilical artery pH	7.3 (7.2–7.36)	7.278 ± 0.02052	0.929
Umbilical artery base excess	−6.678 ± 1.722	−6.064 ± 0.7506	0.706

Data are expressed as mean ± standard deviation or as absolute number (percentage). BE, base excess; g, grams; NICU, neonatal intensive care unit; OP, occipito-posterior. Values in bold represent the p-values with a significance (<0.005).

Table 5: Labor length.

All	SARS-CoV-2 positive	SARS-CoV-2 negative	p-Value
Length of I stage (min)	123.5 ± 9.59	157.3 ± 11.35	**0.026**
Length of II stage	37.84 ± 3.64	42.71 ± 3.43	0.331
Length of III stage	10.98 ± 0.96	11.54 ± 0.93	0.676
NULLIPAROUS			
Length of I stage	172.1 ± 16.39	211.2 ± 18.01	0.115
Length of II stage	62.32 ± 6.43	60.71 ± 5.79	0.852
Length of III stage	11.95 ± 1.46	12.36 ± 1.59	0.850
MULTIPAROUS			
Length of I stage	82.35 ± 8.61	114.1 ± 12.36	**0.040**
Length of II stage	20.14 ± 2.54	29.52 ± 3.43	**0.032**
Length of III stage	10.29 ± 1.28	11.01 ± 1.13	0.674

Data are expressed as mean ± standard deviation. Unit of measure for all the variables: minutes. Values in bold represent the p-values with a significance (<0.005).

the rate of cesarean delivery, preterm birth or other obstetric complications, and neonatal outcomes had not worsened.

To the best of our knowledge, this is the first study that evaluated the effect of SARS-CoV-2 infection on labor length. SARS-CoV-2 infection activates an immunological response through the production of pro-inflammatory cytokines and a modest interferon response [9]. A cytokine storm triggered is characterized by elevated levels of IL-6 and TNF-α expression through the angiotensin two pathway [9]. Considering that labor is first and foremost a pro-inflammatory event, it is presumable that SARS-CoV-2-related inflammation may result in increased myometrial contractility and, possibly, faster cervical dilatation rate [10]. Moreover, infection may cause change in circulating catecholamines, resulting in augmentation of uterine activity and, possibly, faster cervical dilatation rate [10]. Besides a direct effect on myometrial contractility, it is believed that catecholamine changes may indirectly improve uterine perfusion and contractile activity [10]. These effects may explain the differences in oxytocin use and duration of the first and second stage of labor among the two groups of patients. Indeed SARS-CoV-2 positive patients less frequently needed of augmentation during labor.

Analyzing delivery outcomes, we found that SARS-CoV-2 positive women required less frequently intrapartum analgesia, albeit, no differences were found in previous studies on analgesia request of positive patients during labor [11–13]. It may be hypothesized that the faster rate of labor progression has led positive women to request intrapartum analgesia less frequently. On the other hand, however, it is also plausible that the reduced analgesia request contributed to shorter times, despite several studies have shown that analgesia does not impact labor time [14, 15].

The post-partum hemorrhage rate and the average blood loss at the delivery were lower too, for SARS-CoV-2 patients compared with negative.

According to our findings a higher rate of delivery in the occiput posterior position were found among positive women. There are no studies evaluated the incidence of fetal malposition in COVID-19 positive patients, however the correlation between maternal positioning and fetal malpresentation is recognized [16]. In addition a more relevant aspect to take under consideration when working on data recruited during the pandemic are related to a more sedentary life and a restriction in the physical activity greatly correlated to a higher risk of infection [17–19]. Therefore, it would be reasonable to assume that the increased sedentary lifestyle among COVID-19-positive women may be responsible not only for the infection itself, but also for the increased rate of fetal malposition.

The effect of SARS-CoV-2 on the pregnancy have been widely analyzed since the beginning of the pandemic with even more precise and accurate studies. The risk of pregnancy complications is controversial but most of the studies conclude with an increased risk of preeclampsia, pre-term delivery and stillbirth [3, 20–22]. Our results did not show an increased risk of pre-term delivery in SARS-CoV-2 positive women. A recent published study on 4,000 pregnancies founded a reduction in the rate of pre-term delivery during

lockdown period in Germany, asserting the possibility of a lower risk of pre-term delivery due to the protective effect of less physical activity [23].

The relationship between gestational diabetes and COVID-19 has been analyzed also pointing that SARS-CoV-2 may cause its new-onset [24]. Authors assessed that a mechanism could include pancreatic beta cell damage and dysfunction caused by SARS-CoV-2 entry via ACE2 receptors, as well as sequelae of inflammation and hypoxemia [25]. An eventual higher susceptibility of diabetic patients to contract the infection should be investigate and further research with a higher number of patients is needed.

Finally, we do not report any statistical differences in term of neonatal outcomes, according to previous studies [22, 23, 26]. No cases of fetal demise or stillbirth were recorded in our study population. No vertical transmission of SARS-CoV-2 has been demonstrated, and after initial doubts, also the breastfeed of positive women has been declared safe and encouraged [23, 26].

We should consider and include among the limitation of the present study, that from March 2020 to March 2023, vaccination against SARS-CoV-2 has been introduced. With an update of the 30th of August 2023, in fact, in our district (Piedmont, four millions of habitants) vaccinations have been administered with a full coverage of three doses to 85.1 % of the population [27]. Our study started analyzing women without a vaccination and ended with women fully vaccinated. Authors believe that more studies are needed, analyzing the type of vaccine administered, the number of doses, the stage of the pregnancy in which it has been administered, the antibodies status of the women (pre-infected women vs. women who have never experienced the infection).

We should also consider another limitation regarding the different lockdown periods that our district afforded during the time frame we analyzed. Lockdown could affect some of the pregnancy outcomes such as the dietary, physical, and psychological, according to previous studies [28, 29]. Psychological breakdown and reduced use of healthcare services from pregnant women are some of the most analyzed aspects of SARS-CoV-2 during pregnancy from the existent literature [28, 29]. As said, these aspects are surely influenced by the different severity of governmental restrictions of the lockdown periods. The reduced use of healthcare services from mothers (for both causes, the inability of women of reaching hospitals for non-urgent reason and the suspension of demandable services from hospitals and out-patient clinics) can, for example, eventually justify a more frequent utilization of medically assisted procreation techniques before the pandemic period [30]. Furthermore, different variant of SARS-CoV-2 should be differenced and, although no severe forms of infection were observed in our cohort of patients, our laboratory did not specifically search the different types of the virus. One of the last reviews, anyway, exclude any different severity of the infection in pregnancy according to the variant of the virus [31]. Plus, we would like to state that in our cohort of positive patients, paucisymptomatic and asymptomatic women are analyzed together. The rationale is, as declared among methods, that women with symptoms had a very mild symptomatology (flu-like symptoms, without clinical signs of moderate or severe infection nor needs of medications or oxygen support) and did not require any further assistance regarding the COVID-19 disease.

In conclusion, basing on our experience, and following national guidelines, a universal screening of SARS-CoV-2 patients could be abandoned for all admitted patients, reserving the test to symptomatic once. SARS-CoV-2, in fact, seems not to influence the outcome of pregnancy itself or the neonatal wellbeing. Further research is needed, with an enlargement of the number of patients, to understand the influence of infection, also if asymptomatic, on the labor length and delivery outcome.

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