



ISSN: 2230-9926

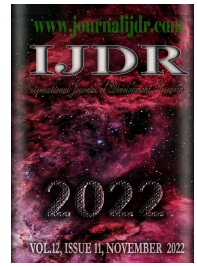
Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research

Vol. 12, Issue, 11, pp. 60315-60321, November, 2022

<https://doi.org/10.37118/ijdr.25818.11.2022>



RESEARCH ARTICLE

OPEN ACCESS

SAFETY OF HOSPITAL BIRTH DURING THE COVID-19 LOCKDOWN PERIOD: SYSTEMATIC REVIEW WITH META-ANALYSIS

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ARTICLE INFO

Article History:

Received 17th August, 2022
Received in revised form
20th September, 2022
Accepted 29th October, 2022
Published online 30th November, 2022

Key Words:

COVID-19;
Parturition; Pregnancy;
Safety; Lockdown.

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ABSTRACT

Objective: To synthesize evidence on the safety of hospital delivery for asymptomatic pregnant women regarding the risk of SARS-CoV infection during the COVID-19 lockdown period. Method: systematic review with meta-analysis of articles published in PubMed, CINAHL, Embase and Web of Science databases. The risk of bias of the included studies was assessed according to the epidemiological design and heterogeneity was explored using the Egger test. **Results:** These 23 studies included 650 pregnant women with a mean age of 26.9 (± 5.9) years. The pooled prevalence of SARS-Cov-positive pregnant women by RT-PCR and nasopharyngeal swab at admission was 74.3% (95%CI 0.65 – 0.83; I²=48.3). On the other hand, the prevalence of positive pregnant women after childbirth was 3.6% (95%CI 0.00 – 0.06; I²=89.8). There was a higher proportion of births that took place in a hospital environment (73.5%) compared to births in an extra-hospital environment (26.4%). The combined proportions of newborns tested after birth were 58.2% (95%CI 0.63 – 0.89; I²=36.9) and of preterm births (<37 weeks) of 14.5% (95%CI 0.13 - 0.33; I²=88.9). **Conclusions:** hospital delivery proved to be safe for asymptomatic pregnant women regarding the risk of infection during the COVID-19 lockdown period.

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Citation: Pitilin, E. B., Pelazza, B. B., Gasparin, V. A., Sbardeloto, T., Falavina, L. P., Baratieri, T., Potrich, T., Oliveira, P. P. and Lentsck, M. H. "Safety of hospital birth during the COVID-19 lockdown period: systematic review with meta-analysis", *International Journal of Development Research*, 12, (11), 60315-60321.

INTRODUCTION

The outbreak of coronavirus disease 2019 (COVID-19) has led to an alarming health condition in which specific policies have been imposed worldwide to prevent the spread of the virus. Several countries have systematically adopted a stricter measure to control the spread of the disease, the lockdown. This strategy consists of the total closure of all services considered non-essential, prohibiting the movement of people on the streets, commerce, industries, public and private establishments, among others (Beigi, 2020).

In the midwifery context, visiting periods were suspended, antenatal consultations were reduced, postnatal visits were cancelled, and questions about the safety of the route of birth emerged. The first case of a pregnant woman infected with COVID-19 was confirmed on March 20, 2020 in Wuhan, and despite the significant increase in the incidence and prevalence of infected pregnant women, little is known about the medium and long-term impact of COVID-19. term in birth outcomes (Rasmussen, 2019). According to the Centers for Disease Control and Prevention⁽³⁾ in the United States, during the critical period of lockdown, there were 161 deaths among pregnant women, in addition to more than 125,000 confirmed cases and 22,000

hospitalizations of pregnant women. Due to the ease of transmission of COVID-19, there was great concern about the mode of delivery and the possibility of excessive ventilation of the parturient, increasing exposure to the respiratory virus (Knight, 2020). However, there are strong arguments in the literature that patients with confirmed or suspected COVID-19 infection do not have a contraindication for vaginal delivery (Buonsenso, 2020; Ferrazzi, 2020). On the other hand, the risk of vertical transmission, as well as the most suitable and safe place of birth still remain unknown (Knight, 2020; Buonsenso, 2020; Alzamora, 2020). One of the theoretical reasons for considering a non-hospital birth would be the possibility of reducing COVID-19 infection in pregnant women and neonates, avoiding exposure in hospital environments, however, there are no data to support this hypothesis so far. The International Federation of Gynecology and Obstetrics (FIGO) reinforces that the hospital is the most appropriate environment to reduce maternal and perinatal morbidity and mortality, including in pregnant women at usual risk (Stones, 2019). Although the possible risks associated with COVID-19 and the clinical characteristics of infected pregnant women have been investigated in previous studies (Rasmussen, 2019; Buonsenso, 2020; Ferrazzi, 2020), it is still not possible to say whether delivery in a hospital environment is safe or whether delivery is preferable, outside this environment during the critical period of a pandemic. The safety of hospital delivery can be assessed through the proportion of asymptomatic pregnant women who were tested for COVID-19 at the time of hospital admission and/or after delivery, incidence of neonatal infection and adequate management of the newborn, presence of respiratory symptoms soon after delivery. Birth, uncertainty of vertical transmission, need for oxygen support, among other indicators (Grunebaum, 2020). In this context, the question is: is giving birth in a hospital environment safe regarding the risk of infection by SARS-CoV in the context of the pandemic during the lockdown period? In many countries this has become an active topic for discussion in newspapers, magazines and social media. In the United Kingdom, the National Health Service suspended home births, as well as in Germany, where medical organizations were also against it (Grunebaum, 2020). The answer at this difficult time should focus on reducing stress and knowledge gaps so that pregnant women can make informed decisions and can be advised about their delivery and safe birthplace (Mattern, 2020). Obstetricians and health professionals who care for pregnant women must be aware of the psychological burden of the COVID-19 outbreak on these women and alternative measures and effective interventions must be available to support them during the pandemic crisis (Griffin, 2020). A preliminary survey did not find a systematic review on the subject, nor did it show that non-hospital birth is safer as a result of the pandemic. In this way, this study will be able to support a clinical practice where nurses and other health professionals who assist pregnant and parturient women can promote care and recommend conscious options about the place of birth and make decisions based on evidence that go beyond the fear of exposure to infection. Therefore, the objective of this study was to synthesize evidence on the safety of hospital delivery for asymptomatic pregnant women regarding the risk of SARS-CoV infection during the COVID-19 lockdown period.

METHODS

This is a systematic review with meta-analysis described according to the Preferred Reports for Systematic Reviews and Meta-Analyses (PRISMA) protocol (Page, 2021). From October 15 to 21, 2021, a survey was carried out of the first published studies on the place of birth of asymptomatic pregnant women during the COVID-19 pandemic lockdown period (February 2020 to April 2020). The search was carried out in the National Library of Medicine (PubMed), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science (WoS), Elsevier SciVerse Scopus (SCOPUS) and Latin American and Caribbean Literature databases. in Health Sciences (LILACS). Medical Subject Headings (MeSH) terms were used and adapted for each electronic database with the help of a health science librarian: (COVID-19 OR 2019 Novel Coronavirus Infection OR 2019-nCoV COVID-19 OR Coronavirus

2019 Pandemic Infection or Disease OR SARS-CoV-2 OR SARS-CoV-2 Screening) AND (home birth OR delivery OR hospital delivery OR delivery obstetric OR outcome of pregnancy OR cesarean section OR delivery or postpartum period OR place of birth OR delivery). Articles with a cohort study design, case series, newsletters and reports containing delivery outcomes were included. After performing the search in the databases, the identified articles were organized in the Mendeley® software, in order to identify duplicates. Texts not available in full, even after accessing the library of the Universidade Federal da Fronteira Sul (UFFS) where the research was carried out, were excluded. Studies in a language other than English or Spanish were also excluded. Studies should contain data on asymptomatic pregnant women who gave birth during the COVID-19 pandemic and who were tested before and after delivery, as well as place of birth (hospital or non-hospital), route of birth (vaginal delivery or cesarean section), evidence of mother-to-child transmission (defined as the presence of clinical signs from mother to child through testing for SARS-CoV in placenta or breast milk or cord blood or amniotic fluid), associated morbidities (gestational diabetes, gestational hypertension, and others), presence of postpartum respiratory symptoms, need for oxygen support, mechanical ventilation, admission to the Intensive Care Unit (ICU) and maternal death.

Newborn (NB) outcomes research should contain information on: type of pregnancy (single and/or twin), fetal distress (yes or no), isolation after birth (yes or no), proportion of births tested and positive for COVID-19, prematurity (< 37 weeks), low birth weight (< 2,500g), presence of respiratory symptoms after birth (yes or no), severe neonatal asphyxia (Apgar <7), need for hospitalization in neonatal ICU (yes or no) and death (yes or no). The assessment of the safety of hospital delivery was performed through the proportion of pregnant women who tested negative for SARS-CoV at admission and positive after delivery, in addition to the proportion of neonatal SARS-CoV infection after delivery. We excluded conference abstracts, expert opinions or suggestions, news, editorials without birth data, reviews, case studies with few participants ($n \leq 7$), and studies whose respiratory diseases were caused by other viral agents. The risk of bias of the included studies was assessed according to the epidemiological design. The Joanna Briggs Critical Appraisal Tools tool⁽¹³⁾ was used for cross-sectional studies, the Newcastle-Ottawa Scale⁽¹⁴⁾ for cohort studies and the tool proposed by Murad *et al*⁽¹⁵⁾ to assess the quality of the case series. For the selection of studies, two authors independently evaluated the publication identified through the search strategy, verifying the previously established eligibility criteria. Duplicates were excluded with the help of Rayyan® Software software. In the first phase, articles were selected according to their title and abstract, those that met the inclusion criteria were selected. Then the full text was read. A protocol for extracting data from full texts was defined. Agreement between reviewers was high (Kappa = 0.85) and possible inconsistencies were resolved by a third reviewer who independently reviewed. Heterogeneity between studies was explored using *i*-square statistics (I²), whose values <50% indicate low heterogeneity and values $\geq 50\%$ indicate a substantial level of heterogeneity⁽¹⁵⁾. In view of the clinical heterogeneity, a fixed-effect model was used to calculate the pooled data analyses. The funnel plot showed the rate of results of individual studies versus their accuracy (Egger's Test). For the statistical analysis, the programs Review Manager 5.4 and Statistical Package for the Social Sciences 20.0 were used. The combined prevalence of the variables analyzed in each study was obtained by the number of pregnant women in the sample divided by the total number of pregnant women in the population x 100 (%), with a confidence interval of 95% (95%CI). The systematic review protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO), registration number CRD42020185202.

RESULTS

1,985 articles were identified. After analyzing the inclusion and exclusion criteria, 23 studies were selected for inclusion in the

systematic review (Figure 1). The general characteristics of the studies, including the country where the research was carried out, the research design, the number of pregnant women in the sample, the number of those who tested positive for SARS-CoV at admission and who tested positive after delivery are described in Table 1. These 23 studies included 650 pregnant women, of whom 483 (74.3%) were confirmed for SARS-CoV by RT-PCR and nasopharyngeal swab at hospital admission, while 176 (27.0%) tested negative for the virus. The mean age of pregnant women ranged from 26.9±5.9 to 33.4±5.4 years. There was a higher proportion of births that took place in a hospital environment (73.5%)^(15-21,25-31) compared to births in an extra-hospital environment (26.4%) (Wu, 2019; Yang, 2020; Yang, 2020; Pierce-Williams, 2020; Breslin, 2020; Baergen, 2020). Most studies were carried out in China (16-30), followed by the United States (31-34), Portugal (Dória, 2020), England (Govind, 2020) and Iran (Hantoushzadeh, 2020). The combined proportions of different maternal outcomes in the general population of pregnant women are described in Table 2. The pooled prevalence of SARS-Cov-positive pregnant women at admission was 74.3% (95%CI 0.65 – 0.83; I²=48.3). On the other hand, the prevalence of positive pregnant women after childbirth was 3.6% (95%CI 0.00 – 0.06; I²=89.8). All pregnant women who developed symptoms after delivery had mild symptoms such as fever, myalgia, cough, headache. There were no data on miscarriage due to COVID-19 infection that occurred during the first trimester.

The proportion of cesarean sections was 71.0% (95%CI 0.69 – 0.85; I²=24.8) and of hospital births 73.5% (95%CI 0.71 – 0.85; I²=21.2). Screening for vertical transmission through testing for SARS-CoV in amniotic fluid and/or placenta and/or umbilical cord blood and/or breast milk occurred in 39.2% of cases. None of the tests performed showed signs of vertical transmission in the NB during the monitoring period. Among the associated morbidities were gestational diabetes mellitus and gestational hypertension. The different neonatal outcomes of the studies are described in Table 3. The combined proportions of newborns tested after birth were 58.2% (95%CI 0.63 – 0.89; I²=36.9) and preterm births (< 37 weeks) of 14.5% (95%CI 0.13 - 0.33; I²=88.9)^(6,14-18,20-33). It is important to emphasize that eight studies reported information on the isolation of the NB immediately after birth, with the pooled proportion of NBs isolated after birth keeping a distance of two meters from the mother for the initial assessment of 24.5% (0.56 – 1.12; I²= 39.9). In 11 studies (47.8%)^(6,16,19,22,24,26-30,34-37) it was possible to observe low birth weight (<2.500g), but without making it clear whether low birth weight was related to infection with COVID-19 or pre-existing morbidities or even complications of pregnancy. The most common adverse perinatal outcome was neonatal ICU admission, a combined ratio of 20.0% (95%CI 0.06 – 0.47; I²=146.8) reported in five studies^(6,24,34,36, 37). Only three studies^(18,25,37) showed perinatal death, including 02 stillbirths (Table 3). Figure 2, shows the prevalence of asymptomatic pregnant women tested positive for COVID-19 after

Table 1. General characteristics of the studies, including the country where the research was carried out, the research design, the number of pregnant women in the sample, the number of pregnant women tested positively for SARS-CoV at admission and tested positively after delivery (n= 23)

Authors	Country	Study	Number of pregnant women in the sample	Pregnant women positive for SARS-CoV on admission	Pregnant women positive for SARS-CoV after childbirth
Yangli Liu et al. ⁽¹⁸⁾	China	case series	13	10	0
Viktoriya London et al. ⁽³¹⁾	EUA	cohort	81	68	4
R Pierce-Williams et al. ⁽³²⁾	EUA	cohort	64	49	0
Xu Qiancheng et al. ⁽¹⁹⁾	China	transversal	28	17	0
ChunchenWu et al. ⁽²⁰⁾	China	case series	8	8	0
Xiaoqing Wu et al. ⁽²¹⁾	China	transversal	23	22	0
Yanting Wu et al. ⁽²²⁾	China	case series	13	13	3
Hui Yang et al. ⁽²³⁾	China	transversal	55	42	0
Hui H-Yang et al. ⁽²⁴⁾	China	cohort	27	25	0
Huaping Zhu et al. ⁽²⁵⁾	China	case series	9	0	9
Breslin N et al. ⁽³³⁾	EUA	transversal	43	23	1
Liu W et al. ⁽¹⁶⁾	China	case series	19	10	0
Liu D et al. ⁽¹⁷⁾	China	case series	15	11	0
Khan S et al. ⁽²⁶⁾	China	case series	17	12	0
Ferrazzi E et al. ⁽⁶⁾	Itália	transversal	42	38	1
Doria M et al. ⁽³⁵⁾	Portugal	transversal	103	91	2
Baergen R, Heller DS. ⁽³⁴⁾	EUA	transversal	20	6	0
Cao D et al. ⁽²⁷⁾	China	case series	10	10	0
Chen H et al. ⁽²⁸⁾	China	case series	9	0	1
Chen R et al. ⁽²⁹⁾	China	transversal	17	10	0
Govind et al. ⁽³⁶⁾	Inglaterra	case series	9	0	0
Hantoushzadeh S et al. ⁽³⁷⁾	Irã	case series	9	9	3
Na Li et al. ⁽³⁰⁾	China	case series	16	9	-
Total			650	483	24

Table 2. Combined ratios of different maternal outcomes in the general population of pregnant women

Results	Pregnant women (n/N)	Mean (SD)	Reason (CI 95%)	I ² (%)
Positive on admission	483/650	21.0 (22.7)	74.3 (0.65 – 0.83)	48.3
Denied at admission	176/650	7.6(6.7)	27.0 (0.16 – 0.37)	96.6
Positive after delivery	24/650	1.0 (2.0)	3.6 (0.00 – 0.06)	89.8
Negatives after delivery	152/650	6.6 (5.2)	23.3 (0.01 – 0.32)	102.8
Vaginal delivery	188/650	8.1 (10.2)	28.9 (0.14 – 0.30)	85.6
Cesarean delivery	462/650	20.0 (16.5)	71.0 (0.69 – 0.85)	24.8
Hospital birth	478/650	20.7 (17.0)	73.5 (0.71 – 0.85)	21.2
Out-of-hospital birth	172/650	7.4 (10.1)	26.4 (0.14 – 0.28)	78.1
Tracking for vertical transmission	255/650	11.0 (9.5)	39.2 (0.31 – 0.48)	47.6
Associated morbidities	201/650	8.7 (6.7)	30.9 (0.30 – 0.50)	58.2
ICU admissions	12/650	0.5 (1.5)	1.8(-0.01 – 0.06)	371.1
Oxygen support	37/650	5.9 (9.0)	5.6 (0.08 – 0.41)	153.4
Need for mechanical ventilation	136/650	1.6 (4.3)	20.9 (-0.02 – 0.17)	290.6
Maternal death	7/650	0.3 (1.4)	1.0 (- 0.03 – 0.10)	479.6

SD= Standard deviation. CI=Mean-centered confidence interval. n=number of pregnant women in the sample. N= total number of pregnant women in the studies. I²= Coefficient of variation centered on the mean.

birth in each study by standard deviation of the risk difference confirmed by Egger's test ($p < 0.001$). It is possible to observe that the smaller studies present smaller proportions of pregnant women positive for SARS-CoV after birth.

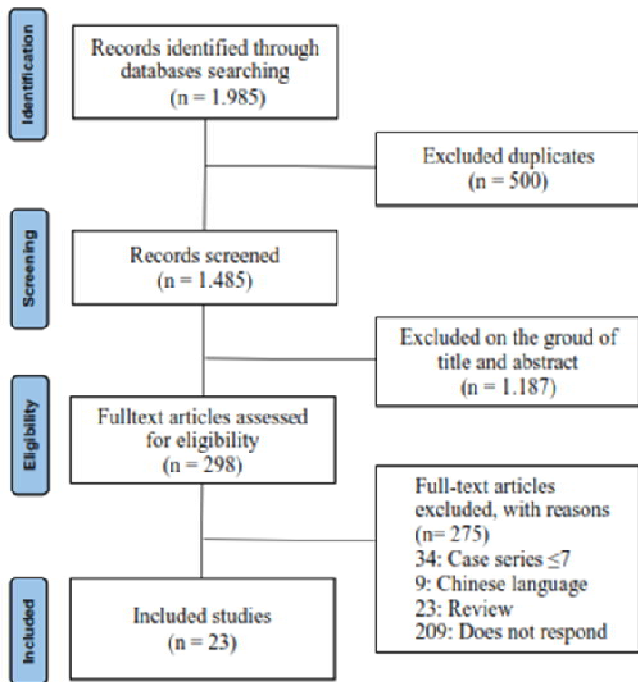


Figure 1. Flowchart of the publication selection process for the study

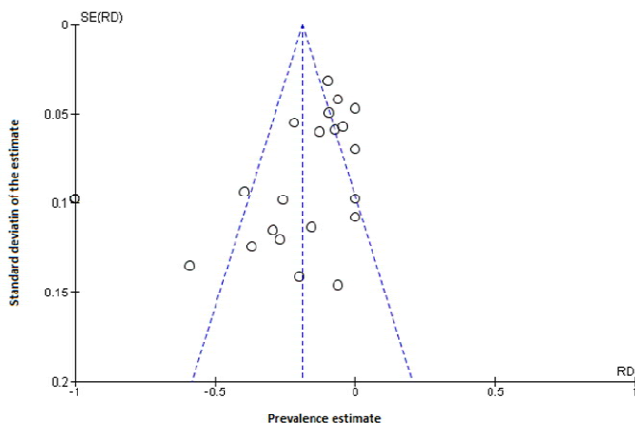


Figure 2. Funnel graph: prevalence of asymptomatic pregnant women tested positive for COVID-19 after birth in each study by standard deviation of risk difference

The existence of the small-study effect was analyzed by visually inspecting the funnel plot. The effect of pregnant women who tested negative for COVID-19 on admission and who tested positive for SARS-CoV after birth was assessed using relative frequencies and prevalence (Figure 3). The overall prevalence was 19.0% (95%CI= -0.22 - -0.16) in the fixed model of the 23 studies investigated and the heterogeneity between the studies was significant ($p < 0.001$).

DISCUSSION

The studies used to prepare this review article are the first non-randomized studies containing small groups of women screened during the COVID-19 lockdown period. They do not provide clear indications, but they do show that in a pandemic situation special care must be taken during pregnancy and delivery management in order to minimize maternal and neonatal harm.

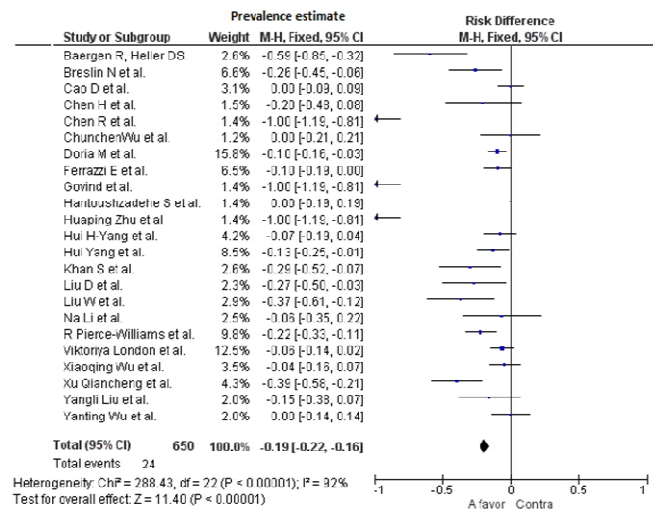


Figure 3. Estimated prevalence of the general population of asymptomatic pregnant women tested negatively for COVID-19 at admission and positive for SARS-CoV after birth

The high heterogeneity represented by the studies was already expected due to the selected observational designs. However, the effect in small studies was ruled out and it is possible to answer whether hospital delivery is safe for asymptomatic pregnant women regarding the risk of SARS-CoV infection during hospitalization in the context of the pandemic. The safety of hospital delivery was evaluated through the proportion of asymptomatic pregnant women who tested negative for COVID-19 at the time of admission, but who tested positive after delivery, in addition to the proportion of neonatal infection through vertical transmission to the newborn. Through the studies included in this review, childbirth in a hospital environment was shown to be safe since the analyzed outcomes had low combined prevalence ratios, especially for that hospital designated by the local government as a reference obstetric institution^(38,39). Especially during childbirth there is the possibility of excessive ventilation, leading to exposure to the respiratory virus. Amniotic fluid, vaginal secretions and blood particles can increase the risk of virus transmission^(4,40).

In addition, pregnant women infected with SARS-CoV may be asymptomatic until admitted to labor, which in itself poses a significant risk of exposure to their relatives (including the newborn) and to all providers involved in their care. care⁽³³⁾. Based on the findings of this study, evidence points out that, in developed countries, hospital institutions proved to be safe to give birth even in a period of pandemic lockdown. Most pregnant women who tested positive for COVID-19 were infected before hospital admission, either through exposure to the community, family or friends, reinforcing the argument that intra-hospital transmission in developed countries occurs in smaller proportions^(23,31,32,35). Effective control of nosocomial infection prevention such as strict protocols, regular disinfections, separation of known infected patients on other wards, use of appropriate personal protective equipment (PPE), triage of patients and staff, strict visit policies are important measures that reduce the risk of a patient being infected within the hospital environment⁽⁴¹⁾. A study that evaluated the risk of neonatal infection at home versus hospital delivery identified that there is an increased risk of infection-related mortality for newborns in planned home births, reinforcing the argument that the hospital is a safe environment for giving birth⁽⁴²⁾. It is noteworthy that the aforementioned study was carried out before the COVID-19 pandemic, and its interpretation should be cautious when used as a reference during the pandemic period. Among the studies that presented non-hospital delivery^(17,22,26) the proportion of pregnant women who gave birth in these environments was low (26.4%), with worrying outcomes, since the woman presented suspicious symptoms of COVID-19. 19 such as headache and difficulty breathing after childbirth needing assistance. An important aspect found in the studies included in this review is that all vaginal births performed in hospital institutions were

Table 3. Combined proportions of different neonatal outcomes in the general population of pregnant women

Results	NB (n/N)	Mean (SD)	Reason (CI 95%)	I ² (%)
RN tested	384/659	18.2 (11.1)	58.2 (0.63 – 0.89)	36.9
Positive RN	9/659	0.4(0.8)	1.3 (0.00 – 0.03)	212.5
Twin	9/659	0.3 (0.5)	1.3 (0.00- 0.03)	168.3
Fetal stress	17/659	0.8 (1.5)	2.5 (0.00 – 0.13)	209.3
Isolated after birth	162/659	20.2 (17.3)	24.5 (0.56 – 1.12)	39.9
Premature (< 37 weeks)	96/659	4.8 (6.1)	14.5 (0.13 – 0.33)	88.9
Respiratory symptoms after birth	25/659	14.0 (2.4)	3.7 (- 0.01 – 0.21)	222.1
Low weight (< 2.500mg)	43/659	2.6 (2.0)	6.5 (0.06 – 0.31)	120.0
Severe asphyxia (Apgar < 7)	13/659	0.6 (1.2)	1.9 (-0.00 – 0.01)	238.0
Neonatal ICU admission	132/659	7.7 (14.5)	20.0 (0.06 – 0.47)	146.8
Perinatal death	4/659	0.1 (0.5)	0.6 (-0.00 – 0.04)	282.6

NB= Newborn. SD= Standard deviation. CI=Mean-centered confidence interval. n=number of newborns in the sample.

N= total number of newborns in the studies. I²= Coefficient of variation centered on the mean.

performed in a delivery room with negative pressure isolation, possibly reducing the risk of contamination for the NB and the team^(6,31,34). However, the prevalence of cesarean section was also observed in high proportions in all studies, even without adequate clinical evidence to support this practice. The American College of Obstetricians and Gynecologists⁽⁴³⁾ states that, despite the increased risks of ICU admission and the need for mechanical ventilation, these factors do not justify cesarean section as a choice for the mode of delivery, and that this should be based on maternal or fetal obstetric indications, not just because of the presence of COVID-19. Another argument that can support the practice of safe childbirth in a hospital environment is the emergence of respiratory symptoms in pregnant women after birth. We do not know whether pregnancy-related immune regulation alters the course of the disease by suppressing the exaggerated inflammatory response observed in this disease or whether it is associated with a worse prognosis^(25,44).

There is not enough data to verify whether pregnancy results in worse outcomes, but 23.08% of asymptomatic pregnant women included in 10 studies had respiratory symptoms after delivery^(6,20,23,18,26-28,30,32-34,37), requiring oxygen. Although most pregnant women with COVID-19 infection do not experience pneumonia and decompensation during labor, advanced care strategies may be necessary in the postpartum period^(23,28,31,34). In fact, most considerations surrounding the management of pregnant women with suspected and/or known COVID-19 infection include not only the best strategy to ensure safe care at birth, but also strategies to avoid exposure of healthcare professionals who serve them. Therefore, until more evidence is available, there are reasons to continue the clinical course of labor in the hospital environment^(6,17,23,29,32-34,36,37).

At this point, there seem to be two situations: the evolution of the woman who is hospitalized with COVID-19 and her fetus, and the SAR-CoV infection of women and the NB. It is worth noting that most health care systems in many countries are not set up to allow for a seamless transfer of home care to the hospital when indicated, as well as blood transfusions, emergency preparedness rooms, or insufficient access for those trained to perform advanced neonatal resuscitation, if necessary⁽⁴²⁾. Although most of the positive cases identified in the studies presented a mild or asymptomatic course of the disease, as well as birth in a hospital environment^(18,32,33,37) the universal screening test for all pregnant women can point to therapeutic strategies and specific preventive measures and guarantee a safe birth even in times of a pandemic. The important heterogeneity between the studies evaluated, the result of observational methodologies, limits the external validity of the results⁽⁴⁵⁻⁴⁶⁾. However, such findings were identified as priority gaps for future research, standardizing the management and assistance to pregnant women regarding the mode of delivery and safe place of birth during the pandemic lockdown period. The small number of cases in some included studies, non-randomized retrospective studies, and the lack of standardized criteria for birth surveillance represent the main limitations of the studies included in this review. However, all studies have characteristics that give them greater reliability, since they used surveys and census information and not sampling.

CONCLUSION

This review synthesizes the first non-randomized studies containing small groups of women examined during the COVID-19 lockdown period and sought to answer whether hospital delivery is safe for pregnant women regarding the risk of SARS-CoV infection in the critical context of the pandemic. The safety of hospital delivery was evaluated through the proportion of asymptomatic pregnant women who tested negative for COVID-19 at the time of admission, but who tested positive after delivery, in addition to the proportion of neonatal infection through vertical transmission to the newborn. Through the studies included in this review, childbirth in a hospital environment was shown to be safe since the outcomes analyzed had low combined prevalence ratios. This is the first systematic review that evaluates and summarizes the safety of a hospital birth during the pandemic lockdown period. The high heterogeneity represented by the studies was already expected due to the selected observational designs, which requires attention with the extrapolation of the results. However, the effect in the small studies was ruled out. The low proportion of pregnant women who tested positive for COVID-19 after birth, that is, after admission to a hospital environment, was low, which supports the argument that the hospital environment is safe even in critical times of a pandemic. Strategies to guide the place of delivery, also considering the safety and exposure of the care team and the newborn himself, must be implemented. When advising women on birthplace planning during pandemics, obstetricians and other health professionals who accompany pregnant women should seek evidence on outcomes related to possible delivery scenarios. The results of this review can support your choices. Therefore, until more evidence is available, childbirth in a hospital environment is safe, even in times of pandemics.

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