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Review Article

### COVID-19 INFECTION DURING PREGNANCY: REVIEW ARTICLE

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**Abstract:**

**Background:** Pregnant women and their newborns were also severely affected during this outbreak. Because of physiological changes in the immune and cardiopulmonary processes (such as diaphragm elevation, elevated oxygen consumption, and edema of the respiratory tract mucosa), pregnant women are particularly vulnerable to respiratory pathogens and serious pneumonia.

**Aim:** To summarize current evidence investigating COVID-19 infection outcomes on mothers and neonates.

**Method:** This is a systematic review was carried out, including PubMed, Google Scholar, and EBSCO that examining previous studies regarding COVID-19 infection during pregnancy. Authors extracted the data, and then the author's names, year and region of publication, the study type, period of study, and the result were reported.

**Results and Conclusion:** The review included 6 studies concluded that; extensive maternal illness, including ICU admission and perinatal mortality during birth, is indicated in existing evidence by COVID-19 infecting. Conflicting data was obtained regarding mother-fetal infection as many studies with reported positive cases of neonates did not mention restrictions between mother and child during breastfeeding to limit infection.

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**INTRODUCTION:**

A novel coronavirus-associated pneumonia was first reported in December 2019 in Wuhan City, China and worldwide after [1]. It is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and is an emerging disease [2]. The overall mortality rate ranges from 3% to 4% according to the World Health Organization reports, but a higher rate of

patients require admission to the intensive care unit (ICU) [3, 4].

Pregnant women and their newborns were also severely affected during this outbreak. Because of physiological changes in the immune and cardiopulmonary processes (such as diaphragm elevation, elevated oxygen consumption, and edema of the respiratory tract mucosa), pregnant women are

particularly vulnerable to respiratory pathogens and serious pneumonia. The majority of women who acquired infection have mild COVID-19 symptoms such as fever, cough, and shortness of breath, according to limited data, but only a few serious cases are recorded [5].

The most frequent symptoms in pregnant women with COVID-19 are fever (68%) and cough (34%), with other symptoms including dyspnea (12%), diarrhea (6%), and malaise (12%) [6]. COVID-19's inflammatory nature during gestation puts all women and their babies at risk for obstetric risks, as well as the possibility of long-term multi-systemic complications in newborns [7].

There is a lack of evidence also for delivery timing and form (vaginal or caesarean); thus, decisions on delivery route and timing should be individualized for each patient based on obstetrical signs and maternal–fetal status [8]. Early results showed a comparable rate of admission to intensive care unit (ICU) to non-pregnant women, but higher pre- and caesarean deliveries of pregnant women with COVID-19 pneumonia [4].

#### **Study objective:**

The objective of this study was to summarize current evidence investigating COVID-19 infection outcomes on mothers and neonates.

#### **METHODOLOGY:**

A complete literature quest has been carried out with MEDLINE, Embase and Google Scholar. The quest

was carried out between 8 December 2019 and 4 April 2020. The following search words have been combined: COVID-19, pregnancy, maternal deaths, maternal illnesses, complications, clinical symptoms, neonatal morbidity, infant death intrauterine, neonatal mortality, and SARS-CoV-2. In order to determine their importance to our research, authors examined the titles and abstracts (as shown in **Figure 1**). The authors collected data and recorded the name of the authors, the year and the publishing region, the type of study, and results (Table 1).

#### **Statistical analysis:**

No data analysis program was used. The data have been obtained on the basis of a standard type (the author's name, year of publication, region, methodology and results). The members of the community examined these data to assess the initial results and methods of the operation. In order to ensure the legitimacy and reduce the errors, two reviews of each member's results were added.

#### **RESULTS:**

A total of 56 studies included for title screening were submitted to the above-mentioned databases. For abstract screening, 42 have been included, which correspond to 12 publications being excluded. The other 30 complete texts of the publications were checked. The complete text review lead to 24 experiments being excluded and 6 for final data extraction have been recorded (Table 1).

The experiments used had various designs.

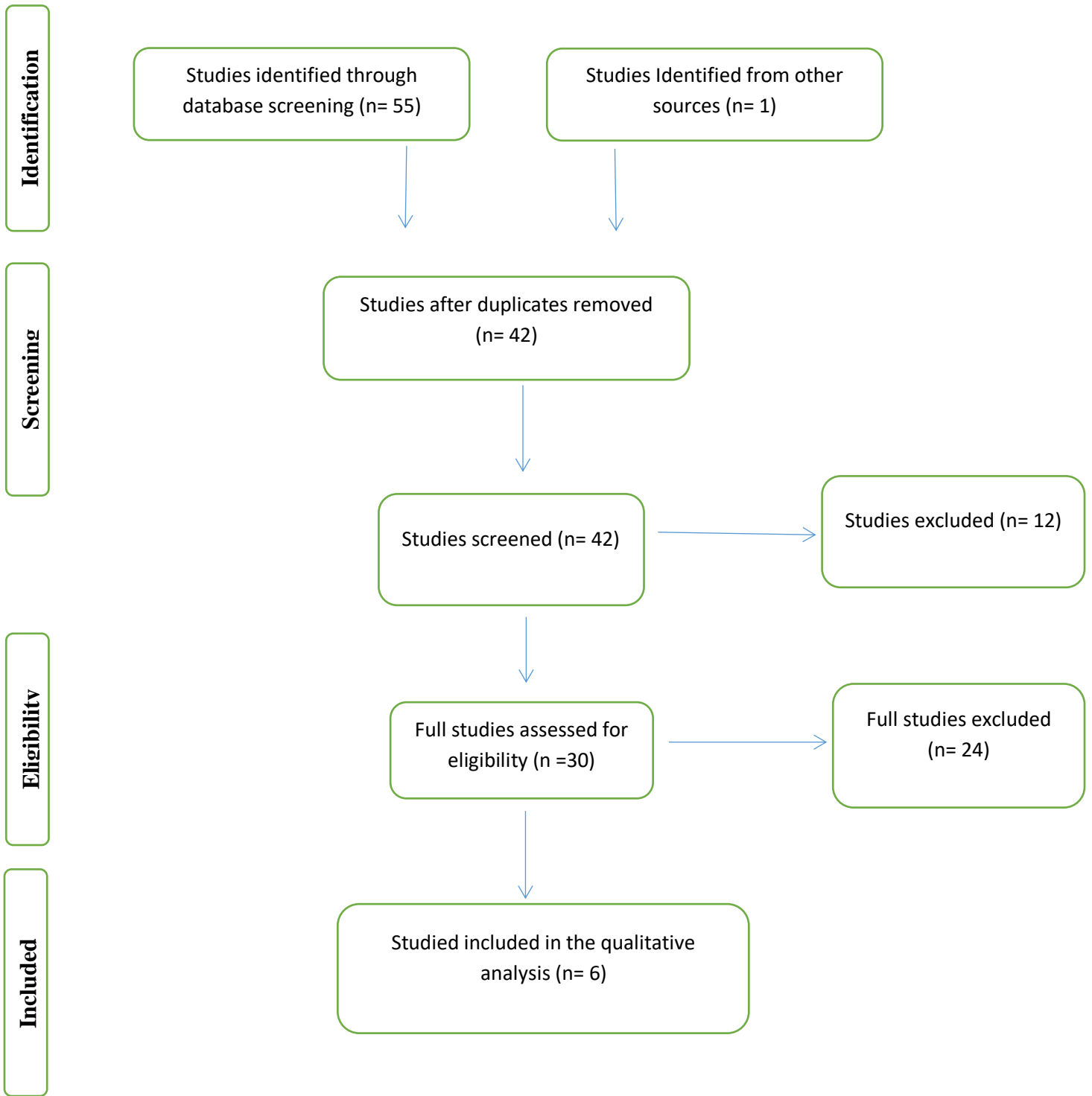


Figure 1: flow chart summarizing the data extraction process

**Table 1: Author, year of publication, study type, and study outcome:**

Author	Study Region	Study type	Sample size	Age	Comorbidities	Fetal Outcome	Maternal Outcome	Delivery
Knight, M., et al. [9]	UK	Prospective national population-based cohort study	427 pregnant women	(41%) were aged 35 or over	34%) had pre-existing comorbidities	(5%) of 265 infants tested positive for SARS-CoV-2 RNA, six of them within the first 12 hours after birth.	(10%) women admitted to hospital needed respiratory support, and five (1%) women died	-
Zaigham, M., et al. [10]	-	A systematic review	108 pregnancies	Mean maternal age ranged from 29 to 32 years	preeclampsia, gestational diabetes, hypothyroidism, placenta previa, previous uterine surgeries etc.	One neonatal death and one intrauterine death	Lymphocytopenia (59%) with elevated C-reactive protein (70%) was observed	Cesarean section accounted for 92% of all deliveries
Lokken, M. E., et al. [11]	Washington, USA	Multicenter retrospective cohort study	240 pregnant patients	Median age was 28 years (IQR, 24–33.5).	Obesity 45.3%, asthma (8.3%), type 2 diabetes mellitus (5.4%), and hypertension (4.6%).	98.7% had live births and 2 stillbirths	Critical disease occurring in 7.5% and (10.0%) were hospitalized specifically for COVID-19 symptoms, (8 of these 24 cases) were admitted to the ICU. Maternal deaths owing to COVID-19 complications occurred (1.3%)	35.5% of infected women had cesarean section
Abourida, Y., et al. [12]	-	Case-report	1	30-year-old	history of premature rupture of membranes (PROM) at 20 weeks in a previous gestation, a scarred uterus, and osteoarthritis	Premature newborn. The newborn experienced severe asphyxia, failing to improve under ventilation. At 1 hour of life, SARS-CoV-2 test using RT-PCR was negative.	Patient presented severe pneumonia symptoms promptly complicated with premature rupture of membranes (PROM).	caesarian delivery
Yan, J., et al. [13]	China	Retrospective study	116 pregnant women	The mean age was 30.8 (range	there were 9 patients (7.8%, 9/116) with gestational diabetes and 5	Of 99 patients, 21 (21.2%) who delivered had preterm birth, including 6 with	There were 8 patients (6.9%, 8/116) with severe pneumonia, all required ICU	2 cases (33.3%, 2/6) resulted in vaginal delivery; 4

				24–41) years	(4.3%, 5/116) with hypertensive disorders, including 4 (3.4%, 4/116) with preeclampsia, and these pregnancy complications were unrelated to COVID-19 pneumonia	preterm premature rupture of membranes. The rate of spontaneous preterm birth before 37 weeks' gestation was 6.1% (6/99). One case of severe neonatal asphyxia resulted in neonatal death. Furthermore, 86 of the 100 neonates tested for severe acute respiratory syndrome coronavirus 2 had negative results	admission, 1 of whom (0.9%, 1/116) required plasmapheresis, 6 (5.2%, 6/116) received noninvasive ventilation, 2 (1.7%, 2/116) received invasive mechanical ventilation, (0.9%, 1/116) received extracorporeal membrane oxygenation but no maternal deaths	cases (66.7%, 4/6) required cesarean delivery
Melo, Géssyc a Cavalcante, and Karina Conceição Gomes Machado de Araújo . [14]	China	A systematic review and meta-analysis.	38 studies were included; data from 279 women were analyzed; 60 patients were diagnosed with COVID-19	Median age was 30	-	Preterm delivery was found in 28 cases, and ten of them occurred in pregnant women with COVID-19 infection. No significant association between COVID-19 infection and preterm delivery. Positive results for SARS-CoV-2 were found in 16 neonates.	Only one of the pregnant women in the studies had a severe clinical form of infection and there were no significant differences regarding neonatal complications in the groups.	12 had vaginal delivery

### DISCUSSION:

Pregnancies women are particularly vulnerable to respiratory diseases because of physical structures and physiological changes in respiratory systems, such as increasing intake of oxygen and respiratory tract edema, which are affected during breastfeeding. Critical Care Unit Admission rates and mortality among pregnant women admitted to SARS-CoV-2 hospitals are reported [9], comparable to rates among the general reproductive age group admitted to UK contaminated hospitals, 20–35 per cent of which

receive critical care and 1–4 per cent die from infections [15]. A large cohort sample of 147 women with COVID-19 has been published by the World Health Organization, with just 8% and 1% having extremely and severely diseased [16]. This indicates that most COVID-19 pregnant women are milder than the general population. Another research has confirmed the presence of milder disease and recovery in pregnant women with COVID-19 pneumonia [17]. In contrast, the CDC recorded just 45 maternal deaths in the United States of America at

the middle of October 2020 in pregnant women with confirmation of SARS-CoV-2 [18]. Yan, J., et al. [13] have recorded (6.9%) heavy COVID-9 pneumonia among pregnant females that is close to China's incidence of serious disease [19, 20]. Our diligent and effective management of diagnosed pregnant cases can be due to this finding to minimize the risk of disease development.

There is no proof that one mode of birth is preferable to another at this time; scientist communities have determined that COVID-19 is not the contraindication of VAD. The biggest drawback, though, is that pregnant women can produce several aerosols and droplets during work. A vaginal delivery can improve the risk of contamination and infection to medical workers in recognition of COVID-19's highly contagious estimation of basic reproductive number (R0). In the end, SARS-CoV-2 may also be infected by feces, particularly for the newborn baby [20- 23].

The results of infant diseases in the SARS-CoV-2 infection gained before or after birth are largely encouraging, since there was no evidence of serious disease in the limited number of positive male early polymerase chain-reaction infants with infection. Early studies of child infection in the perinatal phase have showed that only moderate illness was observed [24-27]. Intrauterine transmission was not found by Schwartz et al. [28]. Lymphocytopenia and thrombocytopenia and radiological discoveries of apparently stable babies born to SARS-CoV-2-infected women have been published on multiple occasions, however. 6 out of 10 were premature-born neonate patients with eight out of 10 in the Zhu et al [29] cohort and two leading factors to morbidity were given by caesarean section. Two cases of SARS-CoV-2-positive pregnancy have been presented by Fan et al [30]. On day 3 and the after, a chest radiograph showed diffuse haziness in one term baby acquired low-grade fever and abdominal distension with lymphocytopenia. Nine days after birth, the baby was released. In a 36+5 week gestational age, the second baby was given via caesarean section, and mild neonatal pneumonia was developed with an antibiotic treatment of lymphocytopenia. In two days the neonate was rescued. Two cases of neonates with positive SARS-CoV-2 testing findings were recorded in a study in Italy who did not wear a mask during breastfeeding as a result of mothers' postpartum diagnosis [31]. In cases where strict monitoring and preventive controls have been implemented and so the risk of vertical transmission cannot be removed, newborns have early promising effects [32].

### CONCLUSION:

Extensive maternal illness, including ICU admission and perinatal mortality during birth, is indicated in existing evidence by COVID-19 infecting. Conflicting data was obtained regarding mother-fetal infection as many studies with reported positive cases of neonates did not mention restrictions between mother and child during breastfeeding to limit infection. Careful pregnancy control of COVID-19 and neonatal infection prevention steps should be justified. Therefore, clinicians should monitor the newborns of mothers with COVID-19 closely.

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