

Management of Pregnancy with Covid-19: A Systematic Review

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ABSTRACT

Backgrounds: COVID-19 is a new virus that comes since 2019, and attacks the respiratory system. Pregnant women are at high risk for adverse effects from Covid-19 infection, because of the adaptive cardiopulmonary changes during pregnancy. During the COVID-19 pandemic, physiological changes during pregnancy are feared to increased maternal morbidity and mortality from COVID-19 infection. Safe and effective antenatal care is carried out through special management during the COVID-19 pandemic.

Purpose: aim of study is to analyze symptoms, management of pregnancy, childbirth, neonatal, pharmacological therapy and COVID-19 vaccination in pregnant women.

Methods: this research used *systematic review* method. The samples was obtained from ScienceDirect, Wiley and Pubmed database. The keyword are pregnant women, Covid-19, management pregnancy with Covid-19.

Results: 10 original research articles was find and accordance with criteria. Management of COVID-19 pregnancy was regulated to reduce exposure the virus in mother and child population. Multidisciplinary health workers were needed to oversee the continuous care of mothers. COVID-19 vaccine in pregnant women was considered safe for mother and fetus.

Conclusion: management or guidelines of COVID-19's pregnancy was carried out continuously and comprehensively to reduce the high rate of morbidity and mortality. COVID – 19 vaccination was attempted as a preventive and protective measure for pregnant women.

Keywords:

Covid-19; pregnancy guidelines; pregnancy management; SARS-CoV-2; vaccination.

BACKGROUND

WHO Director General Tedros Ghebreyesus has declared the COVID-19 outbreak (SARS-CoV-2) as a pandemic on March 11th 2020, the determination of the status of this pandemic was caused by the rapid spread of the virus and extends to areas far from the center of the outbreak ([Cucinotta & Vanelli, 2020](#)). Through several examples of cases in the handling of previous Coronaviruses (SARS – CoV and MERS – CoV) as well as several cases of COVID – 19 revealed that pregnant women population tend to

be at risk for morbidity and mortality compared to the general population ([Liberati et al., 2020](#)).

The increase in maternal and child mortality rates is supported by the results of a systematic review where pregnant women who are confirmed positive for COVID-19 are at great risk for pre-eclampsia and preterm delivery, while babies born to mothers who are confirmed positive for COVID-19 are at risk for treatment in hospitals. NICU or experiencing the incidence of death in the neonatal period of 2.4% ([Liberati et al., 2020](#)). The increasingly rapid spread of COVID-19 should make health workers aware of the clinical symptoms, management principles and prognosis of the outcome of this disease in pregnancy and the puerperium ([Guo & Yang, 2021](#)).

OBJECTIVE

Aim of study is to analyze symptoms, management of pregnancy, childbirth, neonatal, pharmacological therapy and COVID-19 vaccination in pregnant women.

METHODS

Research Design

The research design that will be used by the author is in the form of a systematic review. Systematic review is a research method to carry out the identification, evaluation and interpretation of all relevant research results related to certain research questions, certain topics, or phenomenon of concern ([Kitchenham, 2004](#)). This research was conducted from January 2020 – January 2022.

Literature's Search Strategy

The framework or design in this study uses PICO, which consists of: Population (Pregnant women with positive COVID-19), Intervention (COVID-19), Comparison (No comparison or other intervention), and Outcomes (Management of pregnancy with COVID-19). Literature search using PubMed, Wiley, and ScienceDirect databases by entering several alternative keywords that have been adapted to MeSH and the help of Boolean operators. The keyword are pregnant women, Covid-19, management pregnancy with Covid-19.

Inclusion Criteria

The literature search in this research was based on these following inclusion criterias International research articles where the research subjects are pregnant women who are confirmed positive for COVID-19, research articles where the intervention is COVID-19 in pregnancy, all literature in English published from January 2020 to January 2022, and the design of the research articles which used in this research is original research.

Study Selection and Quality Assessment

Identification	Sciencedirect	PubMed	Wiley	
	N = 456	N = 298	N = 201	
Screening	Title			
	N = 7	N = 5	N = 7	Same Title (N)
	Same Title			
Eligibility	Full-text article			Only abstract (N = 2)
	N = 12			
Included	Article accordance with criteria 10			

Figure 1. Flowchart of Systematic Review

RESULTS

Ten samples of articles that fulfilled the inclusion criteria used a cohort study design (2 studies), and some used a case report design (8 studies).

Table 1. Table of Keynote's of Literature Search Results

No	Researcher's Name and Article's Published Year	Article's Title
1	Abourida et al., (2020)	<i>Management of Severe COVID-19 in Pregnancy</i>
2	Birindwa et al., (2021)	<i>A case study of the first pregnant woman with COVID-19 in Bukavu, eastern Democratic Republic of the Congo</i>
3	Ilham et al., (2021)	<i>Successful management of a pregnant woman with COVID-19 and multiple severe complications</i>
4	Long et al., (2021)	<i>COVID-19 and Pregnancy: A Case Study</i>
5	Moshiri et al., (2020)	<i>Diagnosis and Management of COVID-19 in the Third Trimester of Pregnancy: A Case Report</i>
6	Ogamba et al., (2021)	<i>A case report of COVID-19 infection and management during pregnancy</i>
7	Pelayo et al., (2020)	<i>Severe COVID-19 in Third Trimester Pregnancy: Multidisciplinary Approach</i>
8	Sahin et al., (2022)	<i>Management of pregnant women with COVID-19: A tertiary pandemic center experience on 1416 cases</i>
9	Tambawala et al., (2021)	<i>Successful management of severe acute respiratory distress syndrome due to COVID-19 with extracorporeal membrane oxygenation during mid- trimester of pregnancy</i>
10	Vousden et al., (2022)	<i>Management and implications of severe COVID-19 in pregnancy in the UK: data from the UK Obstetric Surveillance System national cohort</i>

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DISCUSSION

Common Clinical Symptoms

When COVID-19 attacks the body, fever and cough are common symptoms felt by sufferers. Other symptoms such as myalgia, shortness of breath, fatigue, diarrhea and sore throat may occur but are less prominent ([Chen et al., 2020](#)). The cohort study which conducted by Sahin *et al* (2022) and [Vousden et al \(2022\)](#) showed that pregnant women with mild symptoms of COVID-19 had a fairly high proportion, followed by moderate and severe symptoms of COVID-19, respectively. This suggests that pregnancy regulates the immune system, HCG, and progesterone to prevent the occurrence of cytokine storms in pregnant women and reduce the increased morbidity and mortality of pregnant women ([Elshafeey et al., 2020](#))

The population of BAME (*Black, Asians, Minority Ethnic*s) pregnant women has the highest proportion of severe symptoms of COVID-19 ([Vousden et al, 2022](#)). The Centers for Disease Controls (2020) also revealed that poor outcomes from COVID-19 was reported to have increased in minority ethnic groups, but this was not due to biological factors but mostly due to lifestyle and socioeconomic factors.

Management of Pregnancy

In this study there were 4 case reports as review samples where the pregnancy was maintained until a viable gestational age for termination, surely this decision was made taking into account the severity of the symptoms experienced by the mother, the welfare of the fetus and routinely taking therapy under close supervision. The concept of *mother saving* was prioritized in terms of maintaining pregnancy by considering the condition of the fetus. Generally, pregnant women with mild symptoms, moderate to asymptomatic symptoms will be sought so that their pregnancy will last until term ([POGI, 2020](#)).

During the pandemic, pregnant women were advised to do a pregnancy check after making an agreement with the relevant health workers. Pregnant women with suspected cases, pregnant women with symptoms and confirmed positive must have an examination at the referral hospital. In an effort to reduce cross-infection, it would be better if health facilities provide telemedicine facilities for online-based consultation and information provision for pregnant women so that the health of pregnant women and fetuses is monitored properly (Wang et al., 2020).

Management of Childbirth

Based on the [POGI recommendation \(2020\)](#) that COVID-19 infection is not the sole indication for caesarean section delivery. To date, there is no strong evidence that one delivery method has a better outcome than another delivery method.

The 4 case study articles reviewed in this study also show that caesarean section is the method used in delivering labor, taking into account the deteriorating condition of the mother and fetus. This is also reinforced by the results of a cohort study conducted by Sahin et al (2022) and [Vousden et al \(2022\)](#) that the caesarean section delivery method improved dramatically compared to vaginal delivery. However, in a case study report conducted by [Pelayo et al \(2020\)](#) it was revealed that respondents gave birth spontaneously vaginally with a fairly good maternal output.

The phenomenon of a dilated and atonic uterus resembling a *Couvellaire* uterus was demonstrated in the study of [Ilham et al \(2021\)](#). *Couvellaire* uterus is a bluish-purple uterus caused by uterine bleeding that has penetrated the myometrial tissue. Meanwhile, in a study conducted by [Birindwa et al \(2021\)](#), vesicular bleeding was found when performing a caesarean section. On the surface of the maternal side and the umbilical cord, a thrombus is found. Meanwhile, eruptive inflammation occurs in the bladder, posterior surface of the uterus, ovaries and left fallopian tube.

According to [Shanes et al \(2020\)](#) the appearance of intervillous thrombus is generally considered an incidental finding related to cardiovascular disorders in pregnant women such as hypertension. However, this study proved that the formation of intervillous thrombus in the placenta is believed to originate from an increase in thrombotic and thromboembolic disorders that are thought to be in response to the COVID-19 virus.

During the pandemic, termination of pregnancy was important to be analyzed as comprehensively as possible. Starting from assessing the severity of symptoms, gestational age and fetal well-being (WHO, 2020). The place used to carry out the termination of pregnancy must be in an isolation room or isolation operating room for infectious respiratory diseases. Multidisciplinary health workers must be willing and consist of obstetricians, pediatricians, anesthesiologists, pulmonologists to internal medicine doctors (S. Wang et al., 2020). Clinically, if the pregnant woman needs a caesarean section delivery as soon as possible, it is better if it is performed by an experienced obstetrician to reduce the possibility of complications and shorten the time of surgery. During the cesarean section, doctors should pay more attention to reducing bleeding to maintain hemodynamic stability and cardiopulmonary fatigue due to excessive blood loss ([Guo & Yang, 2021](#))

Management of Newborn

Five case report articles showed that infants were born prematurely and tended to have mild to severe asphyxia. According to [Yang et al \(2020\)](#) COVID-19 infection during pregnancy can increase the risk of iatrogenic preterm delivery. Maternal systemic infections such as pneumonia that are not treated immediately have a high risk of causing preterm labor ([Lamont, 2019](#)).

In the study of [Long et al \(2021\)](#) it was found that the baby's serological IgG titer was high in the infant's peripheral blood sample, but the throat swab result was negative. Meanwhile, in the cohort study conducted by Sahin et al (2022) it was found that 1 of 1416 infants tested positive for COVID-19 and 1 sample of breast milk was also tested positive for COVID-19. Based on the two neonatal cases of COVID-19, it can be suspected that vertical transmission of SARS-CoV -2 is true. The most likely routes for SARS-CoV-2 to infect newborns include vertical transmission from mother to fetus, droplet transmission and nosocomial infections ([Breslin et al, 2020](#)).

During the COVID-19 pandemic, if the baby is not confirmed positive for COVID-19, has no history of contact with people exposed to COVID-19 or has no symptoms, either mild or severe, the baby does not require routine investigations, but newborn care must still be carried out. Prevention efforts can be done by providing preferably 1 special

room with adjusted air temperature and humidity, minimizing visits from outside the home, regular air ventilation, maintaining personal hygiene and tools for baby needs. It is recommended to use 75% alcohol and water containing chlorine disinfection to mop floors and utensils (WHO, 2020).

Meanwhile, if the baby is diagnosed as positive for COVID-19, the baby must be immediately rushed to an observation isolation room for at least 14 days or until the baby shows an improving condition. Admission for mother and baby is only allowed if the mother is declared negative during 2 throat swab sampling and signed an informed consent (Wang et al., 2020).

Hygiene of hands and breasts is an important concern during the breastfeeding process. However, for mothers who are suspected, mothers who have symptoms and mothers who are confirmed positive are advised not to breastfeed their babies first (WHO, 2020). In studies of several experimental mammals, found the content of Lopinavir/Ritonavir in their milk, this does not rule out the possibility of this happening in humans. Moreover, mothers who are breastfeeding are not recommended to take this antiviral drug. During the breastfeeding period, mothers are advised to empty their breasts regularly so as not to cause breast engorgement (Wang et al., 2020).

Management of Pharmacological Therapy

Several case reports that were sampled in this study used Hydroxychloroquine and antiviral therapy (Lopinavir, Ritonavir and Remdesivir) as pharmacological treatment options. While the administration of corticosteroids is not recommended for patients with mild or asymptomatic symptoms, except for pregnant women who give birth before 34 weeks of gestation (Favre et al., 2020). Lopinavir / Ritonavir combination therapy has become a relatively safe antiviral regimen for pregnancy ([Liang & Acharya, 2020](#)).

Chloroquine phosphate is generally applied in the treatment of malaria and indeed has antiviral and immunomodulatory properties. Chloroquine phosphate can damage the glycosylation of viral cell receptors so that it can block SARS-CoV-2 infection. But unfortunately, the metabolic activity of Chloroquine and all its derivatives can cross the placental barrier. However, its use can be safely applied according to different gestational ages without causing harmful effects on the mother and fetus ([Kwak-Kim et al., 2020](#)).

A pharmacokinetic report reported that the concentration of Chloroquine in the plasma of pregnant women markedly reduces the absorption of nutrients in the body. It should be noted that excessive use of chloroquine can cause low blood pressure and cause pregnant women to be at risk for supine hypotension. In addition, the use of alpha interferon in the first trimester is associated with a greater likelihood of worsening fetal development ([Liang & Acharya, 2020](#)).

COVID – 19 Vaccination for Pregnant Women

Currently, there are many guidelines and recommendations that recommend COVID-19 vaccination for pregnant women as an effort to prevent transmission of the virus. COVID-19 vaccination in pregnant women is reported to have good outcomes ([Rasmussen et al., 2021](#)).

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Vaccination is a safe and protective measure in the population of pregnant women. Based on the research results of [Jackson et al \(2020\)](#) the COVID-19 vaccine can protect the general population from exposure to the virus and only experiencing mild symptoms of COVID-19. Effectiveness ratio 94 – 95%. Moreover, in other vaccine research studies, the ratio of effectiveness between the general population and the population of pregnant women is very small, so it can be concluded that the vaccine has the same effective function against pregnant women. A cohort study conducted by [Gray et al \(2021\)](#) showed that the COVID-19 vaccine can also provide protection to infants through which serological IgG produced by the vaccine can be transmitted to infants through breast milk.

Vaccination efforts for pregnant women must be intensified through health workers and related health services and vaccination programs must be regulated by each country affected by COVID-19 (Sahin et al, 2022). In Indonesia itself, pregnant women can register for vaccinations at vaccine service centers or health facilities appointed by the government, pregnant women can get vaccines after meeting the requirements and going through the applicable screening process. The vaccines allowed for pregnant women are Sinovac, Moderna, Pfizer according to availability ([Satuan Tugas Penanganan COVID – 19, 2022](#)).

CONCLUSION

Maternal and child health was currently an important concern because they are a vulnerable group exposed to COVID-19 compared to the general population. During the COVID-19 pandemic, physiological changes during pregnancy are feared to increase maternal morbidity and mortality from COVID-19 infection. Therefore, management or management of pregnancy is needed and special considerations in safe and effective antenatal care.

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