Benha Journal of Applied Sciences (BJAS) **print: ISSN 2356–9751**
Vol. (7) Issue (11) (2022), (57-62) **online: ISSN 2356–976x**
http://bjas.journals.ekb.eg

Pregnancy Outcomes in Pregnant Women with COVID 19

H. M. Elshaikh, A. A. Sharaf Eldin, M. A. Elnoury and M. A. Mohamed
Obstetrics & Gynecology Dept, Faculty of Medicine, Benha University, Benha, Egypt
dr.hebaelshaikh@gmail.com

Abstract

The immune system of pregnant women is already compromised, therefore it's not surprising that they're more likely to get severe coronavirus disease 2019 (COVID-19). However, the risk of vertical and horizontal transmission of COVID-19 during pregnancy and its clinical course are mostly unclear. The purpose of this study was to analyse pregnancy outcomes after Covid 19 infection. This retrospective research analysed data from pregnant women who tested positive for Covid 19 using polymerase chain reaction (PCR) at the Isolation hospital of the Faculty of Medicine in Banha, Qalyubia between February 2020 and February 2022. A thorough history was taken, a full physical was performed, an abdominal exam was conducted, and an Ultrasound was performed on every patient. The findings showed that 75 percent of the patients had fever, 68.3 percent experienced dry cough, 48.3 percent experienced tiredness, 34.3 percent experienced dyspnea, 11.7 percent experienced diarrhoea, 3.3 percent experienced headache, and 25% required ventilation. The primary haematological alterations include a decrease in leukocyte count and lymphocyte count, and these changes coincide with an increased risk of foetal or maternal death owing to the presence of COVID-19 during pregnancy.

Keywords: Pregnancy, Outcomes, Pregnant Women, COVID 19.

1. Introduction

Transmission of coronaviruses (CoV) occurs between animals and humans [1].

Humans have not been exposed to the novel (new) Coronavirus strain, which has been given the designation COVID-19. The index cases found on 2019-12-31 in Wuhan, Hubei Province, China. There was early evidence that many of the Wuhan, China cases were connected to the city's massive seafood and live animal market. Later, it was reported that an increasing proportion of patients had never been to an animal market, suggesting that the disease had transmitted mostly from person to person. Officials in China and other nations have documented persistent community-wide transmission of the disease[2].

The 2019 nCoV epidemic was designated a "Public Health Emergency of International Concern" (PHEIC) by the World Health Organization's International Health Regulations Emergency Committee on January 30, 2020. The decision was made so that all countries would be ready for active surveillance, early detection, isolation and case management, contact tracing, and mitigation of further spread of COVID-19 infection [3]. This was done primarily to prevent spread of the virus in countries with weakest health systems.

Pregnant women have been known to have substantial consequences in prior epidemics of other coronavirus infections, such as severe acute respiratory syndrome and Middle East respiratory syndrome [4].

Pregnant women accounted for 5% of US mortality during the 2009 influenza A H1N1 pandemic, although making up just 1% of the US population[5].

The impact of SARS-CoV-2 on pregnant women, foetuses, and babies is little understood, despite the fact that more than 18 million cases of COVID-19 have been documented globally. Preterm birth (37 weeks [22%]) and caesarean delivery (48%]) were recorded among women with confirmed COVID-19 infection in a comprehensive review and meta-analysis of mostly small case series [6].

Around 19% of newborns delivered to these mothers tested positive for SARS-CoV-2 [7], and the estimated incidence of admission to the critical care unit was greater among pregnant women (7%) than non-pregnant women (4%).

The majority of research to date has been on pregnant women who present with symptoms of illness; however, this may be an underestimate of admission rates, since many people are asymptomatic. The impact of COVID-19 on miscarriage, intrauterine foetal growth restriction, congenital abnormalities, long-term growth, and neurodevelopmental outcomes, among many other crucial concerns, remain unsolved. Zika's pregnancy-related consequences are a sobering reminder of the potential cost of viral infection in expecting mothers [8].

World health and social systems have been severely impacted by the 2019 coronavirus illness (COVID-19) pandemic. The rate at which new information has been generated regarding the illness has been almost equal to its worldwide spread. There does not seem to be any significant danger to the mother or foetus. However, the pandemic has forced significant advances in the fields of obstetrics and maternal-fetal medicine. Specialists also need to be aware of COVID-19-specific information in order to make an accurate diagnosis, categorise the severity of the illness, differentiate the symptoms of COVID-19 from those of obstetric problems, and make the best possible therapy options. The evidence-based methodology for treating COVID-19 during pregnancy is presented in this review in a condensed and easily digestible form. In this article, we provide a brief overview of all the topics that an obstetrician or maternal medicine specialist should be aware of, from the fundamentals of the disease and precautions to take during childbirth, to more specialised topics like maternal-fetal management and the birthing process themselves [9].

The purpose of this research was to analyse pregnancy outcomes for women who contracted the

Covid 19 virus while they were carrying their unborn child.

2. Patients and methods

From February 2020 to February 20212, all pregnant women at the Isolation hospital in Qalyubia who tested positive for Covid 19 by PCR were included in a retrospective survey research.

All pregnant women with a positive PCR result for Covid 19 were included.

The researchers utilised a sampling method of "convenience."

The following procedures were performed on every patient: The whole past was recorded, with a focus on: Each woman's demographic information (age, marital status, number of children, residence, profession, and any unusual behaviours) was recorded, as were her specific complaints (primary vs. secondary infertility duration, hirsutism, acne, and so on). Analyzing a woman's menstrual history, focusing on the timing and predictability of periods, Parity, prior pregnancy result, delivery method, postpartum difficulties, number of abortions (induced or spontaneous), whether or not they required surgical evacuation, and whether or not there were complications after the abortion. Background in the use of contraception: (Type& duration), If you have a history of [hypertension, diabetes mellitus, or deep venous thrombosis (DVT)], have recently received blood transfusions, have an allergy to any of the medications you are currently taking, or have recently had any type of surgery (including a caesarean section), please tell your doctor about it (CS). Consanguinity or infertility in the family A history of high blood pressure, diabetes, or If you have a history of drug allergies, Surgical background, laparoscopic complications, Ovulation inducement was attempted during the past 6 months.

Diagnostic Procedures: Measurements of your physical condition include your blood pressure, pulse rate, and body temperature as well as your weight, stature, and body mass index. Checking the fundal height and listening to the baby's heartbeat during an abdominal check.

The health of the foetus is evaluated. Evaluation of the placenta, amniotic fluid index, and estimated foetal weight through abdominal ultrasonography once viability has been confirmed. Evidence of uterine activity and a regular CTG - FHR pattern.

Complete blood count, alanine aminotransferase, aspartate aminotransferase, serum albumin, total bilirubin, direct bilirubin, creatinine, and urea levels. ESR, CRP, D-Dimer, and Ferritin in the Blood. Oral and nasopharyngeal swabs were taken for PCR testing in the lab.

Patient classification relies on findings from chest x-rays, physical exams, and laboratory tests. Symptoms: Modest cases: fever, cough, expectoration, and other symptoms of the upper respiratory tract, but no significant abnormalities or only mild alterations on chest radiography (multiple small patchy shadows and interstitial changes, mainly in the outer zone of the lung and under the pleura). When any of the following were present, we considered the situation to be severe: Extremely rapid breathing (RR) more than 30 times per minute, Partial pressure of oxygen/fraction of inspired oxygen (PaO2/FiO2) 300 mmHg; oxygen saturation (at rest) 93 percent; blood gas analysis (millimeters of Mercury), The onset of a condition requiring close observation and treatment in an intensive care unit, such as respiratory or other organ failure or shock.

3. Results

The mean age of studied cases was 29.53 (±4.21 SD) with range (22-36), among the studied cases there were 19 (31.7%) nulipara, 14 (23.3%) with parity of 1 and 37 (61.7%) with parity more than, there were 3 (5%) with previous abortion and 4 (6.7%) with history of preeclampsia. **Table 1**

Table (1) Distribution of the studied cases according to history data.

	Cases (no=60)	
Age		
Range.	22 – 36	
Mean ± SD.	29.52 ± 4.21	
Parity	No.	%
0	19	31.7
1	14	23.3
≥2	27	45.0
Previous abortion		
No	57	95.0
Yes	3	5.0
History of pre-eclampsia		
No	56	93.3
Yes	4	6.7

The mean BMI of studied cases was 29.44 (±2.02 SD) with range (25.8-33.2). Among the studied cases there were 4 (6.7%) with diabetes and 5 (8.3%) with hypertension. Among the studied cases there were 45 (75%) with fever, 41 (68.3%) with dry cough, 29 (48.3%) with fatigue, 23 (38.3%) with dyspnea, 7 (11.7%) with diarrhea and 2 (3.3%) with headache and

there were 15 (25%) who needed ventilation. According to the severity of disease there were 42 (70%) moderate cases and 18 (30%) severe cases. **Table 2**

Table (2) Distribution of the studied cases according to anthropometric, comorbidities, onset of symptoms, severity of disease

	Cases (no=60)	
Weight		
Range.	65.5 – 96	
Mean ± SD.	78.78 ± 7.18	
Height		
Range.	157 – 171	
Mean ± SD.	163.47 ± 4.19	
BMI		
Range.	25.8 – 33.2	
Mean ± SD.	29.44 ± 2.02	
Comorbidities	No.	%
Diabetes	4	6.7
Hypertension	5	8.3
Onset of symptoms	No.	%
Fever	45	75.0
Dry cough	41	68.3
Fatigue	29	48.3
Dyspnea	23	38.3
Diarrhea	7	11.7
Headache	2	3.3
Need for ventilation	15	25.0%
severity of disease	No.	%
Moderate	42	70.0
Severe	18	30.0

The mean Hb of studied cases was 11.17 (±1.46 SD) with range (8.8-13.6), the mean WBCs was 6.54 (±2.32 SD) with range (3-10.9), the mean PLTs was 210.25 (±32.1 SD) with range (141-267), the mean ALT was 44.58 (±34.16 SD) with range (8-127), the mean AST was 41.4 (±32.13 SD) with range (7-128) and the mean CRP was 44.07 (±59.65 SD) with range (4-59.65). **Table 3**

Table (3) Distribution of the studied cases according to anthropometric

	Cases (no=60)
Hb	
Range.	8.8 – 13.6
Mean ± SD.	11.17 ± 1.46
WBCs	
Range.	3 – 10.9
Mean ± SD.	6.54 ± 2.32
PLTs	
Range.	141 – 267
Mean ± SD.	210.25 ± 32.1
ALT	
Range.	8 – 127
Mean ± SD.	44.58 ± 34.16
AST	
Range.	7 – 128
Mean ± SD.	41.4 ± 32.13
CRP	
Range.	4 – 205
Mean ± SD.	44.07 ± 59.65

The mean gestational age of studied cases was 35.58 (±2.82 SD) with range (28-39), all the studied cases had caesarean section and 15 (25%) maternal death. **Table 4**

Table (4)Distribution of the studied cases according to maternal outcome

	Cases (no=60)	
Gestational age		
Range.	28 – 39	
Mean ± SD.	35.58 ± 2.82	
Mode of delivery	No.	%
CS	60	100.0
Mortality	15	25.0

The studied cases there were 9 (15%) with IUGR, 44 (73.3%) who needed NICU and 6 (10%) neonatal death. Table 5

Table (5) Distribution of the studied cases according to neonatal outcome

	Cases (no=60)	
	No.	**%**
IUGR	9	15.0
NICU	44	73.3
Death	6	10.0

4. Discussion

The SARS-CoV-2 virus is a single-stranded RNA virus that is encapsulated. Just as with other viruses, the immune response to COVID-19 is contingent on a well-functioning immune system. COVID-19 infections may range from mild to lethal [10], depending on the individual's immune response to the virus.

Pregnant women's legal standing falls somewhere in the grey area of this chart. Immune system changes during pregnancy allow for the creation of a semi allogenic baby, and these changes influence how the body responds to infections [11].

We observed that the mean age of the patients analysed was 29.53 (4.21 SD) with a range of (22-36), that 19 (31.7%) were nullipara, that 14 (23.3%) had parity of 1, and that 37 (61.7%) had parity of 2 or more, that 3 (5%) had a history of abortion, and that 4 (6.7%) had a history of preeclampsia.

Hodi et al. [12], who conducted a research to evaluate the pregnancy outcomes of women who tested positive for COVID-19, confirmed our findings. They observed that the patients' ages varied from 22 to 43, with the largest proportion being in the 25-34 year age range. A mean age of 30.9 (+/- 5.18) years was reported. There were 8 first-time mothers and 16 mothers expecting multiple children. Women in their third trimester of pregnancy made up the vast majority of the 23 (95.8 percent)

The average body mass index (BMI) of the cases we examined was 29.44 (2.02 SD), with a range of 25.8-33.2. A research by Engjom et al. [13] showed that patients hospitalised because of COVID-19 were more likely to be obese than women who gave birth in 2018 (p 0.001). Weight gain is known to cause immunological changes.

This thesis showed that out of the total number of patients, 4 (6.7%) had diabetes and 5 (8.3%) had hypertension. Diabetes (5.4% of pregnant COVID-19-infected women), chronic lung disease (3.1%), and cardiovascular disorders (2.9% of pregnant COVID-19-infected women) were the most often reported underlying medical problems (1.9 percent). Pregnant women with COVID-19 pneumonia and hypertension have been documented by Hodi et al. [12], who also observed that hypertensive condition occurs more often in this population.

In this thesis, we established that 45 (75%) of the patients analysed had fever, 41 (68.3%) experienced dry cough, 29 (48.3%) experienced tiredness, 23 (38.3%) experienced dyspnea, 7 (11.7%) experienced diarrhoea, 2 (3.3%) experienced headache, and 15 (25%) required ventilation. In 12 instances (48.0%), Thamer and Al-Rawaf [15] observed that fever was the primary symptom, followed by cough in 9 cases (16.0%). (36.0 percent). Two patients had gastrointestinal distress including nausea, vomiting, and diarrhoea (8.0 percent). Only one pregnant woman with COVID-19 was found to be leaking alcohol. Of the 24 pregnant women who tested positive for COVID-19, 19 (80.3%) were asymptomatic, 3% had mild symptoms (cough, fever, rhinitis, myalgia, or fatigue), and 8% had a more severe clinical presentation (COPD-19 pneumonia, requiring admission to the Intensive Care Unit (ICU) of the COVID Department for noninvasive ventilation support) (Hodi et al., 2012). Our findings revealed that there were 42 (70%) mild instances and 18 (30%) severe cases, all of which had obstetric indications (pelvic presentation in multigravida and preterm delivery and early rupture of foetal membranes in primigravida). The majority of the pregnant women (73.5%, n = 147) were found to have a moderate infection with Covid-19, while 26.5% (n = 53) were found to have a severe infection with Covid-19, according to research by Dileep et al. [16]. Clinical pneumonia was shown to be more common in pregnant

women (43.4 vs. 35.3%, P 0.001) compared to nonpregnant women (8.4% vs. 2.2%, P 0.001) who had the same infection.

Results showed that the average number of red blood cells (Hb) was 11.17 (1.46 SD), with a range of 8.8-13.6; the average number of white blood cells (WBCs) was 6.54 (2.32 SD), with a range of 3-10.9; the average number of platelets was 210.25 (32.1 SD), with a range of 141-267; the average number of alanine aminotransferases (ALT) was 44.58 (34 (4-59.65). Lymphocytopenia, together with increased C-reactive protein and hepatic transaminases, was seen in a research by Ahmad et al. [17] of women infected with COVID-19. Mean white blood cell count and mean lymphocyte count were considerably lower in COVID-19-infected pregnant women compared with the control group, but there was no change in mean haemoglobin, platelet count, PDW, or MPV ($p > 0.05$), according to research by Thamer and Al-Rawaf [15].

All of the patients in the study were delivered through caesarean section, and 15 of the mothers died during labour or delivery, for a total of a 25% maternal mortality rate. Premature deliveries and caesarean sections were found in 26.6% and 47.8% of neonates, respectively, from SARS-CoV-2 positive pregnant women, which is consistent with the findings of Ayed et al. [18]. Sutton et al. [19] conducted a similar research and found that among pregnant women who tested positive for SARS-CoV-2, 27% of the neonates were born prematurely and 59% had to have caesarean sections. Ahmad et al. [17] showed that the risk of caesarean delivery was greater in SARS-COV-2 infected pregnant women than in non-infected patients, especially if they were hospitalised with pneumonia (72.41 percent vs 54.49 percent ; OR 2.19; 95 percent CI 1.46-3.34; p0.001). Maternal mortality was also substantially increased in SARS-CoV-2 infected pregnant women, with an odds ratio (OR) of 41.61 (95% CI, 7.65-203.5; p0.001).

The high rate of caesarean sections could be explained by regional procedures designed to provide better maternal lung ventilation. In the absence of maternal or foetal decompensation during labour, experts agree that acute COVID-19 infection is not a reason to perform surgical completion of premature labour. After preterm labour, foetal distress was the most prevalent reason for an emergency C-section among the pregnant women we analyzed[20]. These data reveal aberrant maternal circulation linked with unfavourable perinatal outcomes, as shown by Shanes et al. [21] in the placentas of women infected with COVID-19 who gave delivery in the third trimester of pregnancy. These alterations might be indicative of a systemic inflammatory or hypercoagulable disorder that has an effect on placental function.

Our data showed that fifteen percent of newborns had IUGR, seventy-three point three percent required NICU care, and six percent died in the first month of life. Nayak et al. [22] found that 2.23 percent of pregnant women who tested positive for COVID-19 had an infant that was born with a low birth weight, and that 29.77 percent of newborns had a birth weight below the normal range. It was determined by Allotey et al. [23] that although COVID-19 is associated with an increased risk of premature delivery, low birth weight, and increased neonatal hospitalizations, it is not associated with an increased risk of intrauterine or neonatal mortality.

Our results that preterm labour and low birth weight are around two times more common in pregnancies with severe COVID-19 symptoms compared to control pregnancies are corroborated by a comprehensive analysis by Lassi et al. [24] that included 31,016 pregnant women from 62 studies.

Maternal pneumonia throughout the course of COVID-19 is a major risk factor for adverse pregnancy outcomes including preterm labour, placental abruption, and even maternal or foetal mortality, therefore it's important to be aware of the potential links between the two. Hospitalization rates for pregnant women infected with COVID-19 were highest during the second and third trimesters of pregnancy, according to the majority of available data, underscoring the importance of maintaining a strict social distance between pregnant women, especially during the third trimester, and the importance of engaging in intensive practise to avoid contracting infections during any stage of pregnancy. Additionally, if pregnant women contracted SARS-COV-2, it would be important to account for early identification and take the required steps to mitigate the effects of COVID-19 on the pregnancy [25].

Communication with pregnant women and sample collection were hampered by the health restriction guidelines implemented during the COVID-19 epidemic. Additional research with a bigger sample size are required to confirm our findings, despite the strength of our methodology.

5. Conclusion

The primary haematological alterations during pregnancy with COVID-19 are a decrease in leukocyte count and lymphocyte count, and an increased risk of foetal and maternal death.

References

[1] C.C. Lai, Y.H. Liu, C.Y. Wang, Y.H. Wang, S.C. Hsueh, M.Y. Yen, et al. Asymptomatic carrier state, acute respiratory disease, and pneumonia due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): Facts and myths. J Microbiol Immunol Infect;53:404-12. 2020

[2] T.M. Abd El-Aziz, J.D. Stockand. Recent progress and challenges in drug development against COVID-19 coronavirus (SARS-CoV-2) - an update on the status. Infect Genet Evol.vol.83,pp.104327,2020.

[3] Q. Li, X. Guan, P. Wu, X. Wang, L. Zhou, Y. Tong, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. N Engl J Med.vol.382,pp.1199-207,2020.

[4] G.A. de Souza Silva, S.P. da Silva, M.A.S. da Costa, A.R. da Silva, R.R. de Vasconcelos Alves, F.D.C.

Ângelo Mendes Tenório, et al. SARS-CoV, MERS-CoV and SARS-CoV-2 infections in pregnancy and fetal development. J Gynecol Obstet Hum Reprod.vol.49,pp.101846,2020.

[5] K. Markandan, Y.W. Tiong, R. Sankaran, S. Subramanian, U.D. Markandan, V. Chaudhary, et al. Emergence of infectious diseases and role of advanced nanomaterials in point-of-care diagnostics: a review. Biotechnol Genet Eng Rev,pp.1-89,2022.

[6] P.T. Heath, K. Le Doare, A. Khalil. Inclusion of pregnant women in COVID-19 vaccine development. Lancet Infect Dis.vol.20,pp.1007-8,2020.

[7] J. Wu, J. Liu, S. Li, Z. Peng, Z. Xiao, X. Wang, et al. Detection and analysis of nucleic acid in various biological samples of COVID-19 patients. Travel Med Infect Dis.vol.37,pp.101673, 2020.

[8] D. Di Mascio, A. Khalil, G. Saccone, G. Rizzo, D. Buca, M. Liberati, et al. Outcome of coronavirus spectrum infections (SARS, MERS, COVID-19) during pregnancy: a systematic review and meta-analysis. Am J Obstet Gynecol MFM.vol.2,pp.100107,2020.

[9] M. López, A. Gonce, E. Meler, A. Plaza, S. Hernández, R.J. Martinez-Portilla, et al. Coronavirus Disease 2019 in Pregnancy: A Clinical Management Protocol and Considerations for Practice. Fetal Diagn Ther.vol.47,pp.519-28,2020.

[10] A.K. Azkur, M. Akdis, D. Azkur, M. Sokolowska, W. van de Veen, M.C. Brüggen, et al. Immune response to SARS-CoV-2 and mechanisms of immunopathological changes in COVID-19. Allergy.vol.75,pp.1564-81,2020.

[11] Z. Saeed, O. Greer, N.M. Shah. Is the Host Viral Response and the Immunogenicity of Vaccines Altered in Pregnancy? Antibodies (Basel).vol.9,. 2020.

[12] J. Hodžić, B. Muračević, H. Štimjanin, R. Iriškić, M. Husika. Pregnancy outcomes of COVID-19 positive pregnant women at the Cantonal Hospital Zenica, Bosnia and Herzegovina. Med Glas (Zenica).vol.19, 2022.

[13] H. Engjom, A.J.M. Aabakke, K. Klungsøyr, T. Svanvik, O. Äyräs, E. Jonasdottir, et al. COVID-19 in pregnancy-characteristics and outcomes of pregnant women admitted to hospital because of SARS-CoV-2 infection in the Nordic countries. Acta Obstet Gynecol Scand.vol.100,pp.1611-9, 2021.

[14] H. BahaaEldin, H.A. El Sood, S. Samy, Y. Khader, M. AbdelFatah, M. Hassany, et al. COVID-19 outcomes among pregnant and nonpregnant women at reproductive age in Egypt. J Public Health (Oxf).vol.43,pp.iii12-iii8,2021.

[15] E. Thamer, S. Al-Rawaf. Hematological Changes and Pregnancy Outcome in COVID-19 Pregnant Patients: A Case–Control Study. Open Access Macedonian Journal of Medical Sciences.vol. 10,pp.511-6,2022.

[16] A. Dileep, S. ZainAlAbdin, S. AbuRuz. Investigating the association between severity of COVID-19 infection during pregnancy and neonatal outcomes. Sci Rep.vol.12,pp.3024,2022.

[17] S.N. Ahmad, D. Sameen, M.A. Dar, R. Jallu, T.N. Shora, M. Dhingra. Do SARS-CoV-2-Infected Pregnant Women Have Adverse Pregnancy Outcomes as Compared to Non-Infected Pregnant Women? Int J Womens Health.vol.14,pp.1201-10,2022.

[18] A. Ayed, A. Embaireeg, A. Benawadh, W. Al-Fouzan, M. Hammoud, M. Al-Hathal, et al. Maternal and perinatal characteristics and outcomes of pregnancies complicated with COVID-19 in Kuwait. BMC Pregnancy Childbirth.vol.20,pp.754,2020.

[19] D. Sutton, K. Fuchs, M. D'Alton, D. Goffman. Universal Screening for SARS-CoV-2 in Women Admitted for Delivery. N Engl J Med.vol.382,pp.2163-4, 2020.

[20] P.C. Browne, J.B. Linfert, E. Perez-Jorge. Successful Treatment of Preterm Labor in Association with Acute COVID-19 Infection. Am J Perinatol.vol.37,pp.866-8,2020.

[21] E.D. Shanes, L.B. Mithal, S. Otero, H.A. Azad, E.S. Miller, J.A. Goldstein. Placental Pathology in COVID-19. Am J Clin Pathol.vol.154,pp.23-32,2020.

[22] A.H. Nayak, D.S. Kapote, M. Fonseca, N. Chavan, R. Mayekar, M. Sarmalkar, et al. Impact of the Coronavirus Infection in Pregnancy: A Preliminary Study of 141 Patients. J Obstet Gynaecol India.vol.70,pp.256-61, 2020.

[23] J. Allotey, E. Stallings, M. Bonet, M. Yap, S. Chatterjee, T. Kew, et al. Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. Bmj.vol.370,pp.m3320,2020.

[24] Z.S. Lassi, A. Ana, J.K. Das, R.A. Salam, Z.A. Padhani, O. Irfan, et al. A systematic review and meta-analysis of data on pregnant women with confirmed COVID-19: Clinical presentation, and pregnancy and perinatal outcomes based on COVID-19 severity. J Glob Health.vol.11,pp.0 5018,2021.

[25] D.A. Schwartz, A.L. Graham. Potential Maternal and Infant Outcomes from (Wuhan) Coronavirus 2019-nCoV Infecting Pregnant Women: Lessons from SARS, MERS, and Other Human Coronavirus Infections. Viruses.vol.12,2020.