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## Intranatal management of pregnancy with COVID 19: A systematic review

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### Abstract

Dawn of 2020, the year of nurse and midwife, has been marked for strengthening of Midwives by WHO. This also brought an irony called COVID 19, which has emerged with extensive morbidity and mortality globally. This systemic review aims to study the intranatal management of pregnancy with COVID 19. It includes all retrospective quantitative studies done with more than 10 study participants. During the extensive search of 80 articles 10 Journal article were selected. The analysis of studies revealed that the intranatal management of pregnancy in mild and moderate cases were as per obstetric condition, while severe cases required focus on the respiratory and general condition of the mother. Mode of delivery was chosen as per the obstetric cause and general wellbeing of mother. Though there were no evidence of Vertical transmission, the morbidity of the parturient and neonates due to COVID 19 mandates continuous foetal and maternal monitoring.

**Keywords:** Intranatal Management & COVID 19, Pregnancy and COVID 19, neonates and COVID 19

### 1. Introduction

Dawn of 2020, bicentennial year anniversary of Florence Nightingale: founder of Modern Nursing, was marked for strengthening of Midwives for safe motherhood worldwide by World Health Organization <sup>[1]</sup> announced it as year of 'The Nurse and Midwife'. Then COVID 19 the irony of for mankind makes its entry into city of Wuhan China in Dec 2019. World Health Organization has to declared this disease as pandemic on 11<sup>th</sup> March 2020 <sup>[2]</sup>. As on 10<sup>th</sup> May 2020, there were 4,130,996 cases and 2,81012 death and exponential growth of the disease every day seen on graphs creates a scary picture <sup>[3]</sup>.

As the expectant mother and family waits for safe confinement amidst COVID 19, they are gripped with fear of impending doom. Several studies have been done on management of pregnancy with COVID 19 but there was a felt need to draw evidence out of all these expert researches. This systemic review aims to study the intranatal management of COVID 19 patients with pregnancy with a view to enable Midwives to vouch for the safety of the mother and newborn. Main objectives of the study are: to assess the effect of COVID 19 on pregnancy and to understand the best possible management of Labor with the evidence available till date.

The exponential growth of the disease calls for professional responsibility to train the fraternity of midwives. The novelty of disease and emerging evidences from multiple studies also makes it a felt need to analyze the evidence available on the subject and render quality nursing services. The review included all retrospective quantitative studies till date with sample size more than 10, with ethical clearance for conduct of the study.

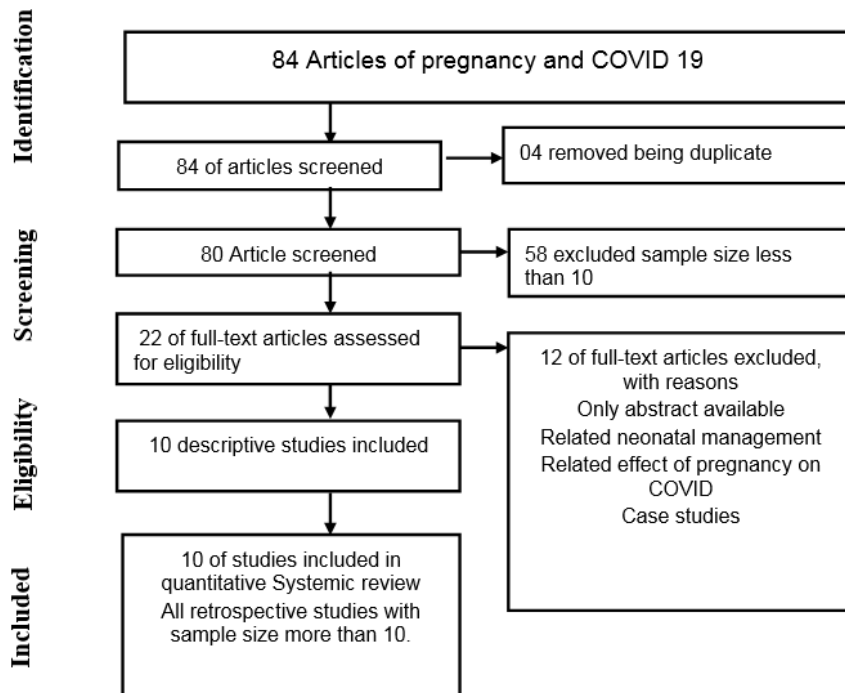
### 2. Materials and methods

#### 2.1. Search methodology and article selection

The current article is a literature review of pregnancy, Labour management and COVID 19, various guidelines and related studies. The searches were done using keywords COVID 19 and Pregnancy, safe motherhood and COVID 19, vertical transmission and COVID in different search engine like Pub Med, Cochrane review, google Scholar, NHS etc. A systemic search of articles spanning across various indexed journals such as Emerg Infect Dis, Lancet, Transl Pediatr, Clin Infect Dis, AJR Am J Roentgenol, Balkan Medical Journal, Annals of Pediatrics, NEJM, Ultrasound Obstet Gynecol, Acta Obstet Gynecol Scand, Front Pediatr, Infection Control & Hospital Epidemiology, Translational Perioperative and Pain Medicine, Am J Perinatol, American Journal of Obstetrics & Gynecology MFM, Australian and New Zealand Journal of Obstetrics and Gynaecology, Chin Journal of Perinatal Medicine and International Journal of Obstetrics and Gynaecology. The extensive search

Lead to 80 articles out of which 10 indexed journal articles were selected for the systematic review with a total of 285 patients across various health centers and countries.

## 2.2. The methodological analysis of selected articles



**Fig 1:** Flow chart of selected studies

## 3. Article review

### 3.1. Research articles addressing the COVID 19 & Clinical manifestation in pregnancy

Liu Y, Chen H, Tang K, Guo Y (2020) [4] in a retrospective descriptive study titled 'Clinical manifestations and outcome of SARS-CoV-2 infection during pregnancy', Thirteen pregnant patients were selected with a view to identify clinical manifestation of COVID 19 with pregnancy at Hospital of Sun Yat-sen University, Guangzhou, China. None of the patients has any underlying disease condition. Three patients were having uncomplicated pregnancy and were discharged on recovery from COVID. The remaining 10 patients underwent caesarean section, 05 emergency caesarean section due to fetal distress PROM and stillbirth in one and remaining were planned for elective cesarean. No severe asphyxia or vertical transmission was found in babies. It was observed that 7.6% of pregnant women with COVID infection had severe symptoms, required ICU admission and ventilator support in comparison of 5% in the general population. The study concluded that pregnant women were also susceptible to COVID infection and posed increased health risk to both mother and foetus [4].

Qiancheng X, *et al.* (2020) [5] performed a single centre retrospective study on 82 women from 15 Jan to 15 March 2020 at central hospital of Wuhan. In the RCT among the total population 28 pregnant women with COVID infection and 54 women were in reproductive age (defined as 18 to 41) and COVID positive. The study aimed at comparing the clinical course and outcome between the pregnant and reproductive age non-pregnant women with COVID 19 infection. The study was evaluated using univariate regression which indicated no association between

A total of 80 articles were selected based on, methodology, sample size and availability of full content. A total of 10 quantitative retrospective studies are selected for review based on inclusion and exclusion criteria. The studies included are from Wuhan, Beijing, Italy and New York.

pregnancy and the severity of disease (OR 0.73, 95% CI 0.08-5.15;  $p=0.76$ ), virus clearance time (HR 1.16, 95% CI 0.65-2.01;  $p=0.62$ ), and length of hospital stay (HR 1.10, 95% CI 0.66-1.84;  $p=0.71$ ). Among 28 pregnant women 22 had safe confinement which include caesarean section (17, 60.7%) or vaginal delivery (5, 17.9%) and no neonate was infected with SARS-CoV-2. The study concluded that pregnant women have comparable clinical course outcomes compared with reproductive-aged non-pregnant women when infected with SARS-CoV-2. There was no evidence to support vertical transmission of COVID-19 in the late stage of pregnancy including vaginal delivery [5].

### 3.2. Research articles addressing the COVID 19 & Perinatal & neonatal Outcome

Liu D, Lin L, Wu X, Zheng D, Wang J, Yang L, Zheng C, (2020) [6] published a Preliminary analysis of 'Pregnancy and Perinatal outcomes of Women with Coronavirus Disease (COVID-19) Pneumonia' among 15 pregnant women from 20 Jan to 10 Feb 2020. The study participants were selected by consecutive sampling and were positive for Reverse Transcription-Polymerase Chain Reaction (RT-PCR) for COVID 19. All were managed as per national guidelines and WHO triage protocol and were in Mild category. Chest Computer Topography scan was done for all with consent to see the lung changes. CT was found to be safe and more accurate for the patients. An important finding of the study was 04 out of 15 continued a safe pregnancy even after two months. 11 patients delivered, 10 caesarean section and 01 vaginal delivery. All had mild symptom with no recurrence. None of the babies had vertical transmission or any sign of fetal compromise. The study concluded that pregnancy doesn't have any effect on

COVID 19. Antiretroviral therapy is not given to all but still, all had equal recovery rate hence article also lacks evidence of Antiretroviral therapy in COVID 19 patients [6].

Zhu H, Wang L, Fang C, Peng S, Zhang L, Chang G, Shiwen Xia, Zhou W. (2020) [7] Neonatologists of Department of Neonatology, Maternal and Child Health Hospital of Hubei Province, Wuhan did a retrospective study titled 'Clinical analysis of 10 neonates born to mothers with COVID19' Among the 08 male and 02 female new borns were born to COVID positive mothers. All were COVID 19 negative but 6 neonates have symptoms of shortness of breath, pneumothorax, vomiting, thrombocytopenia, tachycardia and deranged liver enzymes [7].

Yang H *et al.* (2020) [12, 8, 6] conducted a study to observe the clinical features, outcome of 55 pregnant women who were COVID 19 positive from 20 Jan to 5 Mar 2020 in Maternal and Child Health Hospital of Hubei Province, WUHAN, China. All women were subjected to the CT scan and routine blood test screening for the COVID. They presented with mild symptoms and were admitted in isolation based on WHO triage protocol. 13 patients were COVID positive group and 42 were in the control group. Among the 13 positive cases only 2 had fever in the prenatal period and rest 08 had fever during postnatal period. Among the control group women 11 women had fever in prenatal and 20 had fever during the postnatal period. 20 babies were subjected to the COVID examination by throat swab in 24hrs after birth and none was tested positive. The study also suggested that CT and blood test are a better marker in asymptomatic cases [8].

Breslin N *et al.* (2020) [9] Conducted a multi centric study in New York on 43 women who were tested positive for COVID 19 from 13 – 27 Mar, 2020, in a study titled 'Coronavirus disease 2019 infection among asymptomatic and symptomatic pregnant women'. Two weeks of confirmed presentations in affiliated New York City hospitals. Out of all study participants 4 pregnant women developed severe symptoms during illness, 22 were managed through OPD, 10 had a fever during admission and 04 women were asymptomatic. One among study participants had severe symptoms and required ICU care. Out of 43 cases, 18 delivered (8 caesarean and 10 normal delivery) with labour anesthesia. Cause for caesarean was obstetric. All 18 neonates were COVID negative. As per triage protocol of COVID positive pregnant women reveals 86% mild, 9.3% severe, and 4.7% critical category, which is in concurrence with the general population. That refers pregnancy is no different for COVID infection. There is no evidence of vertical transmission still maternal and neonatal care is mandate. Use of PPE is recommended for Health care worker [9].

Cao D *et al.* (2020) [10] A retrospective study was done to clinically analyze 10 pregnant women with COVID-19 in Wuhan, China from 23 Jan to 23 Feb 2020. All study subjects had a history of exposure to COVID 19 and were within the age of 29 to 35 years. Period of gestation was ranging from 33 to 40 weeks. Among then 02 underwent vaginal delivery and 02 emergency caesarean section due to fetal distress and the remaining 06 elective caesarean

section due to various obstetric causes like GDM, preeclampsia and placental abruption. Majority of subjects experiences Mild to high grade Fever during the prenatal and postnatal period. All neonates had no complication and were tested negative for COVID 19 [10].

Vintzileos W. *et al.* (2020) [11] of NYU Winthrop Hospital, Mineola, New York conducted a retrospective cohort study of all obstetric patients admitted to Labour and Delivery room to assess the impact of routine COVID-19 testing on use of PPE by the health care worker. A total of 161 obstetric patients underwent routine COVID-19 testing on admission. The study population ranged from Age 15 to 42 with a mean age of 31 year. Among all 32 (19.9%) who were COVID-19 positive, 11 (34%) were symptomatic and 21 (66%) were asymptomatic. The sensitivity, specificity, positive predictive value, and negative predictive value of maternal symptoms to predict COVID-19 infection were: 34.4% (11/32), 96.1% (124/129), 68.7% (11/16) and 85.5% (124/145), respectively. Twenty-nine neonates of COVID-19 positive mothers were tested negative. The study hypothesized that 21 additional patients would have required use of PPE by health care workers, as compared to policy of screening based on maternal symptoms as these were asymptomatic but tested positive for the virus. The study suggest the basic PPE for all health care worker as preventive measure. Overall 10% increase of PPE use was seen in hospital post study [11].

### 3.3. Research articles addressing the COVID 19 & Mode of delivery vaginal v/s Caesarean Section

Liao J, He X, Gong Q, Yang L, Zhou C, Li J (2020) [12]. Analyzed the vaginal delivery outcomes among pregnant women in Wuhan, China during the COVID-19 pandemic from 20 Jan to 2 Mar, 2020. A retrospective analysis of medical records and comparison of pregnant women with COVID and pregnancy without COVID 19 was done on 63 samples (10 COVID positive, 53 COVID Neg). The results revealed there is no significant difference in the gestational age, postpartum haemorrhage and perineal resection rate between the two groups. The neonates also don't represent any difference in birth weight and asphyxia rate. The study concluded that under full protective measures pregnant women with mild or no symptoms with COVID can opt for a vaginal delivery without exacerbation of COVID -19 and any risk of COVID to the neonate [12].

Ferrazzi E, *et al.* (2020) [13] conducted a retrospective multi-centric study across 12 hospitals from 1 to 20 Mar 2020, titled 'Mode of delivery and clinical findings in COVID-19 infected pregnant women in Northern Italy'. Total 42 study participants were taken in the study by consecutive sampling by including all the cases in these 20 days in all 12 centers of northern Italy. Among total cases, 18 were emergency caesarean and 24 delivered vaginally. All had mild to moderate symptoms of the COVID 19. Pneumonia was diagnosed in 45% of cases. Pneumonia was more common in caesarean cases with a p-value of 0.024. Only 10 neonates were allowed breastfeeding out of them only two turns positive whose mothers were asymptomatic and did not follow respiratory precautions. Among the 42 newborns 39 neonates were tested negative 1 positive and two had fever and were negative [13].

#### 4. Discussion

FOGSI, Ver 1 of Pregnancy and COVID 19 guidelines also mentions 'Most pregnant women will present mild symptoms and have a similar course to other COVID 19 adult patients.'<sup>14</sup> RCOG Ver 6 guidelines on pregnancy and COVID 19 in para 1.4 mentions that though there is no evidence of abortion or severity of symptoms due to pregnancy but still mother is more susceptible to have severe symptoms in third trimester<sup>[1]</sup>.

The review of studies shows that Liu Y, Chen H, Tang K and Guo Y shows that rate of severity of COVID19 in pregnancy and symptoms are similar with that of general population, Qiancheng X, *et al.* compared clinical course of COVID, in pregnant and reproductive age (defined as 18 to 41) COVID positive women. The study have a comparable clinical course and outcomes compared with reproductive-aged non-pregnant women. Liu D *et al.* analyzed that all study participants had mild symptoms. Almost all mothers presented with mild symptoms like fever and cough as per Yang H *et al.* Postnatal fever was more common than prenatal in the study group. The study was seconded by another study done by Breslin N *et al.* in which majority had mild symptoms. Though Breslin *et al.* also had 4 cases of severe symptoms and ICU admission<sup>[9]</sup>. Cao D *et al.* also had same finding as previous studies All study subjects had a mild condition none had severe symptoms and no mortality reported<sup>[10]</sup>. The studies suggested that pregnancy is not an aggravating factor for COVID symptoms. It require a continuous monitoring of mother for Vitals, SPO2 fact to be considered is that the best care with minimum exposure of health care team is needed with utmost care.

There was no evidence of vertical transmission in babies in studies done by Liu D *et al.* Zhu H *et al.*, Yang H *et al.*, Breslin N *et al.* and Cao D *et al.*<sup>[7, 8, 9, 10]</sup> Ferrazzi E, *et al.* had one baby positive on day 3 of life which generate doubt

about the vertical transmission but it's a weak evidence to generalize anything. In a study by Vintzileos W. *et al.* twenty-nine neonates of COVID-19 positive mothers were tested and they were all negative. Babies born to COVID positive mother have mild symptoms like shortness of breath, pneumothorax, vomiting, thrombocytopenia, and tachycardia and deranged liver enzymes in the majority (60%) as per study conducted by Zhu H *et al.*<sup>[7]</sup>. Fetal hypoxia in above studies mandate the need of continuous fetal monitoring during labour.

ACOG, ACNM, SMFM and American Academy of family physicians, (2020), in an article Patient-centered care for pregnant patients during COVID 19 pandemic, advised hospital and birth centers that are accredited and prepared to deal with obstetric emergencies as the place of choice of delivery during this time. Liao J, He X, Gong Q, Yang L, Zhou C and Li J analyzed that there is no significant difference in the gestational age, postpartum hemorrhage and perineal resection rate between the vaginal delivery outcomes among pregnant women with or without COVID. The neonates also don't represent any difference in birth weight and asphyxia rate. Ferrazzi E, *et al.* witnessed that Pneumonia was more common in caesarean cases with a p-value of 0.024<sup>[3]</sup>.

Ferrazzi E, *et al.* kept babies on breast feed and seen that only two babies whose mother were asymptomatic and feed them without mask turned positive, rest all babies were negative. WHO recommends breast feeding with respiratory hygiene. RCOG Ver 6 recommends breastfeeding can be given after teaching respiratory hygiene to mother or after discussing the options in detail with both parents. FOGSI advises that breast feeding can be given with proper precautions to avoid droplet infection. {Citation}

**Table 1:** Table depicting the maternal and fetal outcome in all reviewed studies

S. No.	Author/ Date	Journal	Findings		Remarks
			Maternal Normal/Caesarean delivery	Fetal Vertical transmission	
1	Liu Y 5-3-2020	J Infect	0/10	No	3 Fetal distress, 1 still birth 1 mother had ICU admission
2	Liu D 19-3-2020	AJR Am J Roentgenol	5/10	? 3	CT is found reliable for observing progress of disease
3	Zeng L 26-3-2020	JAMA Paediatrics	7/26	? 3	1 Fetal distress 3 Pneumonia
4	Ferrazzi E 7-4-2020	Pre Print SSRN	24/18	No	3 NICU admission
5	Yang H 7-4-2020	Journal of Infection	4/9	No	CT & blood test are better marker than symptoms
6	Breslin N 9-4-2020	American Journal of Obstetrics & Gynecology MFM	10/8	No	1 respiratory distress 2 mothers had ICU admission
7	Cao D 10-4-2020	International Journal of Infectious Diseases	2/8	No	2 Fetal distress
8	Vintzileos WS 26-04-2020	Am J Obstet Gynecol	29/3	No	29 neonates tested all negative
9	Qiancheng X 22-4-2020	International Journal of Infectious Diseases	5/17	No	Pregnancy has comparable out come to general population
10	Liao J 29-4-2020	International Journal of Obstetrics and Gynaecology	10/0	No	No difference in vaginal delivery outcome in COVID and NON COVID Patients

## 5. Summary of evidences of intranatal care

- The pregnancy doesn't increase or decrease the chances of COVID 19 infection. Still its matter of mother and baby, hence Labour Room should be prepared for any respiratory emergency as Infection becomes severe in presence of comorbidities or in cases of obstetrics emergencies due to decrease maternal immunity.
- Admission is not needed in mild COVID 19 cases with pregnancy unless there is any obstetric cause. Triage, screening and isolation admission of Labour patients is no different than any other COVID positive patient, (brought in private vehicle, mild cases can be cured in home isolation, Labour & delivery in one isolation room, received and cared by health care worker in complete PPE)
- Continuous Feto- maternal monitoring and cutting short the second stage of labour is key practice.
- Mode of delivery can be vaginal in mild and moderate cases, severe cases and obstetric cause requires caesarean section.
- Vertical transmission is yet to be confirmed but studies gives sufficient evidence of need of continuous fetal monitoring during labour so as to identify the fetal distress.
- WHO & FOGSI recommends Breastfeeding, the reviewed studies couldn't find breast milk infected, but mother has to be taught about the respiratory and hand hygiene.
- Mandatory testing of all the women requiring admission in labour room is not economic but basic PPE is needed in all cases.

## 6. Conclusion

Though there are only a few studies available in this field to date, it is evident that the COVID-19 pandemic has led to a vigorous and multifaceted response from various researchers across the world. Researches on pregnancy and COVID are many but still lacking evidence due to lack of number and majority of studies from Wuhan make it a need to further studies in different affected parts of the World for better generalizability.

There is also a need for further research in India for better country-specific management of pregnancy with COVID.

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