

Pregnancy with COVID-19 Disease: Management & Critical Review in Chattogram Maa O Shishu Hospital Medical College (CMOSHMC)

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Abstract:

Background: Pregnant women with COVID-19 disease are at increased risk of severe illness with greater risk of intensive care unit admission, mechanical ventilation & even death specially in 3rd trimester. Pregnancy greater than 20 weeks with severe maternal illness have five times more ICU admission than pregnancy before 20 weeks.

Objective: Clinical evaluation of course of COVID-19 disease among Covid positive pregnant women to raise awareness emphasizing preventive measure, to seek early medical care & to have an institutional protocol for maternity care during pandemic.

Methods: A prospective observational study in a single tertiary pandemic centre in CMOSH-MC during 15th March to 15th October 2021. All pregnant women admitted with sign symptom of COVID-19 disease, RT-PCR +ve, HRCT+ve or both included in the study.

Total 2639 patient admitted with in COVID-19 disease in the study period 54% were female & among them 64 (2.4%) were pregnant. Out of 64 pregnant mother 20(31%) were admitted in ICU, 61(95%) in 3rd trimester 29 to 39 weeks, 2 previable (aborted) & 1 in postpartum period. Among 61 patient, 23 delivered 11 (48%) vaginal, 12(52%) cesarean section & 7 (11%) died. Indication of cesarean section 3 were for severe & critical covid status & rest 9 were for obstetric cause. 38(60%) patient recovered from covid disease among them 10(16%) from those admitted in ICU & discharged on D16 to D21 with advise for Antenatal checkup & institutional delivery later on. Planned cesarean section for 3rd gravida 39 weeks pregnancy P/ H/O 2 cesarean section was delayed for 10 days after resolution of symptom & cesarean section done at 40+3 weeks, both the mother & baby were healthy. Among patient admitted in ICU lung involvement were 50 to 90 % in HRCT & treatment was given according to guideline inj. Enoxypyrine, Inj. Ramdisivir, steroid & Tocilizumeb. SPO₂ maintained by O₂ progressively through nasal canula, face mask, HFNC (20 patient) & mechanical ventilation in 4 patient. Among 7 death 2 died in antenatal period one from cardiac arrest & 1 from cardiorespiratory failure (admitted with SPO₂ 37%). Rest 5 died in postnatal period 3 after cesarean, 2 being for severe Covid status, one for obstetric indication on D9 in hyper immune state & 2 after vaginal delivery. All 7 patient had lung involvement 70 to 90% in HRCT, Out of 23 delivery, 8 were preterm birth with 1 IUD & 15 delivered at term. Five neonate were admitted in NICU for prematurity, IUGR for observation. Breast feeding & skin to skin contact were encouraged. All neonate were RT-PCR-ve, 2 neonate died on D13 & D17 due to prematurity & IUGR.

Conclusion: Critical review was done to prepare an institutional protocol to optimize care & to reduce risk of severe illness & death. All patient & support partner should be counselled about infection preventive measure, risk factor reduction & importance of seeking medical care early once symptom develop.

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Introduction:

In COVID-19 disease a global pandemic pregnant mother are not at higher risk of infection but are at higher risk of severe & critical disease with respiratory involvement specially in 3rd trimester & puerperium¹. So better understanding of stages of COVID-19 immune & clinical response on innate immunological & physiological changes specially in high risk pregnancy & critical care can reduce maternal & neonatal mortality & morbidity. Pregnancy is a state of immune modulation rather than suppression. Placental immune response & its trophism for COVID-19 virus induces hyperimmune response specially in Lungs, heart, kidney, intestine & placenta. Pregnancy induces physio—anatomical changes in the cardiopulmonary system, adaptive changes in immune system, dysregulated immunity i.e Th1/Th2 immunoregulatory system deviate towards Th2 response with higher CD3, CD8, T cell suppression & cytokines IFN- γ , IL6 & IL10 overproduction². Rapid multiplication of virus in respiratory system with already compromised mucocilliary mechanism & NK/T cell suppression with slow clearance of virus leads severe disease, cardiorespiratory failure specially in 3rd trimester³. More than twofold increase expression of ACE² receptor in target organ in 3rd trimester also increase severity. Reduced cardiopulmonary reserve & existing tissue anoxia due to upward displacement of diaphragm are also exaggerated.

Disease severity varies from asymptomatic (81%), mild, moderate, severe (14%) & critical disease (5%). Asymptomatic, mild to moderate cases in absence of pneumonia & normal vital sign can be managed at home isolation specially in 1st 2nd & early 3rd trimester with hydration, fetal movement count & vital monitoring. Prophylactic LMWH 40 to 60 mg/m can be given in high risk patient. Lab investigation done as per protocol. USG monitoring 4 weeks after onset of symptom & face to face care if <32 weeks but within

7 to 14 of resolution of symptom if pregnancy advances⁴. Social distancing at more than 28wks encouraged. Pregnant patient with clinical findings of COVID-19 disease that warrant pharmacological treatment, O₂ supplementation should be considered for inpatient therapy. Moderate disease with risk factor should be admitted at 37 to 38 weeks, pregnancy with IUGR admitted once diagnosed & pregnancy management should be on obstetric indication. Pregnancy more than 39 weeks planned for expectant management with intensive monitoring till early warning sign. Severe & critical patient with ARDS, Coronary syndrome, AFE, Sepsis & septic shock admitted in intensive care unit irrespective of trimester, for proning at 2nd & early 3rd trimester & critical care management as per protocol. MgSO₄ is used as neuroprotector <32wks with antepartum steroid for lung maturity & antibiotic to prevent secondary infection. Support partner should be tested & if any symptom within 10 days or fever within 48 hrs must leave the maternity. Time of delivery should depend on disease spectrum & gestational age. The risk factor for progression to severe disease, Intensive care or even death is unknown, it is unclear when to wait for maternal decompensation i.e septic shock, acute organ failure. But delivery before decompensation & worsening clinical illness or persistent clinical illness might be an option⁵. Multidisciplinary Team (MDT) should take the decision whether emergency LSCS birth or IOL should be prioritized following escalated guideline for maternal optimal stabilization. PTB is 2 to 3 times more, iatrogenic is greater than spontaneous⁵. There is no evidence to favour one mode over other vaginal versus cesarean delivery & is individualized. Covid disease is not an indication of delivery rather delaying planned IOL & Cesarean section 3-7 days beyond symptom relieve or RT-PCR negative has overall beneficial effect⁵. Figure 1 depicts five stage model for COVID-19 immune & clinical response.

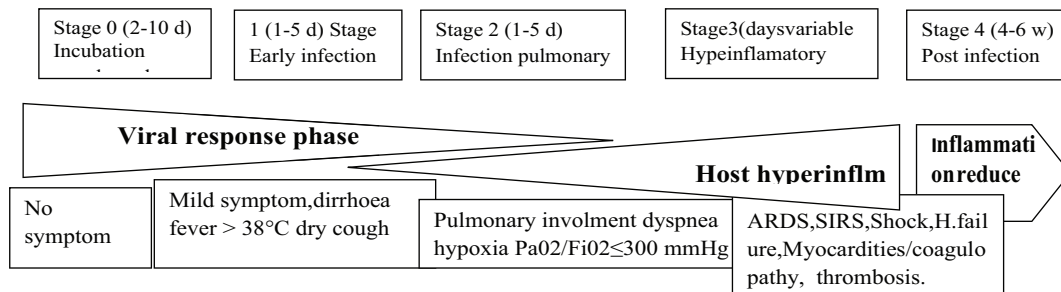


Fig.-1: Five stage model for COVID-19 immune & clinical response²

Mode of delivery depends on obstetric indication & spectrum of disease severity- endothelial dysfunction, pulmonary oedema, myocardial oedema & dysfunction. Mother must be stabilized achieving optimum maternal status targeting O₂ saturation (95%) greater than non-pregnant (92%) before delivery specially cesarean section⁶. In vaginal delivery 2nd stage should be cut short by forceps or ventouse. Combined spinal & epidural is the choice of anesthesia while general anesthesia makes airway maintenance difficult, high risk for professional infection. Women with worsening symptom or vaginal birth is not eminent or poor progress of labor, multiple gestation more than 34 weeks cesarean section is considered in severe & critical disease. Respiratory condition deteriorate due to re-expansion of lungs & Increase blood volume in reflex circulation after delivery. But intensive care can improve the patient as she is no longer pregnant⁷. Among asymptomatic & mild disease cesarean section has higher risk of clinical deterioration & increase need for oxygen supplementation, NICU admission compared to vaginal delivery, so oxygenation is to be maximized SPO₂ >95%⁷.

Polyclonal antibody Casirivimab & Imdevimab 1200mg i/m can be given in mild to moderate cases exclusion criteria being patient with O₂ therapy, severe disease or hospitalized patient⁸. In Severe complication i.e cardiogenic /septic shock & severe respiratory distress higher dose corticosteroid is needed.⁸ When patient is in labor or induced with oxytocin option to improve patient oxygenation prior to contemplate delivery is needed Entonox single patient microbiological filter & Epidural are the preferred labor analgesia & have positive effect on covid related ARDS.⁷

In absence of Entonox/Epidural acetoaminophen upto 4 gm can be given as analgesia, NSAID cause rapid progression of disease & opioid bears clinical risk⁸ Delayed cord clamping & skin to skin contact not discouraged unless preterm birth or needs NICU or critical care. Respiratory acidosis is to be corrected to have oxygenation goal. On ventilation deep sedation, intermittent proning & neuromuscular blocking agent is a lung protective strategy. In rapid progression of COVID-19 disease biochemistry can overlap with PET with severe symptom & HELLP syndrome, RT-PCR done to differentiate. Aspirin can be given in patient with preeclampsia & should be

stopped if platelet <50x10⁹/L. Neutral fluid balance should be maintained in labor to avoid overload⁸.

In postpartum should be aware of potential hypervolemia, close monitoring of intake & output along with respiratory symptom is prudent particularly first 24 to 48 hours postpartum⁸. Both pregnancy & COVID-19 disease raise risk of thromboembolism, patient can clinically worsen after several days of apparently mild illness⁹. So need for postpartum follow up 8 to 12 wks should be highlighted⁹. LMWH 40 kg/24hr if wt < 80kg & 60mg if wt > 80 kg with other risk factor & continued up to 6weeks⁵. Women with infection more than 4 weeks before delivery should receive LMWH 40 mg to 60 mg / day for 10 days as per guideline. Breast feeding is not discouraged but mask & hand hygiene is to be maintained. Baby should be kept in follow up for neurodevelopmental behaviour⁹. *Discharge 14 days after clinical feature resolve or 4 weeks after beginning of symptom or after RT-PCR negative.*⁵ PPIUD is the choice of contraception. Implant can also be given. Must be counselled for vaccination which can be given any time preferably 13 to 33 weeks gestation⁴.

Methods:

A Prospective observational study was done in single centre tertiary Corona Unit of Chattagram Ma-O-Shisu general hospital & medical college from 15th March to 15th October 2021. All pregnant women with sign symptoms of COVID-19 disease confirmed by Positive Antigen test or RTP-CR+ & Or + HRCT or both were included in the study. Pregnancy with fever with or without cough, gastroenteritis, pregnancy with hypertensive disease with severe symptom, pregnancy with anemic heart failure but -ve Antigen test, -ve RT-PCR & or -ve HRCT were excluded from the study. Out of total 2639 patient admitted in Covid unit, 64 Pregnant patient were sampled by purposive sampling. Patients age, gestational weeks, COVID-19 disease severity, any risk factor affecting disease severity were evaluated. Medical management were done according to National guideline by O₂ supplementation, inj. Ramdisivir, Steroid, inj. LMWH & inj. Tocilizumab.

Vital monitoring was done for early warning sign, refractory hypoxemia, need for ICU admission & assessment of organ dysfunction. Accordingly an institution protocol was prepared for obstetric management (Figure 2). As part of preventive measure support partner were tested & if had any

Asses patient symptom &exposure-

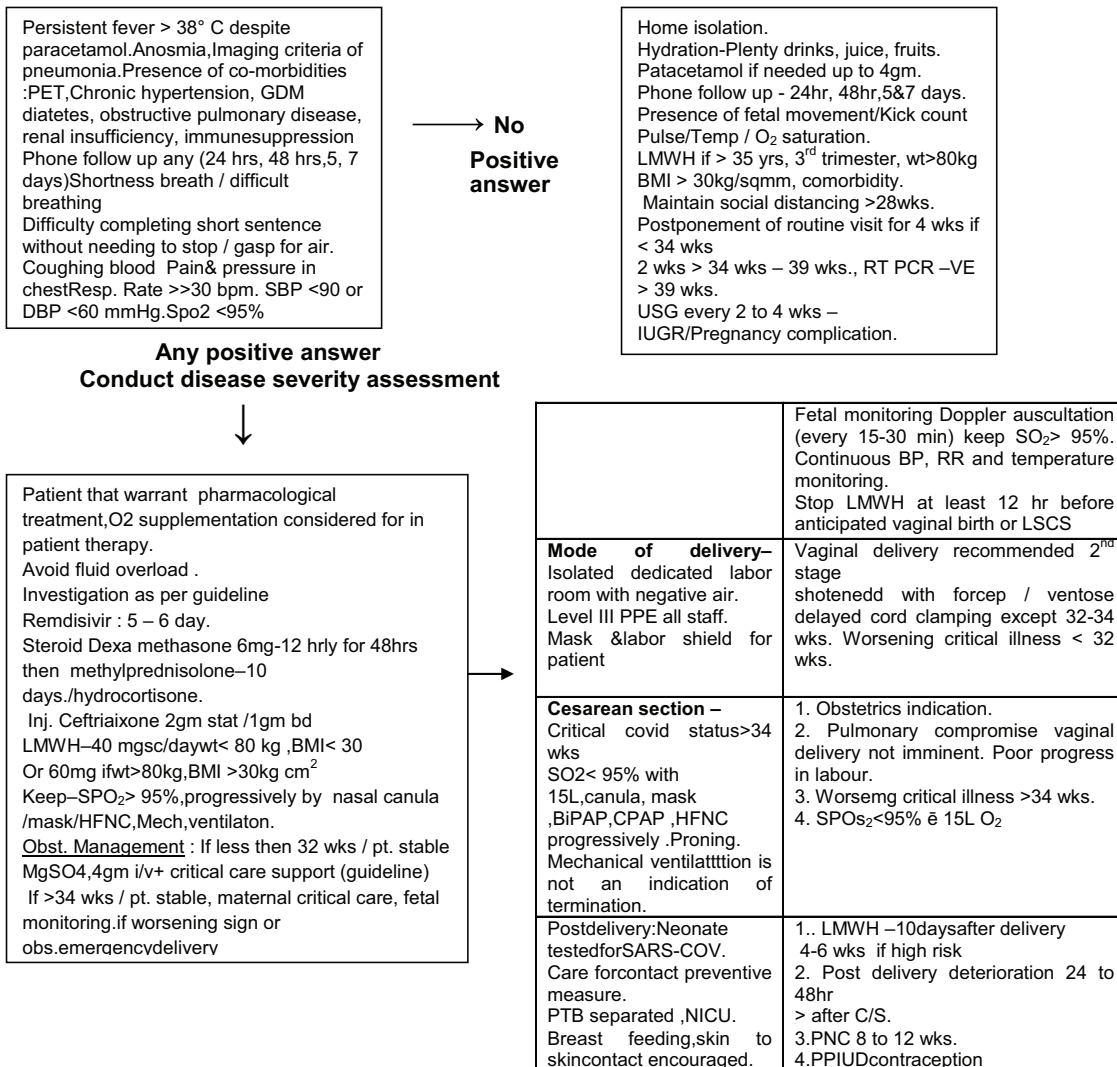


Fig 2: Protocol for Pregnancy with COVID-19 disease management:

symptom within 10 days or fever for 48 hrs were advised to leave maternity. Delivery was conducted in an isolated room with level III PPE. Neonate were also cared by asymptomatic care giver maintaining infection preventive measure.

Operational definition-

a. Covid 19 disease severity-¹

- i. Asymptomatic – RT-PCR +ve. Admitted for birth.
- ii. Mild - RT-PCR +ve, Mild symptom with no pneumonia, FiO₂>300
- iii. Moderate- RT-PCR +ve, Moderate symptom with pneumonia, FiO₂ 200- 300.

- iv. Severe: RT-PCR +ve, Clinical sign at rest RR>30bpm, HR>125bpm Spo₂ <93% on room air or at sea level or Pao₂/Fio₂ <100.
 - v. Critical-Severe+Respiratory failure needs HFN oxygen, evidence of shock, acute renal, hepatic& neurological dysfunction. admission to ICU.
 - vi. Refractory hypoxemia : Inability to maintain PaO₂> 70mmHg with maximal FiO₂ - 1(100%) despite efforts to optimize ventilation PEEP with prone position, inhaled vasodilator& or neuromuscular blockade.
- b. Risk factor : Pregnancy covid +ve status with age> 35years. Weight >80 kg, BMI >30kg/m²,**

preeclampsia, Chronic Hypertension, Heartdisease, Asthma, GDM, CKD, SLE^{4,5}**c. Early worsening sign⁸: Increase sensation of work of breathing .**

Drowsiness even in normal oxygen saturation.
Reduction in urine output .
Respiratory rate > 25 breath/min despite oxygen supplementation.

d. Intensive care unit admission criteria⁵: One major or three minor criteria.

Major criteria-Need invasive mechanical ventilation or Shock
SBP < 90 mmHg & DBP < 60 mmHg with need for vasopressin.
Minor criteria Respiratory rate > 30 breath/min.
Pao₂/Fio₂ < 250.
Multilobar infiltrate, Confusion, disorientation.
Serum creatinine > 77 ng/dl. Leukopenia < 4000 cell/cumm.
Thrombocytopenia < 100000 platelet/cumm.
Hypothermia- Central Temperature < 36°C.
Hypotension need for excessive fluid resuscitation.

e. Oxygen supplementation: Keep PO₂ > 95% progressively⁵

- i. Nasal canula- 1-5L/min
- ii. Mask-6 to 15L
- iii. HFNC-> 15 L
- iv. Mechanical ventilation: Sedation +paralysis +prone ventilation.

f. Organ dysfunction⁵

Respiratory –Chest retracton, Radiological pneumonia >60%, o₂ deficit-

Cardiac dysfunction –Troponin >100ng/dl. LDH- >350 IU

Renal dysfunction Creatinine >84umol/L

Hepatic dysfunction ALT >66U/L.

Sepsis qSOFA Score >2 or 3 of the following Criteria-Glasgow < 13 SBP < 100mmHg, Respiratory Rate > 22 breath/min.

Septic Shock –Arterial hypotension that present after resuscitative volume & that require vasopressor to maintain mean arterial pressure >65 mm Hg & serum Lactate > 2mmol in absence of hypovolemia.

Result:

Out of total 2639 patient in Covid unit 54% were female among them 64 (2.4%) were pregnant with

mean age 27±2D (18 to 38yrs), Urban 52% mostly homemaker (78%) in middle class group, elderly & multigravid. 40% pregnant patient suffered severe & critical disease with 31% ICU admission specially in 3rd trimester 29 to 40+ weeks (94%). Among 23 delivery 11 (48%) were vaginal & 12 (52%) cesarean section, 9 (75%) for obstetric indication & 3 (25%) for covid status, 48% patient being deteriorated following childbirth 8 after cesarean section & 3 after vaginal birth. Among the neonate 15 (65%) born at term & 8 (35%) at preterm with APGAR SCORE 7 to 9 in 17 patient, 5 (22%) needed NICU with 2 NND & 1 had IUD. Out of 64 pregnant patient 57 (89%) recovered with single or multiple psychological morbidity & 7 (11%) died 2 in Antepartum & 5 postpartum mainly due to organ failure. Most of the patient were discharged on 10 to 28 days of admission with total period of hospital stay 3hrs to 28 days.

Table-I*Demography of the study population*

| Variable | Frequency - % |
|---------------------|---------------|
| Mean age | 27±2(SD) |
| Rural | 31 (48%) |
| Urban | 33 (52%) |
| Education : | |
| < Secondary | 29 (45%) |
| > Secondary | 28 (44%) |
| > Graduation | 7 (11%) |
| Occupation : | |
| Teacher | 5 |
| Home maker | 50 (78%) |
| Others | 9 |
| Parity: | |
| Prime | 24 (39%) |
| 2-4 | 38 (59%) |
| >4 | 2 |
| Monthly income | |
| 10,000-20,000/taka- | 6 |
| 20,000-50,000/taka- | 18 |
| > 50,000/taka- | 40 (%) |

Table-II*Pregnancy ç covid 19 disease severity*

| Total 64 | Frequency% |
|--------------------------|------------|
| Asymptomatic | 5 (8%) |
| Mild | 15 (24%) |
| Moderate | 18 (28%) |
| Severe | 6 (9%) |
| Critical admitted in ICU | 20 (31%) |

Table-III
Gestational age, disease severity & need for oxygen supplementation

| Gestational age | Disease severity | | | | Oxygen supplementation (O ₂) | | |
|-----------------|------------------|----------|--------|----------|--|-------------|------------------------------|
| | Mild | Moderate | Severe | Critical | Nasal canula/ Face Mask, | HFNC 31% | Mech. Ventilation (6%) |
| 28-36wk- | 5 | 7 | 2 | 12 | 34(53%) | 12(19%) | 3 |
| 36-40wk- | 10 | 8 | 3 | 8 | 10 | 8(12%) | 1 |
| >40 | | 1 | 1 | | 2 | | |

Table-IV
Mode of delivery

| Delivery | Total(%) | Preterm(%) | Term(%) |
|--------------|----------|------------|---------|
| Vaginal | 11 (48%) | 5 (22%) | 6 (26%) |
| C/S : | 12 (52%) | | |
| Indication | | | |
| Obstetric | 9 | 1 (4%) | 8(36%) |
| Covid status | 3 | 2(9%) | 1 (3%) |

Table-V
Puerperium

| Mode of Delivery | Uneventful | Evenful-respiratory Difficulty/need for O ₂ Vital deterioration | O ₂ supplementation | Mech. Ventilation |
|------------------|------------|--|--------------------------------|----------------------|
| Vaginal n=11 | 8 | 3 | 4 | 3 |
| C/S n=12 | 4 | 8 | 7 | 6 |

Table-VI
Neonatal outcome

| Gestational weeks | Frequency-% | APGAR SCORE 1min/5min | Weight | NICU admission 5(22%) | Take home baby 20 (87%) | NND (9%) | IUD (4%) |
|-------------------|-------------|--------------------------|---------------|--------------------------|----------------------------|----------|----------|
| Preterm 28-36 wks | 8 (35%) | 7 to 8 | 1.6 to 2kg | 3 | 20 | 2 | 1 |
| Term 37-41 wks | 15(65%) | 7 to 9 | 2.5 to 2,6 kg | 2 | | | |

Table-VII
Maternal outcome

| Recovered 89% | Time & cause of death | 7 (11%) |
|---|-----------------------|---------|
| 57 (89%) | Antenatal- | 2 |
| 53% covid ward & 36% from Covid ICU. | Postnatal | 5 |
| Morbidity single to multiple after 1 month of discharge (over telephone) (35%) | MOF - | 2 |
| Insomnia | Reop failure - | 2 |
| Depression | Cardiac failure | 2 |
| HTN | Others -? | 1 |
| DM | Pulmonary embolism | |
| Respiratory : | | |
| Cough / | | 8 |
| Exhaustion..... | | 15 |

Discussion:

In Pregnancy physio-anatomical adaptation & immunomodulation with alteration in cell mediated immunity makes pregnant tolerant to allogenic fetus but decrease ability to defend against virus. Pregnancy with asymptomatic to moderate COVID-19 disease without risk factor though favourable but relatively high rate of complication i.e need for oxygen therapy, prolong intensive care, cardiorespiratory dysfunction, ventilator support & multiorgan dysfunction in severe & critical disease need critical review⁹. There were 78% infection in homemaker indicate community spread. Fewer (2,3%) admission in previable stage may be due to poor co expression & co-localization of placental ACE2 & trans membrane serine protease before 20 weeks & rarely become severe⁴. Middle class 40 (63%) may be they were relatively comfortable with cost & management in this hospital

Severe disease is more in pregnancy in elderly, multipara with comorbidities (7), obesity(1), Preeclampsia (2) asthma(1), GDM (2)& Multiple pregnancy in late 3rd trimester^(2,4,5). SARS COV2 are highly heterogenous in host immune response, in pregnancy Tcell & humoral immunity are suppressed, immunomodulator interleukine & growth factor are decreased, anti inflammatory IL, chemotactic growth factors are not highly expressed specially in 3rd trimester thereby increasing hospitalization, risk for ICU admission(31%) & severe hypoxemia supplemented progressively by nasal canula to mechanical ventilation⁹ (4,6%). Including 1 patient admitted on 2nd postnatal day 12 patient (8 after C/S & 3 vaginal birth) deteriorated requiring increase need for oxygen supplementation progressively nasal canula/mask(9) HFNC (8 recovered) mechanical vent (3 died) than vaginal delivery mech vent (1 died), HFNC (1died) face mask/nasal canula (9). Exaggerated disease severity & pregnancy complication is seen if onset of symptom is just before ,on the day & immediately after delivery hyperinflammatory state².

Maternal clinical status may improve without delivery¹⁰. Out of 64 patient 38 pregnant received medical management with fetal monitoring by doppler auscultation among them 10 from ICU, after recovery discharged with advise for follow up & institutional delivery later on. Avoiding iatrogenic preterm birth & its associated morbidity & mortality is specially important who present with severe & critical covid at earlier gestation¹¹, maternal support & doppler auscultation of fetal heart in a till patient remain stable¹¹. 10 patient with gestational age 29 wks to at

39wks suffered critical disease, more than 70% lung involvement in HRCT maintained O₂ saturation at 95% progressively by HFNC 50L to 80L oxygen for 3to 5 days then recovered, Doppler auscultation fetus alive & discharged on D15 to 18 with advise for kick count, follow up scan & face to face visit after 3-4 wks if needed earlier upto 38 wks. COVID-19 disease is not an indication of c/s in favor of vertical transmission or to give antiviral to mother, or for optimization of care. Rather delaying till early warning sign or RT-PCR negative or 14 days after onset of symptom or 3 to 7 days for resolution of symptom may be beneficial¹¹.

Caesarean section is inevitable in maternal clinical decline due to decompensated cardiorespiratory status, coagulopathy refractory hypoxemia or prolong critical disease to reduce physiological demand of pregnancy & to optimize critical care. But risk of pulmonary complication & mortality is much more due to surgery induced physiological stress & trauma. Among the 3 patient having cesarean 2 died from cardio respiratory failure on 2nd & 3rd postnatal day. Careful monitoring of vital parameter along with provision of medical attention to respiratory complication, Heart failure, Renal complication & hepatic failure is needed¹¹. (9,39%) C/S done for obstetric indication & (3,13%) for severe & critical disease >34wks maintaining O₂ saturation <95% with 15L oxygen. Women with pulmonary compromise O₂ saturation <95% with 15 L Oxygen labor may stress pulmonary situation & maternal refractory hypoxia is an indication of cesarean section >32-34wks preferably 34wks optimizing maternal status¹². Worsening critical illness termination is the rule <32wks vaginal, >32wks CS¹¹. Before 32 wks Multidisciplinary team (MDT) decision should made balancing maternal neonatal risk specially in intubated patient or need for maternal prone position for ARDS5. 2 patient with critical disease one at 36wks had IUD supported by mechanical ventilation D9 & other 33wks on HFNC 90L developed severe hypoxemia immediate after vaginal birth, died on 2nd & 3rd postnatal day, D 18 & D 16 of disease respectively. Among 12 patient delivered by C/S, 2 3rd gravid patient had C/S on day 7 to 10 of onset of disease i.e hyper immune state one critical disease on mechanical ventilation, other obstetric indication maintaining SPO₂ 95% with 10 L oxygen. Both patient deteriorated following childbirth developed severe hypoxemia, O₂ supplemented by HFNC, & higher dose steroid given but both died on D¹² & D¹⁵. Physiological adaptation to labor, delivery & immediate postpartum could exaggerate the dysregulated inflammatory cascade in setting of

underlying severe systemic infection. These physiological changes include significant fluid shift between interstitial, intracellular & intravascular compartment maximizing maternal cardiac output, autotransfusion of upto 500ml of blood back into the intravascular compartment, catecholamine surge & release of inflammatory mediator within the endothelium. These in setting COVID-19 infection could place the patient at a higher risk of developing endothelial dysfunction. Dysregulated immunity & increase maternal & fetal demand for oxygen⁵. Such consideration were at the forefront in the mind of entire MDT optimizing patient oxygenation. When patient is in labor or induced with oxytocin option to improve patients oxygenation prior to contemplate delivery were maximized SPO₂ 95%. Respiratory acidosis is to be corrected to achieve oxygenation goal⁵. Planned IOL & C/S should be avoided specially in hyper immune state⁵. Expected management more than 14 days from onset or 3 to 7 days from resolution of symptom or till RT-PCR negative^{10,11,12} can have beneficial effect. Follow up USG at 28,32,& 37 weeks or at least one should be done after recovery from severe disease¹². One patient 3rd gravid 39 wks pregnancy with P/H/O 2 C/S maintaining 95% oxygen saturation with 15L oxygen had her elective C/S on 40+3wks gestation on D²¹ of disease when she was symptom free & follow up scan satisfactory. Both mother & baby were well & discharged on 5th postnatal day.

Steroid for lung maturation dexamethasone 6mg 4 doses <34wks & then methyl prednisolone for 10 days for ARDS were given in severe & critical disease¹³ but higher dose hydrocortisone was used in one postpartum patient admitted 2nd postnatal day with severe ARDS, 70% lung involvement in HRCT, O₂ saturation maintained 93% with HFNC, medical management as per guideline & discharged on day 15 of admission. Anti IL⁶ agent given within 24hrs organ support in an intensive care unit¹⁴. All delivery were conducted in isolated room, level III PPE, vital sign monitoring with minimal vaginal examination. Acetaminophen 1gm stat were used as labor analgesia to reduce pain & anxiety induced cardiopulmonary stress.

Potential chance of covid induced alteration in mothers psychological status, insomnia, anxiety, depression were addressed. On telephone follow up more than 35% patient suffered from insomnia.¹⁵ to cope with psychological stress of 14 days home isolation practicing psycho education- taking break from Covid related news-stories, mindfulness, eating healthy meal regular exercise, getting adequate sleep

is an essential component of patient management¹⁵. Patient advised to take care for infant neurobehavioural development¹⁴.

Most death occur immediate postpartum upto 6wks & extended postpartum 1year¹⁵. In our observation of total 7 death 2 died antepartum, 1 prime at 40 wks admitted with cardiomyopathy, respiratory failure & SPO₂ 37% with face mask died within 3 hrs of admission with failed attempt for stabilization on D10 of her disease with fetus in utero, 2nd patient 36yrs 3rd gravid at 33wks with GDM & progressive O₂ demand upto 80L HFNC died from sudden cardiac arrest. On D9 of her disease. Remaining 5 died in postpartum. 3 multipara one (3rd gravid 38wks H/O of asthma needed mechanical ventilation died on 3rd postnatal day following C/S, D12 of onset of disease, 2nd patient a 3rd gravid 33 weeks pregnancy GDM on HFNC 90L O₂ refusing mechanical ventilation, planned termination was done vaginally for maternal deterioration but mother died on 2nd postnatal day D15 of onset of disease. 3rd patient (emergency LSCS at 37 + wk P/H/O 2 C/S with labor pain on D10 requiring 15 L O₂ to maintain SPO₂ 95%, died on 2nd postnatal due to respiratory failure, severe hypoxemia with ARDS), 4th 3rd gravid 34wks with refractory hypoxemia LSCS done optimizing oxygenation on day of admission D7 onset of symptom further deteriorated progressively needed mechanical ventilation died on 21st postnatal day D28, 5th prime 36 wks IUD needed mechanical ventilation on D9, treated according to guideline, improved, extubated on D12 of onset of symptom, saturation maintained 15 L oxygen, pregnancy induced on D15 but following childbirth she died on 2nd postnatal day D18 of onset of symptom, Most of the patient had lung involvement around 80 to 90% in HRCT. Death were due to respiratory failure, cardiac failure, Sepsis with MOF & or intubation failure due to airway oedema⁶.

Neonatal issue: Among 23 delivery 15 were at Term (65%), 8 at preterm (35%) & 5 (22%) need NICU. 20 (87%) take home baby with APGAR SCORE 7 to 9 & 3 (13%) death (1 IUD, 2 NND) in severe & critical disease. Neonate should be tested, cared following contact preventive measure Mask, gown & hand hygiene. Asymptomatic newborn could be discharged after delivery & cared by asymptomatic family members with adequate isolation measure & symptomatic & premature should be hospitalized¹⁶. Breast feeding & skin to skin contact encouraged but contact & droplet preventive measure should be taken. CDC recommend temporary separation & expressed milk for maintenance¹⁶.

Conclusion: Pregnant women are considered vulnerable during this ongoing pandemic due to exacerbated detrimental effect in mothers & fetus. Better understanding of stages of COVID-19 immune & clinical response on immunological & physioanatomical changes in pregnancy, labor & early puerperium & immediate management can prevent critical disease & death.

Reference:

1. Marie- Julie Trahan, Isabelle Mahame, Critina Mitric, Camille Simard, Jed Lipes, Halim A Abenhaim: Severe & critical covid; A case series from montreal. *Journal of Saga pub.com.* March 9, 2021..
2. Raquel Ferrer-Oliveras, Manel Mendoza, Sira Capote, Laia Pratcorona, Enrique ESTEVE-Valverde, Luis Cabero Roura, Jaume Alijotas-Reig: Immunological & physiological approach of Covid -19 in pregnancy. *Arch gynaecol obstet* 2021, july; 304(1):39-57.
3. Lu Zang, Lan Dong, Lei Ming, Min Wei, Jun Li, Ruheng Hu & Jing Yang: Severe acute respiratory syndrome corona virus 2 (SARS-COV-2) infection during late pregnancy: a report of 18 patients from Wuhan, China. *J. BMC Pregnancy childbirth*. 2020 Jul 8; 20(1):394.
4. Rakesh Kumar Cut Meurah Yeni, Nikan Asri Utami, Rupali Masand, Rajesh Kumar Asrani, Silesh Kumar Patel et al : SARS CoV2 infection during pregnancy and pregnancy related conditions: Concerns, challenges, management & mitigation strategies- a narrative review. *Journal of infection and public health*. *Journal home page*: <http://www.elsevier.com/locate/jiph>
5. Jerald Pelayo, Gabriella Puugliese, Grace Salacup Eduardo Quintero, Adeep Khalifeh, David Jaspán, & Bhavana Sharma: Severe covid 19 in third trimester pregnancy: Multidisciplinary approach. *www.hindawi.com* vol. 2020/ Article ID. 8889487.
6. Yukiko Chinen, Yoshino Kiniyo, Keiko Mekaru, Tadatsugu Kinjo, Yuuri Higure, Takeshi Kinjo, Kajua Miyagi Hisako Yamada Hitoshi Masamoto, Hideki Goya Tomohide Yoshida Sakiko Maeshiro, Masashi Nakamatsu Jiro Fujita Yoichi Aoki: Critical respiratory failure in pregnancy complicated with Covid-19: A case report. *Eur. J. obstet Gynaecol Reprod Biol*. 2021 August; 2063; 106-108.
7. Waffa Ali Belail Hammad, Mariam Al Beloushi, Badreleden Ahmed, Justin CKonje: Severe acute Respiratory syndrome coronavirus 2 infection in pregnancy. *J. ejo grb*. 2021.06.01es
8. Torre Halscott, MD, MS; Jason Vaught, MD; and the SMFM COVID -19 Task Force: Society for Maternal-Fetal Medicine; Management Consideration for pregnant patients with Covid 19 developed with guideline updated 1.7.21
9. Dilek Shahin, Atakan Tanakan, Seyit A. Erol, Ali T Anuk, Elif G. Y. Eyi, A. Seval Ozgu-Erdinc, Aykan Yucel et al. A pandemic centers experience of managing pregnant women with COVID-19 infection in Turkey : A prospective cohort study. *Int. J. Gynaecol Obstet* 2020; 151: 74-82
10. Jianghui Cai, Mi Tang, Yu Gao, Hongxi Zhang, Yanfeng Yang, Dan Zhang, Han Wang, Hua Liang, Rui Zhang & Bo Wu: Cesarean section or Vaginal Delivery to prevent possible Vertical Transmission From a pregnant mother Confirmed with Covid-19 to a neonate A Systematic Review. <https://www.frontiersin.org/article/10.3389/fmed.2021.634949>.
11. Margot L. Debrabandere, BA. Dana C. Farabaugh, MD. Caro lyn Giordano, PhD. Review on mode of delivery during COVID 19 between December 2019 and April 2020. *Am J Perinatol* 2021; 38:332-341.
12. Lopez M, Gonce A, Meler E, Plaza A, Hernandez S. Martinez-Portilla R.J. Cobo T. Garcia F. et al: Coronavirus Disease 2019 in pregnancy; A Clinical Management Protocol & consideration for practice. *Fetal Diagn. Ther* 202; 47:519-528.
13. Royal College of obstetrician gynaecologist - Corona virus (Covid 19 infection) : Information for health care professionals. Version 13: Published Friday 19 February 2021
14. Safe Motherhood & Covid 19-March 2021 Update. www.arcgis.com/apps/opsdashboard/index.
15. National guideline on clinical management of Covid 19; DGHS Bangladesh short edition of 9th version. 6.5.2021.
16. CDC guideline and Professional Recommendations: Corona virus & Pregnancy <https://www.cdc.gov/coronavirus/2019-nCov/index>.