Title :

Pregnancy outcomes, Newborn complications and Maternal-Fetal Transmission of SARS-CoV-2 in women with COVID-19: A systematic review

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Abstract

Objective: The aim of this systematic review was to examine published and preprint reports for maternal and fetal outcomes in pregnant women with COVID-19 and also assess the incidence of maternal-fetal transmission of SARS CO-V-2 infection.

Design : Systematic review

Data sources: We searched PUMBED. Medline, Embase, MedRxiv and bioRxiv databases upto 31st March 2020 utilizing combinations of word variants for "coronavirus" or "COVID-19" or "severe acute respiratory syndrome" or "SARS-COV-2" and "pregnancy". We also included data from preprint articles.

Study selection : Original case reports and case series on pregnant women with a confirmed diagnosis of SARS-CoV-2 infection.

Data extraction : We included 23 studies [China (20), USA (01), Republic of Korea (01) and Honduras, Central America (01) reporting the information on 172 pregnant women and 162 neonates. The primary outcome measures were maternal health characteristics and adverse pregnancy outcomes, neonatal outcomes and SARS-CoV-2 infection in neonates was extracted. Treatments given to pregnant women with COVID-19 were also recorded.

Results: Out of 172 women affected by COVID-19 in pregnancy, 160 women had delivered 162 newborns (2 set of twins, 12 ongoing pregnancies). In pregnant women with COVID-19, the most common symptoms were fever (54%), cough (35%), myalgia (17%), dyspnea (12%) and diarrhea (4%). Pneumonia was diagnosed by CT scan imaging in 100 % of COVID-19 pregnant women. Pregnancy complications included delivery by cesarean section (89%), preterm labor (21%), fetal distress (9%) and premature rupture of membranes (8%). The most common co-

morbidities associated with pregnant women with COVID-19 were diabetes (11%), hypertensive disorders (9%), placental disorders (5%), co-infections (6%), scarred uterus (5%), hypothyroidism (5%) and anemia (4%). Amongst the neonates of COVID-19 mothers, preterm birth (23%), respiratory distress syndrome (14%), pneumonia (14%) low birth weight (11%), small for gestational age (3%) were reported. There was one still birth and one neonatal death reported. Vertical transmission rate of SARS-CoV-2 is estimated to be 11%.

Conclusion

In pregnant women with COVID-19, diabetes and hypertensive disorders are common co-morbidities and there is a risk of preterm delivery. Amongst the neonates born to mothers with COVID-19, respiratory distress syndrome and pneumonia are common occurrence. There is an evidence of vertical transmission of SARS-CoV-2 infection in women with COVID-19.

Keywords: Coronavirus, COVID-19, cough, comorbidities, fever, newborn, pneumonia, pregnancy, SARS-COV-2, vertical transmission.

Introduction

Coronaviruses are known to infect humans, other mammals, and birds causing respiratory, enteric, hepatic, and neurologic diseases [1]. Amongst these is a novel corona virus SARS-CoV-2, first time reported from Wuhan in China in December 2019 and causes a potentially life-threating respiratory disease termed as COVID-19 [2]. Since then, SARS-CoV-2 infection is reported from every country in the world has rapidly spread across the globe creating a massive public health problem. Owing to the high rates of human to human transmission, WHO declared COVID-19 as a pandemic [3]. More than 1.2 million confirmed cases of COVID-19 and almost 72,600 reported deaths (upto 8th April 2020), the pandemic has reportedly affected more than 180 countries/regions globally and majority of them are in local transmission phase [4].

Since this virus has not been detected in humans before, limited information is available about its effect on people; almost negligible information is available in pregnant women. Previously, members of the coronavirus family such as (SARS-CoV) and Middle East respiratory syndrome (MERS-CoV) are reported to be associated with severe complications during pregnancy like miscarriage, fetal growth restriction, preterm birth and maternal deaths [5]. Pregnant women are more susceptible to infections due to an immunocompromised status and need special attention. Furthermore, during the pandemic, hospital visits may enhance the chances of infection and conversely lack of medical care during pregnancy may do more harm. Hence, there is an urgent need to devise appropriate management protocols for pregnant women to access maternal health care with minimum exposure risk is desired during the current COVID-19 outbreak. However, this would require a thorough situational analysis of COVID-19 and pregnancy.

The aim of this systematic review was to assess the maternal and neonatal outcomes in pregnant women with COVID-19. We also assessed if there is any evidence of the maternal-fetal

transmission of SARS CO-V-2 infection. We believe this information will aid obstetricians and neonatologists to take evidence based decisions to manage pregnant women with COVID-19 and their newborns. This information will also help the societies of obstetricians and gynecologists to devise appropriate guidelines and management of pregnancy and coronavirus diseases in general.

Methods

We performed a systematic search in PUBMED, Medline, Google Scholar, preprint servers medRxiv, bioRxiv and arXiv databases utilizing combinations of word variants for "coronavirus", 2019 n-COV. or "COVID-19" and "pregnancy". The time line was restricted until 31st March 2020, no language restrictions were imposed (the articles were translated in English using google translator). We also applied snowballing method to identify any missed articles. For each search strategy, two authors (RG, DM) reviewed all the abstracts. Reviews, narrative articles, abstracts, duplicates were excluded for analysis. Special attention was paid to exclude grey literature like media reports, blogs and information from unverified sources.

The articles were shortlisted independently by DM and RG to include only the original studies reporting information on pregnant women with a confirmed diagnosis of SARS-CoV-2 infection (Fig.1)**.** The primary outcome measures were maternal clinical presentation, co-morbidities, adverse pregnancy outcomes, neonatal outcomes and SARS-CoV-2 infection in neonates. Third author (SM) coordinated the discussion for agreement of the shortlisted articles and looked for inconsistencies by randomly selecting a subset of articles (20%). The data underwent two rounds of iterations and verifications until all the inconsistencies in the data entries by RG and DM were sorted and all the authors agreed on the outcome measures. The inherent nature of the studies precluded us from ranking the quality of these studies.

Since most were case reports and case series, individual patient data was available from these studies and entered in the table format. In the event the primary outcomes were not reported in the studies, we assumed that these did not occur in the patients and were entered as absent. Data was not available for the all the primary outcomes in all the included studies. Thus for each primary outcome, only studies where the information was available were included for calculations and further analysis.

As a secondary outcome RG independently collected data on the treatments given to pregnant women with COVID-19. As the information is sparse, it could not be organized systematically for analysis and hence it is only included in a narrative manner in the present review.

The systematic review protocol was not registered due to the urgency of the matter and we did not anticipate much of evidence. Considering the nature of the studies and the outcome measures available, we could not adhere to all the guidelines of PRISMA. Although the Synthesis Without Meta-analysis (SWiM) reporting guidelines (https://www.bmj.com/content/368/bmj.l6890) were followed.

Patient and public involvement

No patients or public were involved in the study design, conduct or reporting of our analysis.

Results

Overall, 396 articles were identified through database and snowballing. After screening and assessment of eligibility (Fig. 1); 23 studies were found eligible for inclusion and analyzed in the systematic review (Table 1). These were mainly case series and case reports from China (n=20) [6–25], one each from Republic of Korea[26], USA [27]and Honduras in Central America[28].

Study characteristics

In all the studies, COVID-19 diagnosis in the pregnant women was confirmed by molecular detection of SARS-CoV-2 in at least the throat swabs. Cumulatively, the data on 172 pregnant women (age range 20-47 years) was available of which 160 have delivered and 12 are ongoing pregnancies (Table 1). Ninety-five percent of the women were in the 3rd trimester of pregnancy and 5% of women had gestational age less than 28 weeks. These pregnancies resulted in 162 infants; (158 singletons and two sets of twins). In 45% of cases, there was history of the women residing in the epicenter (Wuhan mainly) or they were in direct contact with COVID-19 confirmed cases. In the remaining women the source of infection is unknown and is possibly via a community transmission. Amongst the pregnant women with COVID-19, 89% underwent cesarean section and the rest had vaginal delivery (Table 1). The reason for cesarean section was either fetal distress or was an empirical decision made by the obstetricians in consultation with the patients. In 39 women reported in the studies, cesarean sections were reported to be conducted in a negative-pressure isolation room by skillful medical team with enhanced personal protective equipments (PPEs) including N95 masks, surgical cap, double gown, double gloves, shoe covers, and powered air-purifying respirator for safe delivery.

Maternal complications in COVID-19

The detailed breakup of the individual studies reporting maternal presentations and outcomes are given in Supplementary Table 1 and the data is represented in Fig 2. The most common symptoms were fever (54%), cough (35%) and myalgia (17%). In a proportion of women dyspnea (12%) has also been reported. The major co-morbidities (Fig 2, Supplementary Table 2)

reported in women with COVID-19 were diabetes (11%) [Gestational diabetes (GDM-9%); T2DM (2%)], hypertensive disorders (9%) which includes preeclampsia, gestational and chronic hypertension. The other co-morbidities were placental abnormalities (5%), co-infections (6%), scarred uterus (5%), hypothyroidism (5%) and anemia (4%). Umbilical cord abnormalities were also reported in 2 cases. Placental abnormalities included placenta previa, placenta accreta and abruptio placenta.

Serious morbidities were reported in 3% of pregnant women with COVID-19 as they required ICU care with mechanical ventilation; of these, one women developed multi-organ dysfunction and was kept on extracorporeal membrane oxygenation (ECMO). Twenty four percent of women required oxygen support with nasal cannula. Due to paucity of time, we could not contact the authors of the original study to know the status of the patient kept on ECMO. So far, no maternal deaths have been reported amongst the studies included.

The adverse pregnancy outcomes (Fig 2) included preterm labor (21%), fetal distress (9%), premature rupture of membranes [PROM (8%)].

Complications in infants born to COVID-19 mothers

Of the 162 neonates born to COVID-19 mothers, (Supplementary Table 3); neonatal data was not available from all the pregnant women with COVID-19, conversely not all maternal information was available in studies reporting neonatal outcomes of COVID-19 mothers. Thus, the data in Supplementary table 1 and Supplementary table 3 may not completely overlap.

Table 2 gives the details of the neonatal data available from these studies. Preterm birth was reported in 23% of the neonates. Respiratory Distress Syndrome (14%), low birth weight [LBW (11%)] and small for gestational age (3%) were also reported. There was one still birth and one

neonatal death reported. A proportion of neonates were admitted to the neonatal intensive care unit (NICU) with serious complications such as pneumonia (14%). One hundred and twenty-two neonates were tested for SARS-CoV-2 infections by RT-PCR. In remaining neonates, the reasons for not testing were lack of reagents, non-willingness of parents and refusal to consent. SARS-CoV-2 infection was reported in 10% of neonates born to mothers with COVID-19.

Mother to child transmission of COVID-19

To address the extent of maternal to fetal transmission of SARS-CoV-2, we carried out a subgroup analysis where we compiled the data from the publications that explicitly reported the neonatal SARS-CoV-2 testing by the type of laboratory method used (RT-PCR or antibody or both), the neonatal samples tested and the time of testing. We further employed a strict criteria to select the studies where the diagnosis was confirmed by RT-PCR or by presence of IgM antibodies within the first 48h of life. Table 3 gives the details of the SARS-CoV-2 infected neonates reported in the studies. In all, 108 neonates were screened by laboratory methods within first 48h of life. Of these, 12 tested positive for SARS-CoV-2 resulting in a possible vertical transmission rate of 11%. Furthermore, in this subgroup of 108 neonates, 14% developed pneumonia. Interestingly 10% of the 108 neonates that developed pneumonia were SARS-CoV-2 negative (Supplementary Table 4).

Treatment and management of SARS-CoV-2 in pregnant women

Table 4 gives the treatments given to the pregnant women with COVID-19. In the described cases and case series, most women received individual and/or combinations of several antibiotics and antiviral drugs along with the steroids mainly methylprednisolone. One study

reported use of Hydroxychloroquine and one study reported traditional Chinese medicine. However, the dosages, routes, duration and timings of the treatment were not detailed in most of the studies.

Discussion

The present systematic review of 23 case series and case reports of 172 pregnant women with COVID-19 from China, USA, Republic of Korea and Honduras generated evidence on adverse pregnancy outcomes, newborn complications, risk of vertical transmission. The clinical manifestations of COVID-19 in pregnant women are observed to be heterogeneous. Not all women with COVID-19 were symptomatic at time of admission. Nearly 50% of the pregnant women were asymptomatic on initial presentation and were diagnosed with COVID-19 after admission for induction of labor. This was not only observed in Chinese population but also reported in other populations [27]. These results imply that asymptomatic presentations are common in pregnant women and represent a substantial risk of spreading the SARS-CoV-2 infection in the community. Given the numbers of exposed women, this is not unexpected and obstetricians must bear in mind that during the pandemic, hospitals must be prepared to deal with such atypical situations. However; the situation is alarming as it will increase the risk of exposure and infection to healthcare providers attending these women. There was an evidence of risk to the healthcare providers and four cases reported in this systematic review were physicians who acquired SARS-CoV-2 infection while providing clinical services to the COVID-19 patients [19,22]. This observation highlights the need of appropriate precautions and use of protective

measures especially use of personal protective equipments (PPEs) to reduce the risk of COVID-19 to the healthcare providers in obstetrics care.

In this systematic review; diabetes, hypertensive disorders and placental disorders were the top three co-morbidities identified in pregnant women with COVID-19. Beyond these, co-infections, scarred uterus, and hypothyroidism were other co-morbidities observed in the group of pregnant women with COVID-19. A nationwide study of 1590 patients with COVID-19 in China reported hypertension (16.9%) and diabetes (8.2%) as the commonest co-morbidities and risk factor for poor outcomes in COVID-19 [29]. Currently, there is no evidence whether thyroid disease is associated with increased risk of viral infections in general and specifically COVID-19 nor is there an association between thyroid disease and severity of the viral infection.

The adverse pregnancy outcomes reported in COVID-19 women were preterm labor, fetal distress and premature rupture of membranes. For preterm births, China reports an incidence of 7·3 per 100 births or 6·7 per 100 live births[30]. However, the numbers of preterm birth observed in women with COVID-19 is comparatively higher (23%). Whether, preterm birth is a secondary complication of respiratory distress or induced directly due to viral infection needs to be determined.

Beyond preterm births, post-partum a substantial number of women required oxygen support, mechanical ventilation and ICU care including ECMO. Thus, post-partum women are also at a risk of developing serious complications warranting emergency preparedness by obstetricians, anesthetist and pulmonologists. Therefore, it is essential that proper triage of patients should be implemented by carefully documenting prior medical and surgical history to help identifying a subset of patients who are at risk of developing serious adverse outcomes of COVID-19.

Maternal deaths due to infection are a matter of concern. The mortality rate of SARS-CoV-2 infection outside china is reported to be 1·5% and 3·6% in China [31]. However, there are no maternal death reported in 23 studies included herein of which 20 are reports from China alone. In this context, we must emphasize that the official website of Ministry of Health and Medical Education (MOHME) of Iran reported death of two pregnant women with COVID-19[32]. However, the study is a narrative review and lacked any patient information and hence it was excluded from our analysis. Data from other parts of the world on pregnant women with COVID-19 is required to get an estimate of maternal mortality in this condition.

Viral infections during pregnancy such as influenza A are reported to be associated with adverse neonatal outcomes and increased the risk of low birth weight babies[33]. Similar observation was found in pregnancy with COVID-19. Low birth weight was reported in 11% of neonates born to mothers with COVID-19. LBW is a risk factor for later life disease susceptibility leading to chronic morbidity. Other common neonatal complications reported are respiratory distress and pneumonia; there was one still birth and one neonatal death reported. This data suggests a substantial adverse impact of maternal COVID-19 on newborns. These observations strongly suggest the requirement of special care to be given to the newborns of mothers with COVID-19.

In all, the present study estimates that 10% of the neonates born to mothers with COVID-19 have SARS-CoV-2 infection. Initial studies reported that SARS-CoV-2 was not detected in placenta, amniotic fluid, cord blood, and neonatal throat swab samples [34], [17], [18] [35] . However, in a latest case series of 33 neonates born to COVID-19 women; 3 neonates were found to be positive for SARS-CoV-2 by RT-PCR [6]. Tests for IgG and IgM antibodies for SARS-CoV-2 became available in February 2020 and Dong et al., [7] reported a newborn with elevated IgM antibodies to SARS-CoV-2 born to a mother with COVID-19. Zeng et al., [23] reported IgG

antibodies in 5 infants and IgM antibodies in 2 infants. However, these infant were negative for SARS-CoV-2 upon molecular testing. While the reasons for such discrepancy could be multiple, a cause of concern could be the possible false negative diagnosis by RT-PCR. It is possible that in the IgM-positive RT-PCR-negative infants the viral load may be low and beyond the sensitivity of the existing RT-PCR methods. In this context, we must highlight that 14% of neonates (even those negative for SARS-CoV-2 by RT-PCR) developed pneumonia within first two days of life. This proportion is higher than the incidence of neonatal pneumonia in general population indicating the possibility of infection by the virus and perhaps the RT-PCR has more false negatives. Therefore, further studies should include rigorous clinical assessment of the newborn along with IgM testing or employ more sensitive methods in newborn samples to determine the burden of neonatal SARS-CoV-2.

The present study aimed to answer an important question that whether SARS-CoV-2 can be transmitted from a pregnant mother to her fetus. This is more relevant based on the evidence of vertical maternal-fetal transmission of recent emerging viral infections including Zika virus, Ebola virus, Marburg virus which led to high maternal and infant mortality [36]. Whether, SARS-CoV-2 infection in the neonates was derived maternally or acquired ex utero is difficult to assess from these studies. However, we addressed this problem by applying strict criteria to include only those studies that clearly reported carrying out the diagnosis in the first 48h of life either by RT-PCR or by IgM antibodies against SARS-CoV-2. As IgM antibodies are not transferred to the fetus via the placenta [37], the neonates even if RT-PCR negative but positive for IgM in first 48h of life are presumed to acquire the infection in utero. The analysis revealed the possibility of intrauterine mother to child transmission, of SARS-CoV-2 in 11% of cases. It is important to point out that in all these positive cases the studies reported use of precautions

like delivery in negative pressure rooms, wearing of N95 masks by mother and PPE by health care providers, and isolation of neonate immediately after delivery making an external acquisition unlikely. While more data is awaited, in this direction; we must consider that there is a reasonable possibility of mother to child transmission of SARS-CoV-2 and this may have long-term implications to fetal heath. Policies must be devised keeping this gap in mind towards management of COVID-19 mothers and infants.

At present, no specific treatments are available for COVID-19 and patients are symptomatically managed. In the reported studies, authors have mentioned administration of antivirals, antibiotics, steroids. One study reported use of Hydroxychloroquine and one with traditional Chinese medicine in the COVID-19 pregnant women. However, the doses administered, the time and route of administration and the length of treatment are not specified in most studies. In absence of a well reported data, it is hard to draw any conclusions on what could be the effective therapies for COVID-19 in pregnancy.

As COVID□19 still appears to be spreading exponentially, the number of pregnant women with COVID-19 are likely to increase in different regions, countries, and continents. Therefore, at this time, it is important that all the stakeholders including pregnant women, their families, general public and healthcare providers, receive as updated, accurate and authentic information regularly. We believe that this systematic review will act as a primer for future studies and development of protocols for management of COVID-19 in pregnancy.

Study limitations

We could not contact the authors of the original studies to find out the status of women admitted in ICU and neonates in NICU so the maternal death and neonatal death data cannot be considered updated. As there were inconsistencies observed in some reports between the results

and discussion sections, we feel that there is an element of bias in the reported studies and possibility of under-reporting of the symptoms by the authors. This may influence the proportions of morbidity reported herein. Considering the nature of the studies and the urgency of the situation, we could not strictly adhere to all the criteria for PRISMA and carry out a meta-analysis.

Conclusions

There is substantial risk of adverse pregnancy and neonatal outcomes in pregnant women with COVID-19. Evidence is garnered on PTB and LBW as commonest adverse neonatal outcomes; GDM/T2DM and hypertensive disorders as co-morbid conditions in pregnant women with SARS-CoV-2 infection. There is an evidence of vertical transmission of SARS-CoV-2 infection in women with COVID-19. The study highlights an urgent need to bring together a multidisciplinary expertise comprising of maternal–fetal medicine and other experts globally with special emphasis on low and middle income countries to formulate evidence based clinical management guidelines for COVID-19 in pregnancy.

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Footnotes

Contributors: RG conceived the study. RG and DM designed the study. RG and DM screened the abstracts for inclusion in the study, extracted and analyzed the data. SM coordinated the discussion for agreement regarding potential relevance or inconsistencies and helped in data interpretation. RG and DM drafted the manuscript, which was critically revised by all authors. All authors approved the final manuscript. RG and DM are the guarantors. The corresponding author RG declare that all listed authors met authorship criteria and that no others meeting the criteria have been excluded.

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Competing interests: All authors have completed the ICMJE uniform disclosure form and declare no support from any organization for the submitted work, no competing interests with regards to the submitted work.

Ethical Approval: Not required

Data sharing: The studies included in this systematic review are available in public domain. All data reported in the manuscript is attached and there is no additional data to be shared.

All the authors declare that the manuscript is an honest, accurate and transparent account of study being reported. No important aspect of the study has been excluded.

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Table1: Characteristics and information of pregnant women with COVID-19 in studies included for the systematic review

Author	Country (City)	Study period	Study design	No. of COVID-19 pregnant women	Delivered	Vaginal delivery	Caesarean section
Zeng L et al [6]	China (Wuhan)	Jan-Feb 2020	Cohort study	33	33	7	26
Dong L et al [7]	China (Wuhan)	Feb-20	Case report	1	1	0	1
Liu D et al [8]	China (Wuhan)	Jan-Feb 2020	Retrospective	15	11	1	10
Liu Y et al [9]	China (Zhejiang,Fujian, Shanxi, Beijing, Guangdong, Jiangxi, Heilogjiang, Anhui)	Dec 2019 to Feb 2020	Retrospective	13	10	0	10
Liu W et al [10]	China (Wuhan)	Feb-20	Case series	3	3	1	2
Zhu H et al [11]	China (Wuhan)	Jan-Feb 2020	Retrospective	9	9	2	7
Zhang L et al * [12]	China (Wuhan)	Jan-Feb 2020	Retrospective	16	16	0	16
Chen H et al [13]	China (Wuhan)	Jan-20	Retrospective	9	9	0	9
Yu N et al [14]	China (Wuhan)	Jan-Feb 2020	Retrospective	7	7	0	7
Chen S et al [15]	China (Wuhan)	Jan-Feb 2020	Retrospective	5	5	3	2

Li Y [16]	China (Zhejiang)	Feb-20	Case report	1	1	0	1
Chen S et al * [17]	China (Wuhan)	Feb-20	Retrospective	3	3	0	3
Chen Y et al[18]	China (Wuhan)	Feb-20	Case series	4	4	1	3
Fan C et al [19]	China (Wuhan)	Jan-20	Case series	2	2	0	2
Wang X et al [20]	China (Suzhou)	Feb-20	Case report	1	1	0	1
Wang S et al [21]	China (Wuhan)	Feb-20	Case report	1	1	0	1
Chen R et al [22]	China (Wuhan)	Jan-Feb 2020	Retrospective	17	17	0	17
Zeng H et al [23]	China (Wuhan)	Feb-march 2020	Retrospective	6	6	0	6
Liao X et al [24]	China (Chongqing)	Feb-20	Case report	1	0	0	1
Li N et al [25]	China (Wuhan)	Jan-Feb 2020	Retrospective	16	16	2	14
Breslin et al [27]	USA (NY)	Mar-20	Case series	7	2	0	2
Zambrano et al [28]	Honduras (Tegucigalpa)	2020, March	Case report	1	1	1	0
Lee et al [26]	Republic of Korea (Daegu)	Jan-20	Case report	1	1	0	1
			Total	**172**	**160**	**18**	**142**

** articles in Chinese*

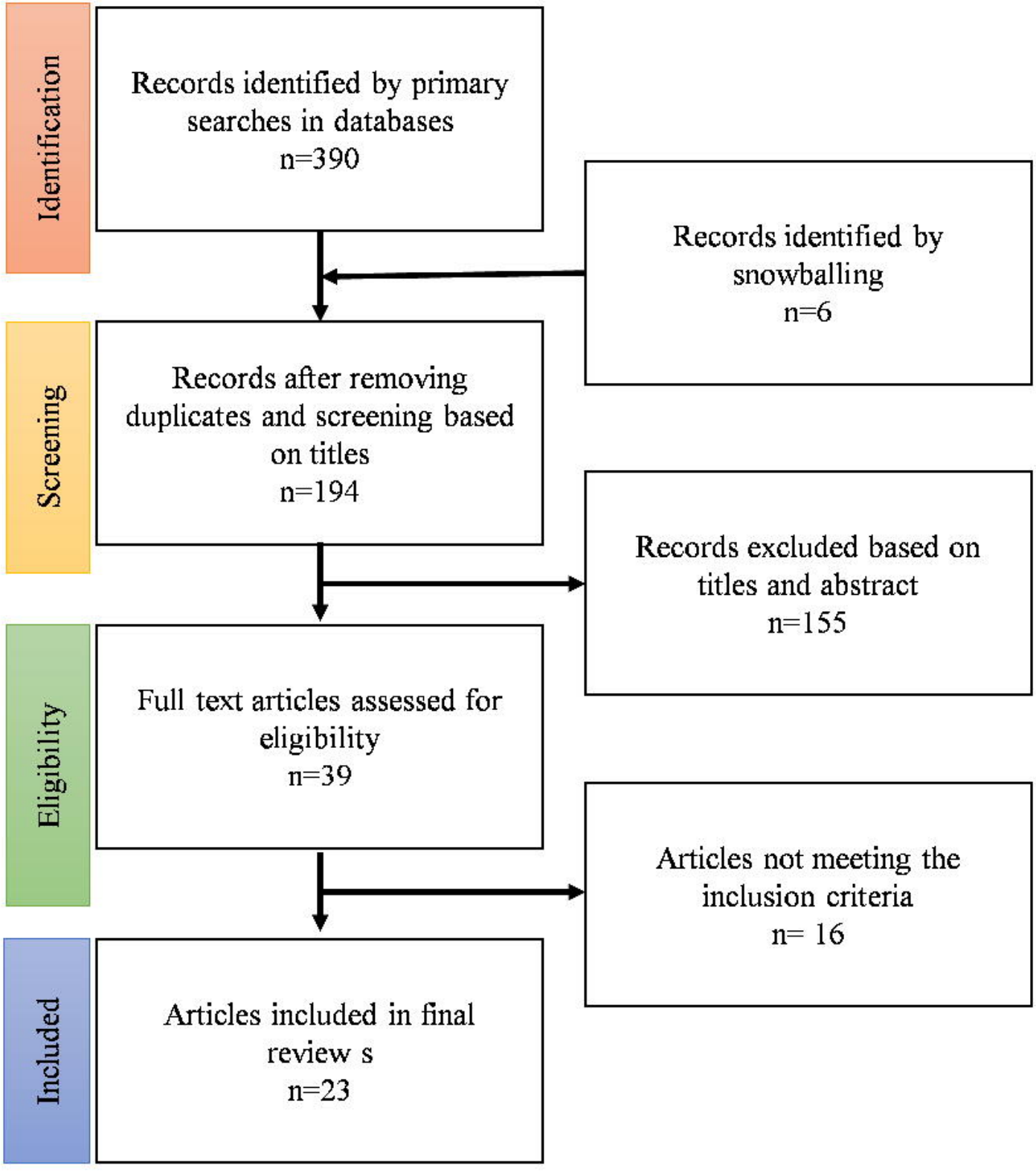

Fig 1 PRISMA (preferred reporting items for systematic reviews and meta-analyses) flowchart of included studies

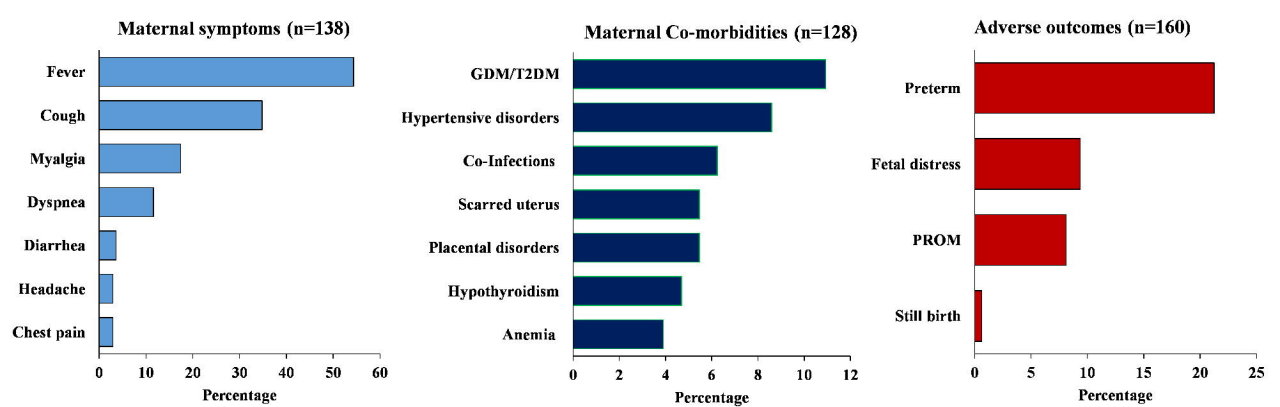

Fig 2: Maternal symptoms, co-morbidities and adverse pregnancy outcomes in pregnant women with COVID-19. Data was collated from studies reported in Table 1. n give the number of women from whom the data is derived for each outcome.

Neonatal outcomes	Data available	Nos.	%
Term	151	116	77
Preterm	151	34	23
SARS-CoV-2 infected	122	12	10
Pneumonia	122	17	14
Respiratory distress syndrome	122	16	14
LBW	137	15	11
SGA	150	5	3
LGA	150	1	1
Still birth	162	1	1
Death	162	1	1

Table 2: Neonatal outcomes born to COVID-19 mothers. Data available is numbers of neonates for whom the data was reported by the authors. Nos. is numbers with the outcome and the percentage are given.

	Tested	Positive	%
Positive by lab test	108	12	11
PCR	108	5	5
IgM	7	4	57
Pneumonia	118	17	14
Pneumonia in test negative	118	12	10

Table 3: Vertical transmission of SARS-CoV-2 from COVID-19 mothers. Data is derived out of neonates tested within first 48 hours by lab test (PCR and/or antibody testing).

Treatment (n=123)	n (%)
Antibiotics (Azithromycin, Cefotiam hydrochloride, moxifloxacin , ceftriaxone)	58 (47)
Antiviral (interferon, ganciclovir, Arbidol hydrochloride, oseltamivir, lopinavir, ritonavir)	32 (26)
Steroids (methylprednisolone)	10 (8)
Hydroxychloroquine	2 (2)
Oxygen support	30 (24)
ECMO (Extracorporeal membrane oxygenation)	1 (1)
Chinese Jinyebaidu granules and Lianhuaqingwen capsules	7 (6)

Table 4 : Treatments given to mothers infected with SARS-CoV-2