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Pregnant women with SARS-CoV-2 infection are at higher risk of death and pneumonia: propensity score matched analysis of a nationwide prospective cohort (COV19Mx)

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KEYWORDS: COVID-19; mortality; pregnancy; SARS-CoV-2

CONTRIBUTION

What are the novel findings of this work?
This study provides estimates of the risk of coronavirus disease 2019 (COVID-19)-related complications in pregnant compared to non-pregnant women, after propensity score matching based on background demographic and medical factors. Pregnancy emerged as a risk factor for death (odds ratio (OR), 1.84; 95% CI, 1.26–2.69), pneumonia (OR, 1.86; 95% CI, 1.60–2.16) and intensive care unit (ICU) admission (OR, 1.86; 95% CI, 1.41–2.45).

What are the clinical implications of this work?
Pregnancy *per se* is a risk factor for several COVID-19-related complications when compared to non-pregnant women. Economic, social, health and political interventions aimed at managing SARS-CoV-2 infection in pregnant women are likely to reduce adverse outcomes, such as death, ICU admission and pneumonia.

ABSTRACT

Objective *There are limited, unmatched data reporting low complication rates in pregnant women with coronavirus disease 2019 (COVID-19). The aim of this study was to compare COVID-19-related outcomes between pregnant and non-pregnant women after adjusting for potential risk factors for severe outcomes.*

Methods *Data were obtained from the COVID-19 National Data Registry of Mexico, which is an ongoing prospective cohort of people of any age with clinically suspected severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and admitted to 475 monitoring hospitals. This study included pregnant and non-pregnant women of reproductive age (15–45 years) with COVID-19 confirmed by reverse transcription polymerase chain reaction. To adjust for underlying risk factors, propensity score matching was conducted for chronic obstructive pulmonary disease, asthma, smoking, hypertension, cardiovascular disease, obesity, diabetes, chronic renal disease, immunosuppression, age, language, nationality and level of health insurance. The primary outcome was death. Secondary outcomes were pneumonia, intubation and intensive care unit (ICU) admission.*

Results *The cohort comprised 5183 pregnant and 175 905 non-pregnant women with COVID-19. The crude (unmatched) rates of death, pneumonia, intubation and ICU admission in pregnant compared with non-pregnant women were 1.5% vs 1.5%, 9.9% vs 6.5%, 8.1% vs 9.9% and 13.0% vs 6.9%, respectively. After propensity score matching (5183 pregnant and 5183*

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non-pregnant matched women), pregnant women had a higher odds of death (odds ratio (OR), 1.84; 95% CI, 1.26–2.69), pneumonia (OR, 1.86; 95% CI, 1.60–2.16) and ICU admission (OR, 1.86; 95% CI, 1.41–2.45) than non-pregnant women, but similar odds of intubation (OR, 0.93; 95% CI, 0.70–1.25).

Conclusion *After adjusting for background demographic and medical factors, pregnancy is a risk factor for death, pneumonia and ICU admission in SARS-CoV-2-infected women of reproductive age.*

INTRODUCTION

Since the first reported case of pneumonia related to the 2019 novel coronavirus (severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)) infection, the virus and its clinical disease (coronavirus disease 2019 (COVID-19)) have spread rapidly throughout the world, being declared a pandemic by the World Health Organization on 11 March 2020. As of 14 October 2020, more than 38 million infections and 1 million deaths had been reported globally by John Hopkins University[1]. With 825 340 infections and more than 84 420 deaths, Mexico had the ninth highest number of confirmed cases and the fourth highest fatality rate (10.23%) among all countries[1].

A major risk factor for adverse outcome in patients affected by COVID-19 is the presence of comorbidities, including diabetes, hypertension and obesity[2]. In addition, age and severity of SARS-CoV-2 infection are associated strongly[3], which may be mediated at least partly by a higher prevalence of non-communicable comorbidities with advancing age.

Epidemiological data from high-prevalence countries have revealed that women are 50% less likely to die or require admission to an intensive care unit (ICU), compared with men[4]. Indeed, women of reproductive age (between 15 and 49 years of age) have a 60% lower likelihood of ICU admission than their age-matched male counterparts[4]. This suggests that pregnant women may not be more susceptible than non-pregnant women to SARS-CoV-2 infection or its serious complications. However, it is unknown[5,6] whether higher maternal age or comorbidities confer a higher risk of adverse outcome in pregnant women with COVID-19.

In this case–control study, based on data from the Mexican National Registry of Coronavirus, we aimed to compare COVID-19-related outcomes between pregnant women and matched non-pregnant women of reproductive age (15–45 years).

METHODS

Study design and approval

This study analyzed data from the Mexican National Protocol for Suspected COVID-19 in Pregnancy (COV19Mx), which is an ongoing prospective cohort of pregnant and non-pregnant women of reproductive age (15–45 years) with suspected SARS-CoV-2 infection, based on information from the Mexican National Registry of Coronavirus, from 1 February to 28 October 2020. The Mexican National Registry of Coronavirus is the national database for COVID-19, developed by the Mexican Government and National Institute of Health, and is updated weekly with data from 475 monitoring hospitals dedicated to COVID-19 and located in all 32 states of Mexico. An approved study protocol was required to obtain information from the COV19Mx registry. The protocol for the current study was approved by the ethics committee of the General Hospital of Mexico (Dr. Eduardo Liceaga), Mexico City, Mexico, approval number CE/23020. The protocol itself, as well as the non-conflict of interest letter and ethics committee approval, can be found at http://doi.org/10.17605/OSF.IO/QM3FA. The study is reported in accordance with the STROBE Statement[7].

Setting

The 475 COVID-19-dedicated monitoring hospitals are part of the Mexican Public Health Network (MPHN). Hospitals within the MPHN are part of the National Mexican Institute of Social Security, Institute of Security and Social Services for State Workers, Secretary of National Defense, Secretary of the Navy of the Mexican Republic and National Health Department. These monitoring hospitals are the only institutions approved to perform reverse transcription polymerase chain reaction (RT-PCR) analysis for SARS-CoV-2 in Mexico and are therefore the reference centers for all patients with suspected COVID-19. Data for the COV19Mx cohort (last accessed 28 October 2020) are fully available at http://doi.org/10.17605/OSF.IO/QM3FA.

Participants

Criteria for inclusion in the Mexican National Registry of Coronavirus were people of any age who were admitted with suspected SARS-CoV-2 infection to any of the 475 monitoring hospitals in Mexico. The decision to perform RT-PCR testing was made by the attending clinicians based on whether SARS-CoV-2 infection was suspected, defined by the presence of two main symptoms (cough, fever and headache) plus at least one of the following: dyspnea, arthralgia, myalgia, odynophagia, conjunctivitis or chest pain[8–10]. All tested patients were entered into the registry before testing, regardless of RT-PCR result, but the analysis was restricted to RT-PCR-positive patients. Clinical information and history were acquired from each patient. The Mexican National Institute of Health does not require informed consent to register patient information.

Outcomes

The primary outcome was death among women of reproductive age with COVID-19, which was defined as

a positive RT-PCR for SARS-CoV-2 in any symptomatic patient. Secondary outcomes were pneumonia (defined as symptoms and signs of lower respiratory tract infection, with no other apparent cause, and a pulmonary infiltrate on chest radiography), intubation and admission to the ICU.

Data sources and measurements

Data on demographics and medical history of the patients were collected and transferred to the Mexican National Registry of Coronavirus, which is a web-based platform. Access to this database is given only to each hospital's epidemiologist, who is responsible for uploading the data. The following data were collected for each patient: state and location of enrolment; sex; state and country of birth; spoken language(s); level of health insurance; date of symptom onset; date and age at hospital admission; pregnancy status at enrolment; history of diabetes mellitus, chronic obstructive pulmonary disease (COPD), asthma, immunosuppression, chronic hypertension, cardiovascular disease, obesity, chronic kidney disease or other non-specified morbidities; smoking habits; SARS-CoV-2 RT-PCR results; the presence of pneumonia; and need for intubation or admission to the ICU.

To avoid bias due to missing data, we acquired and analyzed data from the last update of the Mexican National Registry of Coronavirus, which contains full information on the main outcomes at each update. Because of the nature of this study and the large quantity of missing data, we opted to describe data as uploaded originally, without imputing missing data. The benefit of this approach is that it avoids assumptions regarding missing information. However, imputation is a strategy that would have avoided difficulties during data analysis arising from listwise removal of cases with missing outcome values.

Statistical methods

Normally distributed continuous variables were described as mean ± SD, while non-normally distributed continuous variables were expressed as median and interquartile range. Categorical variables were summarized as *n* (%). Student's *t*-test or Mann–Whitney *U*-test was used to compare continuous variables between the non-pregnant and pregnant groups. Chi-square or Fisher's exact test was used for pairwise comparisons of proportions and odds ratios (ORs), with their corresponding 95% CI, were calculated. For all tests, a *P*-value < 0.05 was considered significant.

We performed propensity score matching to address potential differences in baseline characteristics between the pregnant and non-pregnant women and therefore the possibility of bias because of confounding variables[11]. The propensity score expresses the probability of assignment based on observed baseline covariates[12]. In a set of patients with the same propensity score, the distribution of the baseline covariates will be the same between groups[13]. Thus, by conditioning on the propensity score, the distribution of observed baseline confounding variables should be similar between pregnant and non-pregnant women.

Propensity scoring was conducted using age, language, nationality, health insurance agency, COPD, asthma, smoking, hypertension, cardiovascular disease, diabetes mellitus, obesity, chronic renal disease and immunosuppression as covariates. We performed propensity score matching using the MatchIt package with nearest-neighbor matching in R 2.15.1 (The R Foundation for Statistical Computing)[14]. Whether the balance of covariates between groups was improved after propensity score matching was determined by evaluating the reduction in standardized mean differences between unmatched and propensity score matched samples. Standardized mean differences > 0.1 were considered indicative of a substantial imbalance between groups[12].

Regression models were used on the whole sample to test for independent risk factors for death, pneumonia, intubation and ICU admission in women with COVID-19. Overlap between outcomes in the two groups were presented using Euler diagrams. In order to assess for two-way interactions among covariates, we calculated the variable inflation factor (VIF) for each covariate. The estimated VIF of the covariates ranged from 1.005 to 1.115, showing no two-way interactions between covariates.

Public and patient involvement

There was no public or patient involvement at any stage of this study because of the urgent need to obtain national data regarding pregnancy during the ongoing COVID-19 pandemic.

RESULTS

Participants and descriptive data

A total of 289 331 women of reproductive age with suspected SARS-CoV-2 infection were included in the initial cohort. Of those, 7705 (2.7%) were pregnant and 281 626 (97.3%) were non-pregnant (Figure 1). Complete data regarding the outcomes of death and pneumonia were available for all women. Data were available for intubation and ICU admission in 14 910 women, of whom 1182 were pregnant and 13 728 were non-pregnant.

Of the 7705 symptomatic pregnant women who underwent SARS-CoV-2 RT-PCR testing, 5183 (67.3%) tested positive. The corresponding number of non-pregnant women who tested positive was 175 905 (62.5%). All further analyses were based on these SARS-CoV-2-positive women. The descriptive data of the two groups are shown in Table 1.

Outcome data in unmatched patients

The crude death rate (in unmatched samples) was 1.5% (77/5183) in pregnant women and 1.5%

(2589/175 905) in non-pregnant women (OR, 1.01; 95% CI, 0.80–1.26; $P = 0.935$). The crude rate of pneumonia was 9.9% (513/5183) in pregnant women and 6.5% (11 490/175 905) in non-pregnant women (OR, 1.57; 95% CI, 1.43–1.72; $P < 0.001$). The crude rate of intubation was 8.1% (96/1182) in pregnant women and 9.9% (1364/13 728) in non-pregnant women (OR, 0.80; 95% CI, 0.64–0.99; $P = 0.044$). The crude rate of ICU admission was 13.0% (154/1182) in pregnant women and 6.9% (941/13 728) in non-pregnant women (OR, 2.03; 95% CI, 1.69–2.44; $P < 0.001$). Overlaps between outcomes in pregnant and non-pregnant women are shown in Figure 2.

Logistic regression

Potential predictors of outcome included age, nationality, indigenous language, health insurance level, COPD, asthma, smoking, hypertension, cardiovascular disease, obesity, diabetes mellitus and pregnancy status. The ORs for significant predictors in the overall cohort are shown in Table 2. Pregnancy, maternal age, diabetes mellitus, indigenous language, obesity, hypertension, immunosuppression, chronic renal disease, smoking, low-level health insurance and high-level health insurance were significant independent predictors for death (Nagelkerke R^2, 0.150; area under the curve (AUC), 0.810; 95% CI, 0.801–0.818) and pneumonia (Nagelkerke R^2, 0.069; AUC, 0.677; 95% CI, 0.672–0.682). In addition, asthma was a significant independent predictor for death. Diabetes mellitus, obesity, hypertension, immunosuppression, low-level health insurance and medium-level health insurance were significant independent predictors for intubation (Nagelkerke R^2, 0.018; AUC, 0.591; 95% CI, 0.576–0.607), whilst pregnancy, diabetes mellitus, cardiovascular disease, obesity, low-level health insurance and high-level health insurance were independent significant predictors for ICU admission (Nagelkerke R^2, 0.046; AUC, 0.652; 95% CI, 0.636–0.659).

Outcome data in the propensity score matched patients

After matching by propensity scoring for background demographic and medical factors, patient characteristics were balanced between the pregnant and non-pregnant women, with absolute standardized mean differences < 0.1 (Figures S1 and S2). The matched patient analysis included data from 5183 pregnant and 5183 non-pregnant women with COVID-19. The mortality rate

Table 1 Characteristics of 181 088 women with COVID-19, according to pregnancy status

Variable	*Pregnant (n = 5183)*	*Non-pregnant (n = 175 905)*	P
COPD	10 (0.2)	487 (0.3)	0.255
Asthma	112 (2.2)	6048 (3.4)	< 0.001
Cigarette smoking	91 (1.8)	9644 (5.5)	< 0.001
Hypertension	150 (2.9)	10 518 (6.0)	< 0.001
Cardiovascular disease	24 (0.5)	1166 (0.7)	0.079
Obesity	477 (9.2)	28 791 (16.4)	< 0.001
Diabetes mellitus	174 (3.4)	8669 (4.9)	< 0.001
Immunosuppression	52 (1.0)	1210 (0.7)	0.007
Age (years)	28.5 ± 5.9	33.1 ± 7.5	< 0.001
Indigenous language	100 (2.0)	1138 (0.7)	< 0.001
Mexican nationality	5155 (99.5)	175 281 (99.6)	0.03
Level of health insurance			
Very low	118 (2.3)	1410 (0.8)	< 0.001
Low	2926 (56.5)	108 679 (61.8)	< 0.001
Medium	2002 (38.6)	61 523 (35.0)	< 0.001
High	137 (2.6)	4293 (2.4)	0.352

Data are given as *n* (%) or mean ± SD. Comparisons between groups were carried out using Student's *t*-test or chi-square test, as appropriate. COPD, chronic obstructive pulmonary disease.

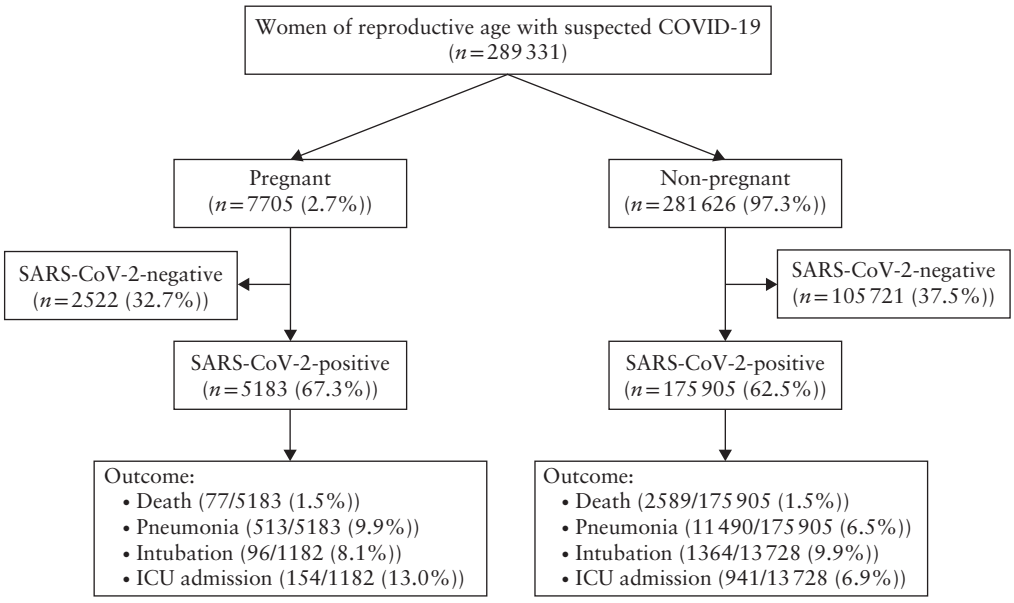

Figure 1 Flow diagram summarizing inclusion and outcome of study population of pregnant and non-pregnant women with COVID-19. ICU, intensive care unit; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

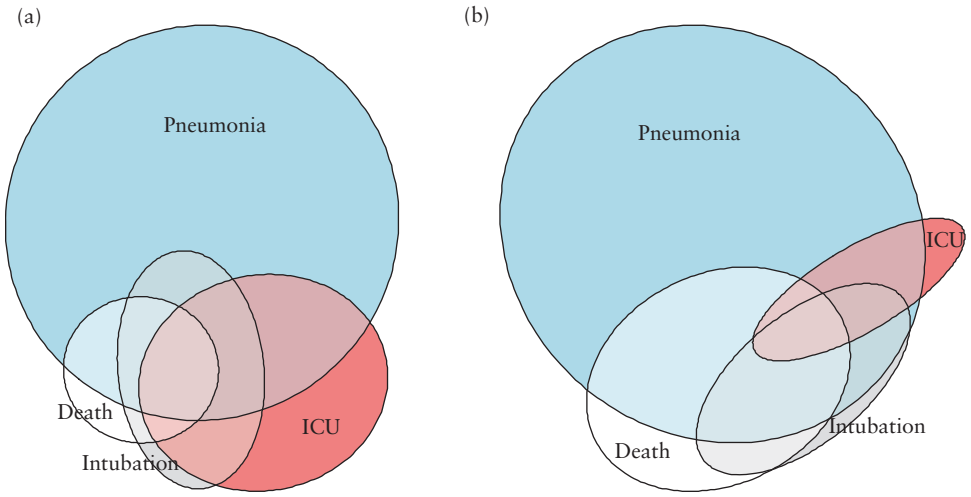

Figure 2 Euler diagrams showing overlap between outcomes in pregnant (a) and non-pregnant (b) women with COVID-19. ICU, intensive care unit.

Table 2 Odds ratios for significant predictors of primary and secondary outcomes in women with COVID-19 in the whole cohort

Predictor	*Death*	*Pneumonia*	*Intubation*	*ICU admission*
Pregnancy	1.654 (1.304–2.097)	1.997 (1.814–2.199)	NS	2.252 (1.868–2.716)
Age (in years)	1.068 (1.062–1.075)	1.036 (1.034–1.039)	NS	NS
Diabetes mellitus	3.501 (3.163–3.875)	2.766 (2.603–2.939)	1.385 (1.206–1.590)	1.205 (1.026–1.416)
Indigenous language	1.860 (1.285–2.692)	1.646 (1.363–1.987)	NS	NS
Cardiovascular disease	NS	NS	NS	1.639 (1.065–2.522)
Obesity	1.899 (1.740–2.073)	1.538 (1.470–1.610)	1.443 (1.282–1.624)	1.494 (1.303–1.713)
Hypertension	1.951 (1.755–2.169)	1.416 (1.328–1.510)	1.353 (1.172–1.561)	NS
Immunosuppression	2.068 (1.773–2.412)	2.068 (1.773–2.412)	1.388 (1.025–1.879)	NS
Asthma	2.435 (1.927–3.096)	NS	NS	NS
Chronic renal disease	7.626 (6.473–8.994)	3.870 (3.415–4.386)	NS	NS
Smoking	0.591 (0.479–0.729)	0.749 (0.683–0.822)	NS	NS
Level of health insurance				
Low	0.482 (0.444–0.523)	0.696 (0.669–0.724)	1.436 (1.008–2.045)	6.573 (2.086–20.715)
Medium	NS	NS	1.679 (1.182–2.385)	NS
High	0.255 (0.163–0.398)	1.560 (1.410–1.726)	NS	10.022 (3.077–32.642)

Data are given as odds ratio (95% CI). ICU, intensive care unit; NS, not statistically significant.

was 1.5% in pregnant women and 0.8% in non-pregnant women (OR, 1.84; 95% CI, 1.26–2.69; $P = 0.001$). The pneumonia rate was 9.9% in pregnant women and 5.6% in non-pregnant women (OR, 1.86; 95% CI, 1.60–2.16; $P < 0.001$). The intubation rate was 8.1% in pregnant women and 8.6% in non-pregnant women (OR, 0.93; 95% CI, 0.70–1.25; $P = 0.65$). The ICU admission rate was 13.0% in pregnant women and 7.4% in non-pregnant women (OR, 1.86; 95% CI, 1.41–2.45; $P < 0.001$).

DISCUSSION

By analyzing data from the open, prospective COV19Mx cohort, we found that although the death rate from COVID-19 was similar in unmatched pregnant and non-pregnant patients, after matching for background demographic and medical characteristics, pregnant women had increased odds for death (OR, 1.84), pneumonia (OR, 1.86) and ICU admission (OR, 1.86) compared to non-pregnant women.

Strengths and limitations

The main strengths of this study are (i) its large sample size, (ii) the accessibility of the COV19Mx cohort, which ensures transparency of the results, and (iii) that we adjusted for relevant background demographic and medical factors which may affect COVID-19 severity. Prior to our study, evidence regarding COVID-19 outcomes in pregnant women originated primarily from small case series[15], and only one study compared the rate of ICU admission between pregnant and non-pregnant women[16]. In the majority of observational studies regarding COVID-19, covariates were not balanced between groups, leading to biased results[17]. In this large-scale nationwide cohort, we accounted for differences in baseline risk factors that could affect the likelihood of a severe COVID-19 course and thereby confound the results. Furthermore, our analysis involved the use of data from an open, public database, which increases its credibility.

The main limitations of this study are that testing was performed only in symptomatic women and,

although data on the primary outcome of death and secondary outcome of pneumonia were available for all SARS-CoV-2-positive women in the cohort, data were available for the secondary outcomes of ICU admission and intubation in only a proportion of them ($n = 14\,910$). However, data on confounders for COVID-19 severity were available for all 289 331 women and outcome analyses were performed including only cases with complete data for that outcome.

Interpretation

There has been intense interest in the prognosis of pregnant women affected by COVID-19, as immunomodulation during pregnancy may affect the clinical course of viral infection. As SARS-CoV-2 is a new virus, innate immunity is the first line of defense and may determine significantly the viral load that reaches the lungs and the time that this takes[18]. SARS-CoV-1 is the human virus with the closest genetic resemblance to SARS-CoV-2. The case fatality rate in the 2003 SARS-CoV-1 outbreak was high in pregnant women[2,19]; higher than that of their non-pregnant counterparts[19]. Although data on COVID-19 are accumulating continuously, the vast majority are derived from small series, and reported rates of serious symptoms and death vary widely. In a high-quality systematic review[15], the rate of maternal mortality was 7/304 (2.3%), with all seven deaths reported in a single case series[20]. Rates of ICU admission, severe pneumonia and mechanical ventilation in the review were 5.1%, 4.7% and 1.8%, respectively[15]. A living systematic review and meta-analysis reported that pregnant women with pre-existing comorbidities, such as high maternal age and body mass index, are more likely to experience severe COVID-19, and pregnancy itself was reported as a risk factor for the need for ICU treatment[21].

Theoretically, pregnant women may be more susceptible to pneumonia because of physiological respiratory changes resulting in potentially increased interstitial fluid within the lungs, coupled with decreased interstitial space secondary to reduced lung volume. Limited, unmatched data have indicated that pneumonia tends to be non-severe in approximately 80% of pregnant women with COVID-19[22], and that maternal death is uncommon[15,22–26]. However, initial commentaries about pregnancy being a protective factor for mortality were very premature and without adequate data[27]. The current study is one of the largest-scale investigations showing that, when matched for medical and demographic characteristics, pregnant women with COVID-19 have a higher risk of pneumonia and death than their non-pregnant counterparts. There is no simple explanation for these observations, although similar phenomena observed for varicella and SARS-CoV-1 were attributed to physiological, mechanical and immunological adaptations of pregnancy as predisposing factors. The only previous study comparing the rate of ICU admission, between pregnant and non-pregnant women of reproductive age with COVID-19, reported that the rate was generally unrelated to age in non-pregnant women, but that it increased with age in pregnant women, from 0% in women aged 25–29 years to 33% in those aged 40–49 years[16]. More recently, another large-scale cohort of 23 434 symptomatic pregnant women showed that pregnancy is indeed associated with a higher risk for death (adjusted risk ratio (aRR), 1.7; 95% CI, 1.2–2.4), ICU admission (aRR, 3.0; 95% CI, 2.6–3.4) and invasive ventilation (aRR, 2.4; 95% CI, 1.5–4.0)[24]. A major difference between that study and the current one is the use of propensity score matching analysis, which enabled us to compare pregnant and non-pregnant women with similar baseline characteristics to ensure that estimates were adjusted and compared fairly. The information from this study strengthens the evidence that pregnant women are indeed at higher risk of severe adverse outcomes.

Another multicenter study of 201 patients, in France and Belgium, conducted a similar analysis using propensity score matching to account for baseline differences between pregnant and non-pregnant women with COVID-19, showing that pregnant women diagnosed at 20 weeks' gestation or later have more severe outcomes compared with non-pregnant women[28].

Although female sex has been shown to be associated with a better clinical course[29] of COVID-19, and this protective effect has been extrapolated to pregnant women, especially in the context of unmatched data[15,22,23,25], pregnancy is an independent risk factor for mortality and severe illness in women with COVID-19.

Generalizability

The main concerns for generalizability arise from the specific conditions and limitations of the Mexican Health System, from which our data are derived. For example, some women may have been intubated in the emergency department or operating room, without being admitted to the ICU, and some may have died in the emergency department or operating room or at home before reaching the hospital. The availability of resources explains some counterintuitive findings, such as the relative lack of overlap between cases of intubation and ICU admissions, as shown in Euler diagrams (Figure 2). This type of variation is not unique to our setting, as it can be observed in any overwhelmed health system and may even vary locally depending on the temporal balance between demand and availability of resources, and it would almost exclusively affect the secondary outcomes of intubation and ICU admission. In favor of our data, it should be acknowledged that the findings are in line with those of the Centers for Disease Control and Prevention report from USA data[24] and the multicenter study in France and Belgium[28], all three reporting the same observation that pregnant women are at higher risk of severe complications, including death.

Future research

There are several questions that have yet to be answered about pregnancy in the current COVID-19 pandemic,

including vertical transmission[30,31], placental damage and receptors[32], diagnostic tests for severe disease[33,34], risk factors for maternal mortality, neonatal–maternal long-term effects, and, in particular, vaccination in pregnancy. Modifications to clinical practice, to ensure the best outcome for healthcare workers and patients[35–38], are also being constantly updated and are shaping the wider context of pregnancy care.

Conclusion

After accounting for differences in baseline risk factors for severe COVID-19 between pregnant and non-pregnant women, pregnancy itself emerged as a risk factor for death, pneumonia and ICU admission in SARS-CoV-2-infected women of reproductive age.

DATA USE AND TRANSPARENCY

Data sharing

Data are available on reasonable request to the corresponding author.

Transparency declaration

The lead authors affirm that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as originally planned (and, if relevant, registered) have been explained.

Terms of free use of the Open Data of the Government of Mexico

These 'Terms of free use' promote the use, reuse and redistribution of open data sets, in accordance with the following: you may do and distribute copies of the data set and its content; disseminate and publish the data set and its content; adapt or rearrange the data set and its content; extract all or part of the content of the data set; commercially use the data set and its content and; create data sets derived from the data set or its content.

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SUPPORTING INFORMATION ON THE INTERNET

The following supporting information may be found in the online version of this article:

Figure S1 Histograms showing distribution of propensity scores in pregnant and non-pregnant women with COVID-19, before and after propensity score matching.

Figure S2 Jitter plots showing distribution of propensity scores in pregnant and non-pregnant women with COVID-19, before and after propensity score matching. Each circle represents a case's propensity score.

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Las mujeres embarazadas con infección por SARS-CoV-2 tienen un mayor riesgo de muerte y de neumonía: análisis por pareamiento por puntaje de propensión de una cohorte prospectiva nacional (COV19Mx)

RESUMEN

Objetivo Existen datos limitados y no contrastados que informan de las bajas tasas de complicaciones en mujeres embarazadas afectadas por coronavirus 2019 (COVID-19). El objetivo de este estudio fue comparar los resultados relacionados con COVID-19 entre mujeres embarazadas y no embarazadas, después de ajustar los posibles factores de riesgo de resultados graves.

Métodos Los datos se obtuvieron del Registro Nacional de Datos sobre COVID-19 de México, que es una cohorte prospectiva en curso de personas de cualquier edad con sospecha clínica de infección por coronavirus del síndrome respiratorio agudo grave de tipo 2 (SARS-CoV-2) e ingresadas en 475 hospitales con seguimiento. Este estudio incluyó a mujeres embarazadas y no embarazadas en edad reproductiva (15-45 años) con COVID-19 confirmado por la reacción en cadena de la polimerasa de transcripción inversa. Para ajustar respecto a los factores de riesgo subyacentes, se realizó un pareamiento por puntaje de propensión para enfermedad pulmonar obstructiva crónica, asma, tabaquismo, hipertensión, enfermedad cardiovascular, obesidad, diabetes, enfermedad renal crónica, inmunosupresión, edad, idioma, nacionalidad y nivel de seguro médico. El resultado primario fue la muerte. Los resultados secundarios fueron la neumonía, la intubación y el ingreso en la unidad de cuidados intensivos (UCI).

Resultados La cohorte consistió en 5.183 mujeres embarazadas y 175.905 no embarazadas, todas con COVID-19. Las tasas brutas (no pareadas) de muerte, neumonía, intubación e ingreso en la UCI en las mujeres embarazadas, en comparación con las no embarazadas, fueron del 1,5% frente al 1,5%, del 9,9% frente al 6,5%, del 8,1% frente al 9,9% y del 13,0% frente al 6,9%, respectivamente. Tras el pareamiento por puntaje de propensión (5.183 mujeres embarazadas y 5.183 no embarazadas pareadas), las mujeres embarazadas tuvieron una mayor probabilidad de muerte (razón de momios [RM], 1,84; IC 95%, 1,26–2.69), neumonía (RM, 1,86; IC 95%, 1,60–2,16) e ingreso en la UCI (RM, 1,86; IC 95%, 1,41–2,45) que las mujeres no embarazadas, pero probabilidades similares de intubación (RM, 0,93; IC 95%, 0,70–1,25).

Conclusión Tras ajustar los factores demográficos y médicos subyacentes, el embarazo es un factor de riesgo de muerte, neumonía e ingreso en la UCI en mujeres en edad reproductiva infectadas por el SARS-CoV-2.

SARS-CoV-2 新型冠状病毒感染的孕妇死亡和罹患肺炎的风险更高：一项针对全国前瞻性队列研究（COV19Mx）的倾向评分匹配分析

摘要

目的 有些有限，且不匹配数据报道了孕妇罹患2019冠状病毒（COVID-19） 的低并发症率。这项研究的目的是在校正严重预后的潜在危险因素后，对孕妇和非孕妇中与COVID-19相关的预后进行比较。

方法 数据从墨西哥COVID-19国家数据注册中心获得，这是一项正在进行的
任何年龄段的临床前瞻性队列研究，其年龄范围广泛，临床疑似新型冠状病毒2（SARS-CoV-2）感染并合并严重的急性呼吸系统综合症，并且已入住475家监测医院。这项研究纳入了使用逆转录聚合酶链反应确认为感染COVID-19的育龄妇女（15-45岁）包括孕妇和非孕妇。为了调整潜在的危险因素，对慢性阻塞性肺病，哮喘，吸烟，高血压，心血管疾病，肥胖症，糖尿病，慢性肾病，免疫抑制疾病，年龄，语言，国籍和健康保险
水平进行了倾向评分匹配。主要预后为死亡。次要预后为肺炎，插管和入院重症监护（ICU） 。

结果 该队列由感染COVID-19 的5183名 的孕妇和175905名非孕妇组成。与
未怀孕的妇女相比，孕妇的死亡率， 肺炎，气管插管和入住ICU比率分别为1.5％比1.5％，9.9％比6.5％，8.1％比9.9％和13.0％比6.9％。（不匹配的原始数据比率）对（5183名孕妇和5183名非孕妇 ）进行倾向评分匹配后，孕妇的死亡率 （优势比（OR）为1.84； 95％置信区间，1.26-2.69），肺炎（优势比为1.86； 95％ 置信区间（1.60 – 2.16）和ICU入院率（优势比为1.86； 95％置信区间，1.41-2.45）高于未怀孕的女性，但插管几率相似（优势比为0.93； 95％置信区间，0.70 – 1.25）。

结论 在调整了背景人口统计学和医学因素后，怀孕是导致育龄妇女感染新型冠状病毒SARS-CoV-2后 死亡，肺炎和入住ICU的危险因素。