

Clinical Presentation and Associated Factors to SARS-CoV-2 infection: A Cross-sectional and Comparative Study Between Pregnant and Non-Pregnant Women

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ABSTRACT

Introduction: Characterising COVID-19 symptoms in pregnant women, who experience unique physiological changes, and comparing them with non-pregnant women helps identify distinct clinical patterns. This supports improved risk assessment, clinical management, and public health strategies, particularly in primary healthcare settings.

Material and Methods: A population-based, cross-sectional, comparative study was conducted using national surveillance data from 475 health units in Mexico. The analysis focused on pregnant and non-pregnant women tested for SARS-CoV-2. The variables included age, symptoms, comorbidities, test results, and vaccination status. The association among symptoms and comorbidities with COVID-19 were through multivariate logistic regression models, in both groups.

Results: The study included 2,054 pregnant and 190,861 non-pregnant women (total n=192,915). COVID-19 was confirmed in 50% overall (41.1% in pregnant vs. 50.1% in non-pregnant women). In non-pregnant women, headache, cough, myalgia, and fever were most common; in pregnant women predominated: headache, cough, odynophagia, and fever. Multivariate analysis showed that in non-pregnant women, fever, cough, malaise, myalgia, dyspnoea, arthralgia, and chills as well as type 2 diabetes and obesity, increased the likelihood of COVID-19, while vaccination showed a protective effect. In pregnant women, fever, cough, malaise, myalgia, and rhinorrhoea were significantly associated with COVID-19, however comorbidities were not.

Conclusion: This study highlights important differences in COVID-19 symptom profiles and associated factors between pregnant and non-pregnant women. Pregnant women showed a distinct pattern with fewer comorbidity associations, while non-pregnant women had a broader range of symptoms and risk factors.

Keywords: COVID-19; Pregnancy; Primary Care

Abbreviations: COPD: Chronic Obstructive Pulmonary Disease; ICU: Intensive Care Unit; SD: Standard Deviation, IQR: Interquartile Range

Introduction

The COVID-19 pandemic has posed unprecedented challenges to global health systems, disproportionately affecting vulnerable populations [1,2], including pregnant females [3,4]. Physiological and immunological changes during pregnancy may increase susceptibility to respiratory infections [5-7] and adverse outcomes, both maternal and perinatal. Understanding the clinical manifestations and associated factors of COVID-19 in pregnant women is therefore essential for guiding evidence-based clinical care, mitigating risks, and improving outcomes. From a public health perspective, pregnant women represent a critical population due to the dual impact of the disease on maternal and neonatal health [8]. COVID-19 has been linked to adverse outcomes for both mothers and newborns. Moreover, in pregnant women, the infection has been associated with increased maternal mortality and a higher likelihood of admission to critical care. For newborns, it has been connected to an elevated risk of preterm birth and the need for admission to a neonatal intensive care unit [3,7,9-11]. Furthermore, the most commonly reported symptoms of COVID-19 in the general population include cough, fever, and myal-

gia, while less frequent symptoms are dyspnoea, diarrhoea, vomiting, haemoptysis, anosmia, and dysgeusia [7].

A systematic review by Zaigham M, et al. [12], which examined 108 cases of COVID-19 in pregnant women, found that fever (68%) and cough (34%) were the most frequent symptoms, followed by malaise (13%), dyspnoea (12%), and diarrhoea (6%). These findings suggest that the clinical presentation of COVID-19 in pregnant women closely resembles that seen in non-pregnant individuals [7]. The similarity in symptom patterns indicates that pregnancy does not appear to significantly alter the typical manifestations of COVID-19. This is consistent with other studies in the literature, which support the view that although pregnant women may be more vulnerable to severe outcomes, the symptoms are generally comparable to those in the wider population [7,11,12]. However, these studies report differences based primarily on descriptive statistics rather than inferential analysis. Additionally, the research has shown that the clinical presentation of COVID-19 varies across age groups (including adolescents, adults, and older adults) [13].

This variability suggests that the clinical manifestations in pregnant women may also differ within the group itself, depending on factors such as age or other individual characteristics. Therefore, the study of their clinical profiles and associated factors contributes to a more accurate risk of stratification. Even the implications for healthcare services are significant, particularly in ensuring the readiness of obstetric care units, access to timely diagnostics, and the integration of COVID-19 protocols within maternal health services. In terms of policy and governance, this issue intersects with broader themes of health equity, reproductive rights, and crisis response. The Data-driven insights can support the formulation of inclusive and adaptive public health policies that protect maternal health, strengthen pandemic preparedness, and reinforce the resilience of healthcare systems. Furthermore, aligning strategies with international recommendations and national health priorities ensure that pregnant women are not overlooked in the design and implementation of health interventions. In this context, the aim of this study is to identify the signs and symptoms associated with COVID-19, as well as the sociodemographic and clinical factors linked to the disease in pregnant women, and to compare these findings with those observed in non-pregnant women.

Material and Methods

Study Design, Setting and Participants

A population-based cross-sectional, comparative, and analytical study was conducted using a previously published secondary dataset from patients in Mexico who underwent nasopharyngeal SARS-CoV-2 testing at medical facilities [13]. Patients were classified as suspected cases of viral respiratory disease through epidemiological surveillance. The original study (a cases-control study) employed a risk set sampling approach to strengthen the internal validity of the case-control analysis [13]. In that context, controls were selected from the source population at the time each case occurred, ensuring they were still at risk of becoming cases. This methodology allowed for a valid estimation of the rate ratio using odds ratios, without assuming that the disease was rare in the source population. Unlike traditional cumulative density or survivor sampling, risk set sampling accounts for the fact that some controls may later become cases—a feature especially relevant for studies based on dynamic, real-time health registries. In the present analysis, we conducted a cross-sectional comparison using the same dataset, focusing on two distinct groups: pregnant and non-pregnant patients. This design enables us to investigate differences in clinical characteristics, comorbidities, and outcomes related to SARS-CoV-2 infection across these two populations, without implementing a longitudinal or time-to-event framework.

Database and Data Sources

The data originates from the national epidemiological surveillance system for viral respiratory diseases, which compiled information from 475 Viral Respiratory Disease Monitoring Health Units

(Unidades de Salud Monitoras de Enfermedad Respiratoria Viral, USMER) and additional non-USMER units adapted for COVID-19 screening throughout the country [14]. Both USMER and Non-USMER units follow standardized procedures for screening patients with respiratory symptoms, recording clinical and epidemiological data through the SISVER platform. The Diagnostic testing for SARS-CoV-2 using RT-PCR is conducted for all patients with severe symptoms. Conversely, in cases with mild symptoms, USMER units test at least 10%, while non-USMER units test based on their operational capacity [14]. Confirmed cases are classified as SARS-CoV-2 positive, negative, or pending and are validated at multiple administrative levels before inclusion in the dataset [14]. In this study, the analysis focused on two groups (pregnant and non-pregnant patients), allowing for comparative assessment within this population-based dataset.

Study Variables

All the information was compiled into a national database that includes SARS-CoV-2 test results, as well as sociodemographic details, clinical characteristics, and information about healthcare facilities. Sociodemographic variables comprised patient age, sex, and nationality (Mexican or non-Mexican). Clinical data included pre-existing comorbidities, along with presenting signs and symptoms. Comorbidities were recorded as binary variables and included diabetes, chronic obstructive pulmonary disease (COPD), asthma, immunosuppression, hypertension, HIV/AIDS, cardiovascular disease, obesity, chronic kidney disease, and other unspecified conditions. The smoking status was classified as either smoker or non-smoker, and the total number of comorbidities was also documented. Besides, signs and symptoms were recorded as binary variables and included fever, cough, odynophagia, dyspnoea, irritability, diarrhoea, chest pain, chills, headache, myalgia, arthralgia, malaise, rhinorrhoea, polypnoea, vomiting, abdominal pain, conjunctivitis, cyanosis, and the sudden onset of symptoms. Additional information included whether the patient had known contact with a confirmed case of viral infection and whether they had been vaccinated. All the data was collected using a standardized Respiratory Triage Form completed by the attending physician [14]. For laboratory-confirmed COVID-19 cases, further information was recorded concerning intensive care unit (ICU) admission, intubation, and mortality. The Healthcare facility data specified whether the unit was part of the USMER or Non-USMER surveillance networks and the type of facility in which the patient was assessed.

Outcomes, Subject's Selection, and Statistical Analysis

The primary outcome variable was a diagnosis of COVID-19, defined by laboratory-confirmed SARS-CoV-2 infection and recorded as a dichotomous variable (positive or negative). A census sampling method was applied to include all eligible pregnant and non-pregnant women registered in the national database during the study period. The sample comprised patients aged 11 years old and over, given that cases of adolescent pregnancy were reported, with the youngest preg-

nant patient being 11 years old. Consequently, both study groups—pregnant and non-pregnant women—consist of individuals aged 11 years and above. This approach ensured that the full available population of interest was included in each study arm. Categorical variables were described using absolute frequencies and percentages, while quantitative variables were summarized as mean, standard deviation (SD), interquartile range (IQR), minimum and maximum values, and range. All estimates were accompanied by 95% confidence intervals (95% CI). On the other hand, comparisons of categorical variables between groups were conducted using Yates’ corrected chi-square test.

Quantitative variables were compared using the Median Test for independent groups. The analysis was conducted across two parallel groups: one group comprising pregnant women, and the other consisting of non-pregnant women. Hence, both groups were analysed separately to identify clinical and epidemiological differences related to COVID-19 diagnosis. In order to assess the association between COVID-19 diagnosis (positive/negative) and the independent variables (e.g., age, comorbidities, signs and symptoms), a series of logistic regression models were applied within each study group. These models included continuous variables such as age, and dichotomous variables including presence of comorbidities and specific clinical symptoms. Multivariate logistic regression analyses were performed. Besides, the multivariate logistic regression models were constructed to identify independent predictors of a positive COVID-19 diagnosis while adjusting for potential confounding factors. Odds ratios (ORs) with corresponding 95% confidence intervals (CI95%) were calculated to quantify the strength and direction of associations. An OR >1 indicated an increased likelihood of COVID-19 diagnosis, whereas an OR <1 indicated a decreased likelihood. Finally, all statistical tests were two-tailed, and a p-value < 0.05 was considered statistically significant.

Ethical Considerations

This study was conducted according to good clinical practices, as defined by Mexican law, and the Helsinki Declaration for research using human beings. The database designed used anonymized dataset

of patients that is publicly available and accessible to anyone through the Mexican Health Ministry. The principles that emerge from the United Nations General Assembly, 1989, were used. A principle of legality and loyalty (the information was obtained in a lawful manner), a principle of accuracy (the relevance of the data was verified), a principle of purpose (the database is specific, a legitimate and a public before its creation), a principle of non-discrimination and a principle of security.

Results

Characteristics of the Study Population

The study included two groups: a total of 2,054 pregnant women and 190,861 non-pregnant women, resulting in a total study population of 192,915 female patients. From this population, we identified 96,457 patients with COVID-19 (50%, CI95% 49.8-50.2) (pregnant women 844; 41.1%, CI95% 39.0-43.0 versus non-pregnant women 95,613; 50.1%, CI95% 49.9-50.3). The mean age was 43.92 years old (SD = 16.10), with a range of 109 years old (minimum = 11 years; maximum = 120 years). The median age was 43 years old (IQR = 31–55 years). When stratified by the variable pregnancy, the median age (28 years old, IQR = 23–33, range = 62 years old; minimum = 11 years old, maximum = 73 years old) among pregnant patients was significantly lower (p<0.001, Median Test for independent groups), compared than non-pregnant patients (median age=43 years old; IQR = 31–55, range = 109 years old; minimum = 11 years old, maximum = 120 years). The most frequently reported symptoms were headache, cough, myalgia, fever, and odynophagia. Other commonly observed symptoms included arthralgia, malaise, and chills. Symptoms such as rhinorrhoea, chest pain, and dyspnoea were also noted in a substantial proportion of cases (Table 1). Less frequently reported symptoms included diarrhoea, irritability, abdominal pain, conjunctivitis, and vomiting. Although, more severe clinical indicators such as polypnoea and cyanosis were reported in 7.4% and 2.7% of patients, respectively. The sudden onset of symptoms was reported by 28.2% of the participants (Table 1).

Table 1. Comparative Analysis of Clinical Symptoms in the Total Population, Pregnant Women, and Non-Pregnant Women.

Variables	Total population N= 192,915 n, % (CI95%)	Pregnant women n= 2,054 n, % (CI95%)	Non-pregnant women n= 190,861 n, % (CI95%)
Fever*	77,247; 40 (39.8-40.3)	605; 29.5 (27.5-31.4)	76,642; 40.2 (40-40.4)
Cough*	109,733; 56.9 (56.6-57.1)	912; 44.4 (42.3-46.6)	108,821; 57 (56.8-57.2)
Odynophagia*	77,118; 40 (39.8-40.2)	630; 30.7 (28.5-32.6)	76,488; 40.1 (39.9-40.3)
Dyspnoea*	41,130; 21.3 (21.1-21.5)	277; 13.5 (12.1-14.9)	40,853; 21.4 (21.2-21.6)
Irritability*	29,332; 15.2 (15-15.4)	192; 9.3 (8.1-10.6)	29,140; 15.3 (15.1-15.4)
Diarrhoea*	36,545; 18.9 (18.8-19.1)	223; 10.9 (9.5-12.2)	36,322; 19 (18.9-19.2)
Chest pain*	42,053; 21.8 (21.6-22)	236; 11.5 (10.1-12.9)	41,817; 21.9 (21.7-22.1)

Chills*	53,912; 27.9 (27.7-28.1)	389; 18.9 (17.2-20.6)	53,523; 28 (27.8-28.2)
Headache*	122,676; 63.6 (63.4-63.8)	1,024; 49.9 (47.7-52.1)	121,652; 63.7 (63.5-64)
Myalgia*	80,298; 41.6 (41.4-41.8)	547; 26.6 (24.8-28.5)	79,751; 41.8 (41.5-42)
Arthralgia*	71,597; 37.1 (36.9-37.3)	466; 22.7 (21-24.6)	71,131; 37.3 (37-37.5)
Malaise*	65,923; 34.2 (34-34.4)	494; 24.1 (22.2-25.9)	65,429; 34.3 (34.1-34.5)
Rhinorrhoea	51,161; 26.5 (26.3-26.7)	525; 25.6 (23.6-27.4)	50,636; 26.5 (26.3-26.7)
Polypnea*	14,287; 7.4 (7.3-7.5)	106; 5.2 (4.2-6.2)	14,181; 7.4 (7.3-7.6)
Vomiting**	11,915; 6.2 (6.1-6.3)	149; 7.3 (6.2-8.3)	11,766; 6.2 (6.1-6.3)
Abdominal pain*	21,454; 11.1 (11-11.3)	159; 7.7 (6.6-8.9)	21,295; 11.2 (11-11.3)
Conjunctivitis*	22,111; 11.5 (11.3-11.6)	153; 7.4 (6.3-8.6)	21,958; 11.5 (11.4-11.7)
Cyanosis*	5,260; 2.7 (2.7-2.8)	31; 1.5 (1-2.1)	5,229; 2.7 (2.7-2.8)
Sudden onset of symptoms*	54,412; 28.2 (28-28.4)	453; 22.1 (20.3-24)	53,959; 28.3 (28.1-28.5)

Note: Prepared by the authors using data from the study. P value was calculated by Yates Corrected Chi-Square Test. *P value <0.001, **P value 0.046. &P value 0.001.

Description of the Non-Pregnant Population

In the 190,861 non-pregnant women showed a higher prevalence across nearly all clinical symptoms. The most commonly reported symptoms were headache, cough, myalgia and fever where, over 40% of these women also experienced and odynophagia, while arthralgia and malaise were also frequently observed. Respiratory symptoms such as dyspnoea, chest pain, and polypnea were notably more common than in the pregnant group. Similarly, gastrointestinal symptoms including diarrhoea, vomiting, and abdominal pain were reported more frequently. Other notable symptoms were rhinorrhoea, chills, conjunctivitis, cyanosis, and sudden onset of symptoms. This overall trend suggests that non-pregnant women presented a broader and more intense clinical symptomatology than pregnant women within the study population (Table 1).

Description of the Pregnant Population

Among the 2,054 pregnant women included in the study, the median gestational age was 7 months, with an interquartile range of 4 to 8 months. The most frequently reported symptom was headache, followed by cough, odynophagia and fever. Additionally, other common symptoms included myalgia, rhinorrhoea and malaise. Respiratory symptoms such as dyspnoea, polypnea, and chest pain were less prevalent compared to the non-pregnant group. Although, gastrointestinal symptoms like diarrhoea, vomiting, and abdominal pain were reported in a moderate proportion of cases. Irritability was present in

9.3% of pregnant women, while conjunctivitis, cyanosis, and sudden onset of symptoms were documented in 7.4%, 1.5%, and 22.1% of the cases, respectively. Overall, the symptom profile in pregnant women appeared milder, with consistently lower frequencies across most variables compared to their non-pregnant counterparts (Table 1).

Identification of Signs, Symptoms, and Associated Factors Related to COVID-19

Regarding to Non-Pregnant Women, the multivariate logistic regression analysis identified several clinical symptoms and comorbidities as factors associated with COVID-19 (Table 2). Symptoms such as fever, cough, malaise, myalgia, dyspnoea, arthralgia, and chills were significantly associated with a higher probability of SARS-CoV-2 infection, while others—such as abdominal pain, conjunctivitis, irritability, and diarrhoea—were linked to a lower probability. A vaccination status also showed a protective effect, significantly reducing the likelihood of COVID-19. Among comorbidities, type 2 diabetes and obesity increase the likelihood of SARS-CoV-2 infection, whereas asthma, chronic obstructive pulmonary disease (COPD), cardiovascular disease, and immunosuppression were associated with a reduced probability of COVID-19. Age showed an inverse association, indicating that younger women had a higher likelihood of SARS-CoV-2 infection. In contrast, variables such as vomiting, chronic kidney disease, human immunodeficiency virus - acquired immune deficiency syndrome (HIV-AIDS), and hypertension were not significantly associated with the outcome.

Table 2: Multivariate Logistic Regression Analysis of Clinical and Demographic Factors associated to COVID-19 in Non-Pregnant Women.

Variables	Beta	OR	CI 95%		P value
Age	-0.004	0.996	.996	.997	<0.001
Fever (1)	0.563	1.756	1.718	1.794	<0.001
Cough (1)	0.475	1.608	1.574	1.643	<0.001
Odynophagia (1)	-0.022	0.978	.957	1.000	0.046
Dyspnoea (1)	0.199	1.220	1.189	1.252	<0.001
Irritability (1)	-0.118	0.888	.863	.914	<0.001
Diarrhoea (1)	-0.031	0.970	.944	.995	0.021
Chest pain (1)	0.088	1.092	1.065	1.121	<0.001
Chills (1)	0.093	1.097	1.070	1.125	<0.001
Headache (1)	-0.024	0.976	.955	.999	0.038
Myalgia (1)	0.205	1.228	1.193	1.264	<0.001
Arthralgia (1)	0.135	1.144	1.111	1.178	<0.001
Malaise (1)	0.231	1.260	1.232	1.289	<0.001
Rhinorrhoea (1)	0.157	1.169	1.143	1.197	<0.001
Polypnea (1)	0.096	1.101	1.057	1.146	<0.001
Vomiting (1)	0.013	1.013	.971	1.057	0.538
Abdominal pain (1)	-0.168	0.845	.818	.874	<0.001
Conjunctivitis (1)	-0.144	0.866	.839	.893	<0.001
Cyanosis (1)	0.202	1.223	1.149	1.302	<0.001
SOS (1)	-0.074	0.929	.908	.950	<0.001
Type 2 Diabetes (1)	0.178	1.195	1.156	1.234	<0.001
COPD (1)	-0.156	0.855	.780	.938	0.001
Asthma (1)	-0.265	0.767	.725	.812	<0.001
Immunosuppressed (1)	-0.305	0.737	.679	.801	<0.001
Hypertension (1)	0.027	1.028	.997	1.059	0.074
HIV-AIDS (1)	-0.007	0.993	.809	1.219	0.949
CVD (1)	-0.249	0.780	.724	.839	<0.001
Obesity (1)	0.116	1.123	1.094	1.153	<0.001
CKD (1)	-0.063	0.939	.858	1.028	0.173
Vaccinated (1)	-0.182	0.834	.815	.852	<0.001
Constant	-0.563	0.569			<0.001

Note: Prepared by the authors using data from the study. SOS=sudden onset of symptoms. COPD=chronic obstructive pulmonary disease. HIV-AIDS=human immunodeficiency virus - acquired immune deficiency syndrome. CVD=cardiovascular disease. CKD=chronic kidney disease. OR: odds ratio. P values were calculated using the chi-square Wald test. P value of the OR adjusted for the variables included in the multivariate logistic regression model. Variables included in the multivariate logistic regression model: Age: years (numerical variable). Fever: presence=1, absence=0. Cough: presence=1, absence=0. Odynophagia: presence=1, absence=0. Dyspnoea: presence=1, absence=0. Irritability: presence=1, absence=0. Diarrhoea: presence=1, absence=0. Chest pain: presence=1, absence=0. Chills: presence=1, absence=0. Headache: presence=1, absence=0. Myalgia: presence=1, absence=0. Arthralgia: presence=1, absence=0. Malaise: presence=1, absence=0. Rhinorrhoea: presence=1, absence=0. Polypnea: presence=1, absence=0. Vomiting: presence=1, absence=0. Abdominal pain: presence=1, absence=0. Conjunctivitis: presence=1, absence=0. Cyanosis: presence=1, absence=0. SOS: presence=1, absence=0. Type 2 Diabetes: presence=1, absence=0. COPD: presence=1, absence=0. Asthma: presence=1, absence=0. Immunosuppressed: presence=1, absence=0. Hypertension: presence=1, absence=0. HIV-AIDS: presence=1, absence=0. CVD: presence=1, absence=0. Obesity: presence=1, absence=0. CKD: presence=1, absence=0. Vaccinated: presence=1, absence=0.

Thus, these findings reinforce the importance of recognising specific clinical and demographic factors that may influence COVID-19 detection, particularly in primary care settings where early identification and appropriate follow-up are essential for reducing transmission and improving clinical outcomes. In relation to pregnant women, the multivariate logistic regression analysis revealed a distinct pattern of associations compared to the non-pregnant women population. Among clinical symptoms, fever, cough, myalgia, malaise, and rhinorrhoea were significantly associated with a higher likelihood of COVID-19, suggesting these remain relevant indicators of infection even during pregnancy. Notably, age also showed a direct association, indicating that older pregnant women were more likely to SARS-CoV-2 infection. In contrast, several symptoms that were significant in the general female population—such as dyspnoea, diarrhoea, chest pain, chills, and headache—did not reach statistical significance in pregnant women, highlighting potential differences in clinical presentation. Furthermore, none of the chronic comorbidities, including type

2 diabetes, asthma, COPD, cardiovascular disease, or obesity, showed significant associations with COVID-19 in the pregnant group. This differs from the non-pregnant population, where several of these conditions were associated with increased or decreased probability of infection.

The Vaccination status also did not significantly influence the probability of infection among pregnant women, in contrast to the protective effect observed in the general female population. Additionally, there were only six factors associated with COVID-19 in pregnant women. Overall, these findings underscore that while some core symptoms such as fever and cough consistently indicate COVID-19 across populations, pregnant women exhibit a more limited set of significant associations, and comorbidities appear to play a lesser role in determining infection probability. This highlights the importance of tailored diagnostic criteria and risk assessment strategies in this vulnerable subgroup (Table 3).

Table 3: Multivariate Logistic Regression Analysis of Clinical and Demographic Factors associated to COVID-19 in Pregnant Women.

Variables	Beta	OR	CI 95%		P value
Age	0.021	1.022	1.008	1.035	0.002
Fever (1)	0.578	1.783	1.393	2.282	<0.001
Cough (1)	0.590	1.804	1.432	2.272	<0.001
Odynophagia (1)	0.144	1.155	0.911	1.464	0.235
Dyspnoea (1)	0.208	1.231	0.899	1.685	0.195
Irritability (1)	-0.267	0.766	0.534	1.099	0.148
Diarrhoea (1)	-0.167	0.846	0.612	1.171	0.313
Chest pain (1)	-0.028	0.972	0.692	1.366	0.871
Chills (1)	-0.212	0.809	0.604	1.084	0.156
Headache (1)	0.217	1.243	0.982	1.572	0.070
Myalgia (1)	0.599	1.821	1.289	2.571	0.001
Arthralgia (1)	-0.127	0.881	0.616	1.261	0.489
Malaise (1)	0.304	1.355	1.050	1.749	0.019
Rhinorrhoea (1)	0.343	1.409	1.105	1.797	0.006
Polypnea (1)	0.373	1.453	0.885	2.384	0.140
Vomiting (1)	-0.049	0.952	0.638	1.421	0.810
Abdominal pain (1)	0.032	1.033	0.695	1.536	0.873
Conjunctivitis (1)	-0.283	0.753	0.514	1.104	0.146
Cyanosis (1)	0.649	1.913	0.814	4.498	0.137
SOS (1)	0.049	1.051	0.817	1.352	0.700
Type 2 Diabetes (1)	0.263	1.301	0.729	2.321	0.374
COPD (1)	-0.776	0.460	0.074	2.883	0.407
Asthma (1)	0.514	1.672	0.852	3.283	0.135

Immunosuppressed (1)	-0.643	0.526	0.170	1.629	0.265
Hypertension (1)	-0.140	0.870	0.426	1.774	0.701
HIV-AIDS (1)	-20.188	0.000	0.000		1.000
CVD (1)	-0.404	0.668	0.057	7.807	0.748
Obesity (1)	0.124	1.131	0.768	1.668	0.532
CKD (1)	-21.514	0.000	0.000		0.999
Vaccinated (1)	-0.118	0.888	0.712	1.108	0.294
Constant	-1.824	0.161			<0.001

Note: Prepared by the authors using data from the study. SOS=sudden onset of symptoms. COPD=chronic obstructive pulmonary disease. HIV-AIDS=human immunodeficiency virus - acquired immune deficiency syndrome. CVD=cardiovascular disease. CKD=chronic kidney disease. OR: odds ratio. P values were calculated using the chi-square Wald test. P value of the OR adjusted for the variables included in the multivariate logistic regression model. Variables included in the multivariate logistic regression model: Age: years (numerical variable). Fever: presence=1, absence=0. Cough: presence=1, absence=0. Odynophagia: presence=1, absence=0. Dyspnoea: presence=1, absence=0. Irritability: presence=1, absence=0. Diarrhoea: presence=1, absence=0. Chest pain: presence=1, absence=0. Chills: presence=1, absence=0. Headache: presence=1, absence=0. Myalgia: presence=1, absence=0. Arthralgia: presence=1, absence=0. Malaise: presence=1, absence=0. Rhinorrhoea: presence=1, absence=0. Polypnea: presence=1, absence=0. Vomiting: presence=1, absence=0. Abdominal pain: presence=1, absence=0. Conjunctivitis: presence=1, absence=0. Cyanosis: presence=1, absence=0. SOS: presence=1, absence=0. Type 2 Diabetes: presence=1, absence=0. COPD: presence=1, absence=0. Asthma: presence=1, absence=0. Immunosuppressed: presence=1, absence=0. Hypertension: presence=1, absence=0. HIV-AIDS: presence=1, absence=0. CVD: presence=1, absence=0. Obesity: presence=1, absence=0. CKD: presence=1, absence=0. Vaccinated: presence=1, absence=0.

Discussion

This study highlights key differences in the clinical presentation of COVID-19 between pregnant and non-pregnant women. Despite representing only a small fraction of the total cohort, pregnant women demonstrated a consistently milder symptom profile compared to their non-pregnant counterparts. Among the 2,054 pregnant patients, the most frequently reported symptoms were cough, headache, and fever, followed by odynophagia, myalgia, and malaise. Respiratory symptoms such as dyspnoea, chest pain, and polypnea were reported at notably lower rates compared to non-pregnant women, suggesting a less severe respiratory involvement in this subgroup. Furthermore, gastrointestinal symptoms such as like diarrhoea, vomiting, and abdominal pain were present in a moderate proportion of cases, while more severe clinical signs such as cyanosis and sudden onset of symptoms were relatively infrequent. Notably, the overall clinical presentation in pregnant women appeared less intense, with consistently lower frequencies across nearly all symptoms. In contrast, the 190,861 non-pregnant women in the study exhibited a more robust and diverse clinical symptomatology. Headache, cough, and fever were the most prevalent symptoms, each affecting over 40% of the group. Symptoms such as myalgia, odynophagia, arthralgia, malaise, and chills were also common, with respiratory complaints like dyspnoea, chest pain, and polypnea occurring at significantly higher frequencies than in the pregnant cohort. Additionally, gastrointestinal and systemic symptoms—including diarrhoea, abdominal pain, vomiting, and irritability—were more prevalent, indicating a broader symptom burden.

The difference in symptom intensity may be influenced by physiological and immunological changes during pregnancy that alter the typical response to viral infections. The relatively lower rates of severe symptoms such as dyspnoea, chest pain, and cyanosis in pregnant women may reflect altered inflammatory or respiratory responses associated with pregnancy. Conversely, the higher prevalence of vomiting in pregnant patients may be partially attributable to the baseline presence of nausea and emesis in pregnancy, rather than a direct manifestation of COVID-19. Furthermore, the significant age difference between groups—median age 28 years old in pregnant women versus 43 years old in non-pregnant women—may partially explain the lower symptom burden in the former group, as younger age is generally associated with milder disease presentations. However, even after accounting for age, the pattern of reduced symptom frequency among pregnant women persisted across most clinical variables. These findings highlight the importance of developing targeted preventive and public health strategies for pregnant women, ensuring early detection, timely care, and appropriate monitoring of COVID-19 symptoms in this vulnerable population. Thus, the comparatively milder symptom profile may contribute to delayed recognition and diagnosis of COVID-19, highlighting the importance of heightened clinical vigilance. Given the potential implications for both maternal and fetal health, ongoing monitoring and timely intervention should be prioritized. Moreover, strengthening follow-up protocols within primary care units is essential to ensure early detection, continuous evaluation, and appropriate management in this high-risk population. On the other hand, when compared with previously published studies on pregnant women with COVID-19, our findings revealed a distinct

symptom profile. In our cohort, the most frequently reported symptom was headache (49.9%), followed by cough (44.4%), sore throat (odynophagia, 30.7%), fever (29.5%), and myalgia (26.6%), whereas in the study by Yan et al. [6], the predominant symptoms were fever (50.9%), cough (28.4%), and fatigue (12.9%), with notably lower frequencies of sore throat (8.6%), myalgia (5.2%), and diarrhoea (0.9%). Similarly, Matar et al. [11] reported fever in 62.9%, cough in 36.8%, and sore throat in 22.6% of pregnant women, while Zaigham et al. [12] documented fever in 68% and cough in 34%.

These comparisons highlight that while fever and cough remain consistent core symptoms across studies, headache, sore throat, and myalgia appeared more frequently in our population, suggesting possible variation in symptom expression due to demographic, immunological, or viral factors. Moreover, when comparing our findings with smaller case series and case reports, particularly from Asian and Latin American populations, notable variations emerge; however, direct comparisons must be approached with caution due to limited sample sizes and methodological heterogeneity. In a study from China reported by Chen et al. [15], which involved nine pregnant women in their third trimester, fever was the most common symptom (7/9= 77.8%), followed by cough (4/9= 44.4%), myalgia (3/9= 33.3%), sore throat (2/9= 22.2%), and malaise (2/9= 22.2%). Similarly, Yu et al. (2020) reported that among seven women near term (mean gestational age: 39 weeks), fever was present in 86%, with isolated instances of cough, dyspnoea, and diarrhoea (14% each) [16].

On the other hand, in a preliminary analysis of 15 pregnant women, Liu et al. [5] found that 13 patients experienced fever (86.7%) and 9 patients experienced cough (60%), respectively [17]. Other case reports from the Chinese population, such as those by Khan et al. [18], observed fever in 2 of 3 women (66.6%) and cough in all cases [18]. Notably, Chen S et al. [19] reported that all pregnant women in their cohort developed low-grade fever only postpartum, not antepartum, suggesting a potentially different immunologic response related to delivery [19]. Outside of China, a Korean case report by Dong Hwan Lee et al. [20] described a 28-year-old woman who developed fever (>38°C), sore throat, and cough after confirmed contact with a SARS-CoV-2 case [20], while the Honduran case reported by Zambrano et al. [21] involved a 41-year-old woman (at 31 weeks) with intermittent fever, dry cough, headache, and myalgia [21]. In a broader Chinese cohort (23 pregnant patients) where all patients had mild to moderate COVID-19 disease, the main reported symptoms included cough in 21.7% of cases, fever in 17.4%, and nasal congestion in 4.3% [22]. These proportions are notably lower than those observed in our study, where symptoms such as fever and cough were more frequently reported among pregnant women. This discrepancy could be influenced by differences in case definitions, timing of symptom assessment, and healthcare-seeking behaviours, as well as the possibility of underreporting in mild cases. Thus, the relatively low frequency of symptoms in this Chinese cohort also highlights the potential for asymptomatic

or oligosymptomatic presentations during pregnancy, reinforcing the need for heightened clinical suspicion and routine testing strategies in obstetric settings.

Limitations of the study

This study has several limitations that should be considered when interpreting the findings. First, as a cross-sectional study with two arms—pregnant and non-pregnant women—the groups differed in sample size, although both were analysed using a census sampling approach within their respective populations. Although this design limits the ability to establish causal relationships between variables, it allows for the identification of epidemiological associations that should be confirmed through studies specifically designed to assess causal relationships. Additionally, comparisons with data from case reports and case series, while valuable for contextualization, are inherently constrained by methodological differences. Such reports often represent more severe or atypical clinical presentations and lack the standardised data collection and population-based structure of observational studies. Therefore, while they offer important clinical insights, their interpretation must be cautious, especially when evaluating symptom prevalence and outcomes across diverse demographic and healthcare contexts. Our findings and other reports illustrate that fever and cough are consistently reported as dominant symptoms across different settings, including our cohort and international case series. However, symptoms such as headache, sore throat, and myalgia may be underreported in smaller studies due to limited scope or reporting bias. While our data suggests a higher burden of symptomatic illness—particularly fever and cough—this may reflect both true biological variation and differences in study design rather than definitive epidemiological divergence. As such, although our broader cohort provides a valuable perspective, the need for more comprehensive, multicentre studies remains essential to fully understand the variability in clinical presentation among pregnant women with COVID-19.

Conclusions

This study underscores the clinical relevance of identifying and comparing COVID-19 symptom patterns and associated factors in pregnant and non-pregnant women. The findings reveal that pregnant women present a distinct clinical profile, with notable differences in symptom frequency and intensity. Specifically, non-pregnant women exhibited a more intense symptomatology, suggesting a potentially greater clinical burden in this group.

These distinctions are crucial for early detection and management strategies in primary care. Further research is needed to stratify the maternal risk to aid in early detection and triage. Moreover, primary care training should be adapted to improve recognition of atypical symptoms in pregnant patients, enhancing timely diagnosis and management. Resource allocation strategies may also need to

prioritise pregnant women for testing, monitoring, and treatment, particularly in settings with limited access to healthcare. Additionally, pregnancy-specific guidance, such as isolation, follow-up, and return to care, should be established. Strengthening surveillance systems to include disaggregated data will enable better monitoring of symptom patterns and outcomes. Finally, these insights can inform vaccination and prevention strategies tailored to maternal populations, ensuring that women at increased risk of severe illness receive appropriate protection and care throughout pregnancy.

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Authors' Contributions

All authors contributed to conceptualization (ideas, formulation, or development of research goals and objectives), formal analysis (application of statistical, mathematical, computational, or other formal techniques to analyse or synthesize study data), writing - original draft (preparation, creation, and/or presentation of the published work, specifically writing the initial draft), writing - review and editing (preparation, creation, and/or presentation of the published work by the research group, specifically critical review, commentary, or revisions, including pre- or post-publication stages), and visualization (preparation, creation, and/or presentation of the published work, specifically data visualization/presentation). Daniel López-Hernández, in addition to the above, contributed to project administration (responsibility for managing and coordinating the planning and execution of the research activity), investigation (development of a research process, specifically experiments or data collection/testing), methodology (development or design of methodology, creation of models), supervision (responsibility for supervision and leadership in the planning and execution of the research activity, including external mentoring), and validation (verification, whether as part of the activity or separately, of the overall replicability/reproducibility of the results/experiments and other research outcomes).

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