

FULL TEXT LINKS



[Am J Obstet Gynecol](#). 2022 Jul;227(1):74.e1-74.e16. doi: 10.1016/j.ajog.2021.12.032.

Epub 2021 Dec 20.

Diabetes mellitus, maternal adiposity, and insulin-dependent gestational diabetes are associated with COVID-19 in pregnancy: the INTERCOVID study

Brenda Eskenazi ¹, Stephen Rauch ², Enrico Iurlaro ³, Robert B Gunier ², Albertina Rego ⁴, Michael G Gravett ⁵, Paolo Ivo Cavoretto ⁶, Philippe Deruelle ⁷, Perla K García-May ⁸, Mohak Mhatre ⁹, Mustapha Ado Usman ¹⁰, Mohamed Elbahnasawy ¹¹, Saturday Etuk ¹², Raffaele Napolitano ¹³, Sonia Deantoni ¹⁴, Becky Liu ¹⁵, Federico Prefumo ¹⁶, Valeria Savasi ¹⁷, Patrícia F Marques ¹⁸, Eric Baafi ¹⁹, Ghulam Zainab ²⁰, Ricardo Nieto ²¹, Berta Serrano ²², Muhammad Baffah Aminu ²³, Jorge Arturo Cardona-Perez ²⁴, Rachel Craik ²⁵, Adele Winsey ²⁵, Gabriela Tavchioska ²⁶, Babagana Bako ²⁷, Daniel Oros ²⁸, Caroline Benski ²⁹, Hadiza Galadanci ³⁰, Mónica Savorani ³¹, Manuela Oberto ³², Loïc Sentilhes ³³, Milagros Risso ³⁴, Ken Takahashi ³⁵, Carmen Vecciarelli ³⁶, Satoru Ikenoue ³⁷, Anil K Pandey ³⁸, Constanza P Soto Conti ²¹, Irene Cetin ³⁹, Vincent Bisor Nachinab ⁴⁰, Ernawati Ernawati ⁴¹, Eduardo A Duro ⁴², Alexey Kholin ⁴³, Michelle L Firlit ⁴⁴, Sarah Rae Easter ⁴⁵, Joanna Sichitiu ⁴⁶,

Yetunde John-Akinola⁴⁷, Roberto Casale⁴⁸, Hellas Cena⁴⁹, Josephine Agyeman-Duah²⁵, Paola Roggero⁵⁰, Ana Langer⁵¹, Zulfiqar A Bhutta⁵², Stephen H Kennedy⁵³, Jose Villar⁵³, Aris T Papageorghiou⁵⁴

Affiliations

PMID: 34942154 PMCID: [PMC8686449](#) DOI: [10.1016/j.ajog.2021.12.032](#)

[Free PMC article](#)

Abstract

Background: Among nonpregnant individuals, diabetes mellitus and high body mass index increase the risk of COVID-19 and its severity.

Objective: This study aimed to determine whether diabetes mellitus and high body mass index are risk factors for COVID-19 in pregnancy and whether gestational diabetes mellitus is associated with COVID-19 diagnosis.

Study design: INTERCOVID was a multinational study conducted between March 2020 and February 2021 in 43 institutions from 18 countries, enrolling 2184 pregnant women aged ≥ 18 years; a total of 2071 women were included in the analyses. For each woman diagnosed with COVID-19, 2 nondiagnosed women delivering or initiating antenatal care at the same institution were also enrolled. The main exposures were preexisting diabetes mellitus, high body mass index (overweight or obesity was defined as a body mass index ≥ 25 kg/m²), and gestational diabetes mellitus in pregnancy. The main outcome was a confirmed diagnosis of COVID-19 based on a real-time polymerase chain reaction test, antigen test, antibody test, radiological pulmonary findings, or ≥ 2 predefined COVID-19 symptoms at any time during pregnancy or delivery. Relationships of exposures and COVID-19 diagnosis were assessed using generalized linear models with a Poisson distribution and log link function, with robust standard errors to account for model misspecification. Furthermore, we conducted sensitivity analyses: (1) restricted to those with a real-time polymerase chain reaction test or an antigen test in the last week of pregnancy, (2) restricted to those with a real-time polymerase

chain reaction test or an antigen test during the entire pregnancy, (3) generating values for missing data using multiple imputation, and (4) analyses controlling for month of enrollment. In addition, among women who were diagnosed with COVID-19, we examined whether having gestational diabetes mellitus, diabetes mellitus, or high body mass index increased the risk of having symptomatic vs asymptomatic COVID-19.

Results: COVID-19 was associated with preexisting diabetes mellitus (risk ratio, 1.94; 95% confidence interval, 1.55-2.42), overweight or obesity (risk ratio, 1.20; 95% confidence interval, 1.06-1.37), and gestational diabetes mellitus (risk ratio, 1.21; 95% confidence interval, 0.99-1.46). The gestational diabetes mellitus association was specifically among women requiring insulin, whether they were of normal weight (risk ratio, 1.79; 95% confidence interval, 1.06-3.01) or overweight or obese (risk ratio, 1.77; 95% confidence interval, 1.28-2.45). A somewhat stronger association with COVID-19 diagnosis was observed among women with preexisting diabetes mellitus, whether they were of normal weight (risk ratio, 1.93; 95% confidence interval, 1.18-3.17) or overweight or obese (risk ratio, 2.32; 95% confidence interval, 1.82-2.97). When the sample was restricted to those with a real-time polymerase chain reaction test or an antigen test in the week before delivery or during the entire pregnancy, including missing variables using imputation or controlling for month of enrollment, the observed associations were comparable.

Conclusion: Diabetes mellitus and overweight or obesity were risk factors for COVID-19 diagnosis in pregnancy, and insulin-dependent gestational diabetes mellitus was associated with the disease. Therefore, it is essential that women with these comorbidities are vaccinated.

Keywords: COVID-19; SARS-CoV-2; body mass index; diabetes mellitus; gestational diabetes mellitus; obesity; overweight; pregnancy.

Copyright © 2021. Published by Elsevier Inc.

Figures

[Genetic Alliance](#)

[MedlinePlus Health Information](#)

Miscellaneous

[NCI CPTAC Assay Portal](#)