

EDITORIAL COMMENT

Risk Factors and Prevention Strategies for Gestational Diabetes in Asian Populations



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Gestational diabetes mellitus (GDM) affects 14% of pregnant women worldwide and is rising.¹ Uncontrolled high blood sugar levels during pregnancy can cause miscarriage, high blood pressure, low newborn blood sugar, and neonatal respiratory distress.² A history of GDM increases the risk of abnormal glucose metabolism, diabetes, and cardiovascular disease for both mother and child.^{3,4} The difference in race and ethnicity affects GDM risk in addition to well-known risk factors like advanced maternal age, familial diabetes history, previous GDM, obesity, and hypertension.^{5,6}

Several studies show that Asians have the highest GDM rates. A 1995-2004 study in California found that Asian Indians had 11.1% age-adjusted GDM prevalence, whereas non-Hispanic whites had 4.1%.⁷ Another U.S. study found that Asian Indians had the highest GDM rates at 129.1 per 1,000 live births from 2011-2019.⁸ Despite the high risk of GDM in Asians, little was known about its causes. Thus, studies are needed to determine if age, weight, hypertension, or other factors are involved.

In this issue of *JACC: Asia*, Boyer et al⁹ examined U.S. singleton pregnancies from 2016-2019 and the relationship between hypertension, obesity, and GDM

by maternal race, ethnicity, nativity, and Asian ancestry. Asian Americans' GDM prevalence was 12.3%, the highest of any race or ethnicity. Japanese (7.3%), Korean (9.1%), and Chinese (10.9%) had the lowest prevalence among the Asian ancestries. These generally match that of previous research.^{7,8} Asian Americans had the lowest rates of hypertension and obesity, but they had a much higher risk of GDM. The study found that GDM risk increased with prepregnancy body mass index (BMI), hypertension, maternal age, lower educational attainment, smoking, and delayed prenatal care. Most Asian Americans born outside the United States had a higher GDM risk than those born in the United States, possibly due to dietary habits, environmental factors, cultural differences, or social dynamics. These findings emphasize the importance of considering prepregnancy health and sociodemographic factors in preventing and managing GDM in U.S. Asian populations.

GDM risk in Asians may result from several factors. First, Asians have higher body fat, larger waist circumferences, and greater abdominal obesity than Europeans of similar BMI.^{10,11} Asians may appear thin but store more visceral fat than Europeans, a condition called "skinny fat." High body fat and visceral fat can cause insulin resistance and type 2 diabetes mellitus (T2DM). Despite having lower BMIs, Asians are paradoxically more likely to develop GDM^{7,8} and T2DM.¹² Future studies can test this hypothesis by incorporating waist circumference or abdominal visceral fat mass into investigation, which may be a better indicator of obesity than BMI, especially for cardiovascular health. The widespread use of BMI to assess health may lead to Asians underestimating their diabetes risk because many are lean with a low BMI, potentially delaying diagnosis. Second, studies have indicated that South Asians are more insulin-resistant and have lower β -cell function than Whites.¹³⁻¹⁶ East Asians, particularly the Japanese, are

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generally more insulin-sensitive than South Asians¹³ and Whites.¹⁷⁻¹⁹ This may explain why Boyer et al and previous studies found that the Japanese have a lower prevalence of GDM and T2DM than South Asians.⁷⁻⁹ Third, Asian genetics may increase diabetes risk. In a genome-wide association meta-analysis, Loh et al²⁰ found 21 T2DM-related single nucleotide polymorphisms (SNPs) in South Asians and Europeans. A BMI-adjusted model was used to assess these SNPs in other ethnic groups. Of the 21 SNPs, 12 were replicated in East Asians, 1 in Africans, and none in Hispanics. These findings suggest that South Asians have T2DM-associated genetic loci that East Asians and other ethnic groups lack, which may explain the higher risk of GDM and T2DM in South Asians. Further genetic association research is needed to confirm these assumptions.

There are other behavioral factors that may affect diabetes risk in Asians. In this study, Boyer et al⁹ found that most Asians born outside the United States have a higher GDM risk than those born in the United States, except the Japanese. Previous studies support this result.^{7,21-23} Noah et al²¹ found that foreign-born Asians were less educated, less insured, had more pregnancies, fewer chronic health conditions, and lower alcohol and cigarette use than U.S.-born Asians, and the risk difference between U.S.-born and non-U.S.-born women remained even after multivariable adjustment. Individuals who are foreign-born may be more disadvantaged in terms of economics and education, which may result in a higher risk of GDM due to limited medical resources, insurance coverage, or migration and environmental adaptation stress.²⁴ More investigation is required to elucidate these disparate presentations. The increased risk of GDM in foreign-born Asians is unlikely due to Asian diet, behavior, or lifestyle because previous studies have shown that GDM risk increases with U.S. residence.^{21,25} Ogunwole et al²⁵ found that foreign-born women with ≥ 10 years of U.S. residency had the highest age-standardized GDM history (11.0%), followed by those with < 10 years residency (6.7%) and U.S.-born women (9.2%). Noah et al²¹ also found that foreign-born women living in the United States for 0-5 years (8.3%), 6-10 years (14.0%), and > 10 years (15.7%) had higher GDM rates than U. S.-born women. This suggests that foreign-born women living in the United States longer are more likely to develop GDM. In U.S. immigrants, longer residency was also associated with higher BMI and T2DM risk,^{26,27} which may be attributed to the adoption of a Western diet and sedentary behavior. Lastly, as GDM is defined as glucose intolerance first recognized during pregnancy, only women without prepregnancy diabetes

are at risk of developing GDM. A study conducted in Northern California revealed that the age-adjusted prevalence of prepregnancy T2DM from 2012-2014 was highest in Hispanics, second among African Americans, and third in Asians. Each of these prevalence estimates was significantly higher than that of non-Hispanic White women.²⁸ Thus, Asians may have a higher risk of GDM due to the exclusion of fewer prepregnancy T2DM patients compared to Hispanics and African Americans. This hypothesis needs confirmation from more research. Overall, besides cardiovascular risk factors, low educational and financial status, insufficient insurance coverage, limited access to medical care, stress related to migration adaptation, and potentially survivorship bias may contribute to the heightened risk of diabetes among Asians.

The study by Boyer et al⁹ revealed several research gaps that could be addressed in future studies. The effects of central obesity (waist circumference), diet, exercise, and economic status on GDM risk were not assessed due to insufficient data. However, this study examined BMI, hypertension, ethnicity, country of birth, and Asian ancestry as potential GDM risk factors. This analysis offers valuable insights into the risk of GDM in the Asian population.

Asians are more likely to develop GDM, so active glucose monitoring during pregnancy is crucial. Asians at risk of GDM can be identified in several ways. The American College of Obstetricians and Gynecologists recommends screening at 24 weeks' gestation for women with BMI ≥ 25 kg/m² or ≥ 23 kg/m² in Asian Americans.²⁹ Due to insufficient evidence of maternal and neonatal benefits outweighing risks, they do not recommend screening before 24 weeks. Future research should examine whether Asians could benefit from earlier screening. Given that Asians have lower BMI but higher body fat, future research should also explore whether waist circumference is better than BMI at identifying GDM risk in Asians. Additionally, more sensitive GDM diagnostic criteria may help identify Asian women at risk. Hirst et al³⁰ found that the less strict International Association of the Diabetes and Pregnancy Study Groups criterion identified more pregnant women at risk for GDM than the American Diabetes Association criterion. A high risk of preterm delivery and neonatal hypoglycemia was associated with those diagnosed with GDM using International Association of the Diabetes and Pregnancy Study Groups but tested negative using American Diabetes Association. More research is needed to determine if current diagnostic criteria can detect glucose intolerance in Asians and if a less strict approach could improve

early management. However, whether healthcare resources can handle the increased number of GDM patients if such criteria are adopted should also be considered.

GDM screening during pregnancy and T2DM screening after GDM are essential for Asians. In a retrospective cohort study conducted by Janevic et al,³¹ Africans (18.5%) had the highest 8-year incidence of T2DM among GDM patients, followed by South and Southeast Asians (16.8%). Therefore, establishing customized criteria for T2DM screening in Asians is crucial. Araneta et al³² proposed that, while many guidelines are based on European and U.S. studies,³³ an HbA1c cutoff of $\geq 6.5\%$ may be insensitive for Asian Americans and could delay their T2DM diagnosis. Asians with prediabetes should be treated more proactively, and further research should determine if current T2DM guidelines are suitable for them.

The prevalence of GDM is higher among Asians as a result of genetic factors and lifestyle choices. Boyer

et al⁹ offer valuable knowledge regarding the influence of prepregnancy health and sociodemographic factors on the likelihood of developing GDM in Asian populations. We provide various hypotheses to improve understanding of this pattern. We suggest conducting additional research to identify and efficiently manage the high occurrence of diabetes among individuals of Asian descent.

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