Prepregnancy body mass index and gestational diabetes mellitus across Asian and Pacific Islander subgroups in California

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BACKGROUND: The American College of Obstetricians and Gynecologists recommends early screening for gestational diabetes mellitus among pregnant Asian people with a prepregnancy body mass index ≥23.0 kg/m^2, in contrast with the recommended screening at a body mass index ≥25 kg/m^2 for other races and ethnicities. However, there is significant heterogeneity within Asian and Pacific Islander populations, and gestational diabetes mellitus and its association with body mass index among Asian and Pacific Islander subgroups may not be uniform across all groups.

OBJECTIVE: This study aimed to analyze the association between body mass index and gestational diabetes mellitus among Asian and Pacific Islander subgroups in California, specifically gestational diabetes mellitus rates among those with a body mass index above vs below 23 kg/m^2, which is the cutoff point for the designation of being overweight among Asians populations.

STUDY DESIGN: Using a linked delivery hospitalization discharge and vital records database, we identified patients who gave birth in California between 2007 and 2017 and who self-reported to be 1 of 13 Asian and Pacific Islander subgroups, which was collected from birth and fetal death certificates. In each subgroup, we evaluated the association between body mass index and gestational diabetes mellitus using multivariable logistic regression models adjusted for age, education, parity, payment method, the trimester in which prenatal care was initiated, and nativity. We fit body mass index nonlinearly with splines and categorized body mass index as being above or below 23 kg/m^2. Predicted probabilities of gestational diabetes mellitus with 95% confidence intervals were calculated across body mass index values using the nonlinear regression models.

RESULTS: The overall prevalence of gestational diabetes mellitus was 14.3% (83,400/584,032), ranging between 8.4% and 17.1% across subgroups. The highest prevalence was among Indian (17.1%), Filipino (16.7%), and Vietnamese (15.5%) subgroups. In these subgroups, gestational diabetes mellitus was diagnosed in 10% to 13% of those with a body mass index <23.0 kg/m^2 and in 22% of those with a body mass index ≥23 kg/m^2. Gestational diabetes mellitus was least common among Korean (8.4%), Japanese (9.0%), and Samoan (9.8%) subgroups with a gestational diabetes mellitus rate of 5% to 7% among those with a body mass index <23.0 kg/m^2 and in 10% to 15% among those with a body mass index ≥23 kg/m^2. Although Samoan patients had the highest rate of obesity, defined as body mass index ≥30 kg/m^2 (57.4%), they had the third lowest prevalence of gestational diabetes mellitus. Conversely, Vietnamese patients had the second lowest rate of obesity (2.4%) but the highest rate of gestational diabetes mellitus at a body mass index of ≥23 kg/m^2 (22.3%).

CONCLUSION: Gestational diabetes mellitus and its association with body mass index varied among Asian subgroups but increased as body mass index increased. Subgroups with the lowest prevalence of obesity trended toward a higher prevalence of gestational diabetes mellitus and those with a higher prevalence of obesity trended toward a lower prevalence of gestational diabetes mellitus.

Key words: Asian, gestational diabetes mellitus, obesity, overweight, Pacific Islander

Introduction

The prevalence of gestational diabetes mellitus (GDM) in the United States ranges from 6% to 25% based on population characteristics and the diagnostic criteria used,[1,2] with a higher prevalence among overweight or obese individuals.[3,4] All patients are recommended to undergo universal screening between 24 and 28 weeks of gestation.[5] However, because of the association between obesity and GDM, the American College of Obstetricians and

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Why was this study conducted?

This study aimed to assess the prevalence and risk of gestational diabetes mellitus (GDM) in 13 distinct Asian and Pacific Islander (API) subgroups by body mass index (BMI) with a focus on a BMI above >23 kg/m^2, which is the recommended cutoff point for early GDM screening for Asian people by the American College of Obstetricians and Gynecologists.

Key findings

GDM risk increases as BMI increases but varied among the different API subgroups. Subgroups with the lowest prevalence of obesity tended to have a higher prevalence of GDM.

What does this add to what is known?

The prevalence and risk of GDM for many API subgroups seemed to be higher in groups with a lower prevalence of obesity and was lower among those with a higher prevalence of obesity.

Gynecologists (ACOG) recommends early screening among non-Asian patients with a body mass index (BMI) ≥25 kg/m^2 who also have any additional risk factors such as a sedentary lifestyle, family history of diabetes mellitus, a personal history of GDM, or other factors that predispose patients to an increased risk for insulin resistance.[5]

Asian individuals are considered to be at high risk for pregestational and gestational diabetes mellitus.[6–9] And although the World Health Organization (WHO) has defined overweight as having a BMI of ≥25 kg/m^2, Asian people with a BMI above this cutoff point have been noted to have a higher percentage of body fat than White people, as well as having increasing rates of diabetes mellitus and cardiovascular disease.[10,11] The ACOG therefore recommends early GDM screening for Asian people with a BMI of ≥23 kg/m^2 who have any of the previously mentioned additional risk factors that predispose them to insulin resistance.[5]

Asians and Pacific Islander (API) people encompass a wide range of geographic, ethnic, and cultural backgrounds. Few studies have examined the prevalence of GDM in the context of these diverse subgroups with previous studies examining BMI and its effect on GDM based on the BMI categories put forth by the WHO (underweight, normal weight, overweight, and obese), which does not fully characterize the relationship between GDM and BMI across a continuum. Because California has the largest Asian population in the United States,[12] we aimed to analyze the association between BMI and GDM among API subgroups in California and hypothesized that there will be a wide variability in the GDM diagnosis for different BMI ranges among the groups. We also examined the rates of GDM above and below a BMI cutoff of 23 kg/m^2 because this is the recommended cutoff point for early screening for GDM in this population, hypothesizing that rates may vary because of heterogeneity within API subgroups.

Materials and Methods

A secondary analysis of a prospective cohort study was conducted using a previously linked database from the California Department of Health Care Access and Information. This database contains linked birth and fetal death certificate and maternal and infant hospitalization discharge records for births in the state between 2007 and 2017. Ethics approval for this study was obtained from the State of California Committee for the Protection of Human Subjects and the Stanford University Research Compliance Office (institutional review board protocol: 43029).

Patients who self-reported to be 1 of 13 API subgroups were included in the analysis, and data collected via birth and fetal death certificates between 2007 and 2017 were analyzed. Patients with more than one delivery during the time period were included, and each pregnancy was analyzed separately. Individuals self-reported up to 3 races plus ethnicity, which were classified as follows: Cambodian, Chinese, Filipino, Guamanian, Hmong, Indian, Japanese, Korean, Laotian, Hawaiian and other Pacific Islander, Samoan, Thai, and Vietnamese. We combined the Hawaiian and other Pacific Islander subgroups in the analysis because Hawaiian and Pacific Islander people are often classified as more than 1 race or ethnicity. GDM was identified based on hospital linked discharge data and vital record data, because using both increased the accuracy of obtaining the information when compared with using either modality alone.[13,14]

Patients were excluded if they had a diagnosis of pregestational diabetes mellitus, multifetal gestations, reported more than one race or ethnicity (with the exception of Hawaiian and Pacific Islanders), the maternal hospitalization was not linked to vital record data, they had a missing or implausible gestational age estimate at delivery (<20 weeks or ≥44 weeks), missing information on maternal country of birth (United States or not), or they had implausible prepregnancy BMI parameters (weight <75 lbs or >450 lbs, height <48 or >78 inches, BMI <12 or >70 kg/m^2).[15] The prepregnancy BMI was calculated from the height and weight reported in vital records. The WHO classifications were used to classify patients as underweight, normal weight, overweight, or classes I, II, or II obesity. In analytical models, we further excluded patients with missing covariate information (maternal age, educational attainment, parity, insurance status, trimester initiated prenatal care).

We calculated the distribution of maternal characteristics across the API subgroups. These included prepregnancy BMI category, maternal age ≥35 years, parity, nativity, educational attainment, payer status for delivery hospitalization, and trimester during which care was initiated, which were all collected from the vital record. We then calculated the prevalence of GDM in each API subgroup overall and separately among those with a BMI <23 kg/m^2 or ≥23 kg/m^2. A cutoff of 23 mg/kg^2 was used because this is the recommended cutoff for early screening among Asian patients based on the ACOG screening guidelines.[5] If the number of cases reported in any of the fields were ≤15, they were not reported in accordance with the data-use agreement to protect confidentiality.

We then used multivariable logistic regression models to evaluate the nonlinear association between BMI and GDM separately in each API subgroup. We fit continuous BMI with restricted cubic splines to evaluate nonlinear relationships. We used Akaike and Bayesian information criteria to determine the number of knots using Harrell's default placements.[16] The models were adjusted for maternal age at delivery, education (did not graduate from high school, graduated from high school or General Education Development degree, some college, or bachelor degree or higher), parity (multiparity vs nulliparity), payment method (private insurance, government-assisted insurance, or other), nativity (born in the United States vs abroad), and the trimester during which prenatal care was initiated (first trimester, second trimester, or third trimester or none). We then used the regression models to predict the probability of GDM at each BMI value in each API subgroup.

Results

We identified 5,666,239 records in the study period between 2007 and 2017 with 684,393 pregnant people identifying as a single API subgroup or as Hawaiian or Pacific Islander. Of these records, 85% met the inclusion criteria (584,032). Japanese patients were more likely to be of advanced maternal age (50%) compared with 8% of Hmong patients, and the rates of obesity ranged from 2.2% in Chinese patients to 59.7% in Samoan patients. More than 10% of patients were classified as being underweight among those who reported being Chinese, Vietnamese, Japanese, Korean, or Thai. The proportion of patients who were born in the United States ranged from 8% of Indian patients to 68% of Samoan patients. The rates of those who graduated from college ranged from 6% among those identifying as Samoan to 82% among Indian patients. Private insurance payment for the delivery services were higher among those subgroups with higher reported rates of having a college degree. Those who identified as Korean, Japanese, or Indian were most likely to initiate care during the first trimester (≥ 90%), whereas Hawaiian or Pacific Islanders and Samoan people were least likely to initiate care in the first trimester (70% and 62%, respectively) (Table 1).

Of the 5,666,239 deliveries, 212,760 (3.75%) patients were excluded because of missing self-reported race or ethnicity information and 67,882 (1.2%) were excluded for reporting being of mixed race or ethnicity. There were fewer than 1% of patients in each category who were excluded for having missing information on prepregnancy BMI, educational attainment, or multiple gestation pregnancy, birth certificate data not linked to patient discharge data, preexisting type diabetes mellitus, missing information on month of prenatal care initiation, gestational age of delivery not within 20 to 43 weeks, missing payment method information, missing parity information, or missing patient age information (Supplementary Table).

The overall prevalence of GDM in our cohort was 14.3% (n=83,400) and ranged from 8.4% to 17.1% across subgroups (Table 2). Those with the highest prevalence of GDM in descending order were Indian (17.1%), Filipino (16.7%), and Vietnamese (15.5%). The lowest prevalence of GDM was found among Koreans, Japanese, and Samoan subgroups (8.4%−9.8%). When analyzing those with a BMI of <23 kg/m^2, Vietnamese, Indian, Chinese, Thai, and Filipino subgroups had the highest rates of GDM (10.9%−13.2%), whereas Japanese, Hawaiian and Pacific Islander, Korean, Hmong, and Guamanian subgroups had the lowest prevalence of GDM (4.1%−6.2%). When analyzing Asian subgroups with a BMI ≥23 kg/m^2, the highest prevalence of GDM was among Vietnamese, Indian, Filipino, and Chinese (19.1%−22.3%), whereas the lowest prevalence of GDM was among Samoans (10.3%).

There was substantial variability in the association between prepregnancy BMI and GDM diagnosis. An increasing BMI was associated with a higher risk for GDM in each subgroup (Figure). However, the groups varied both in the prevalence of GDM at each BMI and in the slope of the association between BMI and GDM with Vietnamese, Indian, Filipino, Thai, and Chinese patients having the largest increased risk for GDM with increasing BMI. Of all the subgroups studied, Samoan patients were noted to have the smallest increases in risk with increasing BMI. All 13 subgroups showed a steeper increased risk for GDM at a BMI of 23 kg/m^2.

Comments

Principal findings

The risk for GDM in relation to BMI among 13 different API subgroups was highly varied, but within each subgroup, there was an increased risk for GDM with increasing BMI. In addition, subgroups with the lowest rates of obesity had a trend toward a higher prevalence of GDM and those with the highest rates of obesity had a trend toward a lower prevalence of GDM. Vietnamese, Chinese, Filipino, Indian, and Thai subgroups comprised a high prevalence GDM group when compared with the other subgroups studied based on their higher risk for GDM at all BMI values.

Results in the context of what is known

Previous studies of API subgroups that examined BMI and its association with GDM have shown an increase in GDM diagnosis when compared with other races and ethnicities studied.[17−20] Hedderson et al[18] found significant variation in the association between GDM and BMI for the different racial and ethnic groups into which Asian and Filipina were separated and found an increased risk for GDM at lower BMI cutoff points for them than for other races and ethnicities studied.[18]

TABLE 1

Maternal demographics of Asian subpopulations

Characteristics	Cambodian n=14,687	Chinese n=159,456	Filipino n=122,085	Guamanian n=1605	Hmong n=21,841	Indian n=105,639	Japanese n=19,903	Korean n=41,395	Laotian n=7345	Pacific Islander n=11,442	Samoan n=5316	Thai n=6216	Vietnamese n=67,102
Age ≥35 y	2379 (16)	56,452 (35)	37,207 (30)	268 (17)	1853 (8)	18,385 (17)	9899 (50)	15,438 (37)	1297 (18)	1862 (16)	695 (13)	1919 (31)	21,889 (33)
Nulliparous	5695 (39)	80,369 (50)	50,982 (42)	556 (35)	6014 (28)	53,746 (51)	10,166 (51)	20,733 (50)	2436 (33)	3985 (35)	1632 (31)	3104 (50)	28,853 (43)
Born in the United States	5559 (38)	21,949 (14)	35,481 (29)	794 (49)	11,583 (53)	8207 (8)	6210 (31)	6974 (17)	3024 (41)	6015 (53)	3596 (68)	858 (14)	8587 (13)
BMI category (kg/m^2)													
Underweight (<18.5)	1229 (8)	20,979 (13)	5761 (5)	30 (2)	610 (3)	5573 (5)	2442 (12)	5125 (12)	448 (6)	296 (3)	26 (<1)	698 (11)	9295 (14)
Normal weight (18.5–24.9)	8885 (61)	117,536 (74)	73,904 (61)	635 (40)	10,340 (47)	65,500 (62)	14,509 (73)	30,625 (74)	4179 (57)	3659 (32)	736 (14)	4056 (65)	49,473 (73)
Overweight (25.0–29.9)	3051 (21)	17,337 (11)	29,126 (24)	469 (29)	6694 (31)	26,720 (25)	2195 (11)	4544 (11)	1706 (23)	3001 (26)	1379 (26)	1046 (17)	6706 (10)
Class 1 obesity (30.0–34.9)	1113 (8)	3002 (2)	9856 (8)	247 (15)	3105 (14)	6362 (6)	581 (3)	885 (2)	720 (10)	2320 (20)	1357 (26)	324 (5)	1303 (2)
Class 2 obesity (35.0–39.9)	299 (2)	484 (<1)	2587 (2)	133 (8)	855 (4)	1190 (1)	131 (1)	186 (<1)	220 (3)	1,317 (12)	1005 (19)	77 (1)	250 (<1)
Class 3 obesity (≥40)	110 (<1)	118 (<1)	851 (1)	91 (6)	237 (1)	294 (<1)	45 (<1)	30 (<1)	72 (1)	849 (7)	813 (15)	NR[a]	75 (<1)
Education													
< High school	2379 (16)	3241 (2)	2080 (2)	185 (12)	3174 (15)	1827 (2)	116 (1)	120 (<1)	1055 (14)	1118 (10)	569 (11)	254 (4)	4723 (7)
High school	5407 (37)	13,035 (8)	13,998 (11)	552 (34)	7353 (34)	7776 (7)	1575 (8)	2100 (5)	2577 (35)	4386 (38)	2706 (51)	1160 (19)	16,366 (24)
Some college	4393 (30)	22,748 (14)	41,129 (34)	600 (37)	7664 (35)	9208 (9)	4699 (24)	6839 (17)	2506 (34)	4137 (36)	1722 (32)	1281 (21)	16,492 (25)
College	2508 (17)	120,432 (76)	64,878 (53)	268 (17)	3650 (17)	86,828 (82)	13,513 (68)	32,336 (78)	1207 (16)	1801 (16)	319 (6)	3521 (57)	29,521 (44)
Payer type													
Private insurance	6613 (45)	99,880 (63)	91,202 (75)	901 (56)	7951 (36)	87,918 (83)	17,065 (86)	31,871 (77)	3380 (46)	5521 (48)	1965 (37)	3934 (63)	43,936 (65)
Government-assisted insurance	7544 (51)	19,791 (12)	24,924 (20)	603 (38)	13,526 (62)	13,277 (13)	1699 (9)	6045 (15)	3704 (50)	5313 (46)	3023 (57)	2009 (32)	20,922 (31)
Other	530 (4)	39,785 (25)	5959 (5)	101 (6)	364 (2)	4444 (4)	1139 (6)	3479 (8)	261 (4)	608 (5)	328 (6)	273 (4)	2244 (3)
Trimester started care													
First (<14 wk)	11,538 (79)	138,043 (87)	105,272 (86)	1249 (78)	15,837 (73)	96,302 (91)	18,086 (91)	37,290 (90)	5824 (79)	8023 (70)	3302 (62)	5255 (85)	58,215 (87)
Second (14–27 wk)	2624 (18)	12,928 (8)	14,017 (11)	284 (18)	5367 (25)	7842 (7)	1570 (8)	2855 (7)	1261 (17)	2507 (22)	1445 (27)	816 (13)	7723 (12)
Third (≥28 wk)	525 (4)	8485 (5)	2796 (2)	72 (4)	637 (3)	1495 (1)	247 (1)	1250 (3)	260 (4)	912 (8)	569 (11)	145 (2)	1164 (2)

Data are presented as number (percentage).

[a] NR indicates that 15 or fewer patients are not reportable.

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TABLE 2
Total prevalence of GDM stratified by API subgroup and prepregnancy BMI

API subgroup	All BMI values			BMI <23 kg/m^2			BMI ≥23 kg/m^2		
	Total	GDM	Prevalence (%)	Total	GDM	Prevalence (%)	Total	GDM	Prevalence (%)
Indian	105,639	18,051	17.1	48,510	5564	11.5	57,129	12,487	21.9
Filipino	122,085	20,384	16.7	55,605	6041	10.9	66,480	14,343	21.6
Vietnamese	67,102	10,428	15.5	49,992	6612	13.2	17,110	3816	22.3
Pacific Islander	11,442	1589	13.9	2547	174	6.8	8895	1415	15.9
Thai	6216	862	13.9	3834	421	11.0	2382	441	18.5
Guamanian	1605	222	13.8	425	20	4.7	1180	202	17.1
Chinese	159,456	21,179	13.3	115,850	12,850	11.1	43,606	8329	19.1
Laotian	7345	851	11.6	3279	235	7.2	4066	616	15.2
Hmong	21,841	2471	11.3	7080	383	5.4	14,761	2088	14.2
Cambodian	14,687	1563	10.6	7622	554	7.3	7065	1009	14.3
Samoan	5316	522	9.8	374	NR[a]	NR[a]	4942	508	10.3
Japanese	19,903	1785	9.0	14,330	969	6.8	5573	816	14.6
Korean	41,395	3493	8.4	29,765	1836	6.2	11,630	1657	14.3
Total	584,032	83,400	14.3	339,213	35,659	10.5	244,819	47,727	19.5

API, Asian and Pacific Islander; *BMI*, body mass index; *GDM*, gestational diabetes mellitus.

[a] NR indicates that 15 or fewer patients are not reportable.

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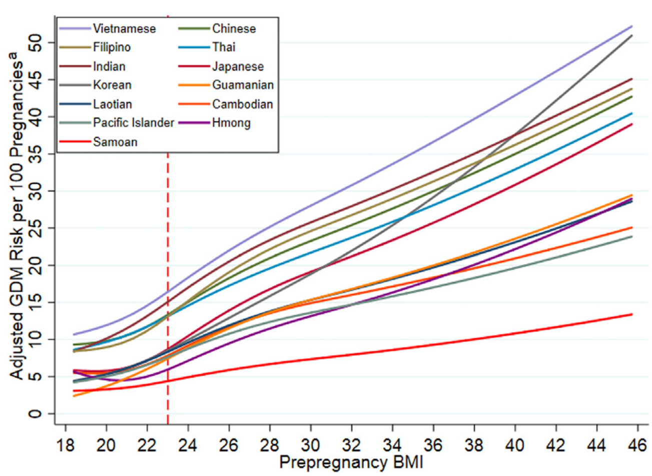
However, this study did not disaggregate API subgroups and only looked at Filipina and Asian pregnant people in the BMI categories. Kim et al[19] analyzed the proportion of GDM cases that were attributable to overweight and obesity in different races. As part of their analysis, they examined 9 Asian subgroups and found that Asian people had the highest prevalence of GDM, but this was less likely to be attributed to BMI when compared with other races and ethnicities. This is in line with the results of our study that found that some of the subgroups with the lowest prevalence of obesity (Vietnamese and Chinese) had the highest prevalence of GDM at both a BMI of <23 kg/m^2 and ≥23 kg/m^2. Each of the studies analyzed BMI data in a distinct grouping of values or BMI categories. Our study adds to the literature by providing data on 13 API subgroups from a robust cohort, highlighting the risk for GDM based on BMI along a continuum.

Data on Samoan and Pacific Islander subgroups are worth noting. In our study, among the Samoan population, although >50% of this group was classified as obese, they had the lowest prevalence of GDM for those with a BMI ≥23 kg/m^2 and the third lowest prevalence of GDM overall. In addition, there was a plateau in the risk for GDM at around a BMI of 28 kg/m^2. These results are

FIGURE
Predictive model of gestational diabetes mellitus risk by BMI in API subgroups



The dotted red vertical line denotes a BMI of 23 kg/m^2. *Superscript letter a* represents adjusted for age, education, parity, insurance type, first prenatal care visit (first, second, or third trimester), and nativity.

API, Asian and Pacific Islanders; *BMI*, body mass index; *GDM*, gestational diabetes mellitus.

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contradictory given that increases in BMI are associated with higher rates of GDM and based on the study by Kim et al[19] that found that Pacific Islanders, among all API subgroups studied, had the highest attributable risk of being diagnosed with GDM based on a BMI ≥30 kg/m^2. Interestingly, Pacific Islander or Hawaiian, Guamanian, and Hmong people had the next highest prevalence of obesity in our study, and these groups also had some of the lowest risks for developing GDM with increasing BMI.

Our data highlight that the absolute risk for GDM may not increase equally with BMI increases for all Asian subgroups. This is congruent with data from the WHO and anthropometric data of Asians that show differing fat distribution ratios at the same BMI for different Asian subgroups.[11,21,22] We found that at BMI values below the ACOG recommended BMI cutoff of 23 kg/m^2, there are 2 distinct groupings within the API population with Vietnamese, Chinese, Filipino, Indian, and Thai subgroups having a higher risk for GDM than the other subgroups analyzed (Figure), and this increased risk persists across the BMI strata with a ≥20% risk of being diagnosed with GDM once being diagnosed with class I obesity (BMI ≥30 kg/m^2). The reason why obesity and its relation to BMI may not be congruent across all subgroups is likely multifactorial and includes a combination of biologic factors, diet, and also social determinants of health.[23] People of South Asian descent have been shown to have a tendency toward greater abdominal obesity and an increased propensity for insulin resistance when compared with Western populations, labeling it a metabolically obese phenotype among normal-weight individuals.[17,23] It is hypothesized that some populations may have been exposed to undernutrition in early life, making them more susceptible to metabolic syndrome later in life if they begin to consume high-energy foods.[17]

Previous studies have also highlighted that acculturation may play a protective role in GDM development.[20,24–26] Although we did not analyze this specifically, it was interesting to note in our study that the groups with the largest proportion of people who were foreign born (Indian, Vietnamese, Thai, and Chinese) were also found to have the highest prevalence of GDM. This was also true for risk for GDM when we adjusted for nativity in our analysis. In addition, previous studies have shown that Asian and Pacific Islander patients who live in ethnic enclaves have lower odds of developing GDM and other adverse obstetrical outcomes.[27] Therefore, the increased risk for GDM is likely multifactorial, including influences of cultural and ethnic differences and other social determinants of health. Additional studies are warranted to further delineate these relationships.

Clinical implications

This study describes the association of BMI with GDM in 13 distinct API subgroups with the results showing varied rates of GDM among these groups. Although there is an increased risk for GDM as BMI increases among all subgroups, this study highlights that some subgroups with less obesity show trends toward higher rates of GDM. Specifically, Vietnamese and Chinese patients had obesity rates that were between 2% and 3%, but the prevalence of GDM among Vietnamese and Chinese patients with a BMI <23 kg/m^2 was the first and third highest (13.2% and 11.1%, respectively) among all the subgroups. Therefore, although an increasing BMI confers an increasing risk for GDM, clinicians should be aware that subgroups with a higher baseline risk for GDM at lower BMIs are going to be more sensitive to increases in BMI in terms of their risk for developing GDM.

Research implications

Our data suggest that diversity and variation in GDM risk based on BMI among Asians need to be validated in other cohorts. Disparities in adverse maternal outcomes have been noted among Asian patients delivering at term in the United States.[28] Because Asians are the fastest growing immigrant community in the United States,[12] analyses with risk stratification among these diverse subgroups need to be conducted for obstetrical outcomes to understand these disparities and move toward understanding social determinants of health within these populations that may account for these outcomes.

Strengths and limitations

The main strengths of our study include its large and diverse study population and its granularity that allowed for examination of GDM data for 13 distinct Asian subgroups that were extracted from hospital discharge records and vital records with these being the most reliable measure of race and ethnicity, BMI, and GDM that can be optained from a large data set when combined.[14,29] Although prepregnancy BMI was either self-reported or derived from the medical record, self-reported weight has been shown to highly correlate with measured weight.[30] In addition, having robust patient-level data allowed for analyses across a wide range of BMI values. Rather than stratifying our data by the WHO BMI categories, we were able to demonstrate the risk along the BMI continuum for each subgroup.

Treatment of GDM diagnosed during the standard time period has been shown to reduce adverse perinatal outcomes, including macrosomia, shoulder dystocia, admission to the neonatal nursery, hypertensive disorders of pregnancy, and cesarean delivery.[31,32] Early screening would allow for earlier treatment and potentially decrease the adverse effects of fetal exposure to hyperglycemia. However, the benefit of early screening remains controversial with views ranging from the ACOG recommendation for early screening to the US Preventative Task Force citing insufficient evidence to recommend early screening.[5,33,34] In our study, we were unable to obtain information on when the patients were diagnosed with GDM, whether it was during an early GDM screen or at a normally timed screen (24−28 weeks), and we were also unable to ascertain which patients were never tested for GDM during their pregnancy at all.

Data regarding the method used to diagnose GDM was also not available (ie, 1-hour screen followed by a 3-hour vs a 2-hour oral glucose tolerance test), which could affect GDM prevalence number.[35] We also were unable to ascertain the medications patients used to treat their GDM and the level of glycemic control that was achieved, which limits the ability to ascertain severity of the disease.

Additional limitations of the study include its reliance on the International Classification of Diseases, Ninth Revision diagnosis codes and vital records to identify patients with GDM with the potential for missed or miscoding among patients. The database also did not include information on a history of GDM or a family history of type 2 diabetes mellitus, which would allow stratification of an individual's risk for GDM. There was also the potential for misclassification of prepregnancy BMI; however, maternal BMI data have been shown to have more incongruencies at the extremes of the BMI spectrum and greater reliability between those extremes.[36]

Conclusions

We found that the risk for GDM increased with increasing BMI across all API subgroups but that this association with BMI varied greatly between groups. The prevalence and risk of GDM for many API subgroups seemed to be higher in groups with a lower prevalence of obesity and was lower in those with a higher prevalence of obesity. ■

Supplementary materials

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