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Ethnic Disparities in Diabetes

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KEYWORDS

• Ethnicity • Disparities • Diabetes • Obesity • Prevention • Treatment
• Lifestyle changes

KEY POINTS

- Racial/ethnic disparities in diabetes persist and are driven by individual, health system, and social factors.
- Obesity is a key driver of excess type 2 diabetes among minorities, but racial/ethnic minority patients may have higher burden of diabetes and prediabetes at lower body mass index (BMI) than Whites; one contributor may be higher rates of visceral adiposity at a given BMI, particularly for Asian subgroups.
- Behavioral, social, health system, and neighborhood factors contribute to disparities in diabetes and obesity.
- Multilevel (patient, provider, health system, and/or community) interventions that promote weight loss and lifestyle change have been shown to prevent or reduce obesity and may prove to be crucial to control the diabetes epidemic among minorities.
- Metformin and sodium-glucose cotransporter 2 inhibitors are drugs of choice for initial medical management of diabetes among minorities with type 2 diabetes mellitus.

INTRODUCTION

The World Health Organization defines equity as the absence of avoidable, unfair, or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or by other means of stratification.[1] Health equity implies a fair opportunity to attain one's full health. Unfortunately, marked racial/ethnic disparities in the United States exist for almost all aspects of diabetes and its care. Minority groups experience higher diabetes incidence and prevalence, worse metabolic control, and more complications. The causes of these disparities are complex; however, individual, health care system, social, and community-level

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factors all contribute to both heightened risk of diabetes and poorer outcomes. The disproportionately high rates of infection and mortality associated with COVID-19 among Latinos, African Americans, Native Americans, and racial/ethnic minority groups, particularly those with diabetes, obesity, and other chronic conditions, underscore the pervasive and destructive consequences of these inequities.[2–4] This article provides an update on racial/ethnic disparities in diabetes in the United States and describes evidence-based strategies for diabetes prevention and treatment among minority adults. We use the same terminology for each racial/ethnic group (eg, African American vs Black; Hispanic vs Latino) as in the corresponding reference.

DISPARITIES IN DIABETES PREVALENCE

Evidence from the National Health and Nutrition Examination Surveys (NHANES) between 2011 and 2016 indicate that the age- and sex-adjusted prevalence of total diabetes (diagnosed and undiagnosed) was 12.1% for non-Hispanic White, 20.4% for non-Hispanic Black, 22.1% for Hispanic, and 19.1% for non-Hispanic Asian adults (overall $P<.001$).[5] The prevalence of undiagnosed diabetes generally followed similar pattern: 3.9% for non-Hispanic White, 5.2% for non-Hispanic Black, 7.5% for Hispanic, and 7.5% for non-Hispanic Asian adults (overall $P<.001$).[5] Marked heterogeneity in diabetes prevalence is observed within the same ethnic group (**Table 1**). Among

Table 1
Estimated prevalence of diabetes, diagnosed and undiagnosed, in the United States among persons aged 20 y or older among different ethnic groups

Ethnic Group	[a]Prevalence of Diabetes (95% Confidence Interval)
A. Non-Hispanic Whites	12.1% (11.0–13.4)
B. Non-Hispanic Blacks	20.4% (18.8–22.1)
C. Hispanics	22.1% (19.6–24.7)
Hispanic subgroups	
1. Mexican	24.6% (21.6–27.6)
2. Puerto-Rican	21.7% (14.6–28.8)
3. Cuban/Dominican	20.5% (13.7–27.3)
4. [b]Central American	19.3% (12.4–26.1)
5. [c]South American	12.3% (8.5–16.2)
D. Non-Hispanic Asians	19.1% (16.0–21.1)
Non-Hispanic Asian subgroup	
1. [d]East Asian	14.0% (9.5–18.4)
2. [e]South Asian	23.3% (15.6–30.9)
3. [f]Southeast Asian	22.4% (15.9–28.9)

[a] Weighted age- and sex-adjusted (95% confidence interval).
[b] Central America: Costa Rica, Guatemala, Honduras, Nicaragua, Panama, Salvador.
[c] South America: Argentina, Chile, Columbia, Ecuador, Paraguay, Peru, Uruguay, Venezuela.
[d] East Asia: China, Japan, Korea.
[e] South Asian: India, Pakistan, Sri Lanka, Bangladesh, Nepal, Bhutan.
[f] Southeast Asia: Philippines, Vietnam, Cambodia, Thailand, Indonesia, Malaysia, Singapore.
Adapted from Cheng YJ, Kanaya AM, Araneta MRG, et al. Prevalence of Diabetes by Race and Ethnicity in the United States, 2011-2016. JAMA. 2019;322(24):2389-2398; with permission.

Hispanic subgroups, prevalence ranged from 12.3% for South Americans to 24.6% for Mexican Americans. There are limited population-based data on Native Hawaiian and Other Pacific Islander (NHOPI) communities; however, estimates suggest a 19% prevalence of diabetes.[6]

DISPARITIES AND TRENDS IN DIABETES INCIDENCE

After a steady increase in diabetes incidence in adults from 1990 to 2007, data from National Health Interview Survey (NHIS) demonstrated a decline in incident diabetes between 2008 and 2017.[7] However, this decrease in incidence was driven primarily by non-Hispanic Whites (annual percentage change was −5.1%, $P = .002$) followed by Asians (annual percentage change −3.4%, $P = .06$), whereas incidence rates among Hispanics and non-Hispanic Blacks did not decrease.[7] In fact, the latest age-adjusted data for 2017 to 2018 indicated that incidence of diagnosed diabetes in adults was highest in Hispanics (9.7 per 1000 persons), followed by non-Hispanic Blacks (8.2 per 1000 persons), and Asians (7.4 per 1000 persons), whereas non-Hispanic Whites had the lowest incidence (5.0 per 1000 persons).[8]

PREVALENCE OF PREDIABETES

The most recent National Diabetes Statistics Report showed that 34.5% of all US adults had prediabetes (defined as hemoglobin A1c [HbA1c] 5.7% to <6.5%, or fasting plasma glucose 100 to <126 mg/dL, or 2-hour postprandial plasma glucose 140 to <200 mg/dL).[8] The prevalence of prediabetes was stable from 2005 to 2008 and 2013 to 2016 and did not differ substantially by race/ethnicity or education: 31.0% among Whites, 36.8% among non-Hispanic Blacks, 36.1% among Hispanics, and 33.0% among Asians.[8] Screening for prediabetes in asymptomatic adults is recommended for adults of any age who are overweight or obese (body mass index [BMI] $\geq$25 kg/m^2 or $\geq$23 kg/m^2 in Asian Americans) and have one or more additional risk for diabetes. The BMI cutoff point of 23 kg/m2 for Asian American subgroups due to increased risk at lower BMI.[9]

Disparities in Diabetes in Youth

According to SEARCH for Diabetes in Youth, a population-based registry study, incidence of both type 1 and type 2 diabetes is increasing in persons younger than 20 years.[10] From 2002 to 2015, the annual relative percent increase was 1.9% and 4.8% in type 1 and type 2 diabetes, respectively.[10] As in the adult population, there were clear racial/ethnic differences in the rate of increase of diabetes among youth.[10] In type 1 diabetes, the steepest increase in incidence was among Asians/Pacific Islanders (4.4% per year), followed by Hispanics (4.0% per year), then Blacks (2.7%/year), and finally Whites 0.7% per year.[10] In type 2 diabetes, similar order was observed. Thus, the fastest increase was among Asians/Pacific Islanders (7.7% per year), followed by Hispanics (6.5% per year), Blacks (6.0%/year), American Indians (3.7% per year), and finally Whites (0.7% per year). Reasons for the increase in type 1 diabetes are unclear; however, the increased incidence in type 2 diabetes is likely due to the increase in obesity in US youths, particularly among minority youth.[11]

DISPARITIES IN PREVALENCE OF GESTATIONAL DIABETES

In 2016, the unadjusted national prevalence of gestational diabetes was 6%.[12] The lowest prevalence was observed among non-Hispanic Blacks (4.8%), followed by non-Hispanic Whites (5.3%), then Hispanics (6.6%), then American Indians/Native

Alaskans, and highest in Asians (11.1%).[12] Although the prevalence of gestational diabetes is lowest among Black women, their risk of subsequent type 2 diabetes was higher than that of all other racial/ethnic groups,[13] and the adjusted hazard ratio of developing diabetes after gestational diabetes was 7.6 for Black women and 4.4 for White women (P = .028).[13]

DISPARITIES IN GLYCEMIC CONTROL

Studies have consistently shown that diabetes control, as reflected by HbA1c concentrations, is worse in Black and Hispanic patients compared with Whites. In a national cohort of persons older than 65 years enrolled in Medicare Advantage Health plans in 2011, Ayanian and colleagues examined the proportions of patients with HbA1c levels ≤9.0%.[14] They found this goal was achieved by 84.0%, 80.6%, and 74.6% among White, Hispanic, and Black enrollees, respectively (P<.001 for the difference between any 2 groups).[14] The racial/ethnic gap in HbA1c continues to widen. Analysis of NHANES conducted between 2003 and 2014 showed worsening of glycemic control among African American and Mexican American patients with type 2 diabetes, whereas corresponding values tended to improve among White patients.[15] It should be emphasized, however, that the difference in HbA1c levels between Black and White persons may be attributed in part to racial/ethnic differences in glycation of hemoglobin.[16] Thus, on average, HbA1c levels are 0.4% points (95% confidence interval [CI], 0.2%–0.6% percentage points) higher among Blacks than those among White individuals for a given mean blood glucose concentrations.[16]

TRENDS AND DISPARITIES IN DIABETES CARE IN THE UNITED STATES

Serial analysis of the NHANES data between 2005 and 2016 suggests that diabetes care has not significantly improved during that period.[17] Only 23% to 25% of patients met the composite goal of targets for HbA1c (<7–8.5%, depending on age and complications), blood pressure (<140/90 mm Hg), low-density lipoprotein cholesterol (<100 mg/dL), and no smoking.[17] These proportions did not change between 2005 and 2016, and racial/ethnic disparities persist.[17] For example, from 2013 to 2016, 25% of non-Hispanic White patients attained the diabetes care composite goal, compared with only 14% of non-Hispanic Blacks and 18% of Hispanic patients.[17]

DISPARITIES IN DIABETES-RELATED COMPLICATIONS

In general, racial/ethnic minorities have more frequent macrovascular and microvascular diabetes complications than Whites.[18,19] In 2010, incidence (cases per 10,000) of end-stage renal disease (ESRD) was more than double in Blacks (36.6) compared with Whites (16.0).[18] Corresponding rates for lower extremity amputation were 40.0 versus 20.4, for stroke 63.1 versus 39.0, and for hyperglycemic death 2.2 versus 1.4. A notable exception was the incidence of acute myocardial infarction, which was lower in Blacks than in Whites, 32.5 versus 37.5, respectively.[18] No corresponding data regarding Hispanic patients were reported.[18] However, findings from settings in which patients receive uniform medical coverage suggest that incidence rates for many of these complications among Black, Asian, and Latino patients are comparable to or lower than those for Whites.[20] The notable exception was ESRD, with adjusted hazard ratios relative to Whites (95% CI) of 2.03 (1.62–2.54; P<.001) for Black patients; 1.85 (1.40–2.43; P<.001) for Asian patients; and 1.46 (1.10–1.93; P = .004) for Latino patients.[21] Hospitalizations due to diabetic ketoacidosis (DKA) increased by 38% overall between 2005 to 2006 and 2013 to 2014 but vary substantially by race and ethnicity. The highest increase in hospitalizations for DKA was among Hispanics (+58.1%), followed by Blacks (+26.9%), and Whites (+18.5%).[9,21] There are also disparities in rates of hypoglycemia: Hypoglycemia requiring health care services is more common in Blacks (4.7%) and Hispanics (3.6%) than in Whites (2.9%).[22]

Both race/ethnicity and the presence of a diabetes diagnosis are important risk factors for hospitalization and death from the 2019 novel coronavirus disease 2019 (COVID-19).[23] Having type 2 diabetes is an important risk factor for hospitalization and severe outcomes regardless of race/ethnicity, and there is emerging evidence of disparities in diabetes complications.[24] In a recent study of 180 patients with type 1 diabetes and laboratory-confirmed COVID-19 from 52 clinical sites across the United States, Black patients had higher odds of presenting with DKA than Whites (odds ratio [OR] = 3.7 [95% CI 1.4, 10.6]).[25]

DISPARITIES IN DIABETES-RELATED MORTALITY

Mansour and colleagues reported significant ethnic disparities in mortality in patients with diabetes who participated in NHANES surveys during 1999 to 2010.[26] Follow-up of this cohort revealed that all-cause and cardiovascular (CV) mortality decreased in all ethnic groups with diabetes. However, the magnitude of reduction in CV mortality significantly differed between various ethnic groups.[26] Thus, Whites experienced the largest reduction in CV mortality from 20.4% down to 14.5%, followed by non-Hispanic Blacks from 20.6% to 16.3%, whereas Hispanics had only a marginal reduction from 18.4% to 17.5%.[26] Similarly, a recent analysis of NHIS conducted from 1997 to 2017 showed a significant decline in CV complications among White patients only, but no change among Black or Hispanic patients.[27] Taken together, while mortality rates decreased in patients with diabetes overall, the least mortality reduction was observed among Hispanics and non-Hispanic Blacks. This finding is in accordance with NHANES data mentioned previously showing that diabetes care during 2005 to 2016 was worst among minorities.[17]

CAUSES OF RACIAL/ETHNIC DIABETES DISPARITIES

Obesity and Visceral Adiposity

Causes of high prevalence of diabetes in minorities are multifactorial (**Box 1**).[28] The obesity epidemic is a main driver of diabetes, particularly among racial/ethnic

Box 1
Causes of racial/ethnic diabetes disparities

1. Obesity and visceral adiposity
2. Unhealthy diet
3. Food insecurity
4. Sedentary lifestyle
5. Acculturation (in some immigrant groups)
6. Low socioeconomic and educational levels
7. Low health literacy
8. Limited English language proficiency
9. Neighborhood factors: poor-quality housing, lack of safe areas for exercise, grocery stores selling high-caloric food and beverages.

minorities. Non-Hispanic Black adults have the highest prevalence of obesity, and Mexican Americans have the highest annual increase in obesity and in waist circumference.[11] Similarly, there has been a steady increase in obesity in US youths (2–19 years) among non-Hispanic Blacks and Mexican Americans, but a recent decline was observed among non-Hispanic Whites.[11] By 2030, it is predicted that severe obesity defined as BMI $\geq$35 kg/m^2 will be highest among non-Hispanic Blacks 31.7% (95% CI, 29.9–33.4), followed by Hispanics 24.5% (95% CI, 22.8–26.2), and non-Hispanic Whites 23.4% (95% CI 22.1–24.8).[29] Although less population-based data are available, evidence suggests that NHOPI obesity rates approach 50%, and rates of diabetes far exceed those in US population overall.[6,30]

The association between obesity and diabetes varies for different racial/ethnic groups. The Patient Outcomes Research To Advance Health Literacy (PORTAL) multisite study examined the association between diabetes and BMI in adults in three integrated health systems.[31] They found higher burden of diabetes and prediabetes at lower BMIs for African American, Hispanic, Asian, and Hawaiian/Pacific Islander patients when compared with Whites. Many Asian American groups, including South Asians and Filipinos, have higher rates of visceral adiposity at a given BMI, which appears to be associated with higher risk of diabetes at younger ages and lower BMI than other groups.[32–35]

Health behaviors

Dietary factors and physical inactivity are risk factors both for developing type 2 diabetes and for inadequate control among those with diabetes.[36–38] High-sugar and high-fat diets are associated with poorer outcomes, and although some traditional diets may be protective,[39] cultural factors, language barriers, and literacy levels can contribute to difficulty adhering to dietary recommendations. Several racial/ethnic groups have lower rates of physical activity, including non-Hispanic Blacks, Native Americans, and Alaska Natives. Ethnic differences in medication adherence have also been identified as a contributor to suboptimal glycemic control among African Americans and Latinos.[40]

Acculturation and immigration

Acculturation, the adoption of attitudes, customs, and values of the prevailing culture of a new society,[41] has been associated with lifestyle changes that may contribute to obesity and type 2 diabetes in some immigrant populations and may be protective for others. For example, among Japanese American men who were more adherent to a Japanese lifestyle in the Honolulu Heart Program, rates of diabetes were lower.[39] In the Multi-Ethnic Study of Atherosclerosis (MESA), acculturation, measured by factors such as place of birth, language, diet, and exercise patterns, was not associated with diabetes prevalence for Chinese Americans or Mexican-origin Hispanics; however, among non–Mexican-origin Hispanics, higher diabetes prevalence was observed in those with the highest levels of acculturation, prevalence ratio (PR) 2.49 (95% CI, 1.14–5.44).[42] This relationship was partially mediated by BMI and diet. Recent evidence on African immigrants, who represent one of the fastest growing immigrant groups in the United States,[43] suggests complex associations between immigration and acculturation. Using data from the NHIS, Turkson-Ocran reported that age-standardized diabetes prevalence was significantly lower in African immigrants than in US-born African Americans, 7% and 10%, respectively (P<.01).[43] Moreover, compared with US-born African Americans, African immigrants who had lived in the United States for 10 or more years were significantly less likely to have diabetes, with a PR of 0.61 (95% CI, 0.43–0.79), hypertension (PR, 0.69%; 95% CI, 0.61–0.78), overweight/obesity (PR, 0.87; 95% CI, 0.77–0.96), or physical inactivity (PR, 0.21%; 95% CI, 0.15–0.28).[43] Hence, African immigrants seem to have a healthier metabolic profile than African Americans.

Social disparities

There is a complex interplay between type 2 diabetes disparities and several social factors, including low individual socioeconomic status (eg, education and income),[8] food insecurity,[44,45] low health literacy and numeracy,[46] communication and language barriers,[47] and neighborhood socioeconomic status. We highlight selected social disparities and their interplay in the following sections.

Limited English proficiency and language concordance. Among patients in the Kaiser Permanente Northern California Diabetes Registry, nonadherence to newly prescribed medications was higher among both Limited English Proficient (LEP) Latino patients and English-speaking Latinos relative to Whites. Among LEP Latinos, the relative risk was 1.36 for oral medications (95% CI, 1.31–1.41) and 1.49 for insulin (95% CI, 1.32–1.69; $P<.05$). Among English-speaking Latinos, the relative risk was 1.23 for oral medications (95% CI, 1.19–1.27) and 1.28 for insulin (95% CI, 1.23–1.39; $P<.05$).[47] It is important to note that patients included in these analyses were all insured in the same system of care. Furthermore, among the LEP patients, these associations were independent of provider language concordance.

Food insecurity. Food insecurity, defined as limited food access due to cost, is more common among minority patients and has been associated with poorer glycemic control. In longitudinal analyses of patients in a primary care network in Massachusetts, food insecurity was associated with higher HbA1c (increase of 0.6%; 95% CI, 0.4%–0.8%; $P<.0001$) over an average 3-year follow-up.[48]

Neighborhood factors. Several studies have suggested that neighborhood environments are associated with diabetes prevalence, incidence, and outcomes.[49] Minority communities, particularly Black neighborhoods, were more likely to be characterized by food deserts, poor-quality housing, and fewer resources for physical activity and exercise.[50] Analysis of US Counties using data from 2013 indicates that counties with higher unemployment, higher poverty, and longer commutes had higher incidence rates than counties with lower levels. By contrast, counties with more exercise opportunities, access to healthy food, and primary care physicians had fewer diabetes cases. In analyses that used data from MESA, communities with better neighborhood resources, for example, grocery stores, parks, and recreational facilities that support physical activity and healthy diets, had a 38% lower incidence of type 2 diabetes.[51] Although the physical environment has long been associated with diabetes, obesity, and physical activity, there is little empirical evidence on whether policy interventions to modify the built environment can improve outcomes from diabetes and its complications.[48,52]

Genetic factors

Genetic factors for diabetes susceptibility contribute similarly to diabetes risk across race/ethnicities.[28] Few studies, however, have had adequate diversity and sample size to quantify the contributions of genetic factors to racial/ethnic differences in diabetes prevalence. In addition, many of these genetic associations may be confounded by environmental exposures that contribute to disease susceptibility. To date, there is little evidence that genetic differences play a major role in racial/ethnic diabetes disparities.[53]

PREVENTION OF DIABETES AMONG MINORITY GROUPS

Lifestyle Changes

Weight loss strategies, including diet and exercise, are essential to prevent or delay onset of diabetes. In the Diabetes Prevention Program (DPP) trial, which included 3234 multiethnic individuals at high risk for diabetes, participants were randomized to a lifestyle-modification program, metformin, or placebo.[36] After an average follow-up of 2.8 years, incidence of diabetes was reduced by 58% and 31% by lifestyle changes and metformin, respectively, compared with placebo.[36] Subgroup analyses of the DPP showed that lifestyle intervention tended to be more effective among minority groups with 61% to 71% reduction in incidence of diabetes compared with 51% reduction among White subjects.[54] The success of the DPP led to culturally tailored adaptations for Hispanics,[54,55] American Indians/Alaska Natives,[56] and African Americans,[57] including faith-based lifestyle interventions in African American churches.[58] These adaptations generally achieved limited or partial success because of short duration of follow-up, high attrition rates, and female preponderance.[54–58]

Metformin

Although metformin was inferior to lifestyle changes in prevention of diabetes in the DPP,[36] its use in this setting may be considered when lifestyle changes are not feasible or successful. In the DPP, metformin appears more effective in reduction of new-onset diabetes among minorities than among Whites.[36] African Americans had a 44% reduction in new-onset diabetes, followed by Hispanics with a 31% reduction, and Whites 24% reduction.[36] In addition, the American Diabetes Association recommends consideration of metformin for patients with prediabetes, especially those with BMI $\geq$35 kg/m^2, those younger than 60 years, or women with a history of gestational diabetes.[59] It is unclear whether these BMI criteria apply.

Neighborhood and Diabetes Incidence

Experimental evidence from the Moving to Opportunity and Tranquility housing mobility study examined the impact of moving to a lower poverty community for residents of public housing projects. After an average of 10 to 15 years of follow-up among 4498 families (approximately 85% African American or Latina women with children), among those who received housing vouchers to reside in a low-poverty area compared with those who did not receive a voucher, incidence of diabetes was 22% lower (95% CI, 31.1%-35.5%), and incidence of obesity was 13% lower (95% CI, 14.4%- 17.7%).[50]

MANAGEMENT OF DIABETES AMONG RACIAL/ETHNIC MINORITIES

Lifestyle Intervention

In the “The Action for Health in Diabetes (Look Ahead)” trial, 5145 (36% minorities, 40% men) overweight or obese participants with type 2 diabetes were randomized to intensive lifestyle intervention and a control group of diabetes support and education.[60] The objective of the lifestyle intervention was loss of 10% of body weight with decreased caloric and fat intake and increased physical activity.[60] After a mean follow-up of 8 years, female patients from all ethnic groups had similar weight loss.[60] Among men, there was a trend toward less weight loss among African American and Hispanic men compared with Whites.[60] A more recent randomized trial conducted in Illinois evaluated culturally tailored diet changes and increase in physical activity in low-income African American patients with type 2 diabetes.[61] Compared with standard care group, HbA1c levels were significantly lower at 6 months, but the difference was no longer significant at 12 and 18 months.[61]

The ADA recommends diabetes self-management education (DSME) in all patients with diabetes. The goal of DSME is to increase the patient's self-efficacy to manage diet, physical activity, glucose monitoring, and stress management.[62] In one meta-analysis of 20 randomized trials of African Americans and Hispanics, DSME programs resulted in modest but significant HbA1c reduction of 0.31% (95% CI, −0.48% to −0.14%) compared with standard care.[63] However, another meta-analysis of eight African American studies did not find any significant impact of DSME in improving HbA1c values.[64] Overall, data suggest that long-term lifestyle intervention adopted in the Look Ahead trial is generally effective in all ethnic groups.[60]

Drug Therapy for Treatment of Diabetes Among Minorities

Metformin

In analyses of electronic health record data, metformin was associated with better HbA1c control for African Americans (n = 7429) than for Whites (n = 8783) (0.9% and 0.4%, respectively, $P<.001$ for the interaction between metformin exposure and race).[65] These results are generally in agreement with those of the DPP showing superior efficacy of metformin in prevention of diabetes among African Americans (44% reduction of new-onset diabetes vs placebo).[36] In addition, a subgroup analysis from the DPP showed that African American subjects with prediabetes treated with metformin have significantly greater decrease in fasting plasma glucose concentrations than Whites up to 2 years after intervention.[66]

Sodium-glucose cotransporter type 2 inhibitors

Sodium-glucose cotransporter 2 (SGLT2) inhibitors are effective, safe, and easy to administer (once a day orally). They have the added benefits of reducing systolic blood pressure and body weight. SGLT2 inhibitors significantly decrease CV and renal events in patients with type 2 diabetes and high CV risk.[67,68] Although these agents are well suited for treatment of type 2 diabetes in racial/ethnic minorities, these groups remain underrepresented in the major trials of SGLT2 inhibitors.[69] However, evidence indicates that the SGLT2 inhibitors empagliflozin and dapagliflozin decrease incidence of CV events in all ethnic groups, including Black patients that constituted approximately 5% of the study populations.[67,68] In a recent randomized trial formed exclusively of African Americans with type 2 diabetes and hypertension, empagliflozin reduced HbA1c levels by 0.78%, mean ambulatory systolic blood pressure by 8.4 mm Hg, and body weight by 1.2 kg compared with placebo after 6 months.[70]

Glucagon-like peptide-1 receptor agonists

Similar to SGLT2 inhibitors, glucagon-like peptide-1 receptor (GLP-1) agonists decreased weight, systolic blood pressure, and CV events in patients with type 2 diabetes and established CV disease.[71] Secondary analysis of phase III trials showed that glycemic efficacy, weight reduction, and safety of the GLP-1 agonist liraglutide are generally similar between African American, Latino/Hispanic, and White patients.[72,73] In the LEADER trial in which Blacks constituted 8.3% of the study population, CV benefits of liraglutide were similar for all racial groups.[71] As with insulin for type 2 diabetes, cost and the requirement for subcutaneous administration may be barriers to use by low-income or minority adults.[74,75]

Addressing Social Determinants of Health

There are limited data on the impact of intervening on the social factors on diabetes outcomes. Patient-provider communication is a critical element in health care provision. Interventions to improve diabetes management among LEP patients have demonstrated improvements in glycemic control.[76] In one study, Latino patients who switched from language-discordant to language-concordant primary care physician had significant improvement in their glycemic control.[77] Enhancing the use of interpreters and efforts aiming at standardization of Medical Spanish in Medical Schools may enhance communication and trust between physicians and LEP Latino patients.[78] Another promising area of investigation is the impact of social needs screening (eg, for food insecurity, housing, transportation) and referral on disparities in diabetes outcomes. The importance of social factors for patients with diabetes and their contribution to health inequities are well documented,[79,80] but there are limited data on whether screening and referral for food or housing insecurity, transportation needs, safety, or other social risk factors is associated with improvement in glycemic control or other components of diabetes care. However, several systematic reviews demonstrate that interventions with community health workers (CHWs)—a lay health worker who is a trusted member, and/or has a close understanding, of the community served.[81] CHWs can take on many different roles, including coordination with the health care system, visit accompaniment, home visits, social support, patient education, social needs screening and linkage to services, and advocacy. In these varied roles, CHWs have been shown to improve clinical and social outcomes among underserved Black, Latino, and Asian adults with diabetes. Diabetes outcomes associated with CHW involvement in care include improved diabetes knowledge and self-care behaviors and modest improvement in glycemic control.[81–90]

SUMMARY AND CURRENT NEEDS

Racial/ethnic disparities in diabetes incidence, prevalence, metabolic control, complications, and mortality are profound and persistent. The gap in incidence of type 2 diabetes between Whites and many minority groups has widened.[5,7,8,10] Obesity has been a main driver of the increase in diabetes incidence, particularly among racial/ethnic minority populations[11]; it is also important to recognize the role of metabolic disease in nonobese individuals. Evidence from randomized controlled trials demonstrates that weight loss, increased physical activity, and medications are effective in preventing and managing diabetes among all racial groups.[36] There is also recognition that strategies to target the obesity and diabetes epidemics must also incorporate social, health system, and community factors that influence these conditions. Rigorous multilevel research can help to address the many gaps in our understanding of diabetes disparities. We need to expand the diversity of behavioral, pharmaceutical, and other clinical trials. High-quality data are needed to better understand patterns of diabetes in the heterogeneous subgroups that make up Latino, Asian, NHOPI, and immigrant populations. More data are also needed on the equity impact of polices at the local, state, and federal levels, for example, to limit the impact of sugar-sweetened beverages, refined carbohydrates, and processed meats. Applying an equity framework in the design, implementation, and analysis of clinical, social, and policy interventions is of critical importance to understanding variation in the effectiveness of these strategies.

CLINICS CARE POINTS

- Screen for prediabetes and diabetes in minority groups if body mass index (BMI) is $\geq$25 kg/m^2 (or $\geq$23 kg/m^2 in Asian Americans). Tailored screening at even lower BMIs may be indicated for some racial/ethnic groups.
- Lifestyle changes are effective in patients with diabetes and in adults with prediabetes to prevent or delay onset of diabetes for individuals of all ethnicities.

- Effective diabetes prevention and treatment should incorporate strategies to address social determinants of health, such as language discordance, low health literacy, food insecurity, and community-level barriers to healthy lifestyle and evidence-based clinical care.
- Metformin is the initial drug of choice for diabetes. It may have superior efficacy among African Americans.
- In addition to their antidiabetic effects, sodium-glucose cotransporter 2 inhibitors and glucagon-like peptide-1 receptor agonists are useful for treatment of diabetes among African Americans and Hispanics as they reduce systolic blood pressure, body weight, and cardiovascular events.

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