Glycemic Improvement and Health Equity in the National Diabetes Prevention Program

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Diabetes Care 2023;46:e128–e129 | https://doi.org/10.2337/dc23-0552

The National Diabetes Prevention Program (NDPP) is a yearlong lifestyle intervention to prevent diabetes through weight loss. However, only 28% of participants achieve ≥5% weight loss, and there are concerning disparities based on age, sex, race, ethnicity, and socioeconomic status (1). Alternatively, new guidelines from the Centers for Disease Control and Prevention (CDC) target ≥0.2% HbA_{1c} improvement for participants with prediabetes (2), but the likelihood of reaching this goal is unknown. We report on the frequency and predictors of achieving ≥0.2% HbA_{1c} improvement in the NDPP.

The NDPP was implemented in a safety net health care system from 2013 to 2018 following CDC guidelines. Participants included 1,171 adults with overweight/obesity and prediabetes, past gestational diabetes, or an elevated score on the CDC's Prediabetes Risk Test. Among 832 participants with prediabetes (i.e., HbA_{1c} 5.7–6.4% within 1 year before starting the NDPP), 535 had HbA_{1c} testing within 1 year after participation by which to examine pre–post change. The other 297 participants with prediabetes lacked follow-up HbA_{1c} testing, which is often conducted in clinical care but not required in the NDPP. HbA_{1c}, height, and demographics, including age, sex, race, ethnicity, and insurance (a proxy of socioeconomic status), were collected from medical records. Weight was recorded at each session attended. Self-reported physical activity (weekly minutes) was recorded after activity tracking was introduced in the second month of intervention.

We first assessed differences in the frequency of follow-up HbA_{1c} testing by demographics, baseline BMI, baseline HbA_{1c}, weight loss, physical activity, and attendance. Multiple logistic regression models then estimated covariate-adjusted differences in achieving ≥0.2% HbA_{1c} improvement by demographics and levels of weight loss (≥5% or <5%), physical activity (≥150 or <150 min per week on average), and attendance (≥9 or <9 months). Covariates included demographics and baseline BMI and HbA_{1c}, weight loss, and attendance in corresponding models. Sensitivity analyses further controlled for physical activity, which was available for 305 participants. The Colorado Multiple Institutional Review Board approved this program evaluation project (16-1093).

Participants with or without follow-up HbA_{1c} testing were similar in sex, race, ethnicity, weight loss, BMI, and physical activity. There were significant differences in mean age (51.8 ± 0.5 vs. 47.8 ± 0.72 years; $P < 0.001$), baseline HbA_{1c} (6.02% ± 0.01 vs. 5.97% ± 0.01; $P = 0.003$), and duration of attendance (4.0 ± 0.2 vs. 3.2 ± 0.2 months; $P = 0.007$). Medicare beneficiaries also had more follow-up HbA_{1c} testing (75.6%) than participants with other insurance types (64.3%; $P = 0.015$).

Participant characteristics and outcomes are shown in Table 1 for the main analysis. Nearly half of participants (45.0%) achieved ≥0.2% HbA_{1c} improvement. Non-Latinx Black participants were 40% as likely as non-Latinx white participants to achieve ≥0.2% HbA_{1c} improvement. There were no significant disparities by sex, age, or insurance. Participants with ≥5% weight loss were 2.5× more likely to achieve ≥0.2% HbA_{1c} improvement than those with <5% weight loss. Average weight loss was 2.2% (SD 3.9) and 1.1% (SD 3.2), respectively, among participants with and without ≥0.2% HbA_{1c} improvement. Neither physical activity nor attendance was a significant predictor of ≥0.2% HbA_{1c} improvement. Results were consistent in sensitivity analyses.

In conclusion, the NDPP appears to be an effective intervention with equitable impact across sex, age, and socioeconomic groups when evaluating HbA_{1c} improvement instead of weight loss. Our findings align with new evidence that the NDPP reduces diabetes incidence by 46% in diverse populations, even without sustained weight loss (3). As diabetes is defined by hyperglycemia, not weight, it is

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Received 28 March 2023 and accepted 29 March 2023

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Table 1—Participant characteristics, outcomes, and predictors of reaching ≥0.2% HbA_{1c} improvement in the NDPP (N = 535)

Predictors	All analyzed participants, n[a]	<0.2% HbA_{1c} improvement, n[b]	≥0.2% HbA_{1c} improvement, n[b]	AOR (95% CI)	P value
Sex					
Female	418 (78.1%)	226 (54.1%)	192 (45.9%)	1.24 (0.79–1.94)	0.344
Male (reference)	117 (21.9%)	68 (58.1%)	49 (41.9%)	1.00	
Age (years)					
18–44	153 (28.6%)	83 (54.2%)	70 (45.8%)	1.93 (0.77–4.83)	0.159
45–64	319 (59.6%)	179 (56.1%)	140 (43.9%)	1.02 (0.54–1.92)	0.943
65+ (reference)	63 (11.8%)	32 (50.8%)	31 (49.2%)	1.00	
Race/ethnicity					
Latinx	318 (59.4%)	170 (53.5%)	148 (46.5%)	0.97 (0.59–1.59)	0.907
Non-Latinx Black	94 (17.6%)	61 (64.9%)	33 (35.1%)	0.40 (0.21–0.78)	0.006
Non-Latinx White (reference)	114 (21.3%)	59 (51.8%)	55 (48.2%)	1.00	
Insurance					
Medicaid or uninsured	349 (65.2%)	197 (56.4%)	152 (43.6%)	0.75 (0.45–1.22)	0.247
Medicare only	47 (17.0%)	47 (51.6%)	44 (48.4%)	0.89 (0.42–1.88)	0.753
Private insurance (reference)	95 (17.8%)	50 (52.6%)	45 (47.4%)	1.00	
Weight loss					
≥5%	72 (13.5%)	26 (36.1%)	46 (63.9%)	2.51 (1.41–4.48)	0.002
<5% (reference)	463 (86.5%)	268 (57.9%)	195 (42.1%)	1.00	
Physical activity (mean time per week)					
≥150 min	159 (52.1%)	73 (45.9%)	86 (54.1%)	1.53 (0.94–2.52)	0.090
<150 min (reference)	146 (47.9%)	85 (58.2%)	61 (41.8%)	1.00	
Attendance					
≥9 months	128 (23.9%)	66 (51.6%)	62 (48.4%)	0.86 (0.58–1.38)	0.532
<9 (reference)	407 (76.1%)	228 (56.0%)	179 (44.0%)	1.00	
Total	535 (100%)	294 (55.0%)	241 (45.0%)		

Another five participants were Asian race, and four participants were American Indian race. AOR, adjusted odds ratio. [a]Data are presented as frequency and percent within rows (e.g., total male vs. female). [b]Data are presented as frequency and percent within columns (e.g., total with vs. without ≥0.2% HbA_{1c} improvement).

unsurprising that lowering glucose can prevent diabetes. Implications for health policy change include reimbursing NDPP suppliers for HbA_{1c} outcomes, whereas current payment models prioritize weight loss (1). Although equitable HbA_{1c} outcomes were observed for Latinx participants, it is concerning that Black participants were least likely to achieve ≥0.2% HbA_{1c} improvement. More effort appears needed to ensure fully equitable outcomes and help even more participants reach or surpass this threshold. Strategies may include using flexible goal setting as an alternative to the NDPP's current emphasis on preset goals (4). Flexible goal setting appeared key to help women, younger adults, low-income participants, and Latinx and Black participants achieve ≥0.2% HbA_{1c} improvement (5). Another important finding is that attending the NDPP for ≥9 months appears less necessary for beneficial outcomes than previously thought (1), which raises the possibility of shortening the program to increase capacity and appeal to potential participants who are deterred by a lengthy intervention. However, results are not generalizable, and further study is needed with nationally representative samples. Efforts to help all participants complete HbA_{1c} testing may also facilitate better clinical care and provide an opportunity for more rigorous evaluation of the NDPP.

Funding. The NDPP at Denver Health was funded by the Amendment 35 Cancer, Cardiovascular Disease, and Pulmonary Disease Grant Program, administered by the Colorado Department of Public Health and Environment, as well as an award from America's Health Insurance Plans in partnership with the CDC. Additional support was provided by Denver Health. N.D.R. also acknowledges support by grants from the National Institutes of Health (R01DK119478, R01DK130900, and UG3HL162967), the American Diabetes Association (7-22-ICTSN-45), and the Robert Wood Johnson Foundation Clinical Scholars program.

The contents of this publication are the sole responsibility of the authors and do not represent official views of any organization.

Duality of Interest. No potential conflicts of interest relevant to this article were reported.

Authors Contributions. N.D.R. is principally responsible for the presented study, including study design, data access, and the decision to submit and publish the manuscript. N.D.R. conceived the study, conducted the data analysis, and wrote the manuscript. K.A.S. and L.P. participated in writing and interpretation. All authors critically reviewed the manuscript as well as read and approved the final submitted version. N.D.R. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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