



A Low-Carbohydrate Diabetes Prevention Program for Adults with Prediabetes: A Mixed Methods Pilot Study

Dina H. Griauzde MD, MSc^{1,2}; Tahoor Ansari MPH²; Kaitlyn J. Patterson BS²; Patti Bihn BSN, RN³; Samuel Shopinski MMS³; Caroline Richardson MD²; Laura R. Saslow PhD²
¹VA Ann Arbor Healthcare System, ²University of Michigan, ³National Kidney Foundation of Michigan

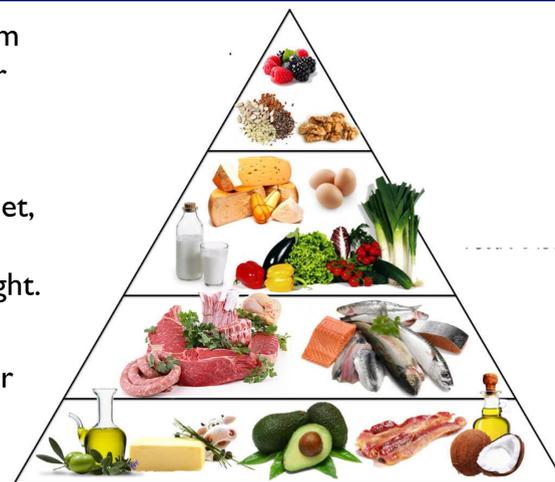


OBJECTIVES

- To evaluate feasibility and acceptability of a Low-Carbohydrate Diabetes Prevention Program (LC-DPP) among adults w/ prediabetes
- To estimate weight loss from a LC-DPP

BACKGROUND

- The CDC's National Diabetes Prevention Program (NDPP) is the prevailing public health strategy for type 2 diabetes prevention
- The NDPP teaches a low-fat, calorie-restricted diet, and many NDPP participants do not achieve clinically-significant weight loss of $\geq 5\%$ body weight.
- Low-carbohydrate diets may be more effective for weight loss among individuals with prediabetes (carbohydrate-insulin hypothesis)



Low-carbohydrate food pyramid

METHODS

Design: single-arm pilot study with mixed methods evaluation

Inclusion criteria: BMI ≥ 25 kg/m² and prediabetes (HbA1c 5.7-6.4%)

Intervention:

- Adapted DPP dietary content to teach participants to follow a low-carb (<25 g net carb/day) rather than a low-fat/calorie-restricted diet
- 16 weekly sessions (**core**); 6 bi-monthly/monthly sessions (**maintenance**)
- Community partnership with National Kidney Foundation of Michigan

Quantitative Measures:

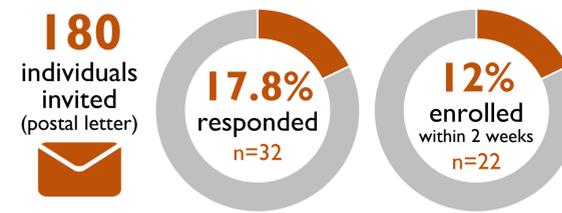
- Feasibility (rate of recruitment)
- Acceptability (session attendance)
- Change in weight
- Change in HbA1c

Qualitative Measures:

Semi-structured interviews at 6 months (n=13) and 12 months (n=12)

RESULTS

Recruitment



22 participants

Baseline characteristics (n=21)

Mean age in years (SD)	58.9 (11.0)
Female, n (%)	9 (42.9%)
White, n (%)	18 (85.7%)
Education > HS, n (%)	17 (85.0%)
Married / partnered, n (%)	15 (71.4%)

6- and 12-month outcomes

Outcomes (mean (SD) or N(%))	6 months	12 months
Core days attended	10.3 (4.5)	NA
Maintenance days attended	NA	3.4 (2.7)
Weight change (kg)	-4.3 (4.9)	- 4.9 (5.8)
% weight change	-4.5 (5.0)	-5.9 (7.1)
$\geq 5\%$ weight loss	10 (45.5)	9 (42.8)
$\geq 7\%$ weight loss	6 (27.3)	8 (36.4)
$\geq 10\%$ weight loss	4(18.2)	6(27.3)
HbA1c change*	-0.1 (0.2)	-0.2 (0.2)

*n=18 at 6 months and n=19 at 12 months

Side Effects and Adverse Events

- No significant differences in side effects (e.g., constipation, diarrhea, headache)
- Ischemic stroke (n=1)

Key Themes

Facilitators of adhering to a low-carb meal plan

Highly effective for weight loss

"...it's the **best diet I have ever been on**, and I've been on a lot...it seems **effortless**, it just seems like [the weight] is melting off..."

- Female, -14.5 kg (18.2% body weight) at 12 months

Decreased hunger and cravings

"I like the fact that I'm **not craving food** and thinking about food all the time."

- Female, -8.63 kg (9.5% body weight) at 12 months

Barriers of adhering to a low-carb meal plan

It's hard to give up carbs

"The **hardest thing is avoiding food that I like or love**, like breads and mashed potatoes and potato chips and pasta and going out to dinner and having a nice, big juicy hamburger on a nice bun."

- Male, -3.6 kg (3.6% body weight) at 12 months

Concerns about dietary fat

"For years and years and years, I've heard eating red meats, cheeses, and nuts, and low carbohydrate foods...is **not good for your coronary system, your heart**. And now, it seems, like the whole thing is reversed. That's the only thing that bothers me."

- Male, 2.2 kg (2.3% body weight) at 12 months

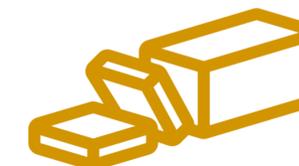
CONCLUSIONS AND NEXT STEPS



A Low-Carbohydrate Diabetes Prevention Program (LC-DPP) is **feasible and acceptable**.



Greater weight loss than historical controls in low-fat DPPs (5.9% v. 4.2%).



Uncertainty about dietary fat and disease risk is a challenge to implementation.



Comparative effectiveness trial of low-carb vs. low-fat DPP

Acknowledgements

Michigan Nutritional Obesity Research Center

National Kidney Foundation of Michigan

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