Open Access

Recent Progress in Nutrition

LIDSEN Publishing Inc.

Editorial

Nutritional Guidance for Individuals with Prediabetes — Uniform or Tailored to Phenotypes?

Sathish Thirunavukkarasu [1, 2, *]

1. Department of Family and Preventive Medicine, School of Medicine, Emory University, Atlanta, GA 30322, USA; E-Mail: sathish.thirunavukkarasu@emory.edu
2. Emory Global Diabetes Research Center, Woodruff Health Science Center, Emory University, Atlanta, GA 30322, USA

* **Correspondence:** Sathish Thirunavukkarasu; E-Mail: sathish.thirunavukkarasu@emory.edu

Special Issue: Nutritional Advice for People with Different Prediabetes Phenotypes – Should be it the Same or Different?

Recent Progress in Nutrition
2024, volume 4, issue 2
doi:10.21926/rpn.2402008

Received: April 15, 2024
Accepted: April 15, 2024
Published: April 23, 2024

Keywords
Type 2 diabetes; isolated impaired fasting glucose; prediabetes; diet; low-calorie diet; nutrition; prevention; precision prevention

Prediabetes affected an estimated 860 million adults globally in 2021, with projections indicating a rise to a staggering 1.2 billion individuals (a 36% increase) by 2045 [1]. Those with prediabetes face not only a heightened risk of developing type 2 diabetes but also increased susceptibility to micro- and macro-vascular complications and premature mortality [2]. Hence, it is imperative to implement effective intervention strategies to prevent the progression of prediabetes to type 2 diabetes.

Prediabetes encompasses various heterogeneous phenotypes, including isolated impaired fasting glucose (i-IFG), isolated impaired glucose tolerance (i-IGT), and IFG plus IGT, each exhibiting distinct pathophysiological abnormalities [3, 4]. In i-IFG, there is a notable impairment in early-phase insulin secretion coupled with heightened hepatic insulin resistance [3]. Conversely, i-IGT entails

impaired early- and late-phase insulin secretion alongside increased insulin resistance in skeletal muscle. IFG plus IGT represents a combination of defects observed in both i-IFG and i-IGT [3]. Understanding these distinctions is crucial for developing tailored intervention approaches to prevent type 2 diabetes in individuals with prediabetes [5].

Nutritional guidance recommended in diabetes prevention guidelines typically emphasizes calorie restriction (with no standard set levels), especially from fats, and increasing the consumption of fiber-rich foods [6]. While these dietary changes, with or without improvements in physical activity, are highly effective in reducing diabetes incidence among individuals with IGT [7], their impact appears less pronounced in those with i-IFG [8]. Previous studies have shown that the Mediterranean diet, high-protein and low-carbohydrate diet, plant-based diet, Dietary Approaches to Stop Hypertension (DASH) diet, as well as diets rich in whole grains, legumes, nuts, fruits, and vegetables, and limited processed foods, are associated with a reduced risk of type 2 diabetes [9]. Furthermore, researchers suggest that low-calorie diets (800 to 1500 kcal/day), which are high in protein and moderate in carbohydrate and fat content, may have the potential to reduce hepatic insulin resistance [10]. This reduction could lead to improvements in fasting hyperglycemia and a decreased incidence of diabetes among individuals with i-IFG [10].

For this special issue titled “Nutritional Advice for People with Different Prediabetes Phentoypes — Should be it the Same or Different?”, we invite submissions of original research articles evaluating the efficacy of different dietary approaches among individuals with various prediabetes phenotypes.

Author Contributions

S.T. conceived the idea, conducted the literature review, and wrote the manuscript.

Funding

This research was supported by the Synergy Awards from the Woodruff Health Science Center, Emory University, and Georgia CTSA’s Pilot Program, funded by the Robert W. Woodruff Health Science Center at Emory University and the National Center for Advancing Translational Sciences of the National Institutes of Health (NIH) under Award Number UL1TR002378.

Competing Interests

The author has declared that no competing interests exist.

References

1. International Diabetes Federation. IDF Diabetes Atlas, 10th ed. Brussels, Belgium: International Diabetes Federation; 2021.
2. Cai X, Zhang Y, Li M, Wu JH, Mai L, Li J, et al. Association between prediabetes and risk of all cause mortality and cardiovascular disease: updated meta-analysis. BMJ. 2020; 370: m2297.
3. Abdul-Ghani MA, Tripathy D, DeFronzo RA. Contributions of beta-cell dysfunction and insulin resistance to the pathogenesis of impaired glucose tolerance and impaired fasting glucose. Diabetes Care. 2006; 29: 1130-1139.

4. Campbell MD, Sathish T, Zimmet PZ, Thankappan KR, Oldenburg B, Owens DR, et al. Benefit of lifestyle-based T2DM prevention is influenced by prediabetes phenotype. Nat Rev Endocrinol. 2020; 16: 395-400.
5. Chakkalakal RJ, Galaviz KI, Sathish T, Shah MK, Narayan KMV. Test and treat for prediabetes: A review of the health effects of prediabetes and the role of screening and prevention. Annu Rev Public Health. 2023:doi: 10.1146/annurev-publhealth-060222-023417.
6. American Diabetes Association. 3. Prevention or delay of diabetes and associated comorbidities: Standards of care in diabetes-2024. Diabetes Care. 2024; 47: S43-S51.
7. Gillies CL, Abrams KR, Lambert PC, Cooper NJ, Sutton AJ, Hsu RT, et al. Pharmacological and lifestyle interventions to prevent or delay type 2 diabetes in people with impaired glucose tolerance: Systematic review and meta-analysis. BMJ. 2007; 334: 299.
8. Sathish T, Khunti K, Narayan KMV, Mohan V, Davies MJ, Yates T, et al. Effect of conventional lifestyle interventions on type 2 diabetes incidence by glucose-defined prediabetes phenotype: An individual participant data meta-analysis of randomized controlled trials. Diabetes Care. 2023; 46: 1903-1907.
9. Evert AB, Dennison M, Gardner CD, Garvey WT, Lau KHK, MacLeod J, et al. Nutrition therapy for adults with diabetes or prediabetes: A consensus report. Diabetes Care. 2019; 42: 731-754.
10. Thirunavukkarasu S, Taylor R, Khunti K, Tapp RJ, Raben A, Zhu R, et al. Low-calorie diets for people with isolated impaired fasting glucose. Commun Med (Lond). 2024; 4: 35.