75-LB

Pre-treatment fasting glucose concentration predicts weight loss on a high fiber, low glycemic load diet: The Healthy Weight for Living Study

Lorien E. Urban[1], Susan B. Roberts[2], Yishai Zohar[1], Arne Astrup[3], Mads Fiil Hjorth[3], Anastassios G. Pittas[2], Edward Saltzman[2], and Sai Krupa Das[2].

1. Gelesis, Boston MA, USA. 2. Tufts University Human Nutrition Research Center on Aging, Boston MA, USA. 3. University of Copenhagen, Denmark.

INTRODUCTION

- The struggle to curb the current obesity epidemic with an optimal diet has largely failed, giving rise to numerous insufficient approaches.[1]
- Caloric restriction, although effective in the short-term, is frequently derailed by biologic feedback mechanisms that stimulate appetite, reduce dietary compliance, and ultimately lead to a rebound of energy intake and weight gain.[2] Increasing dietary fiber intake has been employed as a means of influencing subjective appetite and preventing weight gain.[3]
- Low-carbohydrate or low-glycemic load diets have demonstrated differential success according to insulin resistance.[4-7]
- While glycemic parameters may help predict weight loss success, attempts to establish whether pretreatment glycemic status predicts or determines weight loss response have been inconsistent.[8-9]
- **The purpose of this analysis was to explore fasting plasma glucose concentrations as an objective predictor of weight loss in participants of the Healthy Weight For Living Study: a 24-week comprehensive intervention based on a high-fiber, low glycemic-load diet.**

METHODS

- This was a re-analysis of a previously reported 24-week, group-based behavioral weight loss study.[10]
  - The primary goal of the diet intervention was to facilitate portion-controlled menus containing ≥ 40 g/day of dietary fiber and a low glycemic load. Macronutrient targets were 25% protein, 27% fat, and 48% low-glycemic index carbohydrates.
- For this re-analysis, subjects were dichotomized by baseline fasting blood glucose (FBG) concentrations as low (FBG < 90 mg/dL) and high (FBG ≥ 90 to 125 mg/dL).
- Differences in weight loss between low and high FBG groups were examined using linear mixed models adjusted for baseline body mass index, age, gender, and site, or Fisher's exact tests ($\alpha = 0.05$).

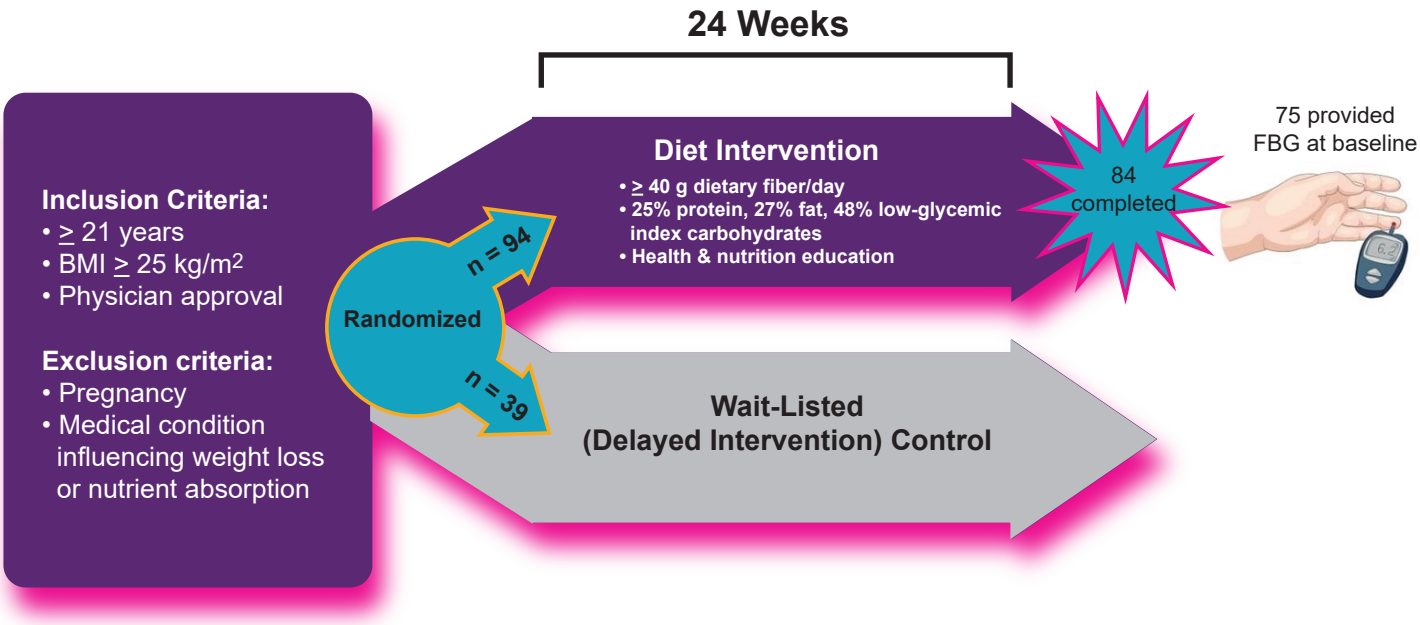

Figure 1: Six-month study design.[10] Only subjects who completed the diet[11] intervention (purple arrow) *and* provided baseline fasting glucose measurements were included in the current analysis. BMI = Body Mass Index, FBG = fasting blood glucose at baseline.

RESULTS

- In the original 24-week study[10], the overall mean weight loss in the intervention group was 8.0 ± 0.7 kg (**Figure 2**).
- Subjects with high FBG lost significantly more weight (-9.4%, range: -7.9% to -10.9%) at 24 weeks compared to subjects with low FBG (-4.1%, range: -1.4% to -6.9%) (*P* = 0.038, **Figure 3**). Trajectories between the two FBG groups appeared to diverge by 10 weeks and persisted thereafter.
- By 24-weeks, 79% of participants with high FBG achieved a 5% reduction in body weight, compared with 50% achievement among low FBG participants (*P* = 0.064, **Figure 4**).
- Similarly, 36% of participants with high FBG achieved a 10% reduction compared to only 8% with low FBG (*P* = 0.088).
- When FBG was examined as a continuous predictor of weight loss at 24 weeks, a trend for an inverse relationship was observed (β -0.12%; CI: -0.26% to .011%; *P* = 0.072; **Figure 5**).

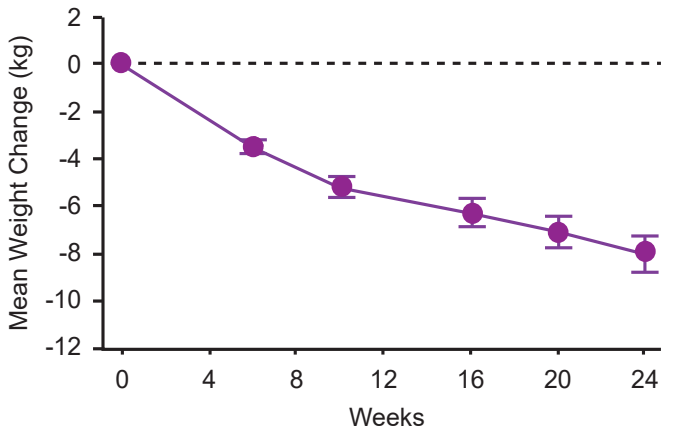

Figure 2: Body weight changes in all participants (n = 84) who completed a high fiber, low glycemic load diet intervention for 24 weeks.[10] Data presented as mean ± SEM.

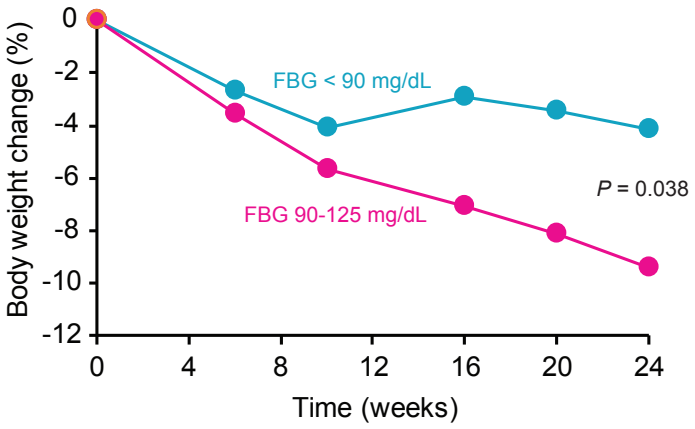

Figure 3: Mean body weight changes in participants with low (n = 12) or high (n = 58) baseline fasting blood glucose (FBG) during a 24-week high fiber, low glycemic load diet intervention.

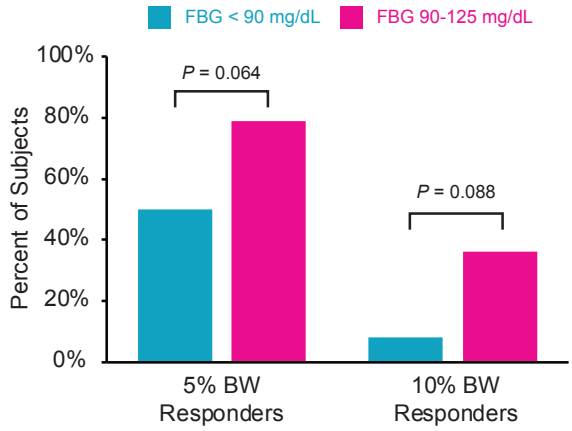

Figure 4: Achievement of 5% and 10% body weight (BW) loss at 24 weeks in participants with low or high fasting blood glucose (FBG).

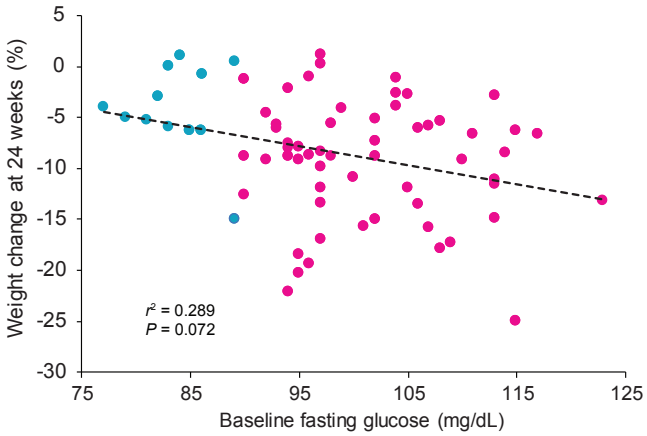

Figure 5: Inverse relationship between body weight change at 24-weeks and baseline fasting blood glucose (FBG) levels. Blue = FBG < 90 mg/dL, Red = FBG 100-125 mg/dL.

DISCUSSION

- In this re-analysis of the Healthy Weight for Living study[10], our primary observations were that 1) individuals with high FBG demonstrated an enhanced weight loss response to a high fiber, low glycemic load diet, and 2) baseline FBG tended to predict weight loss. Accordingly, a greater percentage of participants with high FBG achieved weight loss milestones of 5% and 10% by the end of the study.

- These results are consistent with other analyses of independent diet studies presented at this congress demonstrating that subjects with prediabetes respond better to diets that are lower in glycemic load and carbohydrate content (**Hjorth ADA#202-OR, Hjorth ADA#73-LB**), *ad libitum* diets that are lower in their relative amounts carbohydrate (**Astrup ADA#201-OR**), or higher in fiber (**Astrup ADA#792-P**), and that subjects with elevated fasting plasma glucose responded preferentially to Mediterranean diets that are higher in plant-based fats (and therefore lower in carbohydrate content, **Estruch ADA#78-LB**).

DISCUSSION CONTINUED

- There are several central (CNS) and peripheral mechanisms by which blood glucose levels may influence satiety and ultimately weight loss;[12,13] however, we cannot conclude if this particular biomarker is responsible for the enhanced weight-loss observed or whether there are other markers or mechanisms involved. For example, the diet employed in this study was rich in dietary fibers and strong evidence suggests a role for gut microbiota in their fermentation and production of metabolites such as short-chain fatty acids that may facilitate weight loss.[14]
- Over the past several decades, numerous trials have compared various diets for the management of obesity based on the assumption that a single dietary strategy is appropriate for all individuals. Our results clearly demonstrate that failure to consider glycemic status may underestimate true weight loss potential.

CONCLUSIONS

- These novel results, along with other analyses of large, international diet studies presented at this congress (**73-LB, 78-LB, 792-P, 201-OR, 202-OR**), demonstrate that easily accessible biomarkers such as fasting blood glucose are strong predictors of dietary weight loss success and represent a significant step forward in personalized weight management.

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