



Carbohydrate Counting Does Not Improve Glycemic Control in Type 1 Diabetes Patients

Written by Maria Vinal

Kirstine Bell, APD, CDE, University of Sydney, Sydney, Australia, presented pooled data from six randomized controlled trials conducted over a 10-year period showing that carbohydrate counting had no significant effect on glycemic control.

Carbohydrate counting has become the gold standard for adjusting prandial insulin dose despite limited evidence to recommend it over other dietary interventions for improving glycemic control in type 1 diabetes (T1D). Most international guidelines have based their recommendations on narrative reviews and the results of the few available studies; however, carbohydrate counting does not take into account differing effects of carbohydrates on blood glucose levels and the many different factors associated with stimulation of insulin secretion.

The objective of this meta-analysis was to assess the efficacy of carbohydrate counting on glycemic control in adults and children with T1D. Six studies that assessed the management of T1D with and without carbohydrate counting were included [DAFNE Study Group. *BMJ* 2002; Gilbertson HR et al. *Diabetes Care* 2001; Kalergis M et al. *Diabetes Obes Metab* 2000; Laurenzi A et al. *Diabetes Care* 2011; Scavone G et al. *Diabet Med* 2010; Trento M et al. *J Endocrinol Invest* 2011]. The control groups received usual care, general nutrition advice, or low glycemic index dietary advice. All studies were of at least 3 months' duration; patients (503 adults; 104 children aged 8 to 13 years) could be on flexible or fixed insulin therapy.

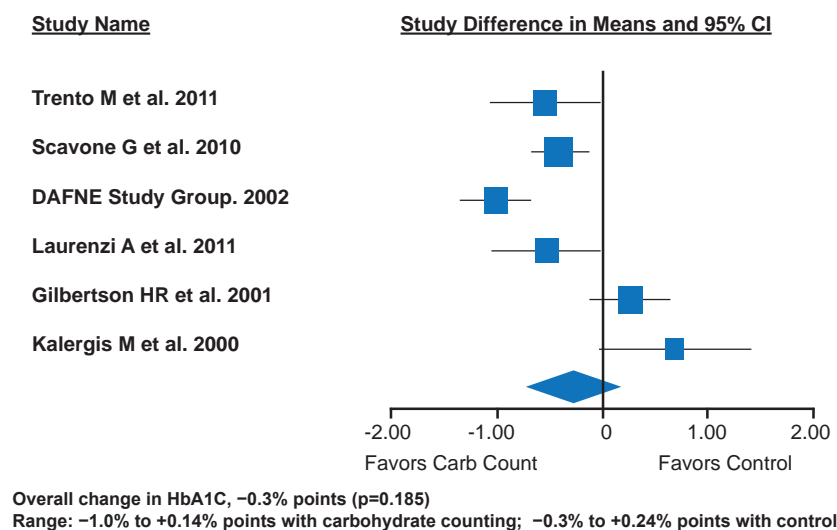
The primary outcome was improvement in glycated hemoglobin (HbA1C). Secondary measures included the number and severity of hypoglycemic episodes, fasting plasma glucose, insulin dose required to maintain glycemic control, body weight, and quality of life.

There was no significant improvement in HbA1C in patients who practiced carbohydrate counting compared with those who did not (Figure 1). The overall change in HbA1C was -0.3% points ($p=0.185$). Four studies favored carbohydrate counting (range, -1.0% to $+0.14\%$); two favored the control (range, -0.3% to $+0.24\%$).

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Figure 1. Carbohydrate Counting Does Not Significantly Improve HbA1C



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Due to the low number of studies and inconsistencies in reporting metrics, the results for the secondary outcomes are weak. However, there were trends for reduced risk of hypoglycemia, improved quality of life, and no changes in insulin dose, weight, or fasting plasma glucose level. The literature shows a wide variation in carbohydrate counting ability with greater accuracy and precision associated with lower HbA1C levels. However, skill and compliance were not measured in these studies.

As this analysis shows, carbohydrate counting may not result in optimal blood glucose control and clinicians need to realize some patients may fail with this approach. Many people with T1D have difficulty managing postprandial blood glucose levels despite their best efforts. In addition, carbohydrate counting has been linked to unhealthy food beliefs, fats and protein intake that exceed nutritional recommendations, and increased reliance on packaged foods. Clinicians need to emphasize healthy eating with insulin matched to food choices rather than choosing foods to limit insulin or making dosing easier. Additional research is needed to support the use of carbohydrate counting in clinical practice, particularly in children and adolescents. Recent studies examining the effect of protein and fat on insulin requirements show promising results and could provide an alternative method for determining prandial insulin dose.

Lifestyle Intervention Is Beneficial in Pregnant Women at Risk for Gestational Diabetes

Written by Maria Vinall

Lifestyle modifications incorporating healthy diet and increased physical activity in nonpregnant adults are effective for proper weight control as well as prevention of diabetes in at-risk individuals. Jessica Marcinkevage, PhD, MSPH, Centers for Disease Control and Prevention and Emory University, Atlanta, Georgia, USA, reported the results of study in pregnant women at risk for gestational diabetes in which a similar lifestyle intervention (LSI) was effective in improving glucose metabolism and insulin resistance.

The objective of this randomized, controlled, pilot feasibility study was to assess the effects of LSI on glucose metabolism and insulin resistance in overweight/obese (body mass index [BMI] ≥ 25 kg/m²) low-income African American women. Women <20 weeks gestation with singleton pregnancies were randomized to either regular/standard care (RC; n=29) or LSI (n=28) which included individualized one-on-one counseling on physical activity and dietary advice in addition to standard care. They also received biweekly booster calls and pedometers to track

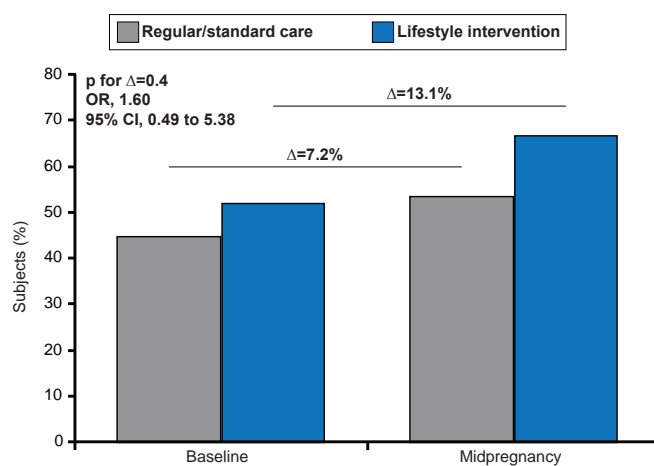
physical activity. Women in the RC group received written literature on physical activity and diet during pregnancy during their baseline visit only and proceeded with regular prenatal care as scheduled.

Study outcomes included physical activity determined by a self-reported Pregnancy Physical Activity Questionnaire, gestational weight gain from baseline visit, glucose metabolism (total glucose area under the curve), documented evidence of gestational diabetes, and insulin resistance (homeostatic model of insulin resistance). There were no differences in baseline characteristics between the two groups. Subjects were mean age 24 years and ~12 weeks pregnant when recruited. About 60% of the total sample was either obese or morbidly obese and >30% were current or former smokers. The majority of women reported diabetes in a first-degree relative.

Over the duration of their pregnancies, women in the LSI group gained ~10 kg versus 9 kg for women in the RC group. There were no differences between groups in the median weight gained at midpregnancy and prior to delivery, or in the amount of weight retained from delivery to the 6-week postpartum visit.

Women in the LSI group had higher odds of meeting physical activity recommendations at midpregnancy compared with women in the RC group (OR, 1.60; 95% CI, 0.49 to 5.38; Figure 1).

Figure 1. Percentage of Subjects Meeting Physical Activity Recommendations



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There was improved glucose metabolism ($p < 0.05$) at midpregnancy in the LSI group. There were trends indicating improved insulin resistance at both midpregnancy and post partum for the LSI group compared with the RC group. (Figure 2). In addition, for women in the LSI group there was a 12% decrease in the odds of developing gestational diabetes compared with those in the RC group (Figure 3).