Sustainable Weight Loss among Overweight and Obese Lactating Women Is Achieved with an Energy-Reduced Diet in Line with Dietary Recommendations: Results from the LEVA Randomized Controlled Trial

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ARTICLE INFORMATION

Article history:
Accepted 28 May 2014
Available online 1 August 2014

Keywords:
Diet
Overweight and obesity
Postpartum
Weight loss

http://dx.doi.org/10.1016/j.jand.2014.05.017

ABSTRACT

The aim of this study was to evaluate dietary changes during and after a dietary treatment shown to result in significant and sustained weight loss among lactating overweight and obese women. This is crucial before clinical implementation. Data were collected from the LEVA (in Swedish: Livsstil för Effektiv Viktminskning under Amning [Lifestyle for Effective Weight Loss During Lactation]) randomized controlled factorial trial with a 12-week intervention and a 1-year follow up. At 10 to 14 weeks postpartum, 68 lactating Swedish women with a prepregnancy body mass index (calculated as kg/m^2) of 25 to 35 were randomized to structured dietary treatment, physical exercise treatment, combined treatment, or usual care (controls) for a 12-week intervention, with a 1-year follow-up. Dietary intake was assessed with 4-day weighed dietary records. Recruitment took place between 2007 and 2010. The main outcome measures were changes in macro- and micronutrient intake from baseline to 12 weeks and 1 year. Main and interaction effects of the treatments were analyzed by a 2×2 factorial approach using a General Linear Model adjusted for relevant covariates (baseline intake and estimated underreporting). It was found that at baseline, the women had an intake of fat and sucrose above, and an intake of total carbohydrates and fiber below, recommended levels. At 12 weeks and 1 year, the dietary treatment led to reduced intake of energy ($P<0.001$ and $P=0.005$, respectively), fat (both P values <0.001), and sucrose ($P<0.001$ and $P=0.050$). At 12 weeks, total carbohydrates were reduced ($P<0.001$). A majority of women in all groups reported low intakes of vitamin D, folate, and/or iron. In conclusion, a novel dietary treatment led to reduced intake of fat and carbohydrates. Diet composition changed to decreased proportions of fat and sucrose, and increased proportions of complex carbohydrates, protein and fiber. Weight loss through dietary treatment was achieved with a diet in line with macronutrient recommendations.
J Acad Nutr Diet. 2015;115:78-86.

INCREASING OVERWEIGHT AND OBESITY AMONG women of childbearing age is a growing concern because of the comorbidities that affect both maternal and child health.[1,2] Childbearing is associated with persistent weight gain because of gestational weight gain and postpartum weight retention, which can exacerbate overweight and associated conditions.[3-5] Prepregnancy overweight and obesity are risk factors for high postpartum weight retention,[6] and postpartum women retain, on average, 0.4 to 3.0 kg,[3,6] and approximately 20% of women retain >5 kg.[4]

In the postpartum period, many women wish to lose weight.[7] Taking advantage of the increased energy requirements of lactation,[8,9] lifestyle treatment can enhance postpartum weight loss. The Institute of Medicine has recently recommended that women be offered counseling on diet and physical activity to eliminate postpartum weight retention.[10] Swedish authorities recommend that overweight and obese women seek treatment from a dietitian to reduce postpartum weight retention.[11] In the recent LEVA trial (in Swedish: Livsstil för Effektiv Viktminskning under Amning [Lifestyle for Effective Weight Loss During Lactation]), a newly developed dietary behavior modification treatment aiming to implement the Nordic Nutrition Recommendations[12] provided clinically relevant weight loss (9%), which was sustained, and even increased to 10%, at 9 months after treatment termination.[13] The Nordic Nutrition Recommendations provide recommendations with only minor differences from international dietary guidelines[12];

this aspect of the trial is generalizable to most Western societies.

A substantial proportion of women are not limiting their postpartum energy intake sufficiently to return to prepregnancy weight, likely due to high intakes of fat and sugar, as seen in the general population.[14] Also, US data indicate that both dieting and nondieting lactating women might not be getting the recommended levels of micronutrients.[15-17] Current information about the dietary intake among lactating women in lifestyle interventions is limited and, in part, lacks sufficient methodological quality, particularly longer term or post-treatment data.[18] Using data from the LEVA trial, the aim of this study was to first evaluate the short- and long-term (ie, during and post treatment) effects on macronutrient intake of the intervention, and second, to report the diet achieved with the dietary treatment in relation to the Nordic Nutrition Recommendations, both macronutrients and micronutrients of specific concern. This study may reduce barriers to treatment initiation by providing a detailed description of the intervention protocol of a successful weight-loss treatment, providing indicators of treatment implementation efficacy, and soundness of the diet achieved.

METHODS

Study participants and study design of the intervention trial have been described previously.[13] The trial consisted of a 12-week treatment period and a 9-month follow-up after treatment and included assessments of the separate and interactive effects of diet and exercise behavior-modification treatments on weight and body composition during lactation in women who were overweight or obese before pregnancy. The current study is a secondary data analysis. Briefly, healthy lactating women with self-reported prepregnant body mass index (calculated as kg/m^2) 25 to 35 and a singleton term delivery were recruited between 2007 and 2010. Baseline measurements were made by trained research staff and nurses at 8 to 12 weeks postpartum. At 10 to 14 weeks postpartum, 68 women were randomized to four intervention groups: dietary behavior modification group (D group), physical exercise behavior modification group (E group), dietary and physical exercise behavior modification group (DE group), and control group (C group). Group allocation was concealed to all parties until completion of baseline measurements. According to the 2×2 factorial design, the following treatments were provided: D group, dietary treatment; E group, physical exercise treatment; DE group, dietary and physical exercise treatments; and C group, no treatment (usual care). The intervention lasted 12 weeks. At the end of the intervention and at the 1-year follow-up 9 months later, baseline measurements were repeated. The study was approved by the Regional Ethics Board in Gothenburg, Sweden. All participants gave written informed consent.

Study Design

Weighed 4-day dietary records collected at baseline, 12 weeks, and 1 year were analyzed. Main and interaction effects of the dietary and physical exercise treatments on dietary outcomes were evaluated. In addition, a report on the diet in relation to recommendations is provided.

Study Outcomes

The primary outcomes of the analyses were self-reported changes in macronutrient intake from baseline to 12 weeks and 1 year (fat [total and saturated], carbohydrates [total, complex carbohydrates, sucrose, fiber], protein), and intake levels of macronutrient density, as well as intake of micronutrients (vitamin D, folate, calcium, iron, and sodium), including proportion of women reaching the Nordic Nutrition Recommendations recommended levels.

Baseline and Follow-Up Measurements

Dietary Intake. Dietary intake was assessed with a 4-day weighed diet record. The women were provided with an electronic scale (HR2395, Philips) and instructed to weigh and record all foods and beverages consumed for 4 consecutive days, to the nearest 1 g. The measurement days were jointly established to be representative of their habitual diet and to include 3 weekdays and 1 weekend day (preferably Wednesday through Saturday). The women were advised to continue their current diet during recording, including the number and type of meals eaten outside the home. In addition to weighing foods to the greatest extent possible, both at home and other locations, the women were instructed on collecting food packaging and labeling, or to provide detailed descriptions of foods using household measurements. The women received all instructions to complete the dietary record from trained research staff using a standardized procedure. Based on the assumption that an attractive outcome (a better diet intervention) can motivate a certain action (a truthful record), the women were informed that if they were randomized to dietary treatment their dietary record would be used to construct the intervention diet plan. Dietary intake was entered and calculated by a dietitian or trained research staff using Dietist XP software (version 3.2, 2012, Kost och Näringsdata), using the Swedish 2010 dietary database, and data from food manufacturers. If records were incomplete, the woman was contacted and asked to provide additional information. If such information was not available, standard servings from the dietary database were used for recorded foods. All entered and calculated dietary data were reviewed for accuracy and consistency by one dietitian. All foods analyzed using the database had complete data for nutrients included in the analysis. Complex carbohydrates were calculated as total carbohydrates minus monosaccharaides and disaccharides. Vitamin/mineral supplements were not included in the calculations, as it is critical to elucidate whether diet alone provides sufficient nutritional value under the investigated circumstances. In addition, this is most representative, as only 15% reported using a multivitamin/mineral supplement at baseline, 10% after the intervention, and none at 1 year.

Weight, Height, Body Composition, and Energy Expenditure. Measurements were made after an overnight fast. Weight was determined to the nearest 0.1 kg, with women wearing light underclothing with an electronic scale (MC 180 MA, Tanita). Height was measured to the nearest 0.5 cm, without shoes, with a wall-mounted stadiometer. Body composition was measured by using dual-energy x-ray absorptiometry (DXA) (Lunar Prodigy, GE Lunar Corp). Total energy expenditure (TEE) was measured using doubly labeled