COMMENT

High-fat diets: healthy or unhealthy?

Marie C. GULDSTRAND and Caroline L. SIMBERG
Obesity Unit, Department of Internal Medicine, Karolinska Institutet, Danderyd Hospital, SE-182 88 Stockholm, Sweden

ABSTRACT

In the current dietary recommendations for the treatment and prevention of Type 2 diabetes and its related complications, there is flexibility in the proportion of energy derived from monounsaturated fat and carbohydrate as a replacement for saturated fat. Over the last few years, several population studies have shown that subjects eating a lot of refined grains and processed foods have a much larger increase in waist circumference than those following a diet higher in monounsaturated fat, protein and carbohydrates rich in fibre and whole grain. In the present issue of Clinical Science, Sinitskaya and co-workers have demonstrated that, in normal-weight rodents categorized into groups of high-fat and medium-carbohydrate [53% / 30% of energy as fat/carbohydrate; 19.66 kJ/g (4.7 kcal/g)], high-fat and low-carbohydrate [67% / 9% of energy as fat/carbohydrate; 21.76 kJ/g (5.2 kcal/g)] and high-fat and carbohydrate-free [75% / 0% of energy as fat/carbohydrate; 24.69 kJ/g (5.9 kcal/g)] diets, the high-fat diets containing carbohydrates were both obesogenic and diabetogenic, whereas the very-high-fat and carbohydrate-free diet was not obesogenic but led to insulin resistance and higher risk of cardiovascular disease. This finding may indicate that high-fat diets could easily give rise to an unhealthy diet when combined with carbohydrates, highlighting the significance of macronutrient composition, rather than caloric content, in high-fat diets.

Dietary advice is vital for patients with Type 2 diabetes. Initial dietary advice was aimed at controlling the glucose concentration in the blood and the urine. A high-fat and low-carbohydrate diet was advocated for the treatment of Type 2 diabetes by Dr W. Osler and by other distinguished physicians at that time [1]. The diet recommended for Type 2 diabetics in 1923 contained approx. 75% of total energy intake from fat, 20% from protein and 5% from carbohydrates [1]. The current recommendations of the ADA (American Diabetes Association) and EASD (European Association for the Study of Diabetes) on dietary composition for the treatment and prevention of diabetes mellitus are <35% of total energy intake from fat (<10% from saturated and trans-unsaturated fat, <10% from n–6 and n–3 polyunsaturated fat and 10–20% from cis-monomounsaturated fat), 10–20% from protein and 45–60% from carbohydrates [2,3]. Thus current low-fat and high-carbohydrate diet recommendations are dramatically different from the high-fat and low-carbohydrate dietary recommendations from the 1920s.

Excess weight is the principal risk factor for Type 2 diabetes. Visceral fat produces inflammatory activators, which, in turn, evoke insulin resistance. Obesity therefore promotes insulin resistance and glucose intolerance [4]. The cardiovascular and other metabolic complications resulting from abdominal visceral obesity and Type 2 diabetes are a significant cause of premature morbidity and mortality in industrialized countries [5]. Not surprisingly, the risk of the contribution of high-fat food in weight gain and cardiovascular complications has been thoroughly investigated in population studies. Results from an 8-year follow-up in the NHS (Nurses’ Health Study) showed that, overall, the percentage of calories from fat only had

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Correspondence: Dr Marie C. Guldstrand (email marie.guldstrand@ds.se).

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a weak positive association with weight gain [6]. Increased intake of monosaturated and polyunsaturated fat were not associated with weight gain; however, the percentage of fat from animal, saturated and trans-unsaturated fats had associations with greater weight gain. Furthermore, diets lower in carbohydrate and higher in vegetable sources of fat and protein have been shown to reduce glycaemic burden and the risk of coronary heart disease in women [7].

In the present issue of Clinical Science, Sinitskaya et al. [8] have demonstrated that, in rodents categorized into groups with high-fat and medium-carbohydrate [53%/30% of energy as fat/carbohydrate; 19.66 kJ/g (4.7 kcal/g)], high-fat and low-carbohydrate [67%/9% of energy as fat/carbohydrate; 21.76 kJ/g (5.2 kcal/g)] and high-fat and carbohydrate-free [75%/0% of energy as fat/carbohydrate; 24.69 kJ/g (5.9 kcal/g)] diets, high-fat diets containing carbohydrates produced weight gain and abdominal obesity. Interestingly, the high-fat and carbohydrate-free diet did not induce significantly higher BMI (body mass index) or percentage adiposity compared with the control low-fat, high-carbohydrate and low-caloric diet [12%/64% of energy as fat/carbohydrate; 15.48 kJ/g (3.7 kcal/g)]. Instead, the high-fat diets containing low- and medium-carbohydrate induced significantly higher BMI and percentage adiposity than the control diet. However, the authors [8] did not comment upon the fact that the high-fat and medium-carbohydrate diet [53%/30% of energy as fat/carbohydrate; 19.66 kJ/g (4.7 kcal/g)] also contained 7–8% less metabolizable energy content in the form of protein compared with the other diets, possibly confounding the conclusions. In fact, population studies have shown that a lower content of protein in the diet may not be favourable in terms of trying to maintain a thinner waist; instead, high-energy intake from protein predicts a decrease in abdominal fat [9]. Also, subjects eating a diet containing refined grains and processed foods have a much larger increase in waist circumference than those eating carbohydrates rich in fibre and whole grains [9]. Furthermore, fat-rich diets can acutely induce insulin resistance, especially in subjects with already low adiponectin levels [10]. Thus it is possible that the restriction of dietary fat and a diet high in carbohydrates might be particularly effective in subjects with low adiponectin levels, such as individuals with obesity and Type 2 diabetes. The high-fat diets in the study by Sinitskaya et al. [8] in combination with carbohydrates and low-protein content may, in part, give rise to an unhealthy diet, highlighting the significance of macronutrient composition, rather than merely the caloric content, in high-fat foods.

In the current dietary recommendations for people with Type 2 diabetes, there is flexibility in the proportion of energy derived from monounsaturated fats and carbohydrate [2,3]. Provided that energy intake is controlled, the use of monounsaturated fat instead of carbohydrate as a replacement for saturated fat may cause an increase, as opposed to a decrease, in HDL (high-density lipoprotein)-cholesterol levels, which is of particular benefit in Type 2 diabetes and abdominal obesity. Thus monounsaturated fats are promoted as the main source of dietary fat because of their lower susceptibility to lipid peroxidation and consequent lower atherogenic potential [11]. The rationale for modifying fat distribution and reducing weight is based on an expected improvement in insulin sensitivity, β-cell function and insulin-sensitizing factors [12]. Adiponectin, which is exclusively produced and secreted from the adipocyte, has putative antiatherogenic properties and appears to ameliorate insulin resistance in both muscle and liver [10,12]. This protein has now been extensively explored, and it is possible that a low plasma adiponectin concentration may be a convenient marker for identifying subjects with the metabolic syndrome who may progress to a prediabetic state when consuming an unhealthy diet. Ways of preventing severe obesity, especially in childhood, by providing healthy dietary recommendations for individuals at risk, and also the role of calorically sweetened soft drinks and the contribution of increased total intake of caloric sweeteners to the present obesity epidemic need to be subjected to intense scrutiny.

REFERENCES


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