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Caloric restriction improves health-related quality of life in healthy normal weight and overweight individuals

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Context

Studies have demonstrated that caloric restriction (CR) increases longevity in animals and also decreases the risk of diabetes, cardiovascular disease and cancer in humans without obesity.^{1, 2} It is hypothesised that these favourable CR effects may be related to a reduction in metabolism, reduced core temperature and lowered triiodothyronine (T₃).³ While it is unlikely that studies will ascertain whether CR extends life, intermediate length studies may be able to determine the safety, tolerability and feasibility of CR and its effects on chronic disease development and biomarkers correlated with longevity.² This study aimed to examine the sustained effects of a 25% CR on health-related quality of life (QOL) in individuals without obesity.

Methods

The CALERIE 2 (Comprehensive Assessment of the Long-term Effects of Reducing Intake of Energy Phase 2) study was a 2-year parallel-group multisite randomised clinical trial comparing a 25% CR with habitual energy intake on an ad libitum (AL) basis in adults. Participants were healthy adult men and women, aged 20–50 with a body mass index (BMI) range of 22–28 kg/m². Self-reported questionnaires which employed several validated instruments were administered to measure mood, QOL, stress, sleep and sexual function. Counselling was a key element of the intervention, in which 50 sessions, individual and group, were conducted.

Findings

The 218 participants who completed the study were predominantly white women (70%), with an average BMI of 25 kg/m². The goal of a 25% CR was not achieved and decreased from 15.2% to 11.9% at months 12 and 24, respectively. This led to a 7.6 kg (10.4% body

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weight) loss for the CR group compared with no significant weight loss (0.4 kg) in the AL group at 24 months.

The CR group experienced an improvement in mood (Beck Depression Inventory-II: between-group differences (BGD)) (−0.76, 95% CI −1.41 to −0.11), tension (Profile of Mood States BGD) (−0.79, 95% CI −1.38 to −0.19), improved general health (BGD 6.45, 95% CI 3.93 to 8.98), sexual function (BGD 1.06, 95% CI 0.11 to 2.01) and sleep duration (BGD −0.26, 95% CI −0.49 to −0.02) from baseline to month 24. Among participants who were overweight, the AL group had worsening depression scores compared with the CR group (estimated change (SE): 0.92 (0.34) vs −0.30 (0.26)).

Commentary

The CALERIE 2 study is the first study to demonstrate that sustained CR is tolerable, with mild improvements in health-related QOL in individuals without obesity. Although the study population, which included a small sample of healthy, highly motivated population with an average BMI of 25 kg/m², may limit its generalisability, this study does highlight the difficulty in achieving sustained CR and weight loss. Despite more than 50 possible individual and group counselling sessions, the degree of CR for most of the study was a mere 10%, or <250 kcal/day. Participants reached the highest CR (19.5%) in the first 6 months, when the interventions were most intense.

Although weight loss results in improvement of health-related QOL in those who are overweight and have obesity,⁴ the conclusions of this study are less clear as the authors did not address whether the effects on health-related QOL were mediated by the weight loss or by CR. Depression scores were worse in the AL group compared with the CR group only in the overweight cohort, suggesting baseline weight may influence results. In addition, the improvement in the sex hormone-binding globulin, which decreases with obesity, in the CR group, could be explained by the degree of weight loss.

Furthermore, each person, regardless of his or her BMI, has a unique biological adiposity 'set point'; therefore, an individual's response to CR may inherently vary greatly.⁵

Implications for practice

Whether to focus on CR, and not the macronutrient content of the diet, is at the heart of the current controversy in the treatment of obesity and to optimise health. One might conclude from this study that we all should modify our diet, regardless of our health or weight status. But are we sure that a caloric reduction of <250 calories/day, the equivalent of a half of a bagel or a small handful of chips, is a worthwhile undertaking? Or, should we should steer away from our obsession from calorie counting and focus instead on the quality of the food that we eat?

We do not know what degree of CR is needed to achieve improvements in health-related QOL, but we do know it requires an extraordinary amount of support. Therefore, the incentive to offer this intervention to a low-risk, normal or overweight individual is lacking and likely not sustainable in practice.

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