

Symposium on 'Dietary management of disease'

Session 3 (Joint with the British Dietetic Association): Management of obesity Weight-loss interventions in the treatment of obesity

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Treatments to induce weight loss for the obese patient centre on the achievement of negative energy balance. This objective can theoretically be attained by interventions designed to achieve a reduction in energy intake and/or an increase in energy expenditure. Such 'lifestyle interventions' usually comprise one or more of the following strategies: dietary modification; behaviour change; increases in physical activity. These interventions are advocated as first treatment steps in algorithms recommended by current clinical obesity guidelines. Medication and surgical treatments are potentially available to those unable to implement 'lifestyle interventions' effectively by achieving losses of between 5 kg and 10 kg. It is accepted that the minimum of 5% weight loss is required to achieve clinically-meaningful benefits. Dietary treatments differ widely. Successful weight loss is most often associated with quantification of energy intake rather than macronutrient composition. Most dietary intervention studies secure a weight loss of between 5 kg and 10 kg after intervention for 6 months, with gradual weight regain at 1 year where weight changes are 3–4 kg below the starting weight. Some dietary interventions when evaluated at 2 and 4 years post intervention report the effects of weight maintenance rather than weight loss. Specific anti-obesity medications are effective adjuncts to weight loss, in most cases doubling the weight loss of those given dietary advice only. Greater physical activity alone increases energy expenditure by insufficient amounts to facilitate clinically-important weight losses, but is useful for weight maintenance. Weight losses of between half and three-quarters of excess body weight are seen at 10 years post intervention with bariatric surgery, making this arguably the most effective weight-loss treatment.

Obesity: Weight-loss interventions: Lifestyle interventions: Anti-obesity medication: Surgical treatments

Dietary approaches

Dietary approaches for weight loss usually focus on two elements, a reduction in energy intake and/or changes in dietary composition. Historically, many approaches have offered the same energy prescription to all participants irrespective of their BMI. This approach has therefore imposed very different daily energy deficits (ED) and theoretically different weight losses among study participants. The first formal comparison of an individualised ED approach was made in a small non-randomised audit

in which participants were either asked to consume 2512 kJ (600 kcal) below their estimated daily energy requirements or offered usual care (5024 kJ (1200 kcal)/d)⁽¹⁾. Preliminary findings suggested a benefit for the individualised approach, which has been confirmed by a subsequent study of overweight and obese men, which was located in a work-site setting⁽²⁾. The study followed a randomised controlled design in which participants were randomised to either an individualised ED diet that was 2512 kJ (600 kcal) below estimated daily requirements or a generalised low-energy diet providing 6279 kJ (1500 kcal) daily. No

Abbreviations: ED, energy deficit, VLCD, very-low-energy diets.

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significant difference in mean weight loss at 12 weeks was found between the dietary groups (ED diet group 4.3 (SD 3.4) kg v. low-energy-diet group 5.0 (SD 3.5) kg). However, attrition was found to be significantly less in the individualised approach, with four withdrawing from the ED diet group and fifteen subjects withdrawing from the low-energy-diet group ($P = 0.004$). Arguably, compliance with the dietary regimen was better in the ED diet group whose weight loss was closer to the predicted weight loss. The National Institute for Health and Clinical Excellence clinical guideline⁽³⁾ supports the use of such an approach with the statement 'Diets that have a 600 kcal/d deficit (that is, they contain 600 kcal less than the person needs to stay the same weight) or that reduced calories by lowering the fat content (low-fat diets), in combination with expert support and intensive follow-up, are recommended for sustainable weight loss'.

Differing macronutrient composition

Programmes for weight loss that are based on dietary advice can comprise a range of different types of advice and promise widely differing outcomes. Guarding against such dietary interventions that are extreme and nutritionally unbalanced or advocate a diet composition that is contrary to the Food Standards Agency's eatwell plate⁽⁴⁾ are important issues for health professionals to consider when advising on a particular dietary approach. Nutritionally-unbalanced approaches are most likely to be unsustainable in achieving long-term weight control. A low-carbohydrate high-protein approach (e.g. the Atkins diet⁽⁵⁾), which has been popular over the last decade, has been reported to show a weight loss at 12 weeks that is superior to the more-accepted low-fat high-carbohydrate approach⁽⁶⁾. At 1 year post intervention these differences in weight change are no longer evident, limiting the justification for the use of such an approach. A comprehensive study has recently evaluated four different approaches that differed in the percentages of energy provided by fat, protein and carbohydrate⁽⁷⁾. The four diets examined in the study comprised (% energy from fat, protein and carbohydrates respectively): 20, 15, 65; 20, 25, 55; 40, 15, 45; 40, 25, 35. All participants were advised to consume an individualised energy intake (ED of 3142 kJ (750 kcal) below their estimated daily requirements). The researchers tried to minimise other differences between groups and, for example, suggested very similar foods to be included across the four diets. The 2-year study also included group and individual instruction. After 6 months the mean weight loss across diets was reported to be 6 kg (7% initial body weight) and at 2 years 80% of participants completed the trial and the average weight loss was reported to be 4 kg. This important and conclusive study suggests only a small role for different macronutrient compositions within dietary treatments for intentional weight loss.

Very-low-energy diets

Very-low-energy diets (VLCD), defined as providing 3347 kJ (800 kcal)/d⁽⁸⁾, are one approach that has been

successfully used to achieve intentional weight loss over a short period of time. Although not a new approach, VLCD first came to prominence in the 1980s. They have recently become popular once more, probably as a result of their use and promotion by media personalities. In most cases such treatments are available over the counter in the form of drinks and some pre-prepared snacks. A recent systematic review has considered whether the VLCD approach has value beyond such short-term weight loss⁽⁹⁾. The meta-analysis of randomised trials compared the long-term efficacy of VLCD with that of low-energy diets defined as providing ≥ 3190 kJ (1000 kcal)/d. The mean weight loss achieved over an average duration of approximately 3 months by participants of the VLCD and low-energy-diet treatments was reported to be 16.1 (SD 1.6) % and 9.7 (SD 2.4) % respectively; the mean difference of 6.4 (SD 2.7) % being highly significant ($P = 0.0001$) and at a level most likely to be of clinical importance. Perhaps predictably, the VLCD approach was found to be less effective over the longer term, when compliance with such a regimen was shown to wane. The duration of follow-up for the studies included in the analysis was found to vary considerably, ranging from 1 year to 5 years, with the mean follow-up being approximately 1 year. The mean weight loss (%) for the two treatments was reported to be 6.0 (SD 3.2) for VLCD and 5.0 (SD 4.0) for low-energy diets, with a non-significant between-group difference of 1.3 (SD 5.1). Perhaps most telling is the weight regain according to group, with patients on the VLCD and low-energy diets regaining 62% and 41% of the lost weight respectively. It is concluded that the long-term use of VLCD diets (for >16 weeks) cannot be justified in terms of improved weight losses and higher costs of specific products⁽⁹⁾. However, VLCD do have a role in weight management for particular patients, with the most obvious group being those who are obese and awaiting surgery.

Commercial weight-management programmes

A variety of different weight-management programmes exist and many operate internationally. For more than approximately two decades there has been reluctance by such business operations to divulge the results of their programmes. More recently, there have been various published evaluations of such weight-management programmes. An examination of the results of a group-delivered intervention aimed at men has shown a short-term (8 weeks) weight loss of 5% in 90% of those completing the 8-week programme whereas at week 24 of treatment $\geq 10\%$ weight loss was achieved in 69% of those still enrolled⁽¹⁰⁾. Details of attrition rates were not reported. The most comprehensive study in this area is probably a randomised study design that has evaluated the Atkins, Zone, Ornish and Weight Watchers popular diets⁽¹¹⁾. Participants were randomly allocated to each of the popular diets, of which the Ornish diet (a vegetarian diet containing <10% energy from fat) and the Atkins (<20 g carbohydrate/d) were found to be the most difficult for participants to accept, with a 50% attrition rate. Interestingly, at 1 year weight losses of 2–3 kg were found to

be similar across all groups, suggesting few differences in dietary compliance across the groups.

Internet-delivered interventions

Given the ever-increasing numbers of individuals able to access the internet, the possibility to deliver weight-management programmes via this route appears attractive. The obvious advantages include flexibility and cost, but early reports of the benefits of this approach differ widely in their findings. A UK study located with the National Health Service attempted to deliver a weight-management programme that incorporated advice on diet and physical activity and behavioural therapy and provided some tools to support and sustain behaviour change; some advice was personalised⁽¹²⁾. The intervention was compared with usual care. Mean weight loss for both groups was found to be low at 1.3 kg (usual care) and 1.9 kg (internet group), with no advantage shown for the internet approach above usual care when judged in terms of weight loss. Furthermore, the attrition rates are high at >50% for the internet group and one-third for usual care. Two other studies have however provided some more encouraging preliminary findings following the use of internet-delivered weight-management programmes. In one study a weight-management programme was delivered to all employees of a large firm, resulting in a small weight loss (<2% body weight) and also an increase in the number of employees in the normal-weight category (from 27.0% to 29.8%)⁽¹³⁾. In this uncontrolled evaluation a positive relationship was found between increased web-site usage and increased weight loss, albeit with a very high attrition rate (79%) at 6 months. Another study has explored the effectiveness of two different internet-delivered approaches: an online therapist-led structured behavioural weight-loss website (VTrim[®]; University of Vermont, Burlington, VA, USA); a self-help commercially-available website (eDiets.com; eDiets.com Inc., Fort Lauderdale, FL, USA)⁽¹⁴⁾. The VTrim[®] group was found to have lost significantly more weight than the eDiets.com group at 6 months (8.3 (SD 7.9) kg v. 4.1 (SD 6.2) kg; $P = 0.004$) and to have maintained a greater loss at 12 months (7.8 (SD 7.5) kg v. 3.4 (SD 5.8) kg; $P = 0.002$). Attrition rates were reported to be 35% for the VTrim[®] group and 22% for the eDiets.com group. To date, internet-based studies appear to have only a limited effectiveness at achieving clinically-important weight losses and report very high attrition rates. However, further research in the form of a randomised controlled trial examining the effect of a weight-management intervention may still be justified.

Physical activity for weight loss

The maintenance of increased physical activity in those individuals with a raised BMI is a difficult challenge. Current guidelines from the American Association of Sports Medicine report that in order to lose or maintain weight loss 60–90 min physical activity daily may be necessary⁽¹⁵⁾. The best evidence for the role of physical activity in weight loss has been reported by the National

Institute for Health and Clinical Excellence⁽³⁾; physical activity for a minimum of 45 min three times weekly together with dietary change in the form of an individualised ED diet (2510 kJ (600 kcal) below the estimated daily requirement) leads to an additional weight loss of 1.5 kg compared with ED diet alone. Physical activity may be more important in maintaining weight losses rather than in increasing weight loss.

Psychological and behavioural interventions for weight loss

Can psychological and behavioural therapy interventions improve dietary compliance? This question is relevant in terms of increasing weight loss by improving compliance to advice. Behavioural and psychological interventions are diverse but can broadly be divided into: interventions concerned with self monitoring of behaviour and progress; identification of and avoidance of triggers that prompt unwanted behaviour, in particular unplanned eating (stimulus control); modification of unhelpful thoughts and thinking patterns into helpful ones (cognitive restructuring). Particular behaviours that have been focused on include goal setting, problem solving, assertiveness training, securing social support and a slowing of the rate of eating. Changes in behaviour in line with such strategies can lead to a reduction in energy intake or an increase in energy expenditure, ultimately leading to weight loss. To determine the effectiveness of such strategies the effects of psychological interventions in overweight or obesity as a means of achieving sustained weight loss have been examined in a meta-analysis⁽¹⁶⁾. Most studies included in this analysis assessed behavioural and cognitive-behavioural approaches for weight reduction. It was found that when delivered as the only intervention, without other lifestyle approaches, behaviour therapy leads to a significantly greater weight reduction when compared with placebo (weight mean difference -2.5 (95% CI -1.7 , -3.3) kg). More frequently, when cognitive-behaviour therapy is combined with a diet and exercise intervention weight loss is increased compared with diet and exercise alone (weight mean difference -4.9 (95% CI -7.3 , -2.4) kg). Finally, increasing the intensity of the behavioural intervention significantly increases weight reduction (weight mean difference -2.3 (95% CI -1.4 , -3.3) kg).

As well as specific general psychological approaches to control weight a recent systematic review has examined the use of financial incentives as a tool for encouraging lifestyle changes that impact on body weight. No effect from financial incentives in influencing weight loss was seen even at 18 months⁽¹⁷⁾.

The evidence from these two systematic reviews confirms that psychological interventions (but not financial incentives) may benefit overweight or obese individuals who wish to reduce their body weight.

Pharmacological treatments

There are two medications that are currently licensed for obesity treatment: sibutramine, which is a re-uptake

inhibitor of both serotonin and noradrenaline and affects a feeling of fullness; orlistat, which reduces the absorption of dietary fat by inhibiting pancreatic lipases⁽³⁾. The National Institute for Health and Clinical Excellence guideline has reviewed the effects of these medications on body weight⁽³⁾. At 1 year sibutramine has been shown to achieve a weight loss in excess of ten times the control treatment (diet alone; intervention 5.3 kg v. control 0.45 kg). Similar effects on body weight have been seen with orlistat, with a mean weight loss of 5.4 kg with medication compared with 2.7 kg for the control treatment (diet alone)⁽³⁾. As dietary advice is advocated with both medications, they require patient input and compliance aside from taking their medication (particularly important for orlistat, as fat mal-absorption can occur on orlistat therapy when compliance with dietary advice is poor and excess fat is consumed). Orlistat is now available over the counter, but at a dose half that examined in clinical trials (60 mg).

Surgical interventions

For those who are unable to implement lifestyle advice to control their body weight surgical treatment may be the only effective treatment. In all cases surgical treatments can be suitable for patients for whom all other options, including medication, have been unsuccessful. Evidence on the value of obesity surgery has come from the large long-term Swedish Obesity Study⁽¹⁸⁾. The study data reported after 10 years have shown a weight change of $\pm 2\%$ for control subjects compared with losses of between 14% and 25% body weight for the subjects in the three surgical groups (gastric bypass, vertical-banded gastroplasty and banding). Perhaps surprisingly, mortality was reported to be higher in the subjects who received no surgical intervention. A review has suggested that overall medication costs remain the same for those patients in receipt of surgical treatments compared with an obese reference population who were not treated surgically⁽¹⁹⁾. Unlike the Swedish Obesity Study in which participants were offered a choice of treatment in a controlled study⁽¹⁸⁾, the participants in a more recent study were randomly assigned either to surgery (adjustable gastric banding) or to conventional treatment for diabetes with a 2-year follow-up. Weight losses of 21% and 5% and remission of type 2 diabetes of 73% and 13% were reported for the intervention and control groups respectively. Surgical treatments are important for those at the very upper end of the BMI scale.

Conclusion

Treatments to induce weight loss aim to achieve negative energy balance. Interventions to achieve such a reduction in energy intake and/or an increase in energy expenditure are varied. Successful weight loss has been most associated with clear quantification of energy intake. In contrast, the influence of macronutrient composition on weight loss has now been shown to be small. Approaches to increase physical activity and alter usual behaviours associated with weight gain do have value, as do specific anti-obesity medications that in most cases double weight loss. Bariatric

surgery, which achieves weight losses of between half and three-quarters of excess body weight, is arguably the most effective weight-loss treatment. In addition to approaches to induce weight loss effective strategies to maintain weight losses are required.

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