

Diabetes and lifestyle – is diet and physical activity the answer?

The association between the global epidemic of obesity and type 2 diabetes is now well recognised (Abdullah et al, 2010; Colagiuri, 2010), but debate about the cause of obesity still rages. Some experts argue for the role of genetics (O’Rahilly and Farooqi, 2008; Frayling, 2012), some believe it is a matter of willpower and personal responsibility (ten Have et al, 2011) and others think that the environment is largely to blame (Wilding, 2012). The truth, of course, is that obesity is a multifactorial condition and that many factors play a part in its development. However, the doubling in the prevalence of obesity over the past 20 years (World Health Organization [WHO], 2013a) is unlikely to be due to genetic factors and is more likely to be caused by environmental factors, specifically increased availability of energy-dense foods and a reduction in physical activity as stated in the 2007 Foresight report (Butland et al, 2007). It is widely recognised that an unhealthy diet and physical inactivity contribute to obesity and type 2 diabetes, but what part do they have to play in combating these twin epidemics?

There is a great deal of cynicism about the effectiveness of diet and physical activity in preventing and treating obesity, with many experts acknowledging the role of lifestyle but expressing doubt about long-term weight maintenance after successful weight loss (Sumithran and Proietto, 2013). There is also much debate about the most effective treatment of obesity and diabetes, with various therapies suggested by geneticists, physicians, surgeons and dietitians. Although the role of lifestyle appears to be increasingly marginalised, it is worth evaluating all options available at present.

Treating diabetes

Targeting the genes

We could take the approach of the geneticists and invest more in understanding the contribution of genes to energy balance, and hope that this will lead to the development of a range of safe, effective

and affordable drugs to treat obesity (O’Rahilly and Farooqi, 2008). This may well occur at some time in the future, although there has been some cynicism expressed about the likelihood of discovering genes that have a significant effect on body weight as a large number of genetic loci have already been identified, but each with a relatively modest effect size (Ng and Bowden, 2013). The *FTO* gene (fat mass and obesity-associated protein [also known as alpha-ketoglutarate-dependent dioxygenase]), for example, which is the gene most strongly associated with obesity, is responsible for only a 0.39 kg/m² increase in BMI in the general population (Speliotes et al, 2010).

Pharmaceutical treatment

Pharmaceutical treatment of obesity has a somewhat chequered history with many agents withdrawn over the years due to serious side effects. Orlistat is the only medication licensed for obesity treatment in the UK, and it has a relatively modest effect.

A recent systematic review reported that orlistat produces an additional 3% weight loss compared to placebo, and that 35–73% of participants taking part in studies achieve clinically meaningful weight loss of >5% (Yanovski and Yanovski, 2014). Although there are other pharmaceutical agents in the pipeline, and these may be more effective than those presently available, they have yet to come to market.

Bariatric surgery

There is no doubt that bariatric surgery has an immediate and significant effect on both glycaemic control and body weight, and that it is an effective treatment for those with diabetes (Tham et al, 2014). A meta-analysis comparing bariatric surgery with conventional therapy in people with diabetes reported a weighted mean difference (WMD) in BMI of -8.3 kg/m² (95% confidence interval [CI] -7.0 kg/m², -9.6 kg/m²; $P<0.001$) and HbA_{1c} WMD of -1.1% (12 mmol/mol; 95% CI -0.6% [6.6 mmol/mol], -1.6% [17.5 mmol/mol];



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$P < 0.001$), with remission rates reported as 63.5% for those receiving surgery compared to 15.6% in the conventionally treated group over mean 17.3 ± 5.7 month follow-up (Ribaric et al, 2014).

In both the US and the UK, there is great enthusiasm for bariatric surgery as a treatment for diabetes: in the US in 2012, the Cleveland Clinic announced that bariatric surgery for diabetes led their list of top ten medical innovations for 2013 (Cleveland Clinic, 2012), and, in the UK, NICE are consulting about changes to increase surgery rates for those with recently diagnosed type 2 diabetes (NICE, 2014). The new NICE guidelines recommend that bariatric assessment should be offered to all individuals with BMI >35 kg/m², and should be “considered” for those with BMI of 30–34.9 kg/m². However, bariatric surgery cannot be viewed as the panacea for diabetes as it is not suitable for everyone, is associated with complication rates of 10–17% and re-operation rates of 7% (Chang et al, 2014), and has resource implications. In addition, there are strong moral objections to the surgical treatment of obesity from many lay people, the media, healthcare professionals and politicians, and, although bariatric surgery may be effective on an individual level, it has no impact on the environmental causes of obesity (Saarni et al, 2011).

Diet and physical activity

Despite the cynicism for the efficacy of diet and physical activity in the treatment of obesity, the common misconception that those individuals who successfully lose weight will regain all lost weight over the longer-term is simply not true. A meta-analysis from the US has reported that the average individual maintained a weight loss of >3 kg ($>3\%$) 5 years after completing a structured weight loss program (Anderson et al, 2001), and a more recent meta-analysis has reported that most behavioural weight management programmes are effective and achieve WMD -2.8 kg (95% CI -3.6 kg, -2.1 kg; $P < 0.001$) at 12 months follow-up (Hartmann-Boyce et al, 2014). Although the clinical meaningfulness of a weight loss of $\sim 3\%$ is open to debate, it is important to remember that those with type 2 diabetes gain weight at approximately 0.5 kg/year (Morgan et al, 2012), so maintenance of weight loss should accrue further benefit over time.

Long-term lifestyle weight loss studies conducted specifically in those with type 2 diabetes are few and far between, and the reported negative outcome on cardiovascular mortality and morbidity from the Look AHEAD trial (Look AHEAD Research Group, 2013) has provided fuel for the cynics who suggest that there is little to be gained from weight loss achieved by diet and physical activity. Although this trial showed no beneficial effect of lifestyle intervention on cardiovascular morbidity and mortality, those in the intensive lifestyle intervention group maintained a 6% weight loss after median 9.6 years follow-up. This weight loss was accompanied by many important benefits, including improvements in glycemic control, physical functioning and quality of life, and reductions in sleep apnoea, urinary incontinence and depression symptoms (Wing, 2014). In addition, those in the intervention group required less medication for both diabetes and cardiovascular risk management.

A frequent criticism of trials of lifestyle programmes for diabetes and obesity is their cost and implications for clinical care. Nearly all published studies evaluate the cost effectiveness (CE) of a single intervention, and in most real-world settings, people with diabetes receive multiple interventions simultaneously (Li et al, 2010). Disentangling the CE of lifestyle and pharmaceutical interventions in established diabetes is challenging, although there is clear evidence of the CE of lifestyle interventions in diabetes prevention (Gillies et al, 2008).

Discussion

So, in the face of controversies about the effectiveness of diet and physical activity in the treatment of diabetes, should we accept defeat and refer everyone for bariatric surgery? It is certainly true that weight management in society today is extremely challenging, and that our environment conspires against us, but it is interesting that although we are happy to blame our society, we appear to be unwilling to effect the environmental changes that would support a healthier diet and increased physical activity. This is partly political; most Western democracies support the principles of commercial freedom and personal responsibility and believe that it is incumbent on the individual to make personal choices about diet and activity in

order to maintain a healthy weight (Department of Health, 2004; Brownell et al, 2010). The medicalisation of obesity also plays a part; obesity was officially classified as a disease by the WHO in 1990, paving the way for therapeutic interventions that focused on the individual (Weight Management Centre, 2010). This medical model of obesity largely ignores the environmental aspects of weight management and explains the challenges people face with weight regain once they have completed a weight management programme.

The answer lies in an integrated approach. Those with diabetes will need effective treatment, but this should be supported by wider interventions targeting diet and physical activity, and which encompass policies and programmes, social marketing, health education and environmental change in order to create a healthier environment for the whole population (Novak and Brownell, 2012). Interventions targeting the environment are designed to improve the health of all, rather than those who are at highest risk of obesity and diabetes, and the available evidence suggests that an effective response involves all stakeholders at every level of society from international bodies, through national, regional and local government to the individual (WHO, 2013b). Numerous stakeholders are involved including individuals, families, local communities, governmental and non-governmental organisations, religious institutions, academic institutions, health and education services, civil society, the media and the private sector and industry. Prevention and control of obesity and diabetes is likely to have the greatest impact by addressing behavioural risk factors at the whole community or population level in a way that is culturally appropriate and where all sectors are working in partnership. ■

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