

# Diet, Obesity and Diabetes



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Received: 📅 May 22, 2018; Published: 📅 May 29, 2018

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## Abstract

Obesity and diabetes have become a very important global problem. In developed countries the incidence of both seems to have stabilised probably due to greater awareness and better education. Weight reduction in obese subjects with diabetes can be achieved by bariatric surgery and often results in remission of diabetes, hypertension and dyslipidaemia but at a cost of mortality and morbidity. Dietary intervention until recently has been relatively unsuccessful. Recently however, structured, low calorie diet with nurse/dietician support in a general practice setting has shown promise. Successful drug therapy to aid weight reduction remains elusive.

## Opinion

There is a national awareness of the increasing prevalence of obesity and type 2 diabetes. The good news is that the rising trends in children's BMI has plateaued in high income countries such as ours but it is sad that they have accelerated in parts of Asia and other regions [1]. Early development of obesity has been shown to predict obesity in adulthood especially for children who are severely obese [2]. An interesting recent article [3] examined overweight children at the age of 7, at 13, and early adulthood. The authors found that at any of these 3 stages overweight was positively associated with risk of type 2 diabetes. Men who had had remission of overweight before the age of 13 years, had a risk of having type 2 diabetes diagnosed at 30 to 60 years of age that was similar to that of men who had never been overweight. Thus there would seem to have been a window of opportunity for diabetes prevention between the age of 7 and 13. Type 2 Diabetes, hypertension and dyslipidaemia, can of course be reversed in many cases by weight reduction. The most impressive results have been obtained through Bariatric Surgery. Weight and metabolic outcomes 12 years after gastric bypass was reported by Adams et al. [4]. This was an observational prospective study of roux en y gastric bypass. Mean percentage body weight reduction in the surgery group was 45kg (mean % change in body weight was minus 35%) as compared to a reduction of minus 2% in the non surgery group. Diabetes remitted in 75% of the patients at 2 years and in 55% at 12 years. Hypertension and dyslipidaemia also remitted significantly more in the surgery group than in the non surgery group. The 12 year incidence of diabetes was 3% in the surgery

group and 26% in the non surgery group. Alas there were 7 deaths by suicide, 5 in the surgery group and 2 in the non-surgery group who went on later to have bariatric surgery. This study and many others demonstrate the success of surgery in causing important weight loss and in reversing important cardiovascular risk factors such as hypertension, diabetes and dyslipidaemia. The morbidity and mortality make physicians and patients wary of the procedure and opt instead for calorie restriction, sometimes with drug therapy such as GLP1 agonists or appetite suppressants. Unfortunately the results only rarely match those of bariatric surgery.

In 2011 Lim et al. [5] published their seminal paper supporting the hypothesis that type 2 diabetes is caused specifically by fat in the liver and pancreas. They showed that on a negative energy balance with a 600-700 kcal/day diet. Liver insulin resistance and fat content normalised within 7 days with first phase insulin response and pancreatic fat content, normalising over 8 weeks. The underlying changes were shown to remain stable over the next 6 months of isocaloric eating. Unfortunately the popularity of this wonderfully successful treatment had not gained widespread acceptance even though it is virtually free from serious adverse events and mortality. However, it seems as if acceptance will dramatically increase in the next few years following the next important paper from Roy Taylors group [6]. The aim of their study was to assess whether intensive weight management in primary care would achieve remission of type 2 diabetes. Forty nine primary care practices in Scotland and the Tyneside region in England were

involved. The patients recruited were between 25 and 60 years of age, who had been diagnosed with type 2 diabetes within the past 6 years, had a BMI of 27-45kg/m<sup>2</sup> and were not receiving insulin. The intervention comprised with drawl of antihypertensive and anti diabetic drugs. Total diet replacement 825-853kcal/day formula diet for 3-5 months, stepped up food reintroduction (2-8 weeks) and structured support for long term weight loss maintenance. The study was run by local nurses or dieticians rather than by specialist staff. Fifteen hundred patients were invited by mail. 800 did not reply and more than 200 refused and 306 individuals agreed to take part in the trial. Only 8% lost to follow up in the 12 months. 86% in the intervention group and 99% in the control group attended the 12 month assessment. At 12 months weight loss of 15kg (24%) or more was found in 24% of participants. Diabetes remission was achieved in 68 (46%) of the participants and in the intervention group and 6 (4%) in the control group. 86% the 36 participant who lost 15kg or more achieved diabetes remission. 2 serious adverse events were seen in one patient (biliary colic and abdominal pain). They were deemed potentially related to the intervention. This trial demonstrates a feasible method of treating obesity at very little cost in a community setting.

There are of course many other methods that have some success in achieving weight reduction through calorie restriction but they are either poorly researched and/or have only very limited success. Intermittent food deprivation is a method which has had some popularity. Intermittent energy restriction is a potent stimulus for ketosis. In mice alternate day food deprivation has been shown to modulate molecular pathways involved in mitochondrial biogenesis, metabolism and cellular plasticity. These results lead to increased metabolic efficiency and endurance capacity [7]. Intermittent fasting in short term studies has been shown to reduce LDL cholesterol and increase HDL. These studies however are observational and lack detailed information about diet [8]. A recent review of weight loss strategies in people with and without diabetes came to the conclusion that intermittent fasting has a benefit beyond the weight loss produced and does not spare lean mass compared with daily energy restriction [9]. Another recent review also came to the conclusion that intermittent energy restriction was no better than continuous energy restriction for short term weight loss in obese adults. The authors suggest that although intermittent energy restriction was shown to be more effective than no treatment, this should be interpreted cautiously due to the small number of studies [10].

A recent study examined bariatric surgery vs. medical treatment with long-term medical complications and obesity related co-morbidities. The surgically treated patients had a greater likelihood of remission of hypertension and other co-morbidities including diabetes but a greater risk of new onset depression and other medical complications. The authors conclude that there should be careful consideration of the medical complications of surgery in their decision making [11]. The difficulties involved in

treating obesity cannot be underestimated. Drug treatment with drugs such as GLP1 agonists have not been impressive. A useful review on treatment options available for obesity has recently been published [12].

Many studies have suggested that different methods of monitoring of weight loss programmes are important for the limited success of these programmes. In a 12 month programme Jospe et al. [13] examined in 250 patients to see whether there would be a difference in outcome between brief monthly individual consults, daily monitoring of weight, self monitoring of diet using My Fitness Pal, self monitoring of hunger or control. 68.4% of the study group of 250 adults with BMI 27 or greater completed the study. The study concluded that adding a monitoring strategy to diet and exercise advice did not further increase weight loss. Bupropion is a drug used in addiction. It stimulates hypothalamic pro-opiomelanocortin (POMC) neurones and reduces food intake and increases energy expenditure. Naloxone blocks POMC auto inhibition. The combination has been used to treat obesity. Arovian et al [14] examined the effect of this combination and found that the combination reduced weight by 6, 4% as compared to a weight loss of 1.2% in the placebo arm. To date drug therapy for obesity treatment has been very disappointing. GLP1 agonists which delay gastric emptying as well as having a central effect on appetite. Three years of liraglutide versus placebo in patients with pre-diabetes and BMI of at least 30 has been reported [15-17]. More than 2000 patients were recruited. Only 50% of the patients completed the study. The subjects on Liraglutide lost 6.1% of body weight compared to the controls that lost 1.9%. A not very impressive treatment alas for obese patients.

In conclusion prevention of obesity, rather than treatment when present, would seem the way forward. The recent evidence is that the rising prevalence of obesity has been curbed in developed countries as has the rising prevalence of diabetes. It is likely that Government intervention with strategies to improve education curb advertising of unhealthy foods and tax reforms to decrease the cost of 'Healthy food' will succeed. Once obesity occurs bariatric surgery is the only very effective treatment but the mortality and morbidity means that patients have to be very carefully chosen. Very low calorie diets with supervision in a General Practice environment with minimal but regular support has been shown to be feasible.

## References

1. NCD Risk Factor Collaboration (NCD-RisC) (2017) Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. *Lancet* 390(10113): 2627-2642.
2. Ward ZJ, Long MW, Resch SC, Giles CM, Cradock AL, et al. (2017) Simulation of Growth Trajectories of Childhood Obesity into Adulthood. *New Engl J med* 377(22): 2145-2153.
3. Bjerregaard LG, Jensen BW, Ångquist L, Osler M, Sørensen TIA, et al. (2018) Change in Overweight from Childhood to Early Adulthood and Risk of Type 2 Diabetes. *N Engl J Med* 378(14): 1302-1312.

4. Adams TD, Davidson LE, Litwin SE, Kim J, Kolotkin RL (2017) Weight and Metabolic Outcomes 12 Years after Gastric Bypass. *N Engl J Med* 377: 1143-1155.
5. Lim EL, Hollingsworth KG, Aribisala BS, Chen MJ, Mathers JC, et al. (2011) Reversal of type 2 diabetes: normalisation of beta cell function in association with decreased pancreas and liver triacylglycerol. *Diabetologia* 54(10): 2506-2514.
6. Lean ME, Leslie WS, Barnes AC, Brosnahan N, Thom G, et al. (2018) Primary care-led weight management for remission of type 2 diabetes (DiRECT): an open-label, cluster-randomised trial. *Lancet* 391(10120): 541-551.
7. Lean MEJ, Powrie JK, Anderson AS, Garthwaite PH (1990) Obesity, weight loss and prognosis in type 2 diabetes. *Diab Med* 7(3): 228-233.
8. Marosi K, Moeh K, Navas Enamorado I, Mitchell SJ, Zhang Y, et al. (2018) Metabolic and molecular framework for the enhancement of endurance by intermittent food deprivation. *FASEB J* fj201701378RR.
9. Santos HO, Macedo RCO (2018) Impact of intermittent fasting on the lipid profile: Assessment associated with diet and weight loss. *Clin Nutr ESPEN* 24: 14-21.
10. Clifton P (2017) Assessing the evidence for weight loss strategies in people with and without type 2 diabetes. *World J Diabetes* 8(10): 440-454.
11. Harris L, Hamilton S, Azevedo LB, Olajide J, De Brún C, et al. (2018) Intermittent fasting interventions for treatment of overweight and obesity in adults: a systematic review and meta-analysis. *JBIM Database System Rev Implement Rep* 16(2): 507-547.
12. Jakobsen GS, Småstuen MC, Sandbu R, Nordstrand N, Hofsø D, et al. (2018) Association of Bariatric Surgery vs Medical Obesity Treatment With Long-term Medical Complications and Obesity-Related Comorbidities. *JAMA* 319(3): 291-301.
13. Werd Al N, la Roux CW (2018) An Integrated view of treatment options available for obesity. *Obesity and Endocrinology* pp. 2-10.
14. Jospe MR, Roy M, Brown RC, Williams SM, Osborne HR, et al. (2017) The Effect of Different Types of Monitoring Strategies on Weight Loss: A Randomized Controlled Trial. *Obesity (Silver Spring)* 25(9): 1490-1498.
15. Apovian CM, Aronne L, Rubino D, Still C, Wyatt H, et al. (2013) A randomized, phase 3 trial of naltrexone SR/bupropion SR on weight and obesity-related risk factors (COR-II). *Obesity (Silver Spring)* 21(5): 935-943.
16. le Roux CW, Astrup A, Fujioka K, Greenway F, Lau DCW, et al. (2017) 3 years of liraglutide versus placebo for type 2 diabetes risk reduction and weight management in individuals with prediabetes: a randomised, double-blind trial. *Lancet* 389(10077): 1399-1409.
17. NCD Risk Factor Collaboration (NCD-RisC) (2017) Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. *Lancet* 390(10113): 2627-2642.



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DOI: [10.32474/ADO.2018.01.000105](https://doi.org/10.32474/ADO.2018.01.000105)



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