

PART 3: DIETARY AND LIFESTYLE FACTORS IN THE MANAGEMENT OF TYPE 2 DIABETES MELLITUS

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Abstract

The importance of weight management as an essential non-pharmacological intervention in the treatment of type 2 diabetes mellitus is considered. Recommendations are made for appropriate ways to manage weight and to measure that management.

Reference

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Introduction

The first two articles of this series considered why complementary medicine practitioners are in the vanguard of the fight against the rapid increase in the incidence of type 2 diabetes mellitus. Several key dietary measures to employ in this battle were examined^(1,2).

Despite the seemingly obvious importance that should be given to dietary considerations, the current Cochrane Review on the efficacy of dietary intervention in treating type 2 diabetes mellitus concludes that 'No high quality data on the efficacy of diet alone exists for treatment of type 2 diabetes mellitus'⁽³⁾.

So if diet alone is not adequate, can any non-pharmacological intervention assist the type 2 diabetic patient?

The answer lies in considering the risk factors for type 2 diabetes mellitus (see the summary in Part 1 of this series)⁽¹⁾. In particular, note these conclusions from some of the studies examined in this review:

Few risk factor-disease associations are stronger than the link between excess adiposity and Type 2⁽⁴⁾.

Overweight is by far the most important risk factor for type 2 diabetes. Almost 70—80% of type 2 diabetic patients are either overweight or obese; moreover, several long term prospective studies have shown a higher risk of diabetes with increasing body weight. ... In most studies the relationship between body weight and the risk of diabetes is continuous and graded⁽⁵⁾.

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Obesity and weight gain dramatically increase the risk (of developing type 2 diabetes), and physical inactivity further elevates the risk, independently of obesity⁽⁶⁾.

... achieving long-term weight management is essential to minimise diabetes-associated morbidity⁽⁷⁾.

The evidence is clear. Dietary measures implemented in isolation to only improve the glycaemic response, but which do not also address weight issues, will nearly certainly not result in substantial benefits for the type 2 diabetic or pre-diabetic patient.

As this third article in the series will show, the patient's weight needs to be suitably managed. In the next and concluding Part 4, the additional benefits of exercise, independent of any weight loss, in managing type 2 diabetes mellitus, will be discussed. It will be suggested that these two interventions are in fact vital, and must be employed in the non-pharmacological battle against type 2 diabetes mellitus.

Fat Distribution Patterns

In managing the weight of a type 2 diabetic or at risk patient, it is not just gross weight gain/loss that is important. The pattern of fat distribution is also important in identifying those patients at risk of developing type 2 diabetes⁽⁸⁾.

Men tend to add fat tissue in the upper body, especially in the abdomen. This is referred to as android pattern obesity. Women on the other hand tend to accumulate adipose tissue around their hips and thighs (gynoid pattern obesity), or in an android pattern. It is this android pattern abdominal obesity that is an important marker in both sexes of an increased risk for the development of type 2 diabetes^(8,9).

Why this is the case may be due to the fact that abdominal adipose tissue is more metabolically active. Additionally its close proximity to the liver may result in an increase of non-essential fatty acids being metabolised by the liver, consequently disturbing glucose oxidation and the extraction of

insulin via the liver. High levels of non-essential fatty acids may also impair pancreatic insulin secretion⁽⁵⁾.

Weight Measurement

Prior to looking at weight management, it is necessary to consider appropriate yet accessible methods to accurately gauge weight loss/gain and fat distribution pattern changes. Measurements commonly employed include the body mass index, waist circumference, and waist to hip ratio⁽¹⁰⁾.

Body Mass Index

The body mass index (BMI) is obtained by dividing weight (without clothes) in kilograms by the square of the height in metres⁽¹¹⁾. For example, a 1.8 metre tall person weighing 90 kilograms will have a BMI of 27.77 (90 divided by 1.8 squared).

A BMI of 18.5 to 24.9 is considered normal. A BMI in excess of 24.9 is considered to be the start of the unhealthy range⁽¹⁰⁾. The BMI is a simple measurement to obtain, and has been shown to have correlations with the incidence of type 2 diabetes. Despite this importance, the BMI remains 'an imperfect measure of total adiposity'⁽⁸⁾.

For example it is known that athletes with a high ratio of muscle to fat will often have a corresponding high BMI. These athletes do often weigh more relative to healthy weight non athletic individuals, but that weight increase is primarily due to muscle and not unhealthy fat deposits.

Waist Circumference And Waist:Hip Ratio

The BMI also does not gauge the pattern of fat distribution. As noted earlier, a pattern of fat distribution occurring primarily in the abdomen (android pattern obesity) is an important indicator of an increased risk of type 2 diabetes. Important measurements of abdominal obesity include the waist:hip ratio and waist circumference, and some studies have indicated that these two measurements may be more important in predicting the risk of diabetic development than the BMI⁽¹⁰⁾.

Several different methods were found in the literature for measuring waist circumference or waist:hip ratio. A 1998 World Health Organisation report on managing obesity suggested that waist circumference is measured at the midway point between the lower border of the rib cage and the iliac crest⁽¹²⁾. The waist:hip ratio may be obtained by measuring the circumference around the waist and the circumference around the hips, and then dividing the results⁽⁹⁾.

A 2003 study published in the *Medical Journal of Australia* evaluated clinical measures of obesity for predicting the risk of cardiovascular death. This study measured waist circumference at the narrowest point between the ribs and the hips when viewed from the front after exhaling. Hip measurements were made at the point where the buttocks, viewed from the side, extended the most. All the subjects remained lightly clothed, and in both instances two sets of measurements were obtained and the mean of those results was used⁽¹³⁾.

Clearly both waist circumference and waist:hip ratio may present more challenges in obtaining consistently accurate measurements than the more simple BMI. Therapists should

use the measurements they feel are most appropriate and, very importantly, the measurement the patient is comfortable in having taken. As waist circumference is an important indicator of increased diabetes risk in both sexes (see below), and is easier to measure (especially for a patient to self monitor), it is suggested that emphasis be placed on monitoring waist circumference.

Regardless of the measure/s used, what is necessary is that the measurements be anatomically sound. For example a waist circumference is not taken at say the mid rib cage area, or a hip measurement is not taken at the top of the calves. It will also be necessary that the measurements are performed in a consistent way, for example always taken at the same body areas. Obtaining a mean of at least two measurements, as performed in the above *Medical Journal of Australia* study, will further assist in obtaining consistently accurate measurements.

Should a patient not be comfortable in having any of the above measurements taken by a practitioner, the patient should be instructed in how the measurements are taken, and encouraged to later report back with those measurements. Here it is helpful to note that clinical experience reveals that another very simple, though less precise, measurement patients can use themselves is to monitor their (hopefully) reducing pants size, or a positive change in the usual belt hole used when using a favourite belt.

Significance Of Waist Circumference And Waist:Hip Ratio Measurements

For men, waist circumference is a better predictor of type 2 diabetes than waist-hip ratio. This is especially so when used in conjunction with the BMI. Men with a waist measurement greater than 100 cm are considered to be at risk of developing diabetes. Though possibly less indicative of an increased risk for males, men with a waist:hip ratio greater than 1.0 are considered to have android obesity⁽⁸⁾.

In women, android obesity is clear indicator of an increased risk of developing type 2 diabetes. The BMI in women however may be less significant than it is for men. Women with a waist circumference greater than 90 cm and/or a waist:hip ratio greater than 0.85 are considered to be at risk of developing diabetes⁽⁸⁾.

Weight Gain

Simple gross weight gain in adult life is a further indication of an increased risk of developing diabetes⁽⁹⁾. Thus this most simple measure should not be completely ignored.

Weight Measurement In Summary

The most accurate results in monitoring weight issues for a type 2 diabetic, or at risk, patient will likely be obtained by having regard to a combination of several different measurements. As the BMI, waist circumference and gross weight loss/gain are appropriate for both sexes and will likely be easier to consistently obtain, it is suggested that those measurements might be preferred. That said, the waist:hip ratio is a further very valid measurement. Using the mean of two or more measurements at each 'weigh in' will also help produce reliable results.

Careful observation and history taking to gain an approximate idea of the possible effects of fat loss/muscle gain through increased exercise is also useful. Indeed, careful observation and history taking can prove quite insightful, especially for those patients who do not wish for a practitioner to take any of the preceding measurements.

Weight Management

It is obvious that there are two major interventions that might be employed in managing a patient's weight, dietary interventions and exercise/activity. Potentially appropriate dietary interventions will be discussed here first, followed by a brief look at the relatively small benefits of exercise in achieving weight loss. Exercise however has other important benefits for managing type 2 diabetes. Those benefits will be the primary focus of the concluding Part 4 of this series of article.

Dietary Interventions For Managing Weight

Various macro-nutrient combinations have been trialled in attempts to learn of the most appropriate diet to help manage weight in diabetic patients. However it is important to note that human studies looking at diet and obesity have produced inconsistent results⁽⁹⁾. It has also been suggested that long term adherence to an appropriate healthy diet only 'occurs when you prescribe a meal pattern that is satisfying, convenient, and palatable'⁽⁹⁾.

Therefore it is necessary to recommend a healthy diet most suitable for the individual patient, ensuring that weight, waistline, blood sugar levels and other appropriate markers are kept under on-going review.

High Protein/Low Carbohydrate Diet

Some carbohydrate was replaced by protein in a trial involving 58 obese type 2 diabetic patients. The diet consisted of 28% protein, 42% carbohydrate and 28% fat (20% being unsaturated fats) and was compared to a control diet of 16% protein, 55% carbohydrate and 26% fat (with 20% again being unsaturated fats)⁽¹⁴⁾.

The subjects lost weight on both diets, but women lost significantly more total and abdominal fat on the higher protein diet. There was no difference between the diets in the fat loss enjoyed by the male patients. Low density lipoprotein levels however were reduced more by the higher protein diet⁽¹⁴⁾.

A 2004 study looked at 66 obese diabetic patients who were randomly assigned to either a high protein (30% protein, 40% carbohydrate) or a low protein (15% protein, 55% carbohydrate) diet. Both diets had matching fats profiles (8% saturated and 12% unsaturated) and fibre (about 30 g/day)⁽⁷⁾.

After an initial 8 week restricted (by 30% or 6,700 calories) energy diet, the patients were provided with an energy balanced diet (that is the energy was increased by 30%) for 4 weeks. They were then asked to follow that energy balanced diet as best they could for the following year⁽⁷⁾.

Thirty-eight patients completed the study, and as expected weight loss was higher following the initial 12 weeks then at the completion of the study 1 year later. At that completion however both diets still provided significant mean weight

losses of 3.7 kg and 2.2 kg for the high and low protein diets respectively. Unfortunately although glycaemic control measures were significantly improved after the initial 12 week period, this improvement was lost by the time the study ended⁽⁷⁾.

Low Fat Vs High Fat Diets

Eleven diabetic patients were randomly allocated to select from either a low fat (20% of energy needs) high carbohydrate diet (65% of energy needs), or a high mono-unsaturated fat diet where 40% of energy needs were obtained from fats and 45% of those needs from carbohydrates. The diets had the same amount of refined sugars and protein. The low fat diet however had more fibre and water, and had less kilojoules per gram of food than the high mono-unsaturated fat diet⁽¹⁵⁾.

The patients ate one diet, and then after a wash out period were assigned to the other diet. The low fat high fibre diet resulted in weight loss for 8 patients, whereas the high mono-unsaturated fats diet provided weight loss for only 3 patients⁽¹⁵⁾.

This was hypothesised to have occurred as the low fat diet was less energy dense (ie had less kilojoules per gram of food than the high mono-unsaturated fat diet), and high energy dense foods have been shown to produce less satiety and to encourage over-consumption. Glycaemic control was unaltered by either diet, and the serum lipid levels also did not significantly differ between the diets⁽¹⁵⁾.

On the other hand, a moderate fat diet (35% energy from fat, with 14% being mono-unsaturated fats) has been shown to be effective and safe for weight loss when compared to a low fat diet (20% energy from fat, with 7% being mono-unsaturated fats)⁽¹⁶⁾. Additionally it has also been demonstrated that people are more likely to persist with, and loose more weight with, moderate fat (35% of energy) diets than with low fat (20% of energy) diets⁽¹⁶⁾.

Exercise And Weight Management

As will be shown in the concluding Part 4 of this series, exercise has benefits additional to any weight loss in managing type 2 diabetes. Nevertheless it is appropriate to first consider exercise solely in the context as an intervention for weight management.

Exercise does have a positive effect in reducing weight in the overweight and obese. However the weight reduction achieved by exercise alone is only marginal, and diet has been shown to be significantly more effective in achieving weight loss than exercise alone. Accordingly an exercise program designed to achieve weight loss will achieve the best results when accompanied by appropriate dietary modifications⁽¹⁷⁾.

Exercise may however be important for long term weight loss. One study which followed its subjects for 3 years showed that the strongest predictor for maintained weight loss was how often the subjects exercised. It has also been suggested that exercise, combined with dietary change, is very important in maintaining a desired weight following a period of weight loss⁽⁸⁾.

Conclusion

Many of our patients will have largely sedentary lifestyles. Thus it is energy intake that is of primary importance in weight gain. High fat foods consumed in large amounts and some carbohydrate rich foods may consequently result in weight gain⁽⁵⁾. On the other hand low energy (high fibre, low to moderate fat) foods may help abate weight gain, and this weight loss might be maintained by an ongoing low to moderate, primarily unsaturated, fat diet^(5,8).

Remember however that human studies looking at diet and obesity have produced inconsistent results, and that long term adherence to an appropriate healthy diet only occurs if that healthy diet is also satisfying, convenient and palatable. Even proponents of a high protein diet for weight loss agree that there is 'more than one approach to healthy eating'⁽¹⁸⁾.

So the key point must be to treat each patient individually. Aim to tailor an appropriate weight management diet that is also appealing to the patient and his/her family. As a starting point it is suggested that attention be directed towards achieving a diet high in fibre (minimum 25 g—30 g/day)⁽¹⁹⁾ and which has moderate (30% of daily kilojoules) levels of primarily unsaturated fats^(8,16).

Also encourage your patients to remain in regular contact, regularly review their diet and provide advice and encouragement. Studies have shown that in addition to dietary and energy balance modifications, intensive lifestyle programs focused on patient education, individual counselling and frequent therapist/patient contact are all required to establish prolonged weight loss⁽²⁰⁾.

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