ABSTRACT
The growing prevalence of type 2 diabetes mellitus (T2DM) and the parallel increase in the prevalence of obesity warrants for effective intervention strategies. Overweight/obese patients with T2DM who attempt weight reduction often face considerable challenges. A recent study in Malaysia conducted among overweight/obese patients with T2DM showed that weight reduction and improved glycaemic control could be achieved with structured lifestyle intervention and the incorporation of behavioural counselling. The structured lifestyle recommendations in this study consisted of 1) a fixed low-calorie diet plan of 1200 kcal/day for female and 1500 kcal/day for male patients; 2) incorporation of one or two servings/day of diabetes-specific formula as a meal replacement; 3) a 14-day structured meal plan consisting of the ingredients list, cooking methods and nutrition facts; and the 4) healthy low-calorie snack options. Exercise prescription of ≥150 min/week of moderate-intensity was also encouraged. Behavioural counselling such as motivational interviewing not only facilitated adherence to the lifestyle recommendations but also further enhanced weight loss and glycaemic control in these patients. This article outlines the localisation of the structured lifestyle recommendations and its effectiveness in achieving weight loss and good glycaemic control in overweight/obese patients with T2DM.

Keywords: Diabetes, structured lifestyle, weight loss, meal replacements, glycaemic control

INTRODUCTION
Type 2 diabetes mellitus (T2DM) is a major health concern of the 21st century due to the dramatic rise in the global prevalence. In Malaysia, T2DM is prevalent in 17.5 percent of the adult population, over double since 1996.1 Obesity is also predominant in 83.4 percent of Malaysians with T2DM2, and consistently the glycaemic control in these patients have worsened with the rise in mean haemoglobin A1c (HbA1c) level from 8.0 percent in 2003 to 8.66 percent in 2008.3 Only 22 percent of Malaysians with T2DM achieved the HbA1c target of <7 percent, the lowest rate since 1998.3

Medical Nutrition Therapy (MNT) consisting of a healthful eating pattern and regular physical activity, is an important component in the management of diabetes alongside pharmacotherapy. It is well established that part of the role of MNT is to achieve weight reduction as a key therapeutic goal for the prevention and management of T2DM.4 Weight reduction with intensive lifestyle modifications has been shown to reduce the incidence of diabetes by 58 percent.5 For individuals with T2DM, the Look AHEAD study reported that a loss of 5–10 percent of body weight can improve fitness, reduce HbA1c levels, improve cardiovascular disease risk factors, and decrease the use of diabetes, hypertension, and lipid-lowering medications.6,7 Nevertheless, adherence to lifestyle changes as prescribed by the MNT is often a challenge. In Malaysia, 80 percent of patients with T2DM consume four or more meals a day and ate more than two carbohydrate portions per snack.8 Only 16.4 percent of patients adhered to the dietary regimen provided by dietitians.9 Several studies showed that weight reduction and glycaemic control in patients with overweight/obesity and T2DM was more feasible and had better adherence when structured lifestyle recommendations were provided.10–12

EVIDENCE FOR STRUCTURED LIFESTYLE INTERVENTION
In the Look AHEAD study10, overweight/obese patients with T2DM who were randomly assigned into the intensive lifestyle intervention (ILI) group lost significantly more weight and achieved greater HbA1c reduction compared to patients who received standard diabetes management and support. The ILI group received a structured low-calorie diet plan of 1200-1800 kcal/day, with meal replacements and one snack, ≥175 min/week of moderate-intensity physical activity and behaviour modifications for weight loss of ≥7 percent.

Similarly, in the Why WAIT programme,11 overweight/obese patients with T2DM who received a structured lifestyle intervention had 82.3 percent of patients achieving the target HbA1c of <7 percent, and 69.4 percent of patients were able to reduce their HbA1c to <6.5 percent within 12 weeks. The successful patients were prescribed with low-calorie diet plans, used meal replacements, ate calorie-controlled snacks, and as well as prescribed with an exercise regime, behaviour modifications, group education, and medication adjustment.

We recently published the effectiveness of the structured approach in a lifestyle intervention study in overweight/obese patients with T2DM in Malaysia.13 We randomised 230 T2DM patients with overweight/obesity and HbA1c >7 percent to receive usual care or structured lifestyle intervention for six months, delivered with behavioural counselling technique. Patients receiving the structured lifestyle intervention demonstrated significant improvements in their
gynaecic control, body weight reduction, and lowering of blood pressure. The structured intervention consisted of low-calorie diet plans, diabetes-specific meal replacements, and increased physical activity.

**HOW TO IMPLEMENT STRUCTURED LIFESTYLE INTERVENTION FOR DIABETES?**

There are several key features of the structured lifestyle approach.

First, providing patients with low-calorie diet plans is key in the structured approach. A calorie restriction of 500-1000 kcal/day from the usual dietary intake is required to create a negative energy balance. In several successful structured lifestyle interventions, overweight/obese patients with T2DM were prescribed with fixed low-calorie diets of approximately 1200-1500 kcal/day for female and 1500-1800 kcal/day for male patients to produce a successful reduction in weight and HbA1c. For long-term weight reduction, the daily caloric intake should be reduced gradually between 250-500 kcal rather than a dramatic reduction of 750-1000 kcal to enhance compliance. Reasonable and paced caloric reductions have improved patients’ adherence and helped patients continue on the recommended dietary plan for a longer duration of time. Total daily carbohydrate intake should be no less than 130 g/day, with 15-20 percent calories contribution from protein and the remaining 25-30 percent calories from fat. The low-calorie diet plans should also incorporate high fibre foods (e.g. whole grains, fresh fruits, and vegetables) and healthy carbohydrate consumption, especially sources low in glycaemic index.

Second, the incorporation of meal replacements to achieve low-calorie intake is another key feature of a structured approach. As part of comprehensive diabetes management, meal replacements have shown to effectively facilitate weight loss and maintenance in overweight/obese patients with T2DM. Commercial meal replacements in the form of shakes, bars, and ready-to-mix powders can be used to replace one or two meals or snacks each day to reduce daily caloric intake. Meal replacements are not only easy to prepare, but also reduces exposure to tempting foods, provides sensory satiety, and removes the need for portion control and caloric counting, which is vital for individuals with poor dietary adherence.

Meal replacements should provide 200-250 calorie replacements and can be used as a sole source of nutrition or taken with conventional foods. Meal replacements are generally used as an absolute replacement of an agreed-upon number of meals/snacks (usually one to two/day) as part of a structured diet plan. Today’s commercial meal replacements are mostly palatable and offered in different flavours and formats that are generally accepted. In the Look AHEAD study, the higher the reliance on meal replacements, the higher the odds were of achieving weight loss goals. Participants in the highest quartile of meal replacements usage had a 4.0 times greater odds of achieving a seven percent weight loss and a 4.1 times greater odds of achieving the ten percent weight loss mark. Lastly, structured lifestyle intervention should be delivered using behavioural counselling strategies. In the Malaysian study, we demonstrated that patients who were counselled using motivational interviewing along with structured lifestyle intervention showed a greater extent of a 2-fold reduction in their body weight and HbA1c at six months with 50 percent lower weight regain at one year compared to patients receiving conventional counselling for structured lifestyle intervention.
LOCALISING STRUCTURED LIFESTYLE INTERVENTION FOR DIETARY MANAGEMENT SUCCESS

CONCLUSION

In the Malaysian study\(^1\), providing a structured lifestyle intervention helped patients simplify the decision-making process and make dietary changes easier to follow. The incorporation of behavioural counselling such as motivational interviewing further enhanced lifestyle adherence and led to significantly better diabetes and weight control. Therefore, in the Malaysian population, where 80 percent of them do not adhere to dietary recommendations, and 70 percent of Malaysians do not adopt a physically active lifestyle, the structured approach could provide the much-needed MNT intensity.

REFERENCES


LEARNING POINTS

- Overweight/obese patients with T2DM could benefit from weight loss of 5–10 percent as modest weight loss reduces cardiovascular risk factors associated with T2DM and improves hyperglycaemia.
- Provision of structured meal plans simplifies the task of following the prescribed diet and consequently lead to better adherence.
- Incorporating behavioural counselling such as motivational interviewing can help motivate patients and facilitate adherence to lifestyle recommendations and consequently lead to significantly better diabetes and weight control.
Breakfast – 300 kcal
Meal replacement formula (one serving) + Small banana (one serving) – 300 kcal

Lunch/ Dinner – 300- 500 kcal
Soup noodle (one bowl) OR
Rice, preferably brown (1 ½ scoop) with Assam fish/ braised chicken/ steamed tofu (one palm size serving) + Stir-fried green vegetables (one cup) + Honeydew / Guava/ Papaya (one serving) + Chinese Tea – 500 kcal
OR
Meal replacement formula (one serving) + Salad/ Fruit (one serving) – 300 kcal

Snacks – 100 kcal
| Apam steamed, kuih | Wholegrain crackers, plain |
| Wet popiah, kuih | Lempeng, plain |
| Sweet potato, steamed | Putu piring |
| Plain corn, steamed | Low-fat yogurt, plain |
| Chickpeas, boiled | Tau Fu Fah, unsweetened |
| Red bean soup, unsweetened | Vegetable pau, small |