CHAPTER 4: Management of Obesity

Part 1: Dietary Management

References:

1. **Peter G. Kopelman, Ian D. Caterson, William H. Dietz - Clinical Obesity in Adults and Children 4e-Wiley-Blackwell (2022)**
2. **Sharon Akabas, Sally Ann Lederman, Barbara J. Moore - Textbook of obesity_ Biological, psychological and cultural influences-Wiley-Blackwell (2012)**

Outline

1. Aim of Obesity Treatment
2. Energy Deficit
3. Non-Dieting Approaches
4. Weight Maintenance

1. Aim of Obesity Treatment

- Let’s think of a common scenario where you calculate a patient’s IBW
- How to set a goal?

Using BMI to set a desirable weight

- Weight = 110 kg
- Height = 160 cm=1.60 m
- BMI = 42.97

→ **Class III Obesity**

- Lower limit (BMI = 18.5): 47.4 kg
- Upper limit (BMI = 24.9): 63.8 kg

- This means a weight reduction of 46.2 to 62.6 kg!

5-10% Weight Loss

- For the same case, a 5-10% weight loss would look like this:
- **5% Goal**: 104.5 kg
- **10% Goal**: 99 kg
- This means a weight reduction of 5.5 to 11 kg!

Table 17.2 Benefits of 5–10% weight loss (Ref)

Mortality
20% decrease in overall
30% decrease in diabetes-related deaths
40% decrease in cancer-related deaths
Blood pressure
10 mmHg decrease
Lipids
15% decrease in cholesterol
Reductions in other lipids
Diabetes
Better blood glucose control
Diabetes prevention in those at risk

Aims of obesity treatment

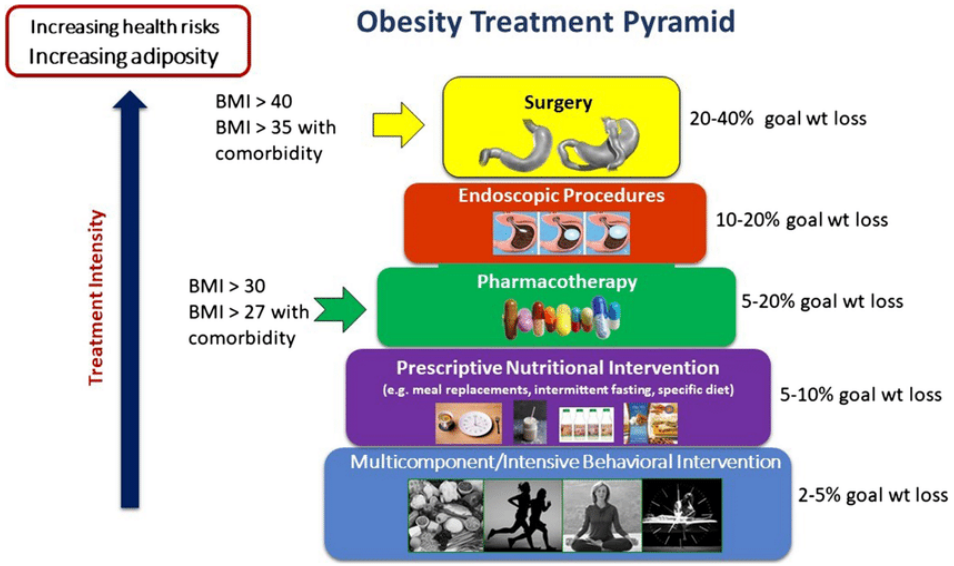
- What are the aims of obesity treatment?
- Think individualized approach
- Goals:
  - A 5–10% weight loss can be one main goal.
  - Reduce risk to health and complications from any associated disease
  - Think about sustainable approaches
  - If weight loss cannot be achieved? → Aim of no additional weight gain (Ex: patients with mechanical complications or emotional or psychological factors)

Also, consider:

- **Mechanical disease**: Better control, less intensive therapy
- **Activity**: More able, less short of breath
- Overall **Quality of life**, wellbeing, and psychosocial functioning
- **Fertility** (important for IVF programs)

Current obesity treatment options

- Interventions usually combine a hypocaloric diet, exercise/activity plan, and behavioral interventions.
- No weight loss → Adjunctive therapy should be considered, such as:
  1. Very low energy diets
  2. Obesity pharmacotherapy
- Finally → bariatric surgery.



DOI: 10.1007/s13679-021-00444-y

Table 17.5 Practical approach to obesity treatment – clinical assessment and rational management outline

BMI	Risk rating	General advice	Eating	Activity	BWMP	Obesity drugs	VLCDs	Surgery
18.5–24.9	Low	Use						
	High		Use	Use				
25–29.9	Low				Use			
	High				Use	Consider*		
30–34.9	Low				Use	Consider/use		
	High				Use	Use		
35–39.9	Low				Use	Use		
	High				Use	Use	Consider	Consider
40+	High				Use	Use	Use	Consider

Risk rating:
Low = waist <102 cm in men and <88 cm in women, and no risk factors present.
High = waist is greater than the above measures, or the presence of risk factors.
Risk factors:
Type 2 diabetes/impaired glucose tolerance, hypertension, coronary heart disease, dyslipidemia, OSA.
*Pharmacotherapy should be considered at a BMI >27 kg/m^2 in the presence of obesity complications when there has been no weight loss in 12 weeks of a lifestyle program. Pharmacotherapy might be considered earlier in those with greater BMI or with more risk factors and diseases.

Behavioral Weight Management Program (BWMP).

2. Energy deficit

- An energy deficit is the mainstay of any weight loss intervention.
- An energy deficit can be achieved by many means. One of the most commonly used weight loss equations states a weekly energy **deficit of 500– 1000 kcal/day** is required to lose **0.5–1.0 kg** of body weight.

Low energy diets

- Prescribing a low-energy diet is an obvious way to achieve an energy deficit.
- Low energy diets (LEDs) provide 800–1200 kcal per day.
- It is almost impossible to meet daily micronutrient requirements → Think of supplementation
- Expected weight loss from research evidence:
  - Over a 14 week period: average of 7–13 kg
  - After 12 months: approximately 6–7 kg is common
  - After 2 years: about 3.5 kg
  - At 5 years: there is often very little change from baseline

Low energy diets

- Partial meal replacement therapy

Some of the daily meals are replaced with supplemented, portion-controlled food (shake, soup, or a bar).

May help people meet their nutrient requirements while on a LED, flexibility in social situations, reducing decision making at other times.

They can also help maintain weight after an initial, intensive period of weight loss

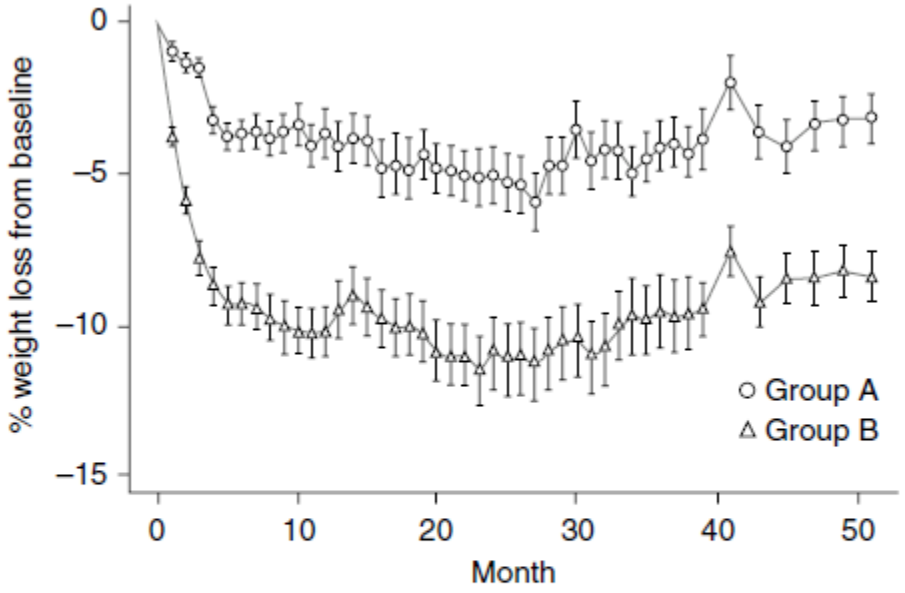


Figure 18.3 Weight loss patterns for those on a 5–6 MJ (1200–1500 kcal) diet over a 4 year period, either with a prescribed diet using conventional food (group A) or using two meal replacements and two snacks (group B) for the first 3 months of the study. From 4 to 51 months, both groups were put on one meal and one snack replacement. (Source: Reproduced with permission from Flechtner-Mors et al. [58].)

Very low energy diets (VLEDs)

Provide approximately **400–800** kcal per day.

Determinants:

1. It must contain all the recommended dietary intake for vitamins and minerals, electrolytes, and fatty acids
2. Provide between 0.8 and 1.5 g of high-quality protein/kg IBW
3. Followed for a fixed period
4. Differs from a person's usual intake.

A VLED needs to be **carefully formulated**!

Box 18.1 Potential complications associated with the use of very low energy diets

Cold intolerance*
Constipation*
Dry skin*
Gastrointestinal upset*
Ketosis*
Lethargy, weakness, fatigue*
Light-headedness, dizziness*
Menstrual irregularity*

Anemia
Brittle nails
Cardiac changes
Decreased voluntary physical activity
Decrease in exercise tolerance
Dehydration
Diarrhea
Electrolyte imbalances
Feeling faint on standing
Gallbladder disease
Gout
Hair loss
Muscle cramps
Nausea
Nutrient deficiencies
Edema

*Common

Very low energy diets (VLEDs)

- A VLED could be considered for highly motivated patients who have tried other methods or need rapid weight loss.
- Not recommended for self-initiated dieters.
- **Contraindications** for VLEDs:

Box 18.2 Quick guide to patient exclusion for very low energy diets

Contraindications
Increased requirements
Pregnancy
Lactation
Illness
Wasting conditions
- Burns
- Cachexia
- Cancer
- Cushing syndrome

Increased medical risk
Recent cardiac disease (last 3 months)
Cerebrovascular disease
- Recent strokeRecent ischemic heart disease
- Transient ischemic heart disease

Underlying renal disease
Underlying hepatic disease
Eating disorders
Used only with medical supervision
Children
Elderly
Insulin treated diabetes
Those with known liver and kidney disease

VLEDs

- Although it is a big deficit, weight loss achieved is rarely as large as expected

→ Partly due to decreases in RMR and voluntary energy expenditure.

- The average weight loss per week is 1.5–2.0 kg for women and 2.0–2.5 kg for men
- Typically, weight loss diminishes substantially after the initial 12 weeks

1. https://apjcn.nhri.org.tw/server/APJCN/15%20Suppl/49.pdf
2. https://www.fao.org/fao-who-codexalimentarius/sh-proxy/pt/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXS%2B203-1995%252FCXS_203e.pdf

How is it used?

- VLEDs are generally taken as a commercial formulation of liquid or powder that serves as the **sole source** of nutrition.

Nutrients contents

1. **Protein**: Not less than 50 g high quality protein. Essential amino acids may be added to improve protein quality
2. **Fats**: Not less than 3 g of linoleic acid and less than 0.5 g α-linolenic acid
3. **Carbohydrates**: Not less than 50 g of available carbohydrates in the recommended daily intake of energy.
4. **Vitamins and minerals**: Should provide 100% of the recommended daily intakes.

- The usual length of treatment is **8-16 weeks**.

https://doi.org/10.1111/nep.13680

How Does Weight Loss Occur?

- Weight loss occurs via the mechanism of ketosis.
- Important: Recall difference between ketosis and ketoacidosis ketoacidosis.
- Ongoing caloric restriction and <100 g of CHO/day, metabolism of fat stores will occur
- → FFAs are used by organs such as the liver, muscles, and the brain as a substrate for metabolism.
- The utilization of these ketone bodies has a protein sparing effect.

1. https://apjcn.nhri.org.tw/server/APJCN/15%20Suppl/49.pdf

Advantages

1. Rapid weight loss is a motivating factor.
2. Diuresis which improves patients feeling of wellness early in the treatment.
3. Low in carbohydrate and the patients become mildly ketotic and mild ketosis results in reduced hunger
4. Ketosis slows the rate of muscle loss
5. Convenience of VLEDs assists with acceptability and compliance. Paradoxically, restricting choice of food items available improves adherence

1. https://apjcn.nhri.org.tw/server/APJCN/15%20Suppl/49.pdf

How should VLEDs be used?

- 1st: Review contraindications to VLED
- 2nd: Set realistic targets. A reasonable initial target is a 10% weight loss.
- 3rd: Exercise should be advocated (both formal and incorporated into daily living)
- Commencing VLED:
  - The importance of achieving mild ketosis to suppress hunger should be **emphasized** and the patients should be encouraged to avoid carbohydrate supplementation. Advise them to have lean meat or fish in the first week.

1. https://apjcn.nhri.org.tw/server/APJCN/15%20Suppl/49.pdf

How should VLEDs be used?

- The patient should be followed up on a **biweekly basis** in the clinic for checkups, advice and encouragement.
- Blood tests on VLED: Important due to potential for serious consequences while on these diets. Include:
  - Electrolytes/ Creatinine
  - Liver function tests
  - Fasting glucose
  - Cholesterol/Triglycerides/HDL
  - Uric Acid
  - Haematology.

Very low energy diets (VLEDs)

- In some cases:
- A portion-controlled meal could be given in addition to the VLED to achieve a total daily intake of 800 kcal.
- This meal should contain appropriate amounts of protein (1.2–1.5 g/kg/day ideal body weight), two cups of low carbohydrate vegetables, and 1–2 teaspoons of oil to stimulate bile secretion and reduce the chance of cholelithiasis.

1. https://apjcn.nhri.org.tw/server/APJCN/15%20Suppl/49.pdf

How should VLEDs be used?

- Usually patients continue on VLED for 12 weeks.
- It is not necessary for patients to reach the goal weight with one period of VLED use → May have repeated periods of use separated by periods of weight maintenance.

1. https://apjcn.nhri.org.tw/server/APJCN/15%20Suppl/49.pdf

How should VLEDs be used?

- Finishing VLED
  - 1st: Dietitian referral to commence lifestyle change program (low fat, reduced CHO diet, lifestyle changes, consultations)
  - Before finishing the VLED , the patient has 2 VLED meals and one specified meal of food a day for 4 weeks
  - This is followed by 4 weeks of 1 VLED meal and 2 specified meals of food a day.
  - After **two months**, the patient should be following a standard low fat reduced carbohydrate diet.

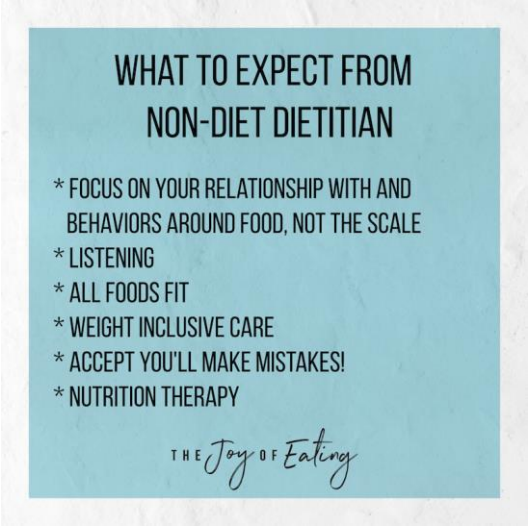
1. https://apjcn.nhri.org.tw/server/APJCN/15%20Suppl/49.pdf

How should VLEDs be used?

- Weight loss
  - Once off a VLED it may be that a patient does not lose further weight. It is sufficient and an acceptable clinical goal to **simply maintain** weight loss.
  - Patients are followed initially at monthly intervals.
  - Weight loss maintained: Lifestyle regime is continued and gradually the interval between visits is increased to 3 months.
  - Weight is rising again / difficulty with controlling food intake: consider drug therapy to assist with weight loss maintenance.

3. Non-Dieting Approaches

- Dieting has come under attack by a growing movement whose contention is that “diets don’t work” and that their physical and psychological ill-effects far outweigh any short-lived benefits



Assumptions of this approach

- **Dieting Is Ineffective**

The well-established finding is that diets fail to produce their most desired outcome—long-term weight loss. These consistent results have fueled the development of non-dieting alternatives.

Assumptions of this approach

- **Dieting Is Harmful**

The drive for thinness and the demonization of “fat” are seen as byproducts of the media industries.

→ Psychological consequences: depression, anxiety, anger, food and weight preoccupation, social isolation, and diminished self-esteem.

→ Physical consequences: reduced metabolic rate, hypotension, dizziness, hair loss, and decreased bone mass.

“Weight cycling” is believed to even lead to the very conditions that dieting seeks to improve

Assumptions of this approach

- **Long-Standing Beliefs Are Incorrect**

1. Non-dieting proponents view developments in the understanding of the genetics of body weight as evidence for a biological rather than a behavioral etiology of obesity.
2. The non-dieting movement also challenges the assumption that being overweight is unhealthy.

Methods of this approach

- Increasing Awareness of the Ill-Effects of Dieting

- Education About the Biological Basis of Body Weight

- Guiding Eating Behavior

Includes abandoning going for long periods without eating, avoiding forbidden foods, and getting weighed frequently.

- Improving Psychological Well-Being

→ Promote enhanced self-esteem and a positive body image.

- Increasing Physical Activity

Increase activity in ways that are enjoyable

Empirical Support??

- **Findings of the Research**

One consistent finding is that non-dieting approaches appear to have favorable effects on **self-esteem**.

Physiological variables: there were small but significant changes in blood pressure and lipids.

Most non-dieting programs produce **little or no change in body weight**.

Strengths

- Affirmation of a person's worth, no matter what he or she weighs.

Overweight people are often viewed as weak-willed, lazy, or undisciplined → This is a form of discrimination and prejudice.

- This movement has promoted messages that encourage overweight persons to live life now, rather than waiting until they lose weight
- Also, this can prompt professionals to remember that they are likely to have anti-fat attitudes that need to be identified and modified

Weaknesses

- The most significant weakness of the non-dieting approaches is the lack of scientific support.
- The belief that weight is not a risk factor for disease is contrary to a large body of literature → **This is misleading and irresponsible**.
- Despite the importance of biological factors in the control of body weight, it is a mistake to minimize the role of environmental factors

4. Weight Maintenance

- Often, sustaining weight loss is harder than losing the initial weight!
- 10% or greater reduction in body weight is associated with an approximately 20–25% decline in 24-hour energy expenditure

→ A formerly obese individual will require approximately 300–400 fewer kcal/day to maintain the same body weight as a never-obese individual of the same body weight and composition.

Defining Weight Loss Maintenance

- Institute of Medicine (IOM): Losing at least 5% of body weight or reducing BMI by at least 1 unit, and keeping weight below this level for **at least one year**
- A recent definition: A weight gain of less than 3% of body weight after weight loss.
- Both the overall weight change and the amount of regain can be considered in setting a comprehensive definition

Why Is Maintenance So Difficult?

- It requires achieving an **exact match** between energy intake and energy expenditure but at a lower level of body weight.

→ It may be more about increasing energy expenditure to a level that can be matched by energy intake.

- **Hormonal changes**: Ghrelin is increased throughout the day following weight loss and may contribute to weight regain. Also, leptin levels decline with weight loss

Why Is Maintenance So Difficult?

- **Motivation**: Many people are extremely motivated in the beginning of a weight loss attempt, but are not able to maintain permanent lifestyle changes.
  - Food restriction is specifically difficult to maintain for long periods.
  - PA increases can be produced, but maintaining those increases is difficult after weight loss has stopped and motivation may be lessened.
- **Reinforcers**: Initially, individuals experience frequent reinforcement from the scale, positive comments, and changes in medication regimens. However, there are fewer during maintenance.
- Our **environment** is not supportive for maintaining the behaviors that support a healthy body weight.

Research on Successful Weight Loss Maintainers

- The National Weight Control Registry (NWCR) studies characteristics of successful maintainers:

Table 22-1 Behavioral Characteristics of Successful Weight Loss Maintainers

• High levels of physical activity
• Low-calorie, moderate-fat diet
• Regular breakfast consumption
• Daily self-weighing
• High degree of conscious control over eating

Research on Successful Weight Loss Maintainers

On average, the members of the Registry have lost over 33 kg and kept it off 5.7 years. They reduced from a BMI of 36.7 to 25.1

How they lost weight?

- Half report that they lost weight on their own; the others received some type of help from programs, physicians, or a dietician
- Dietary approaches: Restricting certain types of food (88%), limiting the quantities of foods (44%), and counting calories (44%) were reported most frequently.
- 90% used a combination of diet plus physical activity

Research on Successful Weight Loss Maintainers

Physical Activity

- Physical activity is **the most consistent predictor** of long-term maintenance of weight loss.
- Participants report very high levels of physical activity (about 60–90 mins/day)
- Walking is the principal activity. Other common activities: resistance training, cycling, cardio-machines, running, and aerobics.
- 36% report watching **<5 hours/week** of TV and 62% report **<10 hours** of TV per week. (the national average in the US is **28 hours**)

Research on Successful Weight Loss Maintainers

Dietary Intake

- Low-calorie, moderate-fat diet. Members report consuming an average of 1,379 kcal/day. (Considering underreporting, this is about 1,800 kcal/day)
- On average, these individuals consume 4.7 meals/day (breakfast, lunch, dinner, and 1–2 snacks).
- They report consuming breakfast on 6.3 days/week → **reduce hunger** later in the day and help **promote higher levels of physical activity**.
- Another important characteristic is the **lack of variety** in the types of foods consumed.

→ Calories consumed is related to the variety of the choices offered; if only one choice is offered, individuals soon become satiated with that taste.

Research on Successful Weight Loss Maintainers

Vigilance

- Another characteristic is that they continue to be vigilant about their diet, exercise, and body weight.
- 36% weigh themselves at least once a day, and 42% report weighing themselves at least weekly.

Research on Successful Weight Loss Maintainers

Weight Regain in Successful Weight Losers

- Even these successful members experience weight regain over time, averaging approximately 2 kg/year
- This weight regain is associated with decreases in the positive behaviors previously discussed.