



Nutrition & Diet Therapy

Third Stage

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Lecture Ten : Diet Therapy; Part 2

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Overview of Obesity

- ▶ **Obesity is a condition characterized by excessive and unhealthy amounts of body fat.**
- ▶ **Some body fat is essential for good health, but too much fat can contribute to the development of serious chronic diseases, including type 2 diabetes, hypertension, and cardiovascular disease (CVD).**
- ▶ **For decades, a variety of methods have been available for measuring body fat in humans. Nonetheless, there is no uniformly accepted range of normal body fat in man. Therefore, there is no standard of human obesity based on a quantitative value for excessive accretion of body fat.**
- ▶ **To determine whether a person's weight is healthy, overweight, or obese, medical experts generally use the body mass index (BMI).**

(BMI)

is a numerical value based on the relationship between body weight and height which related to risk of chronic health problems associated with excess body fat.

Calculating BMI

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height}^2(\text{m})} \text{ or } \text{BMI} = \frac{\text{Weight (lb)}}{\text{Height}^2(\text{in})} \times 704.5$$

Example: An individual weighs 65 kg (143 lb) and is 1.7 m (5 feet 7 inches) tall. $\text{BMI} = 65/(1.7)^2 = 22.5 \text{ kg/m}^2$

Classification of BMI

Underweight: <18.5

Normal: 18.5-24.9

Overweight: 25.0-29.9

Obese: ≥ 30.0

Extreme obesity: ≥ 40.0

Body Fat Composition

❖ **The body is composed of two major fats:**

- 1) Fat-free mass is comprised of body water; mineral-rich tissues such as bones and teeth; and protein-rich tissues, including muscles and organs.
- 2) Total body fat includes “essential fat” and adipose tissue.
 - a) Essential fat is in cell membranes, certain bones, and nervous tissue. Essential fat is vital for survival.
 - b) Adipose tissue contains adipose cells that are specialized for storing energy in the form of triglycerides (fat). Overweight and obese people have excessive amounts of adipose tissue.

❖ The major function of an adult adipose or “fat” cell is to store a droplet of fat. When food is plentiful, adipose cells remove excess fat from the bloodstream for storage. As the amount of fat stored in adipose cells increases, the size of each cell expands, and the body gains weight.

Subcutaneous Fat and Visceral Fat

- ❖ Subcutaneous tissue holds skin in place over underlying tissues such as muscles. Subcutaneous tissue also contains adipose cells.
- ❖ When subcutaneous tissue has more adipose cells than other kinds of cells, it is referred to as subcutaneous fat.
- ❖ Subcutaneous fat helps insulate the body against cold temperatures and protects muscles and bones from bumps and bruises.
- ❖ This layer of fat is thicker in certain regions of men's and women's bodies, especially in the abdominal area, thighs, and buttocks.
- ❖ Visceral fat also contains adipose cells, but this type of body fat forms a protective structure that is under the abdominal muscles and hangs over the stomach and intestines. Although there are some racial differences, women generally have more.
- ❖ Cellulite, lumpy-appearing skin on thighs and buttocks of many women, is not a unique type of fat. Scientists have no clear understanding of why cellulite occurs, but it may simply be subcutaneous fat held in place by irregular bands of connective tissue.

Measuring Body Fat

1- Underwater Weighing

- underwater weighing technique of estimating body composition that involves comparing weight on land to weight when completely submerged in a tank of water.
- Lean tissue is denser than water; fat tissue is not as dense as water. Thus, a person who has more body fat will weigh less when under water than a person who has more lean tissue.
- The underwater weighing method can be an accurate way of assessing body composition, but it is not a convenient, not easy, expensive, not practical way to estimate body fat, because it requires special testing facilities.



Underwater weighing involves comparing a person's weight on land to his or her weight when completely submerged in a tank of water.

Measuring Body Fat

2- Dual-Energy X-Ray Absorptiometry (DXA)

- involves the use of multiple low-energy X-rays to scan the entire body. The method provides a detailed “picture” of internal structures, including fat deposits.
- During the scanning process, the equipment emits a dose of radiation that is lower than that used for a chest X-ray.
- Although DXA is a highly accurate way to estimate body fat content, the equipment is very expensive and not widely available outside of clinical settings.



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Measuring Body Fat

3- Air Displacement

- Air displacement method of estimating body composition by determining body volume. After being weighed on a very precise scale, the subject sits in the chamber of a device called the BOD POD.
- This device measures the volume of air in the chamber with the person in it and compares the value with the volume of air that was in the chamber when it was unoccupied. The person's volume is the volume of air that was displaced after the subject entered the chamber.
- Air displacement measurements provide highly accurate estimates of body fat content, but the measuring device is expensive and not practical for most consumers to use.



The BOD POD device estimates a person's body volume by measuring the space the body occupies while seated inside the chamber.

Measuring Body Fat

4- Bioelectrical Impedance

- This method is based on the principle that water and electrolytes conduct electricity. Body fat resists the flow of electricity, because fat tissue contains less water and electrolytes than lean tissue.
- The bioelectrical impedance device sends a painless, low-energy electrical current via wires connected to electrodes placed on the subject's skin. Within a few minutes, the device converts information about the body's electrical resistance into an estimate of total body fat.
- The method is fairly accurate, as long as the subject's hydration status is normal.



The use of a device that measures bioelectrical impedance is a quick and painless way to estimate body fat content.

Measuring Body Fat

5- Skinfold Thickness

- **A common technique for estimating total body fat involves taking skinfold thickness measurements at multiple body sites, such as over the triceps muscle of the arm. The width of a skinfold indicates the depth of the subcutaneous fat at that site.**
- **To perform the measurements, a trained person pinches a section of the subject's skin, gently pulls it away from underlying muscle tissue, and uses special calipers to measure the thickness of the fat.**
- **After taking the measurements, the values are incorporated into a mathematical formula that provides a fairly accurate estimate of the subject's amount of body fat.**



Body fat content can be estimated by measuring skinfold thicknesses using a special device (skinfold caliper) at multiple body sites, such as the triceps muscle of the arm.

How Much Body Fat Is Too Much?

- Some body fat is essential for good health, but too much adipose tissue, especially visceral fat, can interfere with the body's ability to function normally.
- Percentages of body fat can be used to develop weight classifications for adults. According to one such classification system (Table 1).
- It is important to note that the average healthy young woman has more body fat than the average healthy young man, because she needs the extra fat for hormonal and reproductive purposes.

(Table 1) Adult Body Weight Classification by Percentage of Body Fat

Classification	Body Fat (%)	
	Men	Women
Healthy	13 to 21%	23 to 31%
Overweight	22 to 25%	32 to 37%
Obese	26 to 31%	38 to 42%
Extremely obese	32% or more	43% or more

Key Features of Reliable Weight-Loss Plans

- Is safe and effective.
- Meets nutritional, psychological, and social needs.
- Incorporates a variety of common foods from all food groups.
- Fosters slow but steady weight loss.
- Does not require costly devices or diet books.
- Does not make the dieter feel deprived.
- Emphasizes readily available nutritious foods.
- Promotes changing habits that discourage overeating.
- Encourages regular physical activity.
- Provides suggestions for obtaining social support.
- Can be followed for a lifetime.

((Tips for Modifying Food- and Exercise-Related Behaviors))

• • **Planning Menus:**

1. Plan meals and snacks to cover three or more days, then use the plan to prepare grocery lists.
2. When menu planning, include sources of protein, unsaturated fat, and complex carbohydrates in meals and snacks.
3. Avoid labeling certain foods as “off limits.” Depriving yourself of such items can result in bingeing on the “forbidden” food.
4. Learning to analyze why you have difficulty controlling your intake of these foods and developing strategies to learn how to reduce your intake of them can be very helpful.

• • Food Preparation:

1. Reduce the use of fat in cooking; bake, broil, or roast meats instead of frying them.
2. Add less fat to foods such as cooked vegetables before serving or eating them.
3. If you sample foods while preparing them, consider the amounts you ate and at mealtimes, reduce your portion sizes accordingly.
4. Prepare only enough food to provide one limited-size portion for yourself. Using measuring cups and a small scale for weighing food can be helpful.
5. Serve food on smaller plates and eat with smaller spoons.
6. Take your usual size portion and return one-third to one-half of it to the serving dish or container.
7. Remove serving dishes from the table. Keeping foods or their containers in sight can encourage overeating.

• • Eating Behavior:

1. Keep nutrient dense low calorie snack foods, such as fresh fruits and vegetables, on hand.
2. Eat meals and snacks at scheduled times; don't skip meals, especially breakfast.
3. Eat all food in a "dining" area; avoid eating while engaged in other activities, such as reading a book or watching television.
4. Leave some food on your plate.
5. Become a "defensive eater." Practice ways to refuse food graciously or request smaller portions. Be aware of people, especially relatives and friends, who sabotage your weight loss efforts.

• • Physical Activity:

1. Choose physical activities that you enjoy and can do without the need for expensive equipment.
2. Increase the time you spend walking each day.
3. Reduce the amount of time you spend sitting. For example, do more household chores yourself.
4. Take stairs instead of elevators or escalators whenever possible.
5. Park your car farther from your destination and walk, if you feel it is safe to do so.
6. Perform calisthenics or lift handheld weights while watching television.
7. Adopt moderate-intensity activities for your leisure time. For example, join a co-ed volleyball club or take a ballroom dancing class.

• • Self-Monitoring:

1. Set reasonable weight-loss goals, for example, losing 4 pounds in one month. When you achieve that goal, then set another reasonable goal, and continue.
2. Keep a special notebook to use as a food and exercise diary where you can see it near the kitchen table or refrigerator.
3. In the diary, note the time and place of eating as well as the type and amount of food eaten. Also record who was present and your mood when you ate meals and snacks.
4. Use the diary to identify your food-related problem areas, such as eating when bored or depressed.
5. In the exercise section of the diary, record the form of moderate-intensity exercise you performed and the number of minutes you spent engaging in that activity each day.
6. Measure your waistline weekly and keep a record of the measurements.
7. Weigh yourself at least once a week, preferably at the same time and without clothing.