Nutrition Exercise and Behavior An Integrated Approach to Weight Management 3rd edition Summerfield Solutions Manual

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Chapter 2
Assessment of Body Weight, Body Composition, and Associated Comorbidities

Learning Objectives

Upon successful completion of this chapter, students should be able to:
1. Distinguish between the elements of fat mass and fat-free mass.
2. Distinguish between essential fat and storage fat.
3. Describe how height and weight are most accurately obtained, and discuss limitations of height-weight tables as indicators of overweight, underweight and obesity.
4. Discuss limitations of the BMI in classifying individuals as underweight, overweight, or obese.
5. Discuss the usefulness and limitations of circumference measures, skinfolds, and bioelectrical impedance analysis in estimating body composition.
6. Differentiate between the types of blood cholesterol as indicators of cardiovascular disease risk in children and adults.
7. Define hypertension and discuss its relationship to overweight/obesity.
8. Define type 2 diabetes mellitus and discuss its relationship to overweight/obesity.
9. Characterize the metabolic syndrome and its relationship to overweight/obesity.
10. Describe disease risk factors that should be assessed in underweight individuals.
11. Differentiate between the metabolically healthy and the metabolically unhealthy.

Chapter Outline/Summary

I. Why Assess?

Weight-management assessment has three broad purposes for the client and professional:
- To provide baseline information about body composition, health status, dietary practices, and activity habits.
- To help devise realistic goals for change and develop an individualized treatment program based on those goals.
- To document changes that occur as a result of treatment/behavior change.

An additional purpose of assessment is research—to document population trends in weight that can guide broad policy needs.

II. Anthropometric Assessment

A. What are we made of:

Anthropometrics are measures of body size and proportion.

Two components of human body particularly relevant to weight management: **fat mass** (storage fat as well as small amounts of essential fat found in the nervous system and cell membranes) and **fat-free mass** (bone and other dense connective tissue, body water, and the protein-rich, fat-free portion of the cells that comprises organs, muscles, and the immune system).

B. Common measures of body size:

Measures of body size (height/stature and weight) do not directly address body composition but are used to calculate BMI.

C. Use of BMI in assessment:

The BMI is an indicator of overweight and obesity, but it has several limitations that should be considered when interpreting it.

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D. Height-weight tables:
Height-weight tables, while widely used, have a number of issues largely linked to the way data were collected for their construction and the populations used in collecting data

.

E. Circumference measures:
Circumference measures are helpful in determining body fat distribution and may be preferable to skinfold measures in some instances when estimating percent fat. The waist circumference is a particularly useful circumference measure for estimating internal abdominal visceral fat.

F. Skinfold measures:
Skinfold measures are useful for estimating percent fat but some skill is needed to obtain accurate measures, and appropriate formulas for interpreting measures must be used.

G. Bioelectrical impedance analysis:
Bioelectrical impedance analysis is another good field measure of percent fat but may be less accurate in some environmental and physical conditions.

III. Assessment of Comorbidities

The risk of cardiovascular disease, type 2 diabetes, and all-cause mortality rises with increased BMI. Small weight losses can lower the risk of comorbidities considerably.

A. Cardiovascular disease:
This is the leading cause of death in the U.S. The underlying cause of coronary artery disease is atherosclerosis, linked to high levels of low-density lipoprotein cholesterol and low levels of high-density lipoprotein cholesterol. Abnormal levels of blood lipids are even seen in obese children.

B. Hypertension:
Obese adults and children and adolescents with BMIs above the 95th percentile are more likely to develop high blood pressure than non-obese individuals.

C. Type 2 diabetes mellitus:
Type 2 diabetes is characterized by high blood glucose levels, high circulating insulin (hyperinsulinemia), and insulin resistance, particularly in enlarged fat cells. Obesity, high intake of processed foods, and inactivity increase the risk of developing type 2 diabetes.

D. Metabolic syndrome:
This is a cluster of metabolic abnormalities – hypertension, abnormal blood lipids, elevated fasting glucose, and increased waist circumference that is associated with obesity.

E. Risk factors associated with underweight:
Healthy underweight people do not have a higher risk of chronic disease. Nutritional deficiencies can be assessed by several laboratory tests. Osteoporosis risk may be increased in women with low BMIs.

IV. Body Weight and Mortality

A. Best weight for long life:
Individuals with grade 2 and grade 3 obesity (BMI$\geq$ 35) and those with BMI below 18.5 have recently been found to have higher death rates from all causes.

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Overweight individuals and those with grade 1 obesity do not have higher mortality rates.

B. Metabolically healthy and unhealthy:
Perhaps more important than weight is metabolic health – physically active, healthy diet, normal blood pressure and blood lipids, and normal fasting glucose. These individuals, while they may be obese, do not have higher death or illness rates.

C. Who should lose or gain weight:
BMI alone may not be sufficient reason to recommend weight gain or loss.

Suggested Activities and Applications

Application 2.1. Personal Assessment
Each student will serve as the subject of this assessment. If students prefer to have someone else serve as their subject, the instructor can give permission. Students should be reminded that if they select someone else, all information collected for the assessment must be treated with confidentiality. Students will hand in an assignment that includes these elements:

- A brief description of the subject of this case (gender, age, occupation, and other relevant characteristics).
- The subject's BMI (see Table 1 in Appendix A) and measured waist circumference. Table 2-2 should be used to estimate the health risk associated with this waist circumference and BMI.
- For a person of the subject's gender and height, the recommended weights from the 1959 and 1983 Metropolitan height/weight tables in Appendix A.
- If an elbow caliper is available, individuals can obtain a measurement of their elbow breadth and use Table 4 in Appendix A to determine frame size. Students should comment on how measured frame size compares with what they estimated their subject's frame size to be, and how this affects recommended weight?
- Comment on any apparent contradictions between recommended weight from height/weight tables and BMI health risk category.

Application 2.2. BMI and Health Risk
Students can be put into groups to work on the case study during class, or students can be expected to complete the case study individually in advance of class and be prepared to discuss their responses during the class session.
Answers:

- Maya's "old" BMI falls between 23-24 if using Table 1 in Appendix A. It is calculated using the formula [(weight in lbs X 703)] ÷ (height in ins)^2.
[(140) X 703] ÷ $(65)^2$ = 98420 ÷ 4225 = 23.
- Maya's "new" BMI falls between 26-27 if using Table 1 in Appendix A. It is calculated using the formula [(weight in lbs X 703)] ÷ (height in ins)^2.
[(160) X 703] ÷ $(65)^2$ = 112480 ÷ 4225 = 26.6.
- Her BMI classification is "overweight" and her disease risk is potentially "increased" (Table 2-2), depending on her waist circumference. Two years ago her BMI classification would have been "normal."
- Maya might be at greater risk of type 2 diabetes due to her weight and her family history.
- Maya could begin minimizing her risk of type 2 diabetes by increasing her physical activity, avoiding products that contain high fructose corn syrup, and eating fewer processed foods.

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- Other information that would be useful for Maya to understand her health risk includes her waist circumference.

Activity: Field Assessments of Overweight, Underweight, and Obesity
Rather than provide a detailed lecture about field assessments of overweight, underweight, and obesity, the instructor can assign individual students or groups of students to one of these assessments: (1) height-weight tables; (2) BMI; (3) circumference measures; (4) waist circumference alone; (5) skinfolds; (6) BIA. Each individual or group researches the following questions and reports to the class:

- How useful is the measure in estimating percent fat or health risk?
- What are its limitations?
- How can you increase accuracy/usefulness of the measure?

Chapter 2
Test Bank

True/False
1. Morbidity and mortality are two terms that have the same meaning.
Answer: False

2. Weight management professionals currently have and use ethic or racially specific BMI tables.
Answer: False

3. BMI provides information on weight distribution.
Answer: False

4. A waist to height ratio of 0.5 or higher is predictive of cardiovascular and metabolic abnormalities.
Answer: True

5. Obese adults are six times more likely to develop high blood pressure than lean adults.
Answer: True

6. The rate of Americans with diabetes mellitus has almost doubled in the past decade.
Answer: True

7. Researchers are calling type 2 diabetes mellitus "one of the major threats to human health in the 21st century."
Answer: True

8. Type 2 diabetes affects men and women about equally.
Answer: True

9. In the United States, Non-Hispanic whites have higher rates of diabetes than Asians, Hispanics, and Non-Hispanic blacks.
Answer: False

10. Metabolic syndrome can be reversed with weight loss.
Answer: True

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11. Cardiovascular disease is the leading cause of death in the United States.
Answer: True

12. Even in children, hypertension and abnormal blood lipids are seen in about 60% of obese 5-10 year olds.
Answer: True

13. In the United States, skinfold measures are usually taken on the right side of the body because most equations available for converting skinfolds to percent body fat were developed using the right side of the body.
Answer: True

MULTIPLE CHOICE:

14. Comorbidities are
    A. diseases that exist in clusters and contribute to overall morbidity.
    B. illnesses.
    C. linked to being obese.
    D. All of the above.
Answer: D

15. Anthropometrics is _____.
    A. the study of weight management.
    B. a sturdy wall mounted or free-standing device used to measure stature.
    C. measures of body size and proportion (height, weight, circumference, and skinfolds).
    D. cellular resistance to the uptake of glucose in presence of insulin.
Answer: C

16. This method of assessing body composition involves electromagnetic radiation, which causes cell nuclei to spin and absorb energy. When nuclei realign, released energy creates an image. Examination of cross-sectional areas permits regional determination of fat, muscle, bone and calculation of body composition.
    A. Dual-energy x-ray absorptiometry
    B. Nuclear Magnetic Resonance Imaging (NMR; MRI)
    C. Computed tomography
    D. All of the above
Answer: B

17. A BMI for an adult that is below _____ is used to classify someone as underweight.
    A. 15
    B. 18.5
    C. 25
    D. 30
Answer: B

18. A BMI for an adult of _____ or greater indicates overweight.
    A. 15
    B. 18.5
    C. 25
    D. 30
Answer: C

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19. An expert committee of the American Academy of Pediatrics defines obesity in children and adolescents as BMI at or above the _____ percentile.
A. 75th percentile
B. 85th percentile
C. 90th percentile
D. 95th percentile.
Answer: D

20. An expert committee of the American Academy of Pediatrics defines overweight in children and adolescents as BMI at or above the _____ percentile.
A. 75th percentile
B. 85th percentile
C. 90th percentile
D. 95th percentile.
Answer: B

21. This type of measure is used to estimate FFM, fat mass, and fat distribution:
A. BMI.
B. Circumference measures.
C. Both BMI and circumference measures estimate fat distribution.
D. Neither BMI nor circumference measures estimate fat distribution.
Answer: B

22. This type of measure indicates the amount of fat stored subcutaneously:
A. Waist circumference measure
B. BMI
C. Skinfold measure
D. Height-to-weight ratio
Answer: C

23. This type of fat is stored directly under the skin, which is measured with skinfolds.
A. Subcutaneous fat
B. Internal abdominal visceral fat
C. Essential fat
D. None of the above
Answer: A

24. This method of determining fat-free mass uses a weak electrical current that passes through body tissue but is impeded by tissues that contain little water (such as fat).
A. Dual-energy x-ray absorptiometry
B. Bioelectrical impedance analysis (BIA)
C. BMI
D. All of the above
Answer: B

25. This type of cholesterol is sometimes called “bad cholesterol.
A. Low-density lipoprotein (LDL) cholesterol
B. High-density lipoprotein (HDL) cholesterol
C. Both LDL and HDL are called “bad” cholesterol

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Answer: A

26. High _____levels are associated with a reduced risk of heart disease.
A. LDL cholesterol
B. HDL cholesterol
C. Triglycerides
D. All of the above.
Answer: B

27. _____ make up over 90% of the dietary fats that we consume and store in our fat cells.
A. High-density lipoprotein
B. Low-density lipoprotein
C. Triglycerides
D. Subcutaneous fat
Answer: C

28. This racial/ethnic group has the highest rates of diabetes:
A. Non-Hispanic whites
B. Non-Hispanic blacks
C. Asians
D. American Indians/ Pacific Islanders
Answer: D

29. This disease is characterized by high blood glucose levels, high circulating insulin levels, and insulin resistance.
A. Hypertension
B. Cardiovascular disease
C. Type 2 diabetes
D. All of the above
Answer: C

30. New obesity guidelines recommend weight loss for anyone with a BMI of ___ or greater.
A. 18.5
B. 20
C. 25
D. 30
Answer: C

31. What lipoprotein is responsible for transporting cholesterol back to the liver from the periphery?
A. chylomicron
B. low-density lipoprotein
C. high-density lipoprotein
D. very-low-density lipoprotein
Answer: C

32. Which of the following is an advantage of using the fatfold measurement over the BMI?
A. it is easier to perform
B. it is better at predicting the risk of disease

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C. it is less expensive to perform
D. it can help determine if excess weight is due to muscle mass or fat
Answer: D

FILL IN THE BLANK:
33. List one of the three broad purposes of weight management assessment:
_____
(see pg. 24)

34. List two techniques for accurate assessment of body composition:
1)_____
2)_____
(See pg. 26-27)

35. Provide two examples of the limitations of using BMI to determine overweight/obesity:
1)_____
2)_____
(see pg. 29)

36. List two of the limitations associated with using height-weight tables for assessing whether or not someone is overweight or obese.
1)_____
2)_____
(see pg. 31)

37. List one of the usual sources of error in the skinfold method for assessing body fat:_____
(see pg. 36-37)

38._____ is a cluster of metabolic abnormalities and is associated with an increased risk of disease (e.g. hypertension, abnormal blood lipids, elevated fasting glucose, and central obesity).
Answer: Metabolic Syndrome

39. List two comorbidities associated with higher BMIs.
1)_____
2)_____
Possible answers: type 2 diabetes, cardiovascular disease, hypertension, metabolic syndrome, sleep apnea, pregnancy complications, polycystic ovary syndrome, gastroesophageal reflux disease, nonalcoholic fatty liver.

SHORT ANSWER:

40. What is fat-free mass? Why might fat-free mass vary from one individual to the next?

41. Why might weight management professionals use caution when using anthropometrics as the indicator of success in assessing weight/fatness?

42. What is essential fat?

43. Describe a limitation of Bioelectrical Impedance Analysis (BIA) to measure fat-free mass

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(FFM).

44. Describe two anthropometric assessments used by weight management professionals.

45. What is hypertension? Why is this important to consider by weight loss professionals working with overweight/obese clients?

46. What risk factors should be assessed for underweight individuals?

47. Differentiate between the metabolically healthy and the metabolically unhealthy.

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