MEDICINE

432 Team

44 Obesity

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COLOR GUIDE: • Females' Notes • Males' Notes • Important • Additional

Objectives

1. Definition
2. Pathogenesis of obesity
3. Factors predisposing to obesity
4. Complications of obesity
5. Assessment and screening of obesity
6. Management of obesity

Obesity

Obesity is widely regarded as a **pandemic** and it's defined by the WHO as: "Abnormal or **excessive fat** accumulation in adipose tissue, to the extent that **health is impaired**" and Once it develops **it is difficult to 'cure'** and usually persists throughout life

Prevalence

Well recognized as a serious and growing public health problem .WHO estimates that over 1.7 billion people around the world are overweight, 310 million are obese. Rates of obesity have tripled in the last 20 years in the developing world

In Saudi Arabia

Prevalence of overweight: 36.9 % : 42% male, 31.8 % female

Prevalence of obesity: 35.5 % , severe obesity 3.2 % with female of 44 %, male 26.4 %

The prevalence of overweight and **obesity was higher** amongst a group of **married women** than among a group of single women in Saudi Arabia

Complications of obesity (Health consequences of obesity)

Obesity has adverse effects on both mortality and morbidity it is suggested that obesity at age 40 years can reduce life expectancy by up to 7 years for non-smokers and by 13 years for smokers. Coronary heart disease is the major cause of death but **cancer rates are also increased** in the overweight, especially colorectal cancer in males and cancer of the gallbladder, biliary tract, breast, endometrium and cervix in females.(*Davidson*)

5.23 Complications of obesity	
Risk factors	**Outcomes**
'Metabolic syndrome' Type 2 diabetes Hypertension Hyperlipidaemia	Coronary heart disease Stroke Diabetes complications
Liver fat accumulation	Non-alcoholic steatohepatitis Cirrhosis
Restricted ventilation	Exertional dyspnoea Sleep apnoea Respiratory failure (Pickwickian syndrome)
Mechanical effects of weight	Urinary incontinence Osteoarthritis Varicose veins
Increased peripheral steroid interconversion in adipose tissue	Hormone-dependent cancers (breast, uterus) Polycystic ovary syndrome (infertility, hirsutism; p. 760)
Others	Psychological morbidity (low self-esteem, depression) Socioeconomic disadvantage (lower income, less likely to be promoted) Gallstones Colorectal cancer Skin infections (groin and submammary candidiasis; hidradenitis)

Mechanism of (hunger)

- Signals from peripheries are carried out by neurotransmitters and hormones to CNS in presence or absence of food
- Signal from fat by hormone leptin to hypothalamus **to reduce food intake and increase sympathetic activity and energy expenditure** (**obese people are leptin resistant**. In other word they have more leptin but it doesn't work)
- Gastric distension and contraction send signal for satiety and hunger
- Fall in blood sugar send signals to CNS for hunger
- Sympathetic activity from food thermogenesis leads to reduce food intake
- Ghrelin (hunger hormone) **Secreted in the stomach** and acts on hypothalamus to **stimulate appetite** (Peak before meal and decrease after)

Etiology & Pathogenesis

Obesity happen due to an imbalance in energy intake and energy expenditure over along period of time Due to **combination of several factors:**

- **Lifestyle** (Environmental factors)
- **Genetic** factors (there influence mostly account for < 5% of variation in body weight.)
- **Psychosocial** factors

Reversible causes of obesity (secondary causes)

In a small minority of patients presenting with obesity, specific causal factors can be identified and treated such as:

Endocrine factors

- Hypothyroidism

> **Note: Davidson**
>
> *Few rare single gene disorders have been identified which lead to severe childhood obesity. These include mutations of the melanocortin-4 receptor (MC4R) that accounts for approximately 5% of severe early-onset obesity*

- Cushing's syndrome
- Insulinoma
- Hypothalamic tumours or injury

Drug treatment (e.g. corticosteroid and B-blocker)

NOTE: A patient who has recently gained substantial weight or at a faster rate than previously, and is not taking relevant drugs is more likely to have one them

Clinical assessment and investigations

In assessing an individual presenting with obesity, the aims are to:

- Quantify the problem (measurement)
- Exclude an underlying cause
- Identify complications
- Reach a management plan

Obesity is usually measured (Quantify the problem) on the basis of calculation of

BMI (Body mass index**):** (kg/m2)

- Reliable, easy, correlated with percentage of body fat Guide for selection of therapy.

- Greater BMI is associated with **increased death** from all causes and from CVD

Measurement of waist-hip ratio

- Measurement of central adiposity (Reflects visceral adiposity)
- Associated with increased risk of morbidity, mortality and cardiovascular diseases.

5.26 Quantifying obesity with body mass index (weight/height²)

BMI (kg/m²)	Classification*	Risk of obesity comorbidity
18.5–24.9	Normal range	Negligible
25.0–29.9	Overweight	Mildly increased
> 30.0	**Obese**	
30.0–34.9	Class I	Moderate
35.0–39.9	Class II	Severe
> 40.0	Class III	Very severe

Classification (per fat distribution)

Android (abdominal or central)

- Collection of fat **mostly in the abdomen** (above the waist)
- Apple-shaped
- More in **males**
- Associated with **metabolic diseases**: (**DM2 - Hypertension - Dyslipidemia**)

Gynoid (below the waist,)

- Collection of fat on hips and buttocks
- Pear-shaped
- More in **females**
- Associated with **mechanical problems** (hip and knee)

> *Note: Davidson*
>
> *The key difference between these depots of fat may lie in their vascular anatomy, with intra-abdominal fat draining into the portal vein and thence directly to the liver. Thus many factors that are released from adipose tissue (including free fatty acids; 'adipokines', such as tumor necrosis factor- ⟨, adiponectin and resistin; and steroid hormones) may be at higher concentration in the liver and hence induce insulin resistance and promote type 2 diabetes*

Why is it important to look at it?

It is a common disease with **significant morbidity and mortality** and without screening many high risk patients may not receive counseling about health risks, lifestyle changes, obesity treatment options, and risk factor reduction.

Screening with **BMI**, **waist circumference**, and risk factor assessment is **inexpensive and available to nearly all clinicians.**

Weight loss is associated with a reduction in **obesity-associated morbidity** (by reducing hyperlipidemia, hypertension and insulin resistance). The patient will have better quality of life

P.s: Upon examining a patient noticing Acanthosis nigricans is an indication of insulin resistance and other diseases such as: hypothyroidism, acromegaly, polycystic ovary disease, insulin-resistant diabetes, or Cushing's disease.

Management

Management goals

- Prevention of further weight gain
- Weight loss to achieve a realistic, target BMI (diet is the most effective way)
- Long-term maintenance of a lower body-weight (exercise is the most effective way)

BY using 3 main interventions:

- **Lifestyle intervention** (first line therapy)
    - Diet
    - Physical activity
    - Behavior change

Initial goal:10% weight loss

- **Significantly decreases risk factors**
- Reduction of calories intake 500-1000 calories/day

Slow weight loss is **preferred** approach

- Rapid weight loss is almost always followed by rapid weight gain
- Rapid weight loss is associated with **gallstones** and **electrolytes abnormalities**

After 6 months, weight loss is difficult

- **Ghrelin and leptin effect**
- Energy requirement decreased as weight decreases

Set goals for weight maintenance **for next 6 months then reassess**

- Diet

Indicated for all with **BMI > 30** and those with **BMI 25- 30 with comorbidities**

The patient should be taught about: **food composition** (fat, CHO, protein), **Calories contents** of food by reading labels And **Type of food to buy** and to prepare

There are **lots of types of diets** that can lose weight such as Low calories, diet-portion controlled Low fat diet, Low CHO diet Meditarrean diet (it's consider better than the others due to the use of vegetables and olive oil) in the end the most important thing in losing weight is calorie count and it's **Adjust based on activity and weight**

> *Note: Davidson*
>
> *There is no role for starvation diets, which risk profound loss of muscle mass and the development of arrhythmias*

- Physical activity

It's integral part of weight loss and preventing weight regain it also **Reduce risk** of (**DM**, **heart disease**, **hypertension**). Doing it Alone will not help. (To lose weight the patient need to do at least 250 min of moderate exercise **per week**)

It's important to

Start slowly

- Change of daily living activities
- Avoid injury

Increase intensity and duration gradually

Long –term goal:

- 30-45 min or more of physical activity
- daily 5 or more days per week
- Burn 1000+ calories per week

o Behaviour change
Keep agenda of diet and activity

- Set specific goals regarding: diet, activity related behavior Reminder system
- Reward yourself
- Don't deprive yourself, watch portion

Track improvement:

- Weight measurement on regular basis

- **Pharmacotherapy**

  Used only when 6 months trial of weight and exercise fail to achieve weight loss and should not be used for cosmetic weight loss.

  - **Orlistat** (first Pharmacotherapy drug)
    <mark>A lipase inhibitor</mark>, **reduces the absorption of dietary fat**
    Lowers Cholesterol (4-11%) & LDL (5-10%)
    Side effect include **Chronic malabsorption** syndrome and **Cholestasis (**patients taking orlistat adhere better to low-fat diets in order to avoid unpleasant gastrointestinal side-effects)

  - **Sympathomimetic drugs**
    - Stimulate release of norepinephrine or inhibits its reuptake by nerve terminals
    - Block serotonin and NE reuptake (Sibutramine)
    - Directly act upon adrenergic receptor
    - Reduced appetite by early satiety

  - **Other Drugs** (they're not used for weight loss but have the effect of it)
    - Antidepressant
    - Antiepileptic
    - Diabetic drugs: metformin

- **Surgical intervention**
  - Well-informed and motivated patients
  - Acceptable risk of surgery
  - <mark>Failed previous non-surgical method</mark>
  - Have BMI > 40 or BMI > 35 with comorbidities like diabetes, sleep apnea, osteoarthritis, cardiomyopathy
  - Age 18-60
  - Psychologically stable

Types

  - Restrictive-type of surgery:
    - Vertical banded-gastroplasy
    - Gastric banding
  - Malabsorptive and restrictive:
    - Roux-en-Y gastric bypass
    - Biliopancreatic diversion

Note: <mark>*important*</mark>

Follow up is crucial
Patient must be given supplements some time for life

SUMMARY

1. Obesity is an Abnormal or excessive fat accumulation in adipose tissue, to the extent that health is impaired.
2. Coronary heart disease is the major cause of death in obese. Cancer rates are also increased in the overweight, especially colorectal cancer in males and cancer of the gallbladder, biliary tract, breast, endometrium and cervix in females.
3. Primary causes of Obesity: Lifestyle, Genetics, and psychosocial factors. While secondary causes include: Hypothyroidism, Cushing's syndrome, Insulinoma, and Hypothalamic tumors or injury.
4. Measurement of waist-hip ratio Measures central adiposity reflecting visceral adiposity.
5. Weight loss is associated with a reduction in obesity-associated morbidity (by reducing hyperlipidemia, hypertension and insulin resistance). The patient will have better quality of life.
6. First line of management is Lifestyle, which includes Diet, Physical activity, and behavioral changes.
7. Pharmacological intervention in done when a 6 month trial of lifestyle therapy fails, after that we introduce surgery to the management plan.

IMPORTANT NOTES FROM EXTERNAL RESOURCES

	Notes
Davidson	1- It is not true that obese subjects have a 'slow metabolism', since their BMR is higher than that of lean subjects. 2- There is some evidence that weight loss diets are most effective in their early weeks, and that compliance is improved by novelty of the diet; this provides some justification for switching to a different dietary regime when weight loss slows on the first diet. Vitamin supplementation is wise in those diets in which macronutrient balance is markedly disturbed 3- There is no role for starvation diets, which risk profound loss of muscle mass and the development of arrhythmias

Questions

1) Body mass Index (BMI) gives a measure of relative weight adjusted for height. The healthy range of BMI is between?
   a. 15-18.4
   b. 18.5-25.9
   c. 25-29.9
   d. 30-34.9

2) Which of the following **is not** a secondary cause of obesity?
   a. Hypothyroidism
   b. Cushing's syndrome
   c. Insulinoma
   d. diabetes mellitus

3) Rapid weight loss is a cause of:
   a. Electrolyte imbalance
   b. Diabetes mellitus
   c. Dehydration
   d. Osteoporosis

4) Orlistat is used when:
   a. BMI > 40
   b. When trial of weight and exercise fail
   c. BMI >30 with co-morbidities
   d. Well-informed and motivated patients

5) Which one is not a type of Bariatric restrictive surgery?
   a. Vertical banded-gastroplasy
   b. Gastric banding
   c. Roux-en-Y gastric bypass

432 Medicine Team Leaders

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Answers:

1st Question: B

2nd Question: D

3rd Questions: A

4th Questions: B

5th Questions: C