



PRIMARY HEALTHCARE TEAMWORK

Approach To Obesity Prevention & Management

Objectives:

- ★ Define obesity and classify the degree of obesity.
- ★ Prevalence of obesity in Saudi Arabia.
- ★ Obesity prevention interventions in the community.
- ★ Common causes of obesity.
- ★ Common health problems associated with obesity.
- ★ Evidence based approach to weight reduction.
- ★ Role of health team, medical students, and school health professionals in addressing the problems of obesity in the community

Color index:

Original text **Important** Doctor's notes **Golden notes** Extra

Introduction

Background

- Obesity results from accumulation of body fats overtime. It occurs when the energy intake exceeds energy requirements.
- This could occur as a result of many factors including increased food intake, physical inactivity, and genetic factors. **it's multifactorial**

Definitions

- Overweight: Defined as BMI greater than or equal to 25 kg/m², the point at which all-cause, metabolic, cancer, and cardiovascular morbidity begins to rise.
- Obesity: A state of excess adipose tissue mass. **Defined by most authorities as BMI greater than or equal to 30 kg/m²**
- Satiation: Level of fullness during a meal.
- Satiety: Level of hunger after a meal.
- **BMI is the standard method to diagnose obesity.**

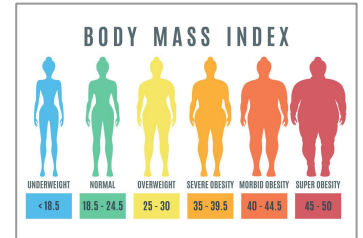
Overweight & Obesity in KSA

- In Saudi Arabia, obesity has become one of the most common public health problems affecting people of both sexes and all age groups.
- According to Saudi Health Interview Survey (SHIS) conducted in 2013, obesity and overweight affect 28.7% and 30.7% of individuals 15 years and older respectively (collectively overweight and obesity affect 59.4% of the total population).
- **Prevalence in adults :**
 - 28.7% were obese (body mass index ≥ 30 kg/m²).
 - Prevalence of obesity was higher among women (33.5% vs 24.1%).
- **Prevalence in children (5-18):**
 - Overweight 23.1%
 - Obesity 9.3%
 - Severe obesity 2% **AKA Morbid obesity**
 - **SA & Kuwait have the highest prevalence of children obesity in the middle east.**

Obesity Classification

Obesity Classification:

- **Body Mass Index:** Most common method used to classify obesity
- A measurement of the relative composition of lean body mass and body fat, calculated as (weight in kilograms)/(height in meters).
- **Healthy Weight:** 18.5–24.9 Kg/M²
- **Overweight:** 25–29.9 Kg/m²
- **Obesity I:** 30–34.9 Kg/m²
- **Obesity II:** 35–39.9 Kg/m²
- **Obesity III:** 40 Kg/m² or more.
- **Morbid obesity:** is defined as a BMI greater than or equal to 40 kg/m²
- **Super obesity:** is defined as a BMI greater than or equal to 50 kg/m²
- Interpret BMI with caution in highly muscular adults as it may be a less accurate measure of adiposity in this group.
- BMI is not as accurate a measure of overweight/obesity in patients with heart failure, pregnant women, body builders, professional athletes, elderly patients, **children (we use growth charts instead)** and certain ethnic groups.
- Based on $BMI = \frac{\text{Weight (kg)}}{\text{Height}^2 (\text{m}^2)}$



Waist Circumference:

- Base assessment of the health risks associated with being overweight or obese in adults on BMI and waist circumference as follows:
 - For **men**, waist circumference of less than 94 cm is low, 94–102 cm is high and more than 102 cm is very high.
 - For **women**, waist circumference of less than 80 cm is low, 80–88cm is high and more than 88 cm is very high.
 - Used to look for the type of obesity (central obesity) and the probability of developing obesity complication & CV complication.

Obesity & Waist Circumference (NICE guidelines 2014)

Table 2: Classification of Obesity²

| BMI | Class |
|-----------|------------------------------------|
| <18.5 | Underweight |
| 18.5-24.9 | Normal |
| 25-29.9 | Overweight |
| 30-34.9 | Obesity class I (mild) |
| 35-39.9 | Obesity class II (moderate) |
| ≥40 | Obesity class III (morbid obesity) |

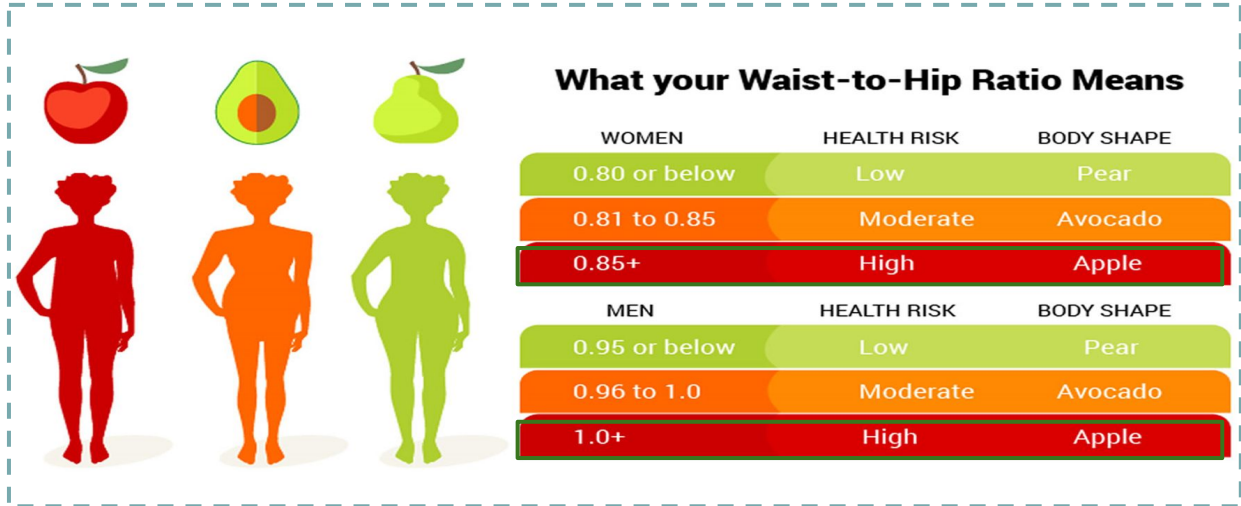
Table 3: Measuring Waist Circumference⁴

- Use a measuring tape that is checked monthly for stretching (replace if stretched).
- Ask the person to remove heavy outer garments, loosen any belt and empty pockets.
- Ask the person to stand with their feet fairly close together (about 12–15 cm) with their weight equally distributed and to breathe normally.
- Holding the measuring tape firmly, wrap it horizontally at a level midway between the lower rib margin and iliac crest (approximately in line with the umbilicus). The tape should be loose enough to allow the measure to place one finger between the tape and the person's body.
- Record the measurement taken on an exhalation

Obesity Classification

Waist to Hip Ratio:

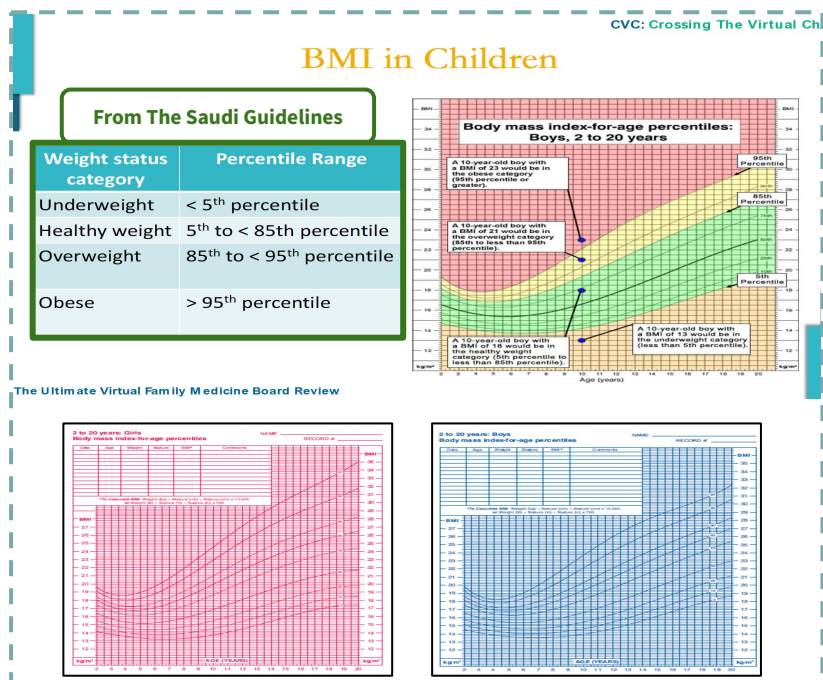
- Has the same goal as waist circumference, to check health related risks that is associated with central obesity specifically.



Overweight and Obesity:

- Adult
 - Overweight: ≥ 25 kg/m²
 - Obesity: ≥ 30 kg/m²
- Children
 - Underweight:** < 5th percentail
 - Normal:** 5th to < 85th percentail
 - Overweight:** 85th % to 95th percentail for age and gender
 - Obese:** > 95th % for age and gender

Children BMI Charts (CDC) / (Growth Chart)



Causes of Obesity

Causes of Obesity:

- **Medical:**
 - Thyroid disease
 - Cushing syndrome
 - **PCOS:** Due to insulin resistance (Common in young females as a cause of obesity)
- **Medications:**
 - Corticosteroids
 - Antidiabetic agents (sulfonylureas, thiazolidinediones, insulin)
 - Antiepileptics
 - Antidepressants **especily** TCA (amitriptyline, imipramine, doxepin)
 - Anxiolytics
 - 2nd generation antipsychotics
- Other causes like: Sedentary lifestyle, eating habits and the pictures below

Table 4: Risk factors of obesity¹⁵

Evidence has shown that individuals with following conditions are at high-risk of becoming overweight or obese.

- After smoking cessation.
- On certain medications (see table 5)
- Polycystic ovarian syndrome
- Hypothyroidism and pseudo-hypoparathyroidism
- Hypogonadism
- Cushing syndrome
- Hypothalamic Obesity
- Genetic Syndromes (e.g. Prader-Willi syndrome, Alstrom syndrome, Bardet-Biedl syndrome, Cohen syndrome, Borjeson-Forsman-Lehmann syndrome, Frohlich syndrome) **Especially in children**
- Growth hormone deficiency
- Eating disorders (especially binge-eating disorder, bulimia nervosa, and night eating disorder)
- Dyslipidemia.
- Family history of obesity.
- Pregnancy, post-natal weight retention, and at the menopause

Table 5: Medications that interfere with weight loss or induce weight gain¹⁵

| Medication Class | Alternatives |
|---|---|
| Antipsychotics/ Mood Stabilizers • Phenothiazines • Atypical antipsychotics: Clozapine, olanzapine, risperidone, quetiapine • Lithium | Ziprasidone, Aripiprazole |
| Antidepressants: • Sedating tricyclics: Amitriptyline > imipramine • Monoamine oxidase inhibitors (non-selective): Isocarboxazid, Phenelzine, tranylcypromine • Selective serotonin reuptake inhibitors: Paroxetine > citalopram, fluvoxamine, sertraline • Mirtazapine | Nefazodone, Bupropion, Venlafaxine |
| Antiepileptics: • Gabapentin, Valproate, Carbamazepine, Pregabalin | Lamotrigine, Topiramate |
| Antiepileptics/antipsychotics used in bipolar disorder • Valproate, Carbamazepine, Clozapine, Olanzapine, Risperidone | Lamotrigine, Topiramate, Ziprasidone |
| • Hormonal contraceptives | Barrier methods |
| • Corticosteroids | NSAIDs |
| Progestational steroids: • Megestrol acetate | Weight loss Aromatase Inhibitors |
| Antidiabetic agents: • Insulin • Sulfonylureas • Thiazolidinediones | Metformin, Acarbose |
| Antihypertensives: • Beta and alpha1- adrenergic blocking agents | ACEI, ARB, Diuretics, CCB |
| Antihistamines: • Cyproheptadine | Diphenhydramine, Decongestants, inhaler |

Metabolic Syndrome

Metabolic Syndrome

- **Metabolic Syndrome** (syndrome X, insulin resistance syndrome):
 - A constellation of metabolic abnormalities that confer increased risk of cardiovascular disease and diabetes mellitus.
 - Major features include central obesity, hypertriglyceridemia, low HDL cholesterol, hyperglycemia, and hypertension.
- Treatment of metabolic syndrome is comprehensive.

Based on NCEP/ATP III Guidelines Criteria:

- **Combination of 3 of the following:**
 - Fasting glucose ≥ 110 mg/dL
 - Waist circumference > 40 " men, > 35 " women
 - HDL < 50 mg/dL women, < 40 mg/dL men
 - Triglycerides ≥ 150 mg/dL
 - Blood pressure $\geq 130/85$ mmHg

Based on WHO Clinical Criteria:

1. **Insulin resistance, identified by one of the following:**
 - Type 2 diabetes
 - Impaired fasting glucose (Fasting blood glucose)
 - Impaired glucose tolerance (post-prandial blood glucose)
 - Or for those with normal fasting glucose levels (< 6.1 mmol/L), glucose uptake below the lowest quartile for the background population under investigation under hyperinsulinemic, euglycemic conditions.
2. **Plus any two of the following:**
 - Antihypertensive medication and/or high blood pressure (≥ 140 mmHg systolic or ≥ 90 mmHg diastolic)
 - Plasma triglycerides ≥ 1.7 mmol/L
 - HDL cholesterol < 0.9 mmol/L in men or < 1.0 mmol/L in women
 - BMI > 30 kg/m² and/or waist:hip ratio > 0.9 in men, > 0.85 in women
 - **Urinary albumin excretion rate ≥ 20 ug/min or albumin:creatinine ratio ≥ 3.4 mg/mmol**

Obesity Associated Health Problems:

- 1** **Breathlessness and sleep apnea**
Mortality (BMI >30 kg/m²)
Coronary heart disease, Hypertension
- 2** **Osteoarthritis (knee)**
Gout / hyperuricemia
- 3** **Type 2 DM**
Dyslipidemia
- 4** **Cancers** (breast in post-menopause,
endometrium, colon, esophagus)
- 5** **Gallbladder disease**

Obesity Implications:

- CVD (Hypertension, dyslipidemia, heart disease and stroke).
- Type 2 diabetes (x5), osteoarthritis.
- Fatty liver and cholesterol gallstones.
- Asthma and other respiratory disturbances.
- PCOS (**Bidirectional**), abnormal menses, infertility, menstrual disorders.
- Sleep disturbances (sleep apnea).
- Increase risk of 13 types of cancer (account for 40% of all cancers).
 - Large increase: uterine, gallbladder, kidney.
 - Others: cervical, ovarian, postmenopausal breast, pancreatic, hepatic, gastric, esophageal, colorectal, prostate, meningiomas, leukemia, thyroid.

Primary Prevention Of Obesity?

- **Education:**
 - Maintaining a balanced diet and a healthy behavior
 - Special consideration for children:
 - Avoid using food as a reward.
 - Encouragement of healthy food consumption.
- **Exercising and active lifestyle:**
 - **Walk and exercise for 30 minute or more, 5 days a week.**
 - Reduce time spent in front of TV, computer, and mobiles.
- **Breastfeeding:**
 - Recent systematic review. However, found only a 10 percent reduction of overweight children with long term breastfeeding.

Prevention

Secondary Prevention

- Exercise.
- Diet. (Diet and exercise can be considered as both primary and secondary prevention)
- Drug Management.
- Bariatric surgery.

Tertiary Prevention

- Decreasing the progression to more severe obesity.
- Reducing the likelihood of associated musculoskeletal, metabolic, or vascular disorders (e.g., osteoarthritis, diabetes, or cardiovascular disease).

Obesity health problems ? How to address ?

- **Health Team:**
 - Work with other health care team members to develop a comprehensive scheme for them.
 - Create non-judgmental atmosphere.
 - Consider barriers people might have.
- **School Health Professionals:**
 - We target the young population (mostly children), because they're the most vulnerable.
 - Promoting Healthy Nutrition at School.
 - Increase daily physical activity of the students (exercise sessions in the morning).
 - Implement a screening program to detect and provide appropriate care
- **Medical Students**
 - Awareness campaigns.

Evidence-based approach to decrease weight:

- Diet.
- Physical activity.
- Behavioral interventions.
- Medications.
- Bariatric surgery.
- It's very important to know the indications of each one of these interventions.

Management Of Obesity

Management Of Obesity

- The ultimate goal of weight management is to improve health and to reduce the risk of obesity related comorbidities.
- For adults with BMI 25-35 kg/m² the target is to lose 5-10% of body weight (0.5-1 kg per week).
- For adults with BMI >35 kg/m² and obesity-related co-morbidities the target is to lose a greater than 15-20% of body weight.

1. Diet:

- No diet has been shown to be better than others for weight loss.
- Low carb are fastest and reduce insulin resistance; that edge is lost by 6 months.
- Structured plans (Weight Watchers, Biggest Loser, Jenny Craig, etc.) good long term, but only if they stay on the plan (can be very costly).
- Satiety plans (AimHungry.com, Volumetrics) successful long term.
- Raw food, vegetarian, Paleo diets are all effective due to reduced calories.
- HCG diet: just an extremely low-calorie diet-500 calories/day.
- More frequent smaller meals.
- **Mediterranean diet and DASH (not weight loss diets) are healthiest.**
 - Decreases risk of DM, CVD, PVD.
 - Improves diabetes even in the absence of weight loss.
- Energy deficit of 500-750 kcal/day or 30% energy deficit:
 - Women 1200-1500 kcal/day; Men 1500-1800 kcal/day
- Maximal weight loss at 6 months is 4-12 kg (5-10%).
- Lesser losses up to 2 years of 3-4 kg due to slow weight regain.
- No benefit from artificial sweeteners.
- **No diet is better than the other, you can recommend any type of diet to the patient, but it has to be supervised by a dietitian.**

Dietary interventions (Saudi guidelines):

- Target energy deficit of **500-1000 kilo-calorie** per day (3,500 kcal/week). Attention should be given to the dietary preferences of the individual (NHMRC, evidence grade A).
- Provide advice on dietary modification appropriate to the patient condition (type, quantity and/or frequency) to achieve and maintain a hypo-caloric intake (a high-protein or a low-fat diet with acceptable macronutrient distribution range).
- Patients should be advised to:
 - Choose low energy-dense foods (e.g. whole-grains, cereals, fruits, vegetables, and salads) and reduce intake of energy-dense foods (e.g. animal fats, sugary drinks).
 - Reduce consumption of junk food.
 - Undertake regular self-weighing.

Management Of Obesity

2. Exercise

- 5-7 times/wk, 30 minutes (45-60 min for weight loss).
 - 150 min/wk of moderate aerobic activity.
 - 55-69% predicted max. heart rate.
 - Resistance training (5 major muscle groups twice weekly).
 - At least 1 hour daily for children .
- 10% decrease in cardiovascular risk for every 10,000 steps/day at baseline.
- Aerobic and resistance training best approach.
- Structured: 2-5 supervised sessions for 12-16 weeks.
- Exercise before and during pregnancy reduces risk of developing gestational diabetes; exercise after pregnancy decreases risk of developing diabetes.

Benefits of Exercise:

- Reduction in the risk of:
 - DM
 - CHD
 - Osteoporosis
 - Some cancers
- Management of:
 - DM
 - Hypertension
 - Hypercholesterolaemia
 - Arthritis

Diet or Exercise?

- Diet only: short term effects unless maintained.
- Exercise only: help in preventing weight gain but not in significant weight loss.
- **Therefore, both of them are required as lifestyle modifications for obesity.**

Weight Loss Maintenance:

- Eat breakfast daily.
- Face-to-face or telephone-delivered maintenance programs.
- Provide at least monthly contact with interventionist.
- Learn to eat when hungry and eat slowly.
- Maintain high levels of physical activity (200-300 min/wk).
- Monitor body weight at least once a week.
- Consume a reduced calorie diet to maintain body weight.

Management Of Obesity

3. Behavioral Interventions:

- Important especially in younger population.
- Adults:
 - Self-monitoring.
 - Goal setting (weight loss of 0.5-1 kg/week till the target BMI is reached).
 - Slowing rate of eating.
 - ensuring social support.
 - Cognitive restructuring (modifying thoughts).
 - Strategies for dealing with weight regain.
- Children:
 - Stimulus control.
 - Self-monitoring.
 - Goal setting.
 - Rewards for reaching goals problem solving.

Readiness To Change Lifestyle Behaviors:

- Assessment questions.
- How important do you think it is for you to make changes at the moment?
- How confident are you that you can change your eating patterns and increase your physical activity to improve health?
- Are there any stressful events in your life now that might get in the way?
- Do you feel you can succeed in changing health behaviors', and how much do you believe it is worth the effort?
- Can you picture yourself changing health behaviors? How do you think your friends and family will react to your efforts?
- Are there people who can support you to change health behaviors'? Do you think they will help you in your efforts?

Figure 1: Stages of Change Model to Assess Readiness to Lose Weight¹⁵

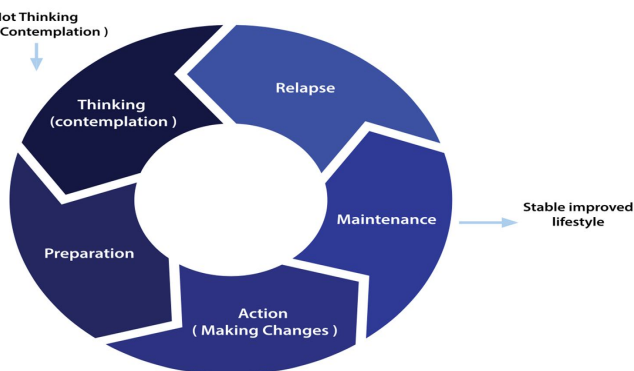


Table 10: Applying the Stages of Change Model to Assess Readiness to Lose Weight¹⁵

| Stages | Characteristics | Patient verbal cues | Appropriate intervention | Sample dialogue |
|-------------------|--|--|---|---|
| Pre-contemplation | Unaware of problem; no interest in change | I am not really interested in weight loss. It is not a problem | Provide information about the health aspects of obesity | Would you like to read some information about the health aspects of obesity |
| Contemplation | Aware of problem, beginning to think of changing | I know I need to lose weight, but with all that's going on in my life right now, I am not sure I can | Help resolve ambivalence, discuss barriers | Let's look at the benefit of weight loss, as well as what you may need to change |
| Preparation | Realizes benefits of making changes and thinking about how to change | I have to lose weight and I am planning to do that | Teach behavior modification; provide education | Let's take a closer look at how you can reduce some of the calories you eat |
| Action | Actively taking steps toward change | I am doing my best; this is harder than I thought | Provide support and guidance, with a focus on the long term | It is terrific that you are working so hard. What problems have you had so far? How have you solved them? |
| Maintenance | Initial treatment goals reached | I've learned a lot through this process | Relapse control | What situations continue to tempt you to over eat? What can be helpful for the next time you face such a situation? |

Management Of Obesity

4. Pharmacological Treatment (Saudi Guidelines)

- Pharmacologic treatment may be considered as an adjunct to lifestyle interventions.
- Consider adding pharmacologic agent with lifestyle interventions on an individual case basis after assessment of risks and benefits:**
 - In obese adults (BMI ≥ 30 kg/m²) who failed to achieve or maintain weight loss with lifestyle modification program.**
 - In obese or overweight individuals (BMI ≥ 28 kg/m² with co-morbidities)** to assist in reducing obesity-related co- morbidities, like type 2 diabetes, impaired glucose tolerance or the risk factors for type 2 diabetes.
 - In adults who are not attaining, or who are unable to maintain clinically important weight loss with dietary and exercise therapy.**
 - In pre-pubertal obese children Pharmacological therapy is generally not recommended, however, it can be considered only (treatment with Orlistat) under supervision of specialized team, if severe co-morbidities are present, e.g. orthopedic problems, sleep apnea, severe psychological disease or within the context of a supervised clinical trial.
- Discuss with the patient the potential benefits, limitations, drug's side effects, and the temporary nature of the weight loss achieved with medications before initiating therapy.
- Discontinue use if the drug is ineffective, or if there are serious adverse effects.
- Refer for specialist services if needed for comorbidities such as musculoskeletal, physiological, endocrinological, sleep apnea and type 2 diabetes , or when a very low-energy diet is recommended.
- General Principles for Medications:**
 - Indicated for BMI ≥ 30 or ≥ 27 with comorbid conditions.
 - Use only approved weight loss medications.
 - Monitor monthly for 3 months then every 3 months.
 - Continue use only if weight loss is $> 5\%$ in 3 months.
 - Recommended diabetes medications for patients on a weight loss program: metformin, GLP-1 analogs, or SGLT-2 inhibitors.
 - In patient with CV disease, consider orlistat and lorcaserin.
 - Consider weight gain when choosing antidepressants, antipsychotics, anti-seizure medications, injectable contraceptives.

Table 12: Characteristics of Anti-Obesity Medications¹⁹⁻²⁵

| Active Ingredient | Lorcaserin HCl | Naltrexone HCl and bupropion HCl extended release | Phentermine and topiramate extended-release | Extended-release Liraglutide* | Orlistat* |
|---------------------|--|--|---|---|--|
| Class | Serotonin 2C receptor agonist | Opioid antagonist and amino ketone antidepressant | Sympathomimetic amine anorectic and anti epileptic drug | GLP-1 receptor agonist | Reversible gastrointestinal lipase inhibitor |
| Mechanism of Action | Selective activation of 5-HT _{2C} receptors on anorexigenic pro-opiomelanocortin neurons in the hypothalamus to decrease food consumption and promote satiety | Regulation of food intake through effect on hypothalamus and mesolimbic dopamine circuit. | Likely mediated by release of catecholamines in the hypothalamus, resulting in reduced appetite and decreased food consumption. Exact mechanism is unknown (phentermine) Potential effect on appetite suppression and satiety enhancement, induced by a combination of augmenting activity of gamma aminobutyrate, modulation of voltage-gated ion channels, inhibition of AMPA/kainate excitatory glutamate receptors, or inhibition of carbonic anhydrase. Exact mechanism known (topiramate) | Directly activates GLP-1 receptors to mimic the action of native GLP-1. Regulates appetite and decreases caloric intake | Exerts activity in the lumen of the stomach and small intestine by forming a covalent bond with the active serine residue site of gastric and pancreatic lipases. The inactivated enzymes become unavailable to hydrolyze dietary fat in the form of triglycerides into absorbable free fatty acids and monoglycerides |
| Half-Life | ~11 hours | ~5 hours (naltrexone)~21 hours (bupropion) | ~20 hours (phentermine)~65 hours (topiramate) | 13 hours | 1-2 hours (parent drug)~3 hours (M1 metabolite)~13.5 hours (M3 metabolite) |
| Metabolism | Extensive hepatic metabolism by multiple enzymatic pathways | Metabolism to active metabolite 6-beta-naltrexol(naltrexone). Extensive metabolism to three active metabolites: hydroxybupropion (viaCYP2B6), and threohydrobupropion, and erythrohydrobupropion (bupropion) | p-hydroxylation on the aromatic ring and N-oxidation on the aliphatic chain. Primarily CYP3A4 but not extensively metabolized (phentermine). Not extensively metabolized. Metabolism to 6 metabolites via hydroxylation, hydrolysis and glucuronidation (topiramate) | Metabolized by endogenous peptidases in a similar way to large proteins | Two main metabolites, M1 (hydrolyzed β -lactone ring product) and M3 (sequential metabolite after M1's cleavage of the N-formylleucine side-chain) |

Pharmacological Treatment

Weight Loss Medications

Orlistat (Xenical) 120 mg tid or OTC as alli 60 mg tid (with meals)

- Over the counter medication.
- Blocks fat breakdown and absorption; GI side effects like gases & loss stool.
- Supplement with vitamins if taking long-term.
- Severe liver damage rare.

Lorcaserin (Belviq) 10 mg bid not available here

- 5-HT_{2c} (serotonin) receptor agonist.
- Controlled substance (needs prescription), promotes satiety.
- Responders > 5% weight loss, non-responders < 2%.
- **Side effects:** dizziness, fatigue, headaches, memory problems, constipation, possible serotonin syndrome with SSRI.

Phentermine (Adipex) 15, 30, 37.5 mg daily

- Appetite suppressant, amphetamine derivative.
- Don't use in hypertensive patients – Licensed for short-term use only.

Phentermine/Topiramate (Qsymia) 3.75/23 mg starting; increase to 7.5/46 mg/d

- Approved for long-term use; 10-14% weight loss – Taper when stopping.
- Side effects: numbness, dizziness, insomnia, constipation – Not for use in HTN or pregnancy (cleft palate).

Bupropion-Naltrexone (Contrave) 8 mg/90 mg 2 bid

- Decreases appetite and food cravings – Increases seizure and suicide risk.
- (Binge eating also SSRI/SNRI and lisdexamfetamine [Vyvanse]).
- Can be considered in case of obese & depressed patient.

Liraglutide (Saxenda) 0.6 mg/d SC; increase weekly to 3 mg/d

- GLP-1 agonist (Most common).
- 1/3 lose 10% of body weight.
- Little CNS effect.
- Has a serious side effects. some people may take it without prescription.

No evidence to reduce weight: for hoodia, green tea, guar gum, raspberry extract, garcinia or guarana.

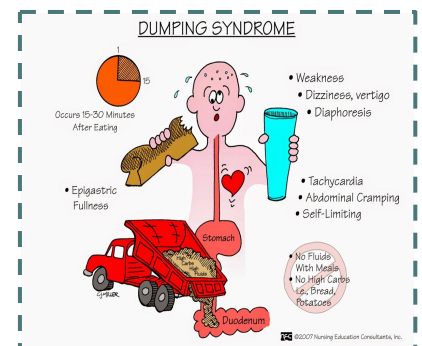
Management Of Obesity

5. Bariatric Surgery

- **Consider bariatric surgery:**
- Refer when bariatric surgery is a consideration:
 - **Adults with clinically severe obesity BMI > 40 kg/m².** regardless of whether he has comorbidities or not. It is the most effective treatment for morbid obesity, it leads to durable weight loss and improvement of co-morbidities (SAGES evidence level I, grade A).
 - **Adults with BMI > 35 kg/m² and severe co-morbidities** not adequately improved with the lifestyle intervention. (SIGN, evidence grade C3 and Canadian, evidence grade B, level 2).
 - **Adults with a BMI > 30 kg/m² with poorly controlled type 2 diabetes and at higher risk of cardiovascular diseases** (NHMRC, evidence grade PP).
 - In post pubertal adolescents with very severe to extreme obesity and severe comorbidities (SIGN, evidence grade D).
- Bariatric surgery in adolescents is to be limited to exceptional cases and performed only by experienced teams (Canadian, evidence grade C, level 4).
- **lifestyle modification must be done after the surgery.**

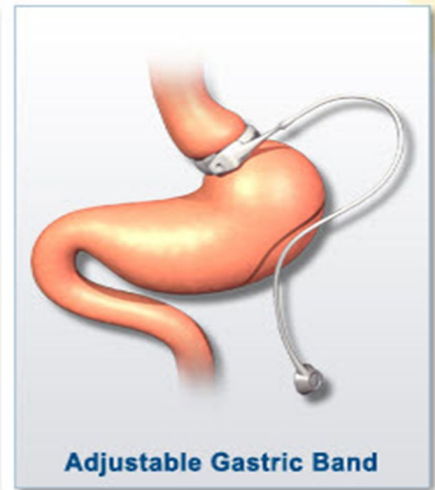
Most Common Complications:

- **Gallstones:** Up to 50% (prophylactic cholecystectomy; bile salt therapy).
- **Dumping syndrome:** Tachycardia, salivation, dizziness: caused by influx of undigested carbohydrates into the jejunum
 - If too much food enters -**especially carbs**- your small intestine quickly, you are likely to experience nausea, vomiting, dizziness, sweating and diarrhea.
 - **Eating** too much or too fast, eating foods high in fat or sugar, and not chewing your food adequately can all cause nausea or vomiting after meals.
- Nausea and vomiting (restrictive procedures)
- Iron deficiency anemia (15% with malabsorptive surgery)
- Nutritional deficiencies (malabsorptive surgery)
- Wound site infections **rare**
- Re-operations 8%
- Hernias
- Mortality after bariatric surgery: (< 0.3%)
 - Lowest with gastric sleeve; Highest with gastric bypass.
 - **#1 Cause of death following bariatric surgery is pulmonary embolism.**



Bariatric Surgery

5. Bariatric Surgery



1. **Laparoscopic Gastric Bypass:** AKA Roux-en-Y here the acids join directly with the jejunum. It's the gold standard for weight loss and decreasing complications & the most common causes of dumping syndrome.
2. **Laparoscopic Sleeve Gastrectomy:** Most commonly used
3. **Adjustable Gastric Band.**
4. **Intra-gastric balloon:** The best for children, it's a safe and effective procedure in weight reduction, but, unfortunately, the results are temporal and almost all patients return to their initial weights after balloon removal.
 - It's a Restrictive procedure (other types of surgeries are either malabsorptive procedures (bypass) or mix).

Table 13: Common types of bariatric surgery ²⁹

| Treatment | General | Potential acute complications | Potential chronic complications |
|---|--|--|---|
| Sleeve Gastrectomy | <ul style="list-style-type: none"> • Hospital stay 1-2 days • Recovery 1-2 weeks • Contraindications <ul style="list-style-type: none"> - Poor surgical candidates - Severe psychiatric disorder - Intolerance to general anesthesia - Pregnancy - Drug or alcohol addiction - Untreated or severe esophagitis - Barrett's esophagus - Severe gastroparesis - Achalasia - Previous gastrectomy • Sometimes used as staged approach to gastric by-pass | <ul style="list-style-type: none"> • Postoperative complications are rare • Hemorrhage • Anastomotic staple line leak • Deep vein thrombosis • Pulmonary emboli • Dehydration • Death | <ul style="list-style-type: none"> • Weight regain • Marginal ulcer • Dumping syndrome with reactive hypoglycemia • Luminal stenoses (stomal narrowing) • Anastomotic staple line leak • Fistula formation • Iron deficiency • Protein malnutrition • Other nutritional and mineral deficiencies (e.g. deficiencies of vitamins A, C, D, E, B and K, folate, zinc, magnesium, thiamine, etc.) • Anemia (often related to mineral and nutrition deficiencies) • Neuropathies (resulting from nutritional deficiencies) • Osteoporosis (often caused by calcium deficiencies and chronically elevated parathyroid hormone levels) • Potential need to re-operate |
| Laparoscopic adjustable gastric banding | <ul style="list-style-type: none"> • Outpatient procedure • Recovery usually one week • Contraindications <ul style="list-style-type: none"> - Poor surgical candidates - Severe psychiatric disorder - Intolerance to general anesthesia - Pregnancy - Drug or alcohol addiction - Untreated or severe esophagitis | <ul style="list-style-type: none"> • Band too tight with gastrointestinal obstructive symptoms (e.g. dysphagia) • Leakage of gastric content into abdomen • Hemorrhage • Deep vein thrombosis • Death | <ul style="list-style-type: none"> • Weight regain • Band slippage, erosion ulceration, port infection, disconnection and displacement • Esophageal dilation • Rare nutrient deficiencies if persistent vomiting or marked and sustained decrease in nutritional intake • Depression • Potential need to re-operate • GERD |
| Gastric bypass | <ul style="list-style-type: none"> • Hospital stay 2-4 days • Recovery 2-4 weeks • Contraindications <ul style="list-style-type: none"> - Poor surgical candidates - Severe psychiatric disorder - Intolerance to general anesthesia - Pregnancy - Drug or alcohol addiction - Untreated esophagitis - Unwillingness or an inability for appropriate long-term follow-up | <ul style="list-style-type: none"> • Gastrointestinal obstruction • Hemorrhage • Anastomotic leaks • Deep vein thrombosis • Pulmonary emboli • Dehydration • Death | <ul style="list-style-type: none"> • Weight regain • Marginal ulcer • Esophageal dilation • Dumping syndrome with reactive hypoglycemia • Small bowel obstruction caused by internal hernias or adhesions • Anastomotic stenoses (stomal narrowing) • Calcium deficiency • Secondary hyperparathyroidism • Iron deficiency • Protein malnutrition • Other nutritional and mineral deficiencies (e.g. deficiencies of vitamins A,C,D,E,B and K, folate, zinc, magnesium, thiamine, etc.) • Anemia (often related to mineral and nutrition deficiencies) • Metabolic acidosis • Bacterial overgrowth • Kidney stones (oxalosis) • Neuropathies (resulting from nutritional deficiencies) • Osteoporosis (often caused by calcium deficiencies and chronically elevated parathyroid hormone levels) • Depression • Potential need to re-operate |

Bariatric Surgery

Efficacy of Bariatric Surgery:

- Weight loss 3 years post surgery:
 - Gastric banding: 16-55%
 - Gastric bypass: 32-71%
 - **Most effective is both bypass and sleeve.**
- Resolution of diabetes:
 - Gastric banding: 31-77%
 - Sleeve gastrectomy: 80-93%
 - **Gastric bypass: 72-100%** (Gold standard in patient with uncontrolled DM + high risk for CVDs).
- Others:
 - Improved quality of life
 - Reduction in medication use

Bariatric Surgery and Diabetes:

- Up to 75% of obese patients have complete resolution of diabetes following bariatric surgery.
- **Roux-en-Y is most effective.**
- Mortality rates 3-4 X higher in those treated with oral medications vs. surgery.
- Best chance for diabetes remission:
 - Young.
 - Lower A1c concentrations.
 - Not using insulin.
 - Not using sulfonylureas or insulin sensitizers.
- Only long-term study showed sustained remission after 15 years at 30%.

Monitoring and Supplementation (Roux-en-Y):

- Labs every 3 months for 1st year **after the surgery**:
 - CBC
 - Glucose, electrolytes
 - Creatinine
- Every 6 months for 1st year **after the surgery**:
 - LFTs, Protein and albumin
 - Iron, TIBC, ferritin
 - Vitamin B12 **why? because the patient want be able to produce intrinsic factor after gastrectomy**, folic acid B9, thiamine B1.
 - Calcium, parathyroid hormone, vitamin D.
 - Lipids.
 - Supplement with: Calcium, Vitamin D, B12, Folate, Iron, Multivitamin 60-120 g protein **and Zinc.**

Assessment Of Overweight/Obese Patients OSCE:

Table 9: Assessment of overweight/obese patients¹²

(Assessment helps to find answers to the following questions):

- 1- What is the class of obesity?
- 2- Is there any co-morbid condition? e.g. depression, eating disorders, sleep apnea, arthritis, or use of medications
- 3- Is it secondary obesity?
- 4- How much does the obesity affect the individual's quality of life? e.g. mobility, self-esteem, socializing.
- 5- Is the individual aware of the health consequences of obesity, and benefit of treatment?
- 6- Has there been any attempt to lose weight? If so, why was it not effective?
- 7- Is the individual ready to start changing?
- 8- Is the individual a candidate for medication therapy or surgical interventions?
- 9- Is there any indication for specialist referral?

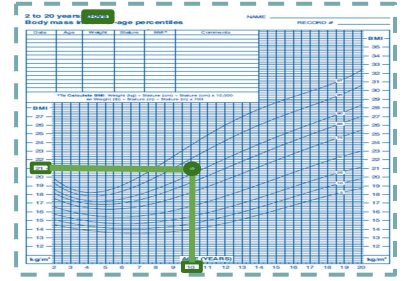
Summary:

- Provide intensive diet and exercise counseling.
- Multidisciplinary team approach (dietitian, personal trainer, psychologist (especially with morbid obesity), behavioral therapist).
- Intervention should last at least 3-4 months.
- Consider adding medication when patients are at a plateau.
- Consider bariatric surgery when the above fail, particularly if BMI > 40 or with comorbid conditions.
- Obesity is a chronic disease that is reaching epidemic status worldwide.
- BMI is a common tool used to grade obesity, but in certain cases it may be inadequate.
- Obesity treatment should always include dietary restriction, increased activity, and behavioral modifications.
- Even 5% to 15% weight loss can significantly reduce the complications associated with obesity.

Lecture Quiz

Q1: A 10 Y/O male has a BMI of 21, which places him at the 92nd percentile. He would be considered?

- A. Normal weight
- B. Obese
- C. Overweight
- D. Morbidly obese



Q2: A 33 Y/O male presents for pre-employment assessment. His blood pressure is 140/85 Hg, and his waist measures 119 cm. A lipid panel reveals an LDL of 138 mg/dl, HDL of 35 mg/dl, triglycerides of 237 mg/dl, and fasting glucose 126 mg/dl.

when you call with his lab results, you recommend :

- A. Starting the DASH diet
- B. Starting monthly visits for weight loss counselling
- C. Starting metformin at 500 mg/day
- D. Starting simvastatin at 10 mg/day
- E. All of the above

Q3: A 57 Y/O female with a BMI of 37 has tried 6 months of intensive behavior weight change and has only lost 3 kg. She has adequately treated hypertension (135/85) and diabetes with A1c in the 8 range. She is on sertraline (Zoloft) for depression. She is requesting weight loss medication.

What would be the best choice ?

- A. Topiramate (Topamax)
- B. Phentermine (Adipex)
- C. Lorcaserin (Belviq)
- D. Liraglutide (Saxenda)

Q4: What is a common complication of bariatric surgery ?

- A. Pulmonary embolism
- B. Cholelithiasis
- C. Malnutrition
- D. Myocardial infarction

Q5: 33 y/o female presented to the clinic what you to advise her about Weight management, she took OCP to regulate her period, her past medical Hx is unremarkable, on physical examination moderate adult acne and mild facial hair, which of the following is most likely a secondary cause that contributes to her obesity?

- A. PCOS
- B. Cushing's syndrome
- C. hypothyroidism
- D. Hyperaldosteronism

THANKS!!

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*Send us your feedback:
We are all ears!*