



LECTURE 2

Weight Control

Dr/ Mahmoud Almenshawy



Obesity and its clinical implications



Definition of obesity

ما هي السمنة؟

Obesity is defined as *an excess of body fat* and is usually characterized by increased circulating plasma **free fatty acid** concentration.

السمنة هي زيادة وزن الجسم عن حده الطبيعي نتيجة تراكم الدهون فيه.



Definition of obesity

دليل كتلة الجسم

Obesity is categorized by body mass index (BMI), which is calculated by weight (in kilograms) divided by height (in meters) squared. **A BMI > 30 indicates obesity.**

دليل كتلة الجسم وتحسب حسب المعادلة التالية:

BMI = الوزن (بالكيلو جرام) ÷ الطول (بالمتر المربع)

وإذا كانت النتيجة أكثر من (30) فإن الشخص يعتبر بدينا



Classification of body fatness on BMI according to WHO

BMI

Classification

18.5 < دون الطبيعي

18.5 - 24.9 سليم

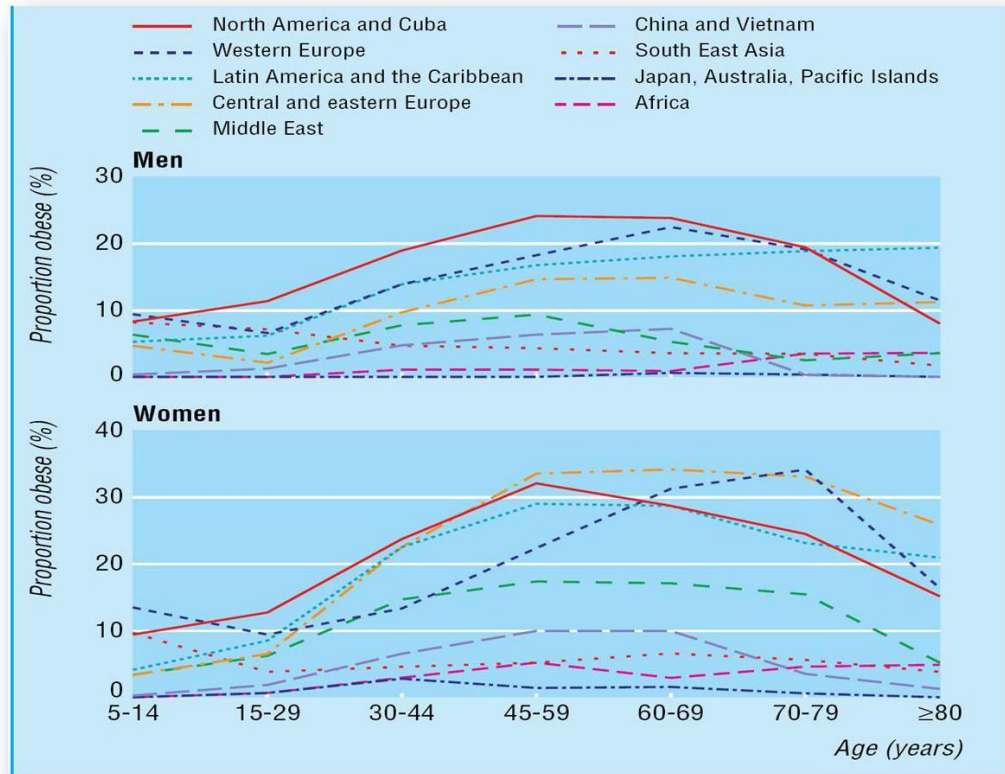
25 - 29.9 زائد عن الطبيعي

30 - 39.9 بدين

40 > مفرط في البدانة



معدلات السمنة في العالم



Prevalence of obesity worldwide. Adapted from Haslam D, James WP. *Lancet* 2005;366:1197-209



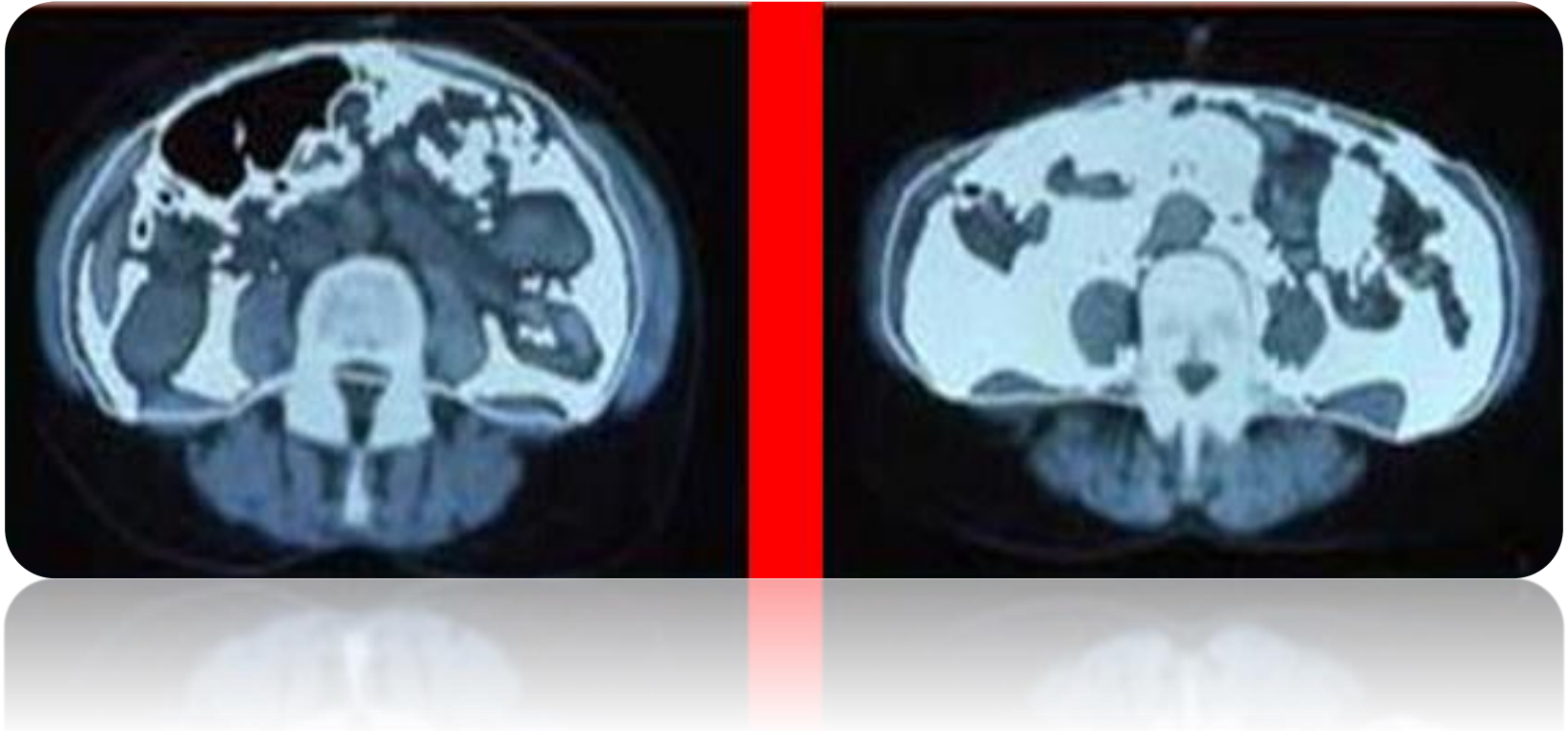


General vs Visceral Obesity



Normal

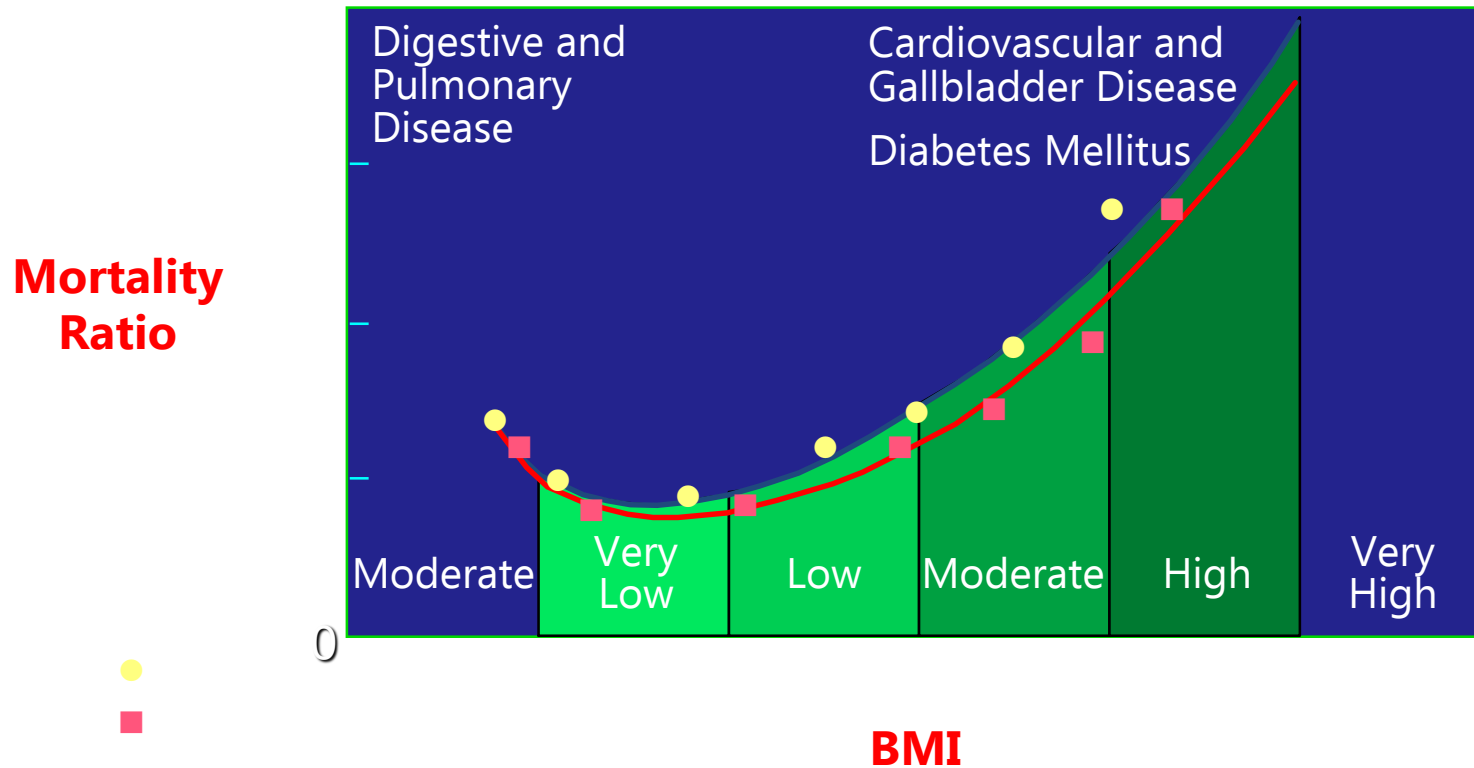
Visceral obesity





العلاقة بين السمنة و معدل الوفيات

American Cancer Society Study of 750,000 Men and Women



Health consequences of obesity

المضاعفات المترتبة عن السمنة

Greatly increased risk (relative risk >3)

▶ Diabetes

السكري

▶ Hypertension

الضغط

▶ Dyslipidaemia

اعتلال الدهون

▶ Breathlessness

ضيق في النفس

▶ Sleep apnoea

▶ Gall bladder disease

التهاب القنوات الصفراوية

Health consequences of obesity

المضاعفات المترتبة عن السمنة

Moderately increased risk (relative risk about 2-3)

- ▶ CAD and heart failure تصلب الشرايين
- ▶ Osteoarthritis (knees) التهاب المفاصل
- ▶ Hyperuricaemia and gout النقرس
- ▶ Complications of pregnancy—for example, pre-eclampsia تسمم الحمل

Health consequences of obesity

المضاعفات المترتبة عن السمنة

Increased risk (relative risk about 1-2)

► Cancer

السرطان

► Impaired fertility

العقم

► Low back pain

الام الظهر

► Increased risk during anaesthesia

مضاعفات التخدير

Overweight

- Recently **the body mass index (BMI)** has been used to define overweight

$BMI = \text{weight (kg)} / \text{height}^2 \text{ (meters)}^2$

or $BMI = \text{weight (lb)} \times 700 / \text{height (inches)}$

18.5-24.9 is the normal range

25-29.9 is overweight

30-34.9 is class I obesity

35-39.9 is class II obesity

Greater than 40 is class III obesity

- **Overweight people with a large abdomens are in worse health than equally obese who have fat distributed around their hips and limbs**



Medical consequences of obesity

- *Patient with hypertension, diabetes mellitus and osteoarthritis can control their condition through weight loss.*
- *Patient with 20% overweight can suffer more from amenorrhea, cervix cancer, colon, endometrium, gal bladder, prostate, uterus, Chronic Heart Disease, fatty liver...etc*



Management of obesity

- *Lifestyle modification*

Diet

Physical activity (exercise)

Feeding Behaviour modification

- *Pharmacotherapy*
- *Surgery (fat removal)*



Diet Management

- **Goals :**

- 1- To restore glycaemic control and optimal lipid levels*
- 2- Adequate needs for growth , pregnancy , lactation for woman*
- 3- Body weight management*
- 4- Keep overall health*
- 5- Coordinate with individual life style*



Physical activity (exercise)

- *Exercise burn calories*
Walking burn about 200 calories per hour
Running burn about 570 calories per hour
Both increases if more body weight or walking uphill
- *Exercise raise body metabolism*
- *Exercise decrease appetite*
- *Patient feel better mentally and emotionally after exercise*
- *Help preventing the loss of muscle mass*



Body Weight Control by exercise

- *Exercise supplements diet restrictions to control body weight and → more lasting effect*
- *Additional value for exercise:*
 - 1- *↓hyperglycemia*
 - 2- *↓Chronic Heart Diseases risk factors*



Components of Feeding Behaviour

- *Meal size*
- *Meal frequency*
- *Composition of meal*



Total Caloric Intake

1- Calculate needs according to daily activity

2- To manage body weight :

↓ or ↑ to reach optimum BMI (< 25)

3- Special considerations in growing children

4- Caloric restriction improves glycaemic control

5- Caloric restriction usually at two levels

Low caloric diets (1000-1500calories per day)

Very low caloric diets (800 calories or less, should be
conducted under strict medical supervision for severely
overweight)

5- Total caloric content = sum of cal/gm:

(gm CHO x 4) + (gm fat x 9) + (gm protein x 4)

6- Caloric distribution (%) _____ : CHO / Fat / Prot

(CHO : 50-70%) / (fat 20-25%) / (protein 16 %)



CHO Content **(quantity and quality)**

- Total CHO \approx 50-70 % of total calories
 - complex CHO \geq 70 %
 - simple CHO \leq 10 %
- **Complex CHO:** grains-legumes البقوليات-pasta-whole grain bread-boiled rice
- **Simple CHO:** refined sugars , fruit sugars
- Example :

If total calories allowed = 1500 cal.:-
Then CHO content = $1500 \times 60\% = 900$ cal.
- Complex CHO $\geq 70\% \times 900 = 630$ cal \approx 160 **gm**
Sugars $\leq 10\% \times 900 = 90$ cal \approx 22 **gm**



Fat Content

- ***Fat restriction : helps control dislipidemia and hyperglycemia.***
- ***Control body weight :***
- ***Total fat content : >30% of total calories***
 - ***polyunsaturated (plant oil) 10%***
 - ***monounsaturated (olive oil) 10 %***
 - ***saturated (animal fat <10%)***
- ***Essential fatty acid supplements***
(soya beans, nuts, rapeseed oils)
- ***Omega 3 fat (fish) anti atherogenic***
(2.3 fish meals/week or fish oil caps 0.3 g)
- ***Total Cholesterol (<300 mg)***



Protein

- *Average total protein content: 16% of total calories (12-20%)*
- *e.g. in total 2000 cal :16%= 320 cal./4= 80 gm protein*
- *Or (0.8-1.2 gm/kg body weight)*
- *Animal and plant proteins (essential amino acids)*
- *Protein restriction in renal function impairment*
- *Allow for: growth, pregnancy, lactation, acute catabolic states, wound healing*



Fiber (undigested parts of diet)

- **Types :** **Soluble** **insoluble**
 (pectin, gums (cellulose, semi-cellulose,
 gel, mucilage) lignin
 ↓ ↓
Effects: metabolic effect increase bulk
 (CHO & lipid)
- **Food contain fibers:**
Soluble: beans, oat bran, fruits and vegetables
Insoluble: whole grains, whole grains, vegetables and beans
- **Recommendation :**
 - double the average normal intake (13- 30 gm)
 - gradual increase to avoid flatulence
 - include both soluble & insoluble



Daily requirement:

Is the energy needed in the Resting State like sleeping.

It differs from person to person according to the gender, height, weight, age and activity. Some way to calculate are in the next URLs

An Example in Diet Construction:

*If a patient needs daily requirement = 2500 calories
and is overweight (BMI = 35)*

Goal: to lower body weight by 1kg/ week

1 kg loss requires loss of 7000 calories i.e. 1000 per dayX7

∴ subtract from his intake 1000 calories per day

daily intake : 2500-1000 = 1500 calories

To distribute the 1500 calories :- e.g.

60% CHO + 24 % fat + 16 % protein = 100 %

(900 cal.) (360 cal.) (240 cal.)



(225 gm)

CHO



(40 gm)

fat



(60 gm)

protein



Standard Body Weight Control by Dietary Restriction

*** Goal : loose 1 kg body weight per week**

*** plan / calculation:**

$$\begin{aligned} 1 \text{ kg/ week} &= 7000 \text{ cal. deficit /week} \\ &= 1000 \text{ cal. deficit / day} \end{aligned}$$

∴ lower caloric intake by 1000 cal/day less than daily
need e.g. : 2500-1000 = 1500 cal./ day



Tough Diet Restriction :

- ***Total cal. Intake : less then 800 cal./day***
 - ***only for patients with very high BMI***
 - ***requires hospital monitoring (electrolytes, E.C.G. etc)***
- ***Patient should be provided with protein content, vitamin and mineral requirements.***



Sugar Substitutes , Sweeteners

	<i>cal/gm</i>	<i>Cost</i>	<i>Max</i>	<i>Side effects</i>
<i>Saccharin</i>	<i>0</i>	<i>Cheap</i>	<i>1gm</i>	<i>Most popular</i>
<i>Aspartame (protein)</i>	<i>very Low</i>	<i>Expensive</i>	<i>50μ/kg</i>	<i>Heat unstable</i>



Fat Substitute

Olestra (Olean):

- *Fatty acid side chains linked to a sucrose molecule, and 7-9 instead of 3 fatty acid side chains*
- *Olestra is indigestible by lipases and by bacterial fermentation*
- *Just as palatable as regular fat to most people*
- *Side effects: loose stools, diarrhoea, abdominal cramps and nausea*
- *Also it may decrease the fat soluble vitamins (A, D, E and K)*



Pharmacotherapy

- ***Amphetamine, methamphetamine and phenmetrazine*** were used in weight loss but not used any more due to their addictive properties and are classified as schedule II
- ***Phendimetrazine, diethylpropion, phentermine, benzphetamine and mazindol*** are used for short term treatments (not more than few weeks) due to their side effects on lung and brain
- ***Sibutramine (meredia 15) and orlistat (Xenical)*** are FDA approved for long term treatment for patient with BMI 30 or 27 with at least one risk factor



Pharmacotherapy Cont...


Sibutramine (meredia 15)

- 10 mg /day may increase after 4 weeks to 15 mg /day if weight loss is inadequate*
- it has both serotonin and norepinephrine reuptake effect decreasing hunger feeling by the hypothalamus.*
- It have a good effect on weight loss but no effect on increased cholesterol, HDL and fasting sugar*
- Contraindicated for patients with seizure disorder, congestive heart failure (CHF), history of myocardial infarction and arrhythmias*



Pharmacotherapy Cont...

Orlistat (Xenical)

- 120 mg three time daily with each meal*
 - Potent and irreversible inhibitor of gastric and pancreatic carboxylester lipases; inhabiting the digestion of the dietary triglycerides*
 - This results is inhibition of the hydrolysis and the absorption of the dietary fat and solubility and absorption of cholesterol*
 - Side effects include fatty, oily and soft stool, increased defection and fecal urgency. These side effects correlate with the amount of fat in the meal*
 - Fat soluble vitamin absorption may be affected*
- 

Guidelines to keep in mind

- *Fat provides more calories than protein or carbohydrates*
- *Too much of any nutrient is stored as fat*
- *Foods higher in water and/or fiber have fewer calories per bite and may satisfy appetite in smaller quantities*
- *Substituting cheese, milk and meats for lower fat alternatives provides nutrients but saves on calories*
- *Low fat dressings and creamers save calories as well*
- *Compact foods like cookies and dried fruits are high in calories per bite*



Drugs Associated with Weight Gain

- *Steroids*
- *Tricyclic antidepressants*
- *Phenothiazines*
- *Lithium*
- *Antihistamines*
- *Sulfonylureas, insulin*
- *Beta blockers, thiazides*



***Drugs used for
WEIGHT
CONTROL***



Xenical

Orlistat marketed as a prescription under the trade name **Xenical**, also known as **tetrahydrolipstatin**.



indication

*XENICAL is for people who are considerably **overweight**, and also have other risk factors such as **high blood pressure, high cholesterol, heart disease or diabetes.***



Pharmacology

- Orlistat is reversible inhibitor of gastric and pancreatic lipases (enzymes that break down triglycerides in the intestine).*
- When lipase activity is blocked, triglycerides from the diet are not hydrolyzed into absorbable free fatty acids, and are excreted undigested instead.*
- Only trace amounts of Orlistat are absorbed systemically; the primary effect is local lipase inhibition within the GI tract after an oral dose. The primary route of elimination is through excretion.*



Side effects

-The primary side effects of the drug are **gastrointestinal-related** such as **steatorrhea** (oily, loose stools with excessive flatus due to unabsorbed fats reaching the large intestine) with frequent **bowel movements**.

side effects are most severe when beginning therapy and may decrease with time.

To minimize these effects;

- avoid foods with high fat content.
- follow a low-fat in the region of 15 grams per meal, reduced-calorie diet. that also controlled oily stools and flatulence



Contraindications

- *Malabsorption .*
- *Hypersensitivity to orlistat .*
- *Reduced gallbladder function.*
- *Pregnancy and breastfeeding .*
- *Obstructed bile duct, impaired liver function, and pancreatic disease.*



Chito@l

Smart Capsule
DEFEAT THE FATS



For Obesity Management & weight maintenance

**100%
NATURAL**

Eat whatever
you want
whenever
you want



➤ Composition

- *Chitosan* *500 mg*
- *Ascorbic acid* *100 mg*
- *Gymnema Sylvestre* *50 mg*



➤ Properties

- *Chitocal is a highly effective weight loss formula which acts as carbohydrate blaster and fat absorption blocker.*
- *Chitocal contains 500 mg high density chitosan which has high ability to combine with fats in stomach and small intestine and resist its absorption*
- *Chitosan absorbs 10-12 times its weight in fat*



➤ Indications

- *Chitocal as weight loss formula helps in reducing body weight and for maintenance for normal body.*
- *Chitocal helps in maintenance of normal blood glucose.*



➤ **Contraindication**

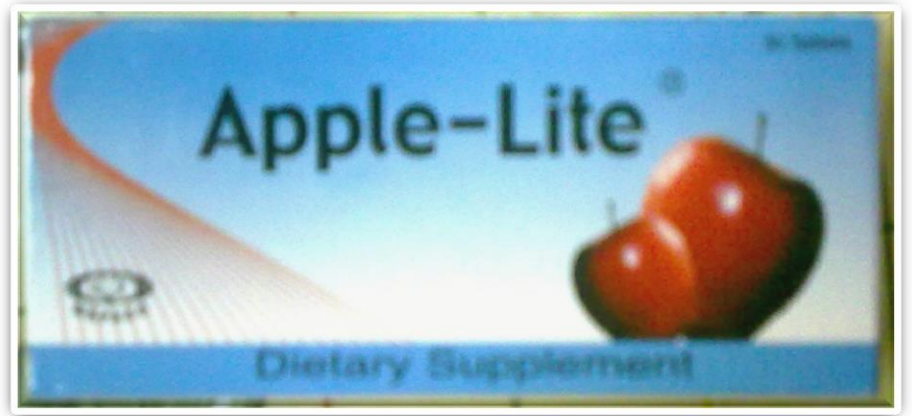
- *Chitocal is 100% safe and no contraindications have been reported.*



➤ Pack

- *Box contains 60 capsules*
- *Price : 120 LE*





Apple-Lite



Composition:

Each tablet contains:

- ***Apple fibers (apple cuticle) 500 mg***
- ***Pure apple Pectin (from apple pulp) 50 mg***



- ***pectin*** increases viscosity and volume of stool so that it is used against constipation and diarrhea.
- ***pectin*** is up to 90% digestible by bacterial enzymes.
- ***Pectin*** binds water, and thus keeps products from drying out. It stabilizes emulsions.
- ***Pectin*** combines with the calcium and proteins of milk, stabilizing foams and gels made with cream or milk.
- ***Pectin*** is not digested, and is considered a beneficial dietary fiber.



Indications:

- ***Food supplement during weight loss programs.***



Side effects:

- *No health hazards or side effects are known in conjunction with the proper administration of designed therapeutic dose.*
- *It is not recommended to use APPLE-LITE below the age of 12 years old , nor during pregnancy & lactation.*

Avoid in Pregnancy



Meridia





**Dosage
Form**

Capsules

Company

Knoll Pharmaceutical



Composition

Each Capsule Contains

Sibutramine Hcl Monohydrate ***10 mg***

Sibutramine Hcl Monohydrate ***15 mg***



Mechanism Of Action

- It is a neurotransmitter reuptake inhibitor*
- Sibutramine works by affecting the area in your brain that controls hunger, providing you with a sense of fullness and satisfaction*



Contraindications

- ❖ *Hypersensitivity*
- ❖ *pregnancy*
- ❖ *With MAOI Drugs*
- ❖ *With other serotonergic agents*
- ❖ *With centrally acting appetite suppressant drugs*

In Patient With

- ❖ *Anorexia Nervosa*
- ❖ *Sever Renal Impairment , Sever Hepatic Dysfunction*
- ❖ *Coronary Artery Disease , Arrhythmia or stroke.*



Side Effects

- ❖ *Irritability, Insomnia*
- ❖ *Headache, short sleep duration*
- ❖ *tachycardia*
- ❖ *Hypertension , Skin rash*
- ❖ *Diarrhea, Flatulence , Abdominal pain , anorexia , Constipation , Dyspepsia, Vomiting*
- ❖ *Arthritis*
- ❖ *Weight loss can precipitate or exacerbate gall stone formation*



**DEAR STUDENT:
BE SLIM TO BE ACTIVE**





*Thank You
Friend*

