MEDICINE 435

Epidemiology of Obesity

OBJECTIVES:

1-describe the magnitude of the problem of obesity.
2- Recognize the consequences of obesity.
3- List the factors leading to obesity.
4- Discuss the prevention of obesity

مصدر مذاكرة

Revised by

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🔴IMPORTANT   🔵NOTES   ⚫EXTRA   🟢MNEMONICS

Obesity and Overweight

Obesity :
Excessive fat accumulation in adipose tissue to the extent that it can affect health .

Overweight :
Has more body fat than needed for body functions
When weight ranges are greater than what is generally considered healthy for a given height '' that what we call BMI''.
Such ranges of weight increase the likelihood of certain diseases and health problems

Measuring Obesity

1) Body Mass Index (BMI):
(indirect, but correlates to direct measures of body fat)

✓ Calculated from a person's weight and height. $BMI = Weight / (height)^2$
✓ Reliable indicator of body fatness for most people.
✓ Inexpensive & easy-to-perform screening for weight categories that may lead to health problems.
At the same BMI :
✓ Women tend to have more body fat than men. Because of the hormones and fat distribution.
✓ Older people tend to have more body fat than younger adults. because younger have more muscles.
✓ Highly trained athletes may have a high BMI because of increased muscularity rather than increased body fatness.
Does not measure body fat directly, but correlates to direct measures of body fat like;
– Skin fold thickness
– underwater weighing
– dual energy x-ray absorptiometry (DXA)
– alternative for direct measures of body fat

increased body weight does not always equate to increased body fat.

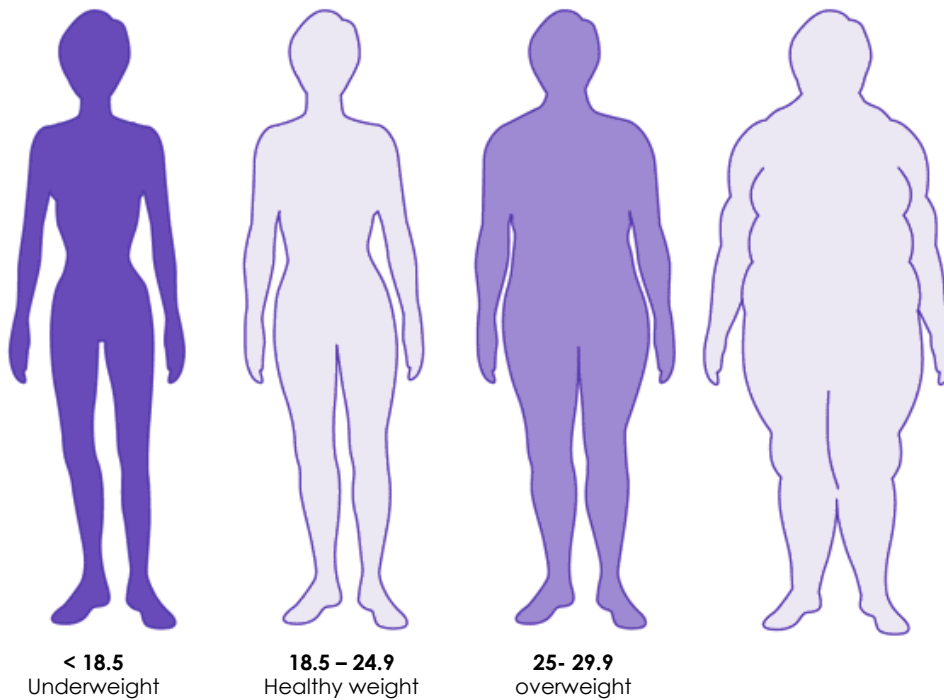| 2) Underwater weighing : (direct)	3) Dual energy x-ray absorptiometry "DXA": (direct)	4) Skin fold thickness : (direct)
Underwater weighing: A method for determining the lean body mass. This method weighs a person underwater and then calculates the lean body mass (muscle) and body fat. This method is one of the more accurate ones. However, it is generally done in special research facilities, and the equipment is costly.	(used primarily to evaluate bone mineral Density but can also be used to measure total body composition and fat content with a high degree of accuracy.) Alternative for direct measures of body fat.	**Males:** Upper Chest, Upper Abdomen **Female:** Triceps, Lower Abdomen, Thighs Due to differences in Fat Distribution : male accumulate upper body fat. Female accumulate upper & lower body fat.

5) Waist Circumference:
(direct)

While standing place a tape measure just above the hipbones; after breathing out.
Risk of heart disease and diabetes mellitus increases in :
Males: > 40 inches (western Setting) > 35 inches (Asians)
Females: > 35 inches (Western Setting) > 31 inches (Asians)

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< 18.5
Underweight

18.5 – 24.9
Healthy weight

25- 29.9
overweight

Obesity classification according to BMI:

Obesity is divided into three separate classes,
with Class III obesity being the most extreme of the three

≥30 obesity

Class I : **30 - 34.9**

Class II : **35 – 39.9**

Class III : **≥40**

## A Global Epidemic; by WHO 1997

Obesity worldwide prevalence

1995	2000	2008	2013
200 million	300 million	857 million	2.1 billion

according to WHO obesity is an emergency and it needs an interference

Why is obesity accelerating in developing countries?

1) Increased consumption of energy dense, nutrient poor foods.
2) Reduced physical activity.

Prevalence and Trends of Overweight and Obesity Among men Ages 20–74 Years in the United States: 1960–2006
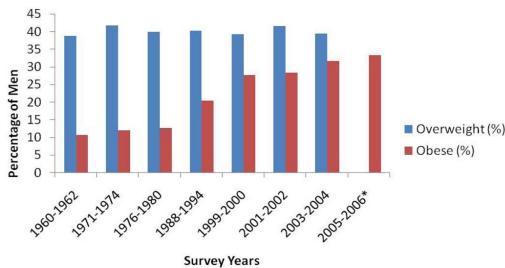
Prevalence and Trends of Overweight and Obesity Among Women Ages 20–74 Years in the United States: 1960–2006
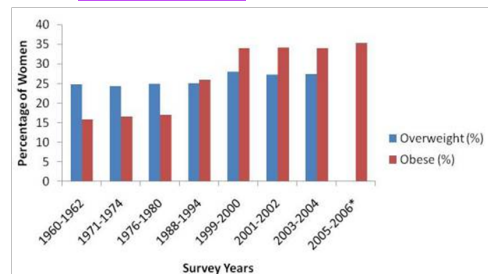
As you can see the prevalence of overweight is high "especially in men" and the prevalence of obesity is getting higher.

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Causes of Obesity: (Not necessarily overeating)

First Factors That Predispose Person To Gain Excessive Weight:

Quantity & sensitivity to satiety hormones (leptin): Hormone that influences the appetite control in the hypothalamus.	Biochemical differences	Basal body temperature
Body image	Genetics: Largest transmissible variation is cultural (discussed below). There is a role of a mutant "obese" gene in obesity development.	Eating patterns and environment
Food availability and packaging	Dietary thermogenesis we burn less carbs than protein	Fidgeting .(a nervous habit e.g.: to bounce one's leg repeatedly	Physical inactivity

Second Characteristics Of Fast Food Linked To Increase Adiposity:

Higher energy density
Reduced complex carbohydrates & fiber
An these are the most affordable food !

Greater saturated fat
Reduced fruits and vegetables.

Third Genetic Role In Obesity :

How much variation in weight gain among individuals can be accounted for by genetic factors? 25%
Largest transmissible variation is cultural.
If you have the gene but you eat healthy you wont get obese.
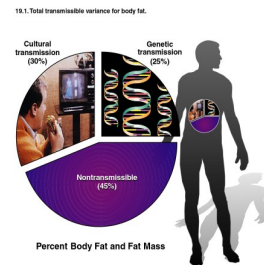If you don't have the gene but you eat unhealthy you'll get obese.
If you have the gene and eat unhealthy the risk of course will increase.
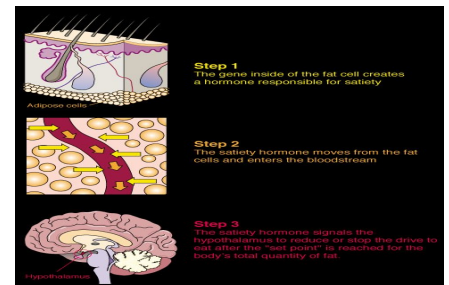# A satiety hormone that influences the appetite control in the hypothalamus.
There is a role of a mutant "obese" gene in obesity development.
A defective ob gene causes inadequate leptin production. Thus, the brain receives an under assessment of body's adipose stores and urge to eat.
In addition to deficient leptin production, scientists also propose the possibility **of defective receptor action** (via a leptin receptor molecule on brain cells), which increases a person's resistance to satiety.

19.1.Total transmissible variance for body fat.
Cultural transmission (30%)
Genetic transmission (25%)
Nontransmissible (45%)
Percent Body Fat and Fat Mass

memorize all numbers please ☺

Step 1
The gene inside the fat cell creates a hormone responsible for satiety
Adipose cells
Step 2
The satiety hormone moves from the fat cells and enters the bloodstream
Step 3
The satiety hormone signals the hypothalamus to reduce or stop the drive to eat after the "set point" is reached for the body's total quantity of fat.
Hypothalamus

Don't forget to check the steps !

Physical Activity: an important component for young & middle aged men, **physical activity relates _inversely_ to body fat levels.**
No relationship between _caloric intake_ and body _fat_ levels. *INTERESTING!*

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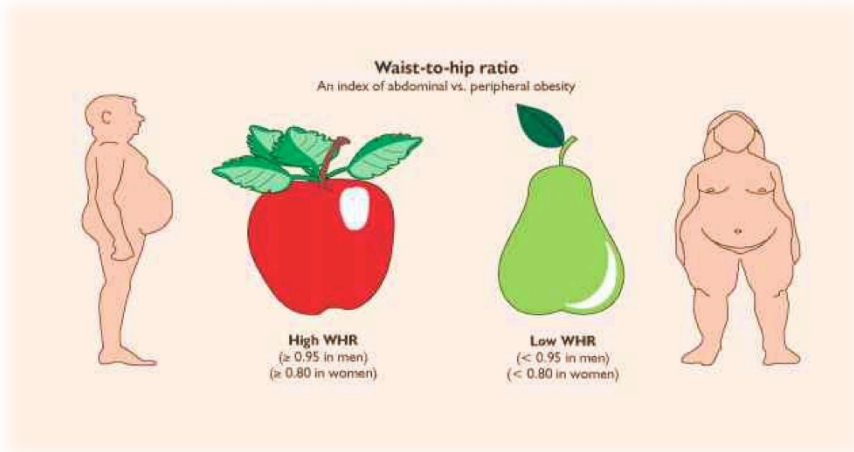
★ COMPLICATIONS OF OBESITY ★

Obesity & Overweight in Children & Adolescents :

- Obesity is a **long term** process obese
child has worse health in future and the chances of getting diseases are higher than normal children
 Children and particularly adolescents who are obese have a high probability of growing to be adults who are obese.

- Obesity frequently **begins in childhood.**
- **Obese parents** likely have overweight children.
- Regardless of final body weight as adults, **overweight children** exhibit **more illnesses** as adults than normal kids.

Visceral v.s. Peripheral Obesity

Waist-to-hip ratio
An index of abdominal vs. peripheral obesity

High WHR
(≥ 0.95 in men)
(≥ 0.80 in women)

Low WHR
(< 0.95 in men)
(< 0.80 in women)

## Abdominal body fat increases health risks: (the dangers fat)

Degree of abdominal fat accumulation is correlated with increased risk of:
- ✓ Cardiovascular disease
- ✓ Type 2 diabetes
- ✓ Premature death
- ✓ Some types of malignancies

At clinical level the physician should have self awareness and healthy and fit so the obese patient will take the advice seriously.

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Obese Syndrome Components
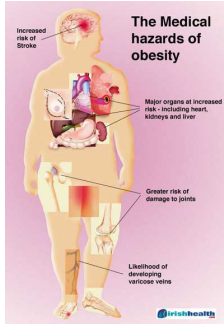
- ✓ Glucose intolerance
- ✓ Insulin resistance
- ✓ Dyslipidemia
- ✓ Type 2 diabetes
- ✓ Hypertension
- ✓ Elevated plasma leptin concentration
- ✓ Increased visceral adipose tissue
- ✓ Increased risk of CHD & some cancers

10kg Weight Loss in 100kg Patient With Obesity Related Co-morbidities
What will happen if an obese person loses 10% of his body weight?

- ★ **Mortality** 20-25% fall in total mortality
     30-40% fall in diabetes related deaths
     40-50% fall in obesity related cancer deaths

- ★ **Blood pressure fall** of approximately 10mm/Hg in both systolic and diastolic values

- ★ **Reduces the risk of developing diabetes by >50%**
     Fall of 30-50% F. glucose.   Fall of 15% HbAIC

- ★ Lipids: Fall of 10% in total cholesterol
                 Fall of 15% LDL
                 Fall of 30% triglycerides
                 Increase of 8% in HDL

Approach to Obesity at Clinical level

- ✓ A full history with a dietary inventory and an analysis of the subject's activity level.

- ✓ Screening questions to exclude depression.

- ✓ Screening for eating disorders as 30% of patients suffer from them.

- ✓ Determine any co-morbidities.

- ✓ Exclude the possible and rare secondary causes.

- ✓ Requirements of treatment and belief to fulfill.

- ✓ Behavior assessment for readiness.

- ✓ Family support, time and financial considerations.

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Approach at community level

- ✓ Empowering parents, and caregivers and educate them.
- ✓ Healthy foods in schools & restaurants.
- ✓ Access to healthy affordable food .
- ✓ Avenues for physical activity.
- ✓ Safe neighborhoods; playgrounds, parks.
- ✓ Physical education in schools/child care facilities.
- ✓ Encourage breast feeding formulas usually contains more nutrients and hormones that babies don`t need.
- ✓ Farmers markets; local fruits and vegetables available.
- ✓ Any barriers considered.

Approach to control epidemic of obesity and overweight (at the level of WHO and countries)

- ✓ Early recognition & awareness.
- ✓ Prompt action by individuals, parents, families physicians, communities & others.
- ✓ Policies for conducive Environment.
- ✓ **Increased physical activity in all age groups.**
- ✓ Nutrition: Breast feeding & dietary determinants.
- ✓ Behavior modifications at all levels, and by all health seekers and health providers.
- ✓ Behavioral surveillance programs to detect changes.
- ✓ Research at basic, clinical, and public health levels.

★ SUMMARY★

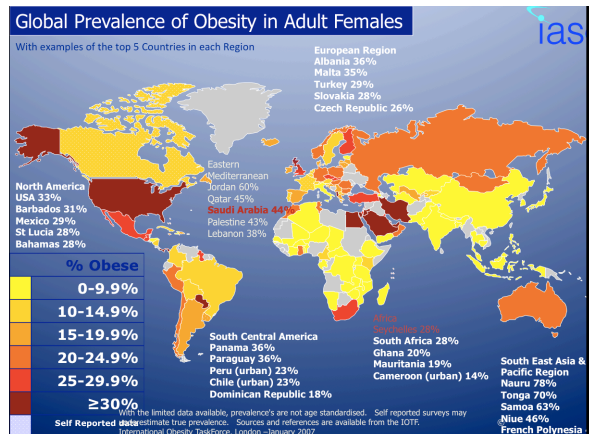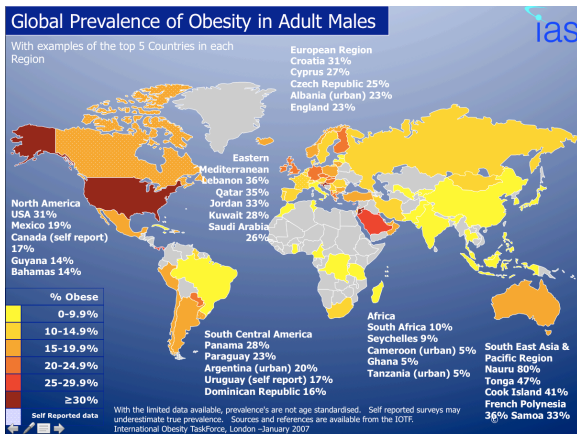Obesity is affected by a complex interaction between the environment, genetic predisposition, & human behavior.

It has increased risk of numerous chronic diseases, from diabetes and cancers to many digestive diseases.

The problem of overweight and obesity is one of the most pressing global issue with massive health care cost.

Demands attention from the healthcare community, researchers, and policy makers.

THE END

Graphs for some studies that were mentioned in the slides + doctor notes

Global Prevalence of Obesity in Adult Males
With examples of the top 5 Countries in each Region

European Region
Croatia 31%
Cyprus 27%
Czech Republic 25%
Albania (urban) 23%
England 23%

Eastern Mediterranean
Lebanon 36%
Qatar 30%
Jordan 33%
Kuwait 28%
Saudi Arabia 26%

North America
USA 31%
Mexico 19%
Canada (self report) 17%
Guyana 14%
Bahamas 14%

South Central America
Panama 28%
Paraguay 23%
Argentina (urban) 20%
Uruguay (self report) 17%
Dominican Republic 16%

Africa
South Africa 10%
Seychelles 9%
Cameroon (urban) 5%
Ghana 5%
Tanzania (urban) 5%

South East Asia & Pacific Region
Nauru 80%
Tonga 47%
Cook Island 41%
French Polynesia 36% Samoa 33%

% Obese
0-9.9%
10-14.9%
15-19.9%
20-24.9%
25-29.9%
≥30%
Self Reported data

With the limited data available, prevalence's are not age standardised. Self reported surveys may underestimate true prevalence. Sources and references are available from the IOTF. International Obesity TaskForce, London –January 2007

Global Prevalence of Obesity in Adult Females
With examples of the top 5 Countries in each Region

European Region
Albania 36%
Malta 35%
Turkey 29%
Slovakia 28%
Czech Republic 26%

Eastern Mediterranean
Jordan 60%
Qatar 45%
Saudi Arabia 44%
Palestine 43%
Lebanon 38%

North America
USA 33%
Barbados 31%
Mexico 29%
St Lucia 28%
Bahamas 28%

South Central America
Panama 36%
Paraguay 36%
Peru (urban) 23%
Chile 23%
Dominican Republic 18%

Africa
South Africa 28%
Ghana 20%
Mauritania 19%
Cameroon (urban) 14%

South East Asia & Pacific Region
Nauru 78%
Tonga 70%
Samoa 63%
Niue 46%
French Polynesia

% Obese
0-9.9%
10-14.9%
15-19.9%
20-24.9%
25-29.9%
≥30%
Self Reported data

With the limited data available, prevalence's are not age standardised. Self reported surveys may underestimate true prevalence. Sources and references are available from the IOTF. International Obesity TaskForce, London –January 2007

in Saudi men are red colored and women have the darker red which means that women have more obesity .

Economist.com rankings
Highest obesity*

| Men, % of total population			Women, % of total population		
1	Lebanon	36.3	1	Qatar	45.3
2	Qatar	34.6	2	Saudi Arabia	44.0
3	Kuwait	32.8	3	West Bank and Gaza	42.5
4	Panama	27.9	4	Lebanon	38.3
5	United States	27.7	5	Panama	36.1
6	Cyprus	26.6	6	Albania	35.6
7	Saudi Arabia	26.4	7	Bahrain	34.1
8	West Bank and Gaza	23.9	8	United States	34.0
9	Bahrain	23.3	9	Egypt	32.4
10	Albania	22.8	10	United Arab Emirates	31.4
11	England	22.7	11	Iran	30.0
12	Germany	22.5	12	Kuwait	29.9
13	Scotland	22.3	13	Turkey	29.4
14	Ireland	20.1	14	Mexico	29.0
15	Israel	19.9	15	Scotland	26.0
16	Mexico	19.4	16	Israel	25.7
17	Australia	19.3	17	Mongolia	24.6
18	United Arab Emirates	17.1	18	Jamaica	23.9
19	Wales	17.0	19	England	23.8
20	Oman	16.7	20	Cyprus	23.7
21	Slovenia	16.5	21	Germany	23.3
	Turkey	16.5	22	Oman	23.1
23	Lithuania	16.2	23	Peru	23.0
24	Canada	16.0	24	Australia	22.2
	Peru	16.0	25	Morocco	21.7
26	Luxembourg	15.3	26	Russia	21.6
27	Sweden	14.8	27	Trinidad & Tobago	21.1
28	Portugal	14.5	28	Fiji	19.3
29	Switzerland	14.1	29	Mauritania	19.2
30	Mongolia	13.8	30	Wales	18.0

* Data for these health rankings refer to the latest year available, 1999-2003. Obesity is defined as body-mass index of 30 or more
Source: "Pocket World in Figures", based on data from the World Health Organisation

Data from KSA National Surveys

Studies by National Surveys KSA	Age group	Prevalence Obesity BMI>30kg/m^2		Prevalence Overweight BMI 25-29.9 kg/m^2		Self eported Physical inactivity	
		Male	Female	Male	Female	Male	Female
1990-93 (n=13177)	>15years	16%	20.26%	27.23	25.20	43.3%	84.7%
1995-2000 (n=17232)	>30 years	26.4%	44.0%	42.4%	31.8%	93.9%	98.1%

Here they are comparing 2 studies but what I want you to know is the the prevalence of obesity is high in both but females are higher while in the prevalence of overweight males are higher

Demographic Prevalence of Obesity (BMI≥30) : USA MMWR August 2010
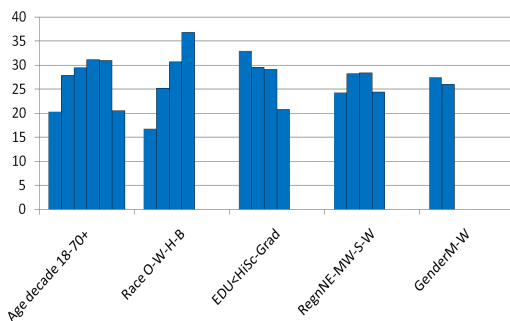
Demographic Prevalence of Obesity in Saudi Arabia (BMI≥30kg/m^2) 1990-1993
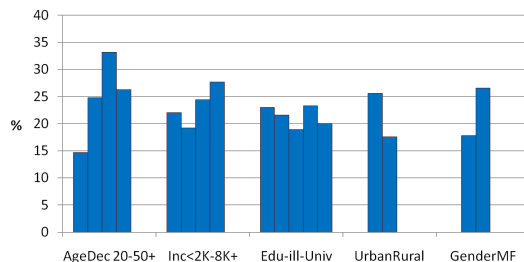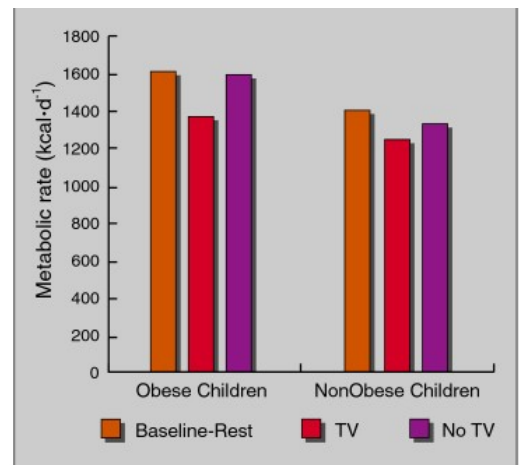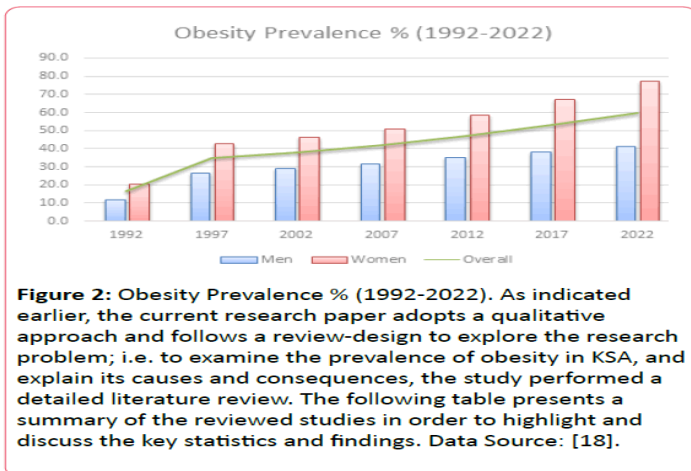

You better make sure to check the two graphs and know the difference in prevalence between US and Saudi

Graphs for some studies that were mentioned in the slides + doctor notes

Author , and place of study	Age group	No of subjects	Criteria used	Prevalence among Males%	Prevalence among Females%
Khashoggi et al (1994)Attendees at PHC Jedahh	11-70 years Mean age 32.2	852 female	Obese BMI >30	----	64.3
			Overweight BMI 25-29.9	----	26.8
AL- Shammati et al (1994b) Attendees at PHC, Riyadh	Mean male = 34 y Female 32 y	733 With back pain	Obese BMI >30		47.0
			Obese BMI >30	51.6	
AL- Jassir et al (1998) Emploees of M.O.H Riyadh	20 yrs and above	1238 males	Overweight BMI 25-29.9	40.3	----
			Obese BMI >30	18.4	.....

(local) studies showing the prevalence of obesity and overweight

In saudi
Obesity : female higher
Overweight : male higher

Figure 2: Obesity Prevalence % (1992-2022). As indicated earlier, the current research paper adopts a qualitative approach and follows a review-design to explore the research problem; i.e. to examine the prevalence of obesity in KSA, and explain its causes and consequences, the study performed a detailed literature review. The following table presents a summary of the reviewed studies in order to highlight and discuss the key statistics and findings. Data Source: [18].

You need to know physical activity is important

MCQs

1) Highly trained athlete his BMI is.
a. Normal
b. Decrease
c. Increase

2)The major role of leptin in body-weight regulation is
a. to reduce dietary intake and fat storage.
b. to signal satiety to the hypothalamus.
c. modulation of energy expenditure and carbohydrate metabolism.
d. All of the above

3) Which of the following adipose derived hormones promotes insulin sensitivity in peripheral tissues?
a. Resistin
b. Adiponectin
c. Amylin
d. Leptin

4) According to Global prevalence study of obesity, the prevalence of obesity in Saudi Arabia is high in …….. more than …….
a. Adult male, adult female
b. Adult female, Adult male
c. Children, Adult

5) Obesity is accelerating in developing countries bc of..
a. Increase consumption of energy dense.
b. Highly nutrient food
c. Increase physical activity

6) 25 years old male, his BMI is 19. He travel to Riyadh because of work, after two years his BMI become 32. Which of the following "factor" is a cause of increasing MBI?
a. Genetic
b. Eating environment
c. Food unavailability

7) Which one of the following is a component of "obese syndrome"?
a. Low plasma leptin conc.
b. Glucose tolerance
c. Hypotension
d. Dyslipidemia

8) 30 years old male has visceral/ abdominal fat. The degree of abdominal fat accumulation is correlated with increase risk of ..
a. Type 1 diabetes
b. Type 2 diabetes

1.C 2.D 3.B 4.B 5.A 6.B 7.D 8.B

THANK YOU !

FOR CHECKING OUR WORK ^^

AND

SPECIAL THANKS FOR OUR TEAM MEMBERS
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