OBESITY

Introduction -

Vast segments of populations of the third world are today in various stages of developmental transition. There are population that are not as yet rid of their problems of under nutrition at one end of spectrum while on the other end the problem of obesity is increasing. Though obesity statistics is not available in India, rough projections put the number of new cases of obese at one lakh every year-50 per cent of them being morbidly obese. Rising prevalence of overweight and obesity and its health consequences has prompted the WHO to identify it as one of today's most important public health problem.

- One in every two adults in the United States is overweight and the prevalence of obesity is increasing all over the world.

Definition ----

-Obesity is a positive energy balance, the intake of calories is more than the expenditure of energy.

-Obesity is a state in which there is a generalised accumulation of excess adipose tissue in the body leading to more than 20 per cent of the desirable weight.

- Over weight is a condition where the body weight is 10 - 20 per cent greater than the mean standard weight for age, height and sex. Obesity invites disability, disease and premature death.

Obesity is a chronic disease.

Excess body weight is a hindrance, leading to breathlessness on moderate exertion and predis- poses a person to diseases like atherosclerosis, high blood pressure, stroke, diabetes, gall blad- der diseases and osteparthritis of weight bearing joints and varicose veins.

Aetiology -----

Obesity is a complex multi factorial chronic disease developing from interactive influences of numerous factors-
Social,
Behavioural,
Psychological,
Metabolic,
Cellular and
Molecular (genetic).

The desire and drive to eat food, satiety choice of food, digestibility of the food eaten and its absorption in the body, metabolism of nutrients and the metabolic rate, drive and ability to exercise are the factors that determine body weight.

Genetic factors: Genetic inheritance probably influences 50-70 per cent a person's chance of becoming fat more than any other factor. A genetic base regulates species differences in body fat and sexual differences within a species. Within families the chance is 80 per cent if both parents are obese and 50 per cent if one parent is obese. A mutation in the human gene for the B3 receptor in adipose tissue, involved in lipolysis and thermogenesis markedly increase the risk of obesity.

Age and sex: It can occur at any age in either sex as long as the person is under positive energy balance. Studies conducted at Nutrition Foundation of India have shown more females than males are found to be over weight among all age groups. Hormonal predisposition put wonten at higher risk of obesity when compared to men.

Eating habits: Certain type of eang habits may lead to obesity.
- Nibbling between meals is common among housewives and is a potential cause for obesity.
- Some may eat faster taking less time for chewing, therefore they tend to consume more food.
- Neurotransmitters or chemicals in the brain that respond to outside stimuli such as sight, taste, smell and temperature transmit signals to other areas of brain and body. Obese respond to external cues to eat rather than internal hunger signals. They eat when it is mealtime or when they are surrounded by tasty foods instead when they are hungry.

- Business executives who frequently attend business lunches have more chance of becom– ing obese.
- People who eat outside home more frequently are prone to obesity. Large portions of food served outside the home promote high calorie consumption.

- People who eat more junk foods (high fat, high carbohydrates) may become obese.

- The person who work in different shifts, whose body clock is disturbed, may over eat.

Physical activity: Obesity is found in persons who lead sedentary lives and pay less to physical activity. Obesity can also be seen among school children who spend too much time on studies, who do not have physical exercise, who do not participate in school games and who use vehicles for commuting to schools.

Stress: Food is one of the many stimulants of endorphin, 'feel good' neurotransmitter. Sek gratification, self punishment, depression, anxiety and stress may lead to excess caloric intake.

Endocrine factor: Obesity is found in hypothyroidism, hypogonodism and cushing's syndrome. Obesity is common at puberty, pregnancy and menopause, suggesting endocrine may be a factor in obesity.

ASSESSMENT

How diets have changed from the age of the cavemen to current day

Our eating habits have changed considerably from the era of prehistoric man to modern times. From active hunter-gatherer societies, through industrial revolution to the present day 'obesogenic' era, humans have changed the way they cultivate and think about food. We call this from **'Stone age to Obese age'**.

#-1. BMI (body mass index) -
It is also called Quetlet index.

Obesity is defined as an excess accumulation of body fat. To measure fat in the body accurately is difficult, and no method is easily available for routine clinical use. Traditionally, overweight and obesity have been evaluated by anthropometric measurement of weight-for-height. More recently, BMI has been used.

- The normal range is 19-24.9 kg/m2,
- Overweight is 25-29.9 kg/m2, and
- Obesity >/= 30 kg/m2.

Not only is the total amount of fat an individual carries important, but also where the fat is distributed in the body. Fat in a central or upper body (android) distribution is most related to health risk. The most accurate way to measure

central obesity is by magnetic resonance imaging or computer-assisted tomography scanning, but this approach is too expensive for routine use.

Simple anthropometric measurements can be used, such as waist
circumference.

- A waist circumference of greater than 1020 mm in men
- and 880 mm in women is a risk factor for insulin resistance, diabetes mellitus and cardiovascular disease.

There is a clear genetic predisposition for obesity. The genetic contribution to obesity is between 25 and 40 % of the individual differences in BMI. For the overwhelming majority of individuals, the genetic predisposition will not be defined by one gene, but by multiple genes .

**Body mass index (BMI) is the cornerstone of the current classification system for
obesity**

Calculate your own BMI - are you a healthy weight for your height?

The Body Mass Index (BMI) is a simple measure that determines whether you're a healthy weight for your height. If you are an adult with a BMI above the healthy range you are at raised risk of a number of health problems linked to

being overweight, such as type 2 diabetes, heart disease and certain cancers.

How to calculate your own BMI:

Things you will need:

You'll need to know your own

– weight (in kilograms) and
– height (in metres) to use the calculator.

Classifications of obesity

Classification	BMI (kg/m2)	Risk of co-morbidities (developing other diseases)
Underweight	<18.5	Low*
Healthy weight	18.5 - 24.9	Average
Overweight for pre-obese	25 - 29.9	Increased
Obesity class I	30 - 34.9	Moderate
Obesity class II	35 - 39.9	Severe
Obesity class III	≥40-	Very severe

*Other health risks may be associated with low body mass index.

BMI = Weight (kg) /Height (m²)

#-2. Body weight:

An adult weighing 10 per cent more than the standard weight is overweight and 20 per cent more is obese.
Body weight in relation to degree of obesity.

% Body weight excess to normal –

25	mild
50	moderate
75	severe
100	very severe

#3-Waist circumference:

It is the most practical tool a clinician can use to evaluate a patient's abdominal fat before and during weight loss treatment. High risk waist circumference:

Men: > 40 inches (> 102 cm)
Women: > 35 inches (> 88 cm)

#4 -Measurement of body fat:

A more accurate definition of overweight and obesity should be based on the total amount of body fat. The upper limit of body fat for defining obesity have been set as 25 per cent for males and 30 per cent for females.

Table -1 criteria for obesity in terms of percentage body fat

Category	Male	Female
Normal	12-20 %	20-30%
Borderline	21-25%	31-33%
Obesity	>25	>33

#5-Waist to Hip ratio:

The predominant distribution of fat in an obese person, whether in the upper part or the lower part of the body, may determine the disease pattern.

The normal ratio waist/hip =0.7

but with upper body obesity the ratio is 0.85 women and greater than 1.0 in males. Abdomi- nal obesity does not always go hand in hand with overweight or obesity.

#6-Broka's index:

The formula for Broka's index is -

Height (cm) - 100 = ideal weight (kg)

This measurement is eassy to calculate and accurate.

Waist circumference

BMI	Low	High	Very high
	Men: <94cm Women: <80cm	Men: 94-102cm Women: 80-88cm	Men: >102cm Women: >88cm
Underweight (<18.5kg/m²)	Underweight (Not Applicable)	Underweight (Not Applicable)	Underweight (Not Applicable)
Healthy weight (18.5-24.9kg/m²)	No increased risk	No increased risk	Increased risk
Overweight (25-29.9kg/m²)	No increased risk	Increased risk	High risk
Obese (30-34.9kg/m²)	Increased risk	High risk	Very high risk
Very obese (40kg/m²)	Very high risk	Very high risk	Very high risk

Source: Health Survey for England (2010-12) /NICE http://www.hscic.gov.uk/catalogue/PUB13219

– TYPES –

1– Grade I obesity:

These people have body mass index more than 25 but less than 29.9. Over- weight does not affect their health, they lead normal health and life expectancy is above normal. They may reduce on their own.

2- Grade II obesity:

The body mass index is between 30-39.9. These patients should be treated by doctors and dietitians. Although they

appear to be in good health, they have reduced tolerance to exercise with shortness of breath on exertion and they are unduly fatigued. This is due to the burden of increased weight they carry always and reduced capacity of the circulatory and respiratory systems that are handicapped by masses of internal fat and fatty infiltration of muscle. For mechanical and metabolic reasons these patients are at increased risk of diabetes, atherosclerosis, hypertension, fatty liver, gall bladder diseases, osteoarthritis, hernias and vari- cose veins. Mortality rate also increases.

3- Grade III obesity:

The body mass index is above 40 and these patients are in pathetic condition. Their day to day activities are restricted due to their enormous mass and more susceptible to diseases mentioned in Grade II. They are susceptible to atherosclerosis, prone to accidents and ave serious psychological disturbances.

Different types of weight gain

"Apple" vs. "Pear"

Above the waist

Below the waist
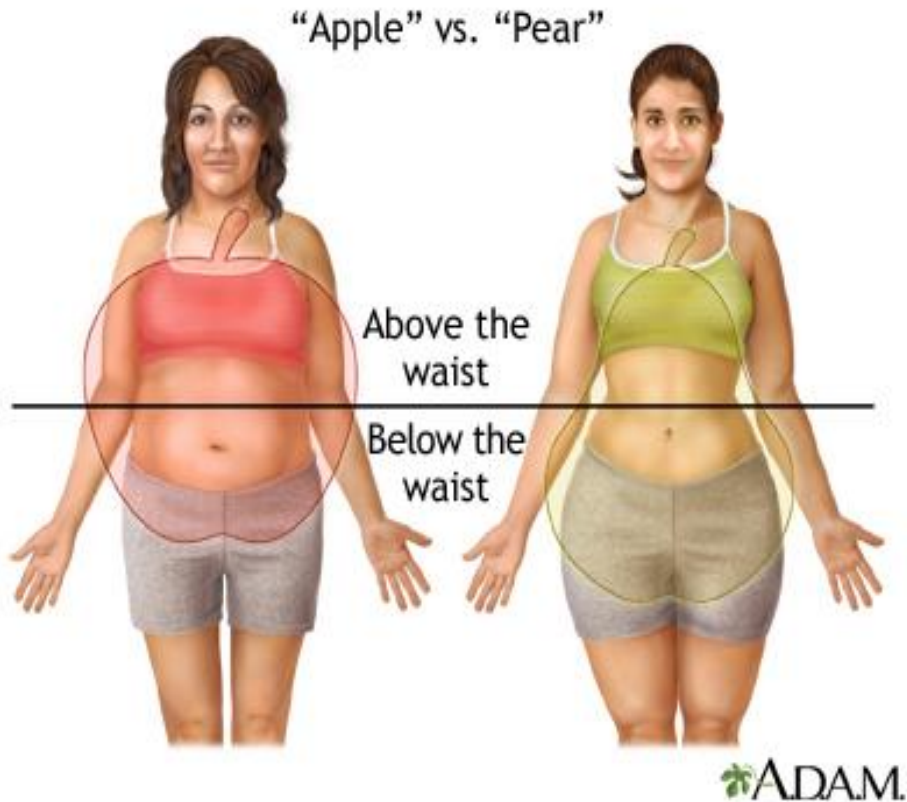
Weight gain in the area of and above the waist (apple type) is more harmful than weight gain around the hips and flank (pear type). Fat cells in the upper body have different qualities than those found in hips and thighs.

TREATMENT

Obesity is a chronic disease that requires long-term treatment. Even a 5-10 per cent loss from initial weight may produce marked improvement diabetes, dyslipidemia and even sleep apnea. The ease of weight gain and difficulty in losing and maintaining weight all make obesity a challenging illness to treat. The goals set for weight loss should be realistic.

Strategies for weight loss and weight maintenance are

- Diet therapy
- Physical exercise
- Stress management
- Pharmaco therapy
- Weight loss surgery

Diet Therapy -

Very low calorie diet < 800 kcal: Although much weight is initialiy tost very low calorie diets, more weight is usually regained. Rapid weight reduction does not teach behaviour changes. Patients on very low calorie have increased risk for developing gallstones. Very low calorie diets (400 to 800 kcal/day) can be used safely in extremely obese individuals (greater than 50% overweight) when under the care of a physician and registered dietitian.

Reducing diet: The initial goal of weight loss therapy is to reduce body weight by approxi- mately 10 per cent from baseline. If this goal is achieved, further weight loss can be attempted. reasonable time line for a 10 per cent reduction in body weight is 6 months of therapy. The person should be put in negative energy balance ideally 500-1000 calories less than RDA. An ideal reduction of 500 g-1 kg/week is approved. Once the target is fixed, progress should be checked once a month. Usually 3 kg are lost in the first month largely due to utilisation of carbohydrate store and water. Reducing diets should provide adequate amounts of protein, vitamins and minerals.

Calorie restriction for weight reduction is the safest and most effective method. One pound of body fat is equivalent to 3500 keal; therefore, intake must be reduced by 500 keal daily to produce a loss of one pound of body fat weekly (500 kcal x 7 days = 3500 kcal). caloric deficit of 1000 kcal/day is required to lose 2 pounds or approximately 1 kg of body fat weekly. This is the maximum weekly weight loss since a more restrictive diet may not be nutritionally adequate.

The calorie recommendation can be determined from actual food intake and not from formu- las. A detailed 24-hour food recall and/or 3-day diet history are generally adequate to deter- mine intake.

Energy Deficit Calculation

Step 1: Estimate the recommended individual caloric requirement (kcal/day) by calculating the Resting Energy Expenditure (REE).

REE of adult males = 10 x weight (in kg) + 6.25 x height (in cm) − 5 x age (in years) + 5. 10 x weight (in kg) + 6.25 x height (in cm) − 5 x age (in years) − 161

Step 2: Multiply REE by Activity Factor of 1.5 for women and 1.6 for men for light activity to REE of adult females %3D estimate daily caloric need. REE x AF = estimated total caloric need (kcal/day) to maintain weight

Step 3: From this number, subtract 500 kcal/day to obtain adjusted calorie intake required to achieve weight loss of approximately 500 g/week.

Example

 Expected loss of weight−500 g/week

Recommended Dietary Allowance−2320 kcal

1 g of body fat is equivalent to−−7.7 kcal

1g of body fat is equivalent to−7.7 x 500 = 3850 kcal

Less calories per week = 3850 kcal

 Less calories per day = 3850/7= 550 kcal

Prescribed calories to be 2320- 550 = 1770 kcal

To achieve a loss of 500 g/week, 1800 kcals are prescribed for adultman.

As weight loss progresses, further caloric reduction may be necessary as caloric requirement decreases with body size.