Present Scenario of Obesity - A Review

Rajesh Asija*, Pankaj Vyas, Sangeeta Asija, Aarti Agarwal
Maharishi Arvind Institute of Pharmacy, Jaipur-302020, Rajasthan, India.
*Corresponding author's E-mail: aartiagrawal011@gmail.com

ABSTRACT

Obesity is a condition in which excess body fat accumulated in the body and it can be measured by BMI. There are so many causes of obesity like more calorie consumption, sleeping disturbance, low physical activity, alcohol consumption, endocrine disruptors etc. There are so many diseases associated with obesity. They are Diabetes, Osteoarthritis, coronary heart disease, gall bladder disease, and hypertension. Obesity can be maintained by proper dietary habit, physical exercise, some medications to lose weight, etc. Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the total India's population.

Keywords: BMI, diabetes, hypertension, coronary heart disease.

INTRODUCTION

Obesity can be described as an imbalance between energy intake and expenditure such that excess energy is stored in fat cells, which enlarge or increase in number.[1]

As per WHO- Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, resulting in reduced life and/or increased health problems.[2]

Body Mass Index (BMI)

The BMI is a statistical measurement derived from the person weight and height. Although it is considered to be a useful way to estimate obesity, it does not measure the percentage of body fat. The BMI measurement is not correct in all respect like a muscleman may have a high BMI but have much less fat than an unfit person whose BMI is lower. But still generally, the BMI measurement can be a useful indicator for the average person's. To calculate the index, there is a very simple formula:

$$\text{BMI (kg/m}^2) = \text{Weight (kg) / Height 2 (m)}$$

Table 1: Classification of Obesity

BMI	Classification
< 18.5	Underweight
18.5–22.9	Normal weight
23.0–24.9	Overweight
25 and above	Obesity

CAUSES OF OBESITY

The most common causes include:

- Excessive calorie consumption.
- Sedentary lifestyle.
- Sleeping disturbance.
- Endocrine disruptors (such as some foods that interfere with lipid metabolism).
- Low Physical activity.
- Alcohol consumption.
- Drastic/ Sudden reduction in Smoking

An obese person has accumulated so much body fat that it might have a negative effect on his/her health. If a person's bodyweight is at least 20% higher than it should be, he or she is considered obese. If Body Mass Index (BMI) is between 23 and 24.9 the person is considered overweight.[4]

Consuming too many calories

People are eating much more than they used to. This habit is mainly seen in developed nations - however, this trend is spread in all over the world. Billions of dollars being spent on public awareness campaigns that attempt to encourage people to eat healthily, but still majority of us continue to overeat.

For example, if the person consumes too many sugar based calories (sugar is common in fat free foods) then person body won't be able to use all of those calories, and the excess calories will be stored as fat tissue.[5]

Leading a sedentary lifestyle

With the arrival of computers, televisions, remote controls, video games, dish washers, washing machines and other modern convenience devices, most of the people are living a much more sedentary lifestyle compared to their grandparents and parents. Decades ago their shopping was by walking down the road to the high street where one could find the bakers, grocers, banks, etc. But now large out-of-town shopping malls and supermarkets started to appear, people now used to

drive their cars instead of walking to get their provisions. In developed countries, such as the USA, dependence on the car has become this much that many people will drive even if their destination is only half-a-mile away. [6]

Endocrine disruptors (such as some foods that interfere with lipid metabolism)

Hepatology provides clues to the molecular mechanism through which fructose (a type of sugar) in beverages may alter lipid energy metabolism and cause fatty liver and metabolic syndrome.

Fructose is mainly metabolized in the liver, which is the target organ of the metabolic alterations caused by the sugar consumption. The study was done by rats receiving fructose-containing beverages presented pathology similar to metabolic syndrome, which causes fatty liver and lipid accumulation (Hyper-triglyceridemia) then leads to hypertension, diabetes, resistance to insulin, and obesity. Unbalanced diets and the lack of physical exercise are key factors in the increase of obesity and other metabolic diseases in modern societies. [4]

Drastic/ Sudden reduction in Smoking

According to the National Institutes of Health (NIH) "Not everyone gains weight when they quit smoking. That who do the average weight gain is between 6 and 9 pounds and approximately 10 percent of people who stop smoking gain a large amount of weight - 30 pounds or more.

Nicotine can reduce the person's desire to eat by directly affecting the activity of serotonin and dopamine, which are substances that control neural transmission in areas of human brain that turn his/her appetite on and off.

Nicotine causes human adrenal glands to release catecholamines which in turn cause the liver to release glucose into the bloodstream and body fat cells to release fatty acids. This increases the energy available to all the cells of the body, and the reaction is similar to what happens after the person eats, which also may help reduce person's appetite. [7]

Consumption of Alcohol

Alcohol is a major source of calories and drinking may stimulate eating, particularly in social settings.

However, calories in liquids may fail to trigger the physiologic mechanism that produces the feeling of fullness. In the long-term, frequent drinkers may compensate for energy derived from alcohol by less eating, but even infrequent alcohol related overeating could lead to weight gain over time. [8]

HEALTH RISKS ASSOCIATED WITH OBESITY

Excessive body weight is associated with many diseases, such as Diabetes mellitus type-2, cardiovascular disease, and certain type of Cancer, Obstructive sleep apnea, and Osteoarthritis. Thus, Obesity is found to reduce life expectancy. [9]

Bone and cartilage degeneration (Osteoarthritis)

Obesity is an important risk factor for osteoarthritis in most joints, especially at the knee joint (the most important site for osteoarthritis). It confers a 9 times increased risk in knee joint osteoarthritis in women. Obesity also causes risk of osteoarthritis for other joints. Recent research indicated that obesity is a strong determinant of thumb base osteoarthritis in both sexes. [9]

Coronary heart disease

Obesity carries a penalty of an associated adverse cardiovascular disease. Largely as a result of this, it is associated with an excess occurrence of cardiovascular disease morbidity and mortality.

Obesity increases an individual's risk of heart failure from coronary heart disease by 104 percent because obesity raises triglyceride levels and blood cholesterol which lead to more plaque deposition in the arteries. Obese people have less HDL cholesterol, the "good" cholesterol that combats plaque deposition than those of an acceptable rate. Obesity raises blood pressure and can lead to diabetes. Diabetes also increases the risk of coronary heart disease. [10]

Gallbladder disease

Overweight is a significant risk factor for gallstones. In such cases, the liver produces excess cholesterol, which is then delivered into the bile causing it to become supersaturated. Some recent studies suggest that specific dietary factors (saturated fats and refined sugars) are the primary culprit in these cases.

Gallstones are the accumulation of calcium or cholesterol in the gallbladder. When too much fat or cholesterol are consumed and not broken down properly. The function of the gallbladder is to store bile produced by the liver and then secrete it during digestion of foods such as fat. This is why eating lean proteins such as fish instead of fatty protein like red meat are a great way to reduce your risks and help your body. [11]

High blood pressure (Hypertension)

There are multiple reasons why obesity causes hypertension, but it seems that excess adipose (fat) tissue secretes substances that are acted on by the kidneys and causes hypertension. Moreover, generally obesity leads to higher amounts of insulin produced and the increased level of insulin increases blood pressure. [12]

High total cholesterol, high levels of triglycerides (Dyslipidemia)

The primary dyslipidemia related to obesity is characterized by decreased HDL levels, increased triglycerides, and abnormal LDL composition. [5]

Type 2 diabetes

One of the strongest risk factors for type 2 diabetes is obesity and this is also one of the most modifiable as it

can be partially controlled through diet and exercise. Overweight cause's cellular changes that make the cells resistant to insulin, the condition called insulin resistance.

In someone with insulin resistance, muscle cells, fat, and liver do not respond normally to insulin, whereas the pancreas continuously produces more and more insulin resulting in too much glucose remains in the blood instead of being taken into the cells. If anyone has more fat cells than muscle cells, the insulin becomes less effective. Insulin producing cells must work harder than normal to keep blood sugar levels regulated; else it may cause the cells to gradually fail. [15]

OBESITY MANAGEMENT

To achieve a healthy weight

Data suggest that an obese person who reduces just 5 to 10 % of his/her body weight (12-25 pounds for someone who weighs 250 pounds) will have significant increase in health. Experts have found that obese people who reduce weight constantly and slowly, like 1 or 2 pounds each week are more successful in keeping their weight down when they have reached their target body weight. [14]

Dietary changes

Experts advise obese people to lose their total daily calorie intake and to consume more vegetables, fruits and whole grains. It is essential to vary the diet of the person but the people will still need to feed himself, and should continue to joyful the tastes of different foods. The consumption of certain refined carbohydrates, sugar and some fats should be losed. [14]

Physical activity

To reduced a kilogram of fat the people need to burn 8,000 calories (1 pound of fat = 3,500 calories). Walking briskly is a good way to start enhancing physical activity if the person is Obese. Combining enhancing physical activity with a good diet will significantly enhancing chances of reduced weight successfully and permanently. [15, 16]

Maintain Calorie Balance

Caloric balance can be maintained by the following way shown in table 2.

Medications for losing weight

There are a number of agents that are being developed by the pharmaceutical industry today which could be grouped according to their general MOA. [14]

Drugs acting centrally to affect appetite and energy regulation

This group includes 5-HT 2C agonists, and other therapies such as amphetamine derivate (phentermine) combined with an dopamine, anticonvulsivant (topiramate) and norepinephrine re-uptake inhibitor (bupropion) combined with an opiod receptor antagonist (naltrexone).

Table 2: Caloric balance maintainance

If the person is...	Calorie balance status is...
Maintaining weight	"In balance." The person is eating roughly the same number of calories that person body is using. The person weight will remain stable.
Gaining weight	"In caloric excess." The person is taking more calories than body is using. The person will store these extra calories as fat and the person will gain weight.
Losing weight	"In caloric deficit." The person is taking fewer calories than the body is using. The body is using more fat from its fat storage cells for energy, so the person's weight is reducing. [15, 16]

Drugs acting peripherally to affect appetite

This group contemplates synthetic forms of the appetite suppressing hormone PYY (3-36) drugs which delays gastric emptying..

Pramlintide is a human analog of the pancreatic ß-cell hormone amylin, a potentially satiety factor. Food intake stimulates endogenous amylin release and the administration of exogenous amylin reduces food intake too. Clinical data showed that pramlintide induced weight loss in type 2 diabetic patients over a 26-week period of administration.

Drugs blocking energy absorption

This group is integrated by the lipase inhibitor drugs. In present days there is only one drug in clinical development of this group: the Cetilistat, which has a similar action mechanism to Orlistat, but it has proved a favorable side-effect profile (90% fewer severe gastrointestinal side effects) compared with that reported for Orlistat.

Drugs acting on metabolism

Human growth hormone fragment, Human growth hormone (hGH) has lipolytic/antilipogenic properties. As an inhibitor of lipoprotein lipase, it can enhance circulating free fatty acids and ultimately reduce fat-cells mass. [14]

Weight loss surgery (Bariatric surgery)

Weight loss surgery (WLS) is also called as Bariatric Surgery. It comes from the Greek word "Baros", which means weight. It is two types of bariatric surgeries:

Restrictive procedures

These make the person's stomach smaller. The surgeon may use a staples, gastric band or both. After the operation the patient cannot take more than one cup of food during each sitting, significantly decreasing his food intake.

Mal Absorptive procedures

Parts of the digestive system, mostly the first part of the small intestine (duodenum) or the mid-section (jejunum), are bypassed. Doctors may also decrease the size of the stomach. This procedure is generally better effective than restrictive procedures. However, the patient has a more risk of experiencing mineral/ vitamin deficiencies because overall absorption is decrease. Successful and permanent weight loss is best achieved as a result of enhanced physical activity, changing how and when the person eats, and modifying behavior. [17, 18]

SURVEY ON OBESITY

Obesity and overweight are more risk factors for a number of chronic diseases like diabetes, cardiovascular and cancer. Once considered a problem only in high income groups, obesity and overweight are now dramatically on the rise in low- and middle-income groups, particularly in urban Population. This survey is being done to study the effect of Dietary pattern and its subsequent impact on Quality of Life in Urban Population. The BMI is a statistical measurement tool of derived from the weight and height of the person and is considered to be a useful way to estimate healthy body weight.

Causes of Obesity

The most common causes include:

- Excessive calorie consumption.
- Sedentary lifestyle.
- Lack of sleep.
- Endocrine disruptors (such as some foods that interfere with lipid metabolism).
- Low physical activity.
- Alcohol consumption.
- Drastic/ sudden reduction in Smoking.
- Genetic factors

An obese person has accumulated so much body fat that it might have a negative effect on their health. Suppose a person's bodyweight is at least 20% more than it should be, he or she is considered obese. If Body Mass Index (BMI) is > 25 the person is considered Obese.

Health risks associated with obesity

High body weight is associated with several diseases like:

- Bone and cartilage degeneration (Osteoarthritis)
- Coronary heart disease
- Gallbladder disease
- High blood pressure (Hypertension)
- High total cholesterol, high levels of triglycerides (Dyslipidemia)

- Respiratory problems
- Type 2 diabetes

As a result, Obesity has been found to lose life expectancy.

Table 3: States of India ranked in order of percentage of people

States	Males (%)	Males rank	Females (%)	Females rank
Punjab	30.3	1	37.5	1
Kerala	24.3	2	34	2
Goa	20.8	3	27	3
Tamil Nadu	19.8	4	24.4	4
Andhra Pradesh	17.6	5	22.7	10
Sikkim	17.3	6	21	8
Mizoram	16.9	7	20.3	17
Himachal Pradesh	16	8	19.5	12
Maharashtra	15.9	9	18.1	13
Gujarat	15.4	10	17.7	10
Haryana	14.4	11	17.6	6
Karnataka	14	12	17.3	9
Manipur	13.4	13	17.1	11
Uttarakhand	11.4	15	14.8	14
Arunachal Pradesh	10.6	16	12.5	19
Uttar Pradesh	9.9	17	12	18
Jammu and Kashmir	8.7	18	11.1	5
Bihar	8.5	19	10.5	29
Nagaland	8.4	20	10.2	22
Rajasthan	8.4	20	9	20
Meghalaya	8.2	22	8.9	26
Orissa	6.9	23	8.6	29
Assam	6.7	24	7.8	21
Chhattisgarh	6.5	25	7.6	27
West Bengal	6.1	26	7.1	16
Madhya Pradesh	5.4	27	6.7	23
Jharkhand	5.3	28	5.9	28
Tripura	5.2	29	5.3	24

BACKGROUND

Obesity is a medical condition in which there is excess accumulation of body fat that may have an adverse effect on health. It is defined by body mass index (BMI) and further evaluated in terms of fat distribution via the waist–hip ratio and total cardiovascular risk factors. BMI is closely related to both body fat and total body fat percentage.

OBESITY IN INDIA

Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the total India's population. Unhealthy and processed food has become much more accessible following India's continued integration in global food markets. However, Indians are genetically susceptible to weight accumulation especially around the waist. Scientists have

identified while studying 22 different SNPs near to MC4R gene, a SNP (single nucleotide polymorphism) named rs12970134 to be mostly associated with waist circumference.

National Family Health Survey (NFHS) Data

Below is a list of the states of India in Table 3 ranked in order of percentage of people who are obese or overweight, based on data from the 2007 National Family Health Survey. [16]

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