



## OBESITY

### 1. INTRODUCTION

Obesity, loosely defined, is the state of being excessively overweight. It afflicts a significant and possibly growing proportion of people in developed societies. It entails medical risks and, in these societies, is considered socially undesirable. It is commonly thought to be the result of sloth, or gluttony, or both. This is an oversimplification and usually not even true. Its treatment is difficult.

There are also a lot of people in affluent societies, especially younger women, who think themselves to be overweight or obese but are not so in the medical understanding of the affliction.

### 2. DEFINITIONS OF OBESITY

One definition of obesity is "more than 20% above normal weight". "Normal Weight" is defined on the basis of data obtained over many years by Life Insurance Companies. Anyone between 10 and 20% above normal weight is defined as "overweight". This is a less serious condition than obesity.

A more common and scientifically acceptable definition is the "Quetelet Index", also known as the "Body Mass Index" (BMI). This is calculated by dividing the weight of a person in kilograms by the square of the height in metres. For example, a person who weighs 63.5 kg and is 1.68 m tall has a BMI of:

$$63.5/1.68^2 = 22.5$$

A BMI of 25 is regarded as the upper limit of normality, a BMI of 18-20 as the lower limit. A BMI between 25 and 30 is considered overweight. Unless an overweight person is also at extra risk for other life-threatening diseases, due to smoking habits, high serum cholesterol levels etc., this condition does not require urgent treatment. A BMI above 30 is considered obese. This condition requires treatment quite urgently.

A lot of (younger) women think themselves to be too fat. This is encouraged by the prevailing ideal image in affluent societies of what is to be considered a pretty or beautiful woman. This ideal person usually has a BMI of about 17-18, a very unrealistic and even unhealthy goal for most women. Lots of women will try to achieve such a low BMI without having any enduring success because such a low BMI will not be natural to their build and figure. Continuing self-inflicted dietary treatment like this may lead to eating disorders and even to systematic weight gain.

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Therefore one must always be careful in applying treatment, it certainly is not harmless when unsuccessful.

Currently men are also being urged to be lean and physical-looking. This could mean that many men will also start thinking themselves to be "too fat". Eventually this could lead to the same problems many women are having with their bodies.

Assessing obesity in children is more difficult than in adults. Application of the Quetelet Index to children is generally considered to be inappropriate.

### 3. THE PREVALENCE OF OBESITY

In most industrial societies, obesity and overweight are increasing in prevalence. In the UK it was estimated in 1987 that 8% of men and 12% of women were obese, while 37% of men and 24% of women were overweight. In Germany (West) in 1992 42% of men and 28% of women were overweight, while 11% of men and 12% of women were obese. In the Netherlands in 1992 self-reported prevalence of obesity was estimated at 2-6% for men and 4-15% for women (depending on age).

Obesity increases with age and coincides with a reduction in physical activity. The greatest increase occurs from the 20's to the 30's. Although the percentage of overweight men in the US remains constant after the thirtieth year, its severity may increase. The percentage of overweight women increases after 30, as does the severity of the condition.

Socio-economic status appears to influence obesity. In many developed countries there is less obesity in the higher socio-economic status - particularly with women. The exceptions to this rule are the physically active labourers in the lower socio-economic groups who have, as expected, a lower incidence of overweight and obesity than their less active peers.

In less developed countries the reverse is true; it is people in the higher socio-economic groups who become obese. A possible explanation for this is suggested in Section 4.

### 4. THE CAUSES OF OBESITY

Obesity can only occur when the energy value of food eaten exceeds energy expended. This situation is known as "a positive energy balance". In this situation the excess intake of energy inevitably appears as deposits of fat.

The intake of food energy is regulated, in people of normal weight, by mechanisms which ensure that it does not exceed energy expenditure. The mechanisms of regulation are very precise. A person weighing 70 kg whose energy intake exceeded expenditure by only 315 kcal per day (the equivalent of a pint of beer and a small packet - 25g - of potato crisps) would double his or her weight in about five and a half

years.

Given the precision required of these regulatory mechanisms and the abundance of food in developed societies, the incidence of obesity is not so surprising. It is even possible, though this is speculation, that the regulation of food intake operates in such a way as to encourage a slight excess rather than a deficiency.

This would have benefited the hunter-gatherers of prehistory, when surplus body fat would provide a reserve in times of dearth.

The optimum physiological regulation of energy intake may be impaired in several ways.

Possibly the most important factor of all is the extent to which humans and domesticated animals can override the regulatory mechanisms which their physiology provides. Wild animals usually stop eating when their hunger is satisfied, people and domesticated animals can consume much more, and often do so.

It seems to be clear nowadays that genetic influences play an important role in determining human fatness and obesity (up to 70% of the differences in BMI can be accounted for by genetic factors). This fact also explains to a certain extent why some people appear to eat and drink all they like and never grow fat while others have to discipline themselves all the time to prevent weight gain.

However environmental factors are still considered to have an important role in the process of becoming obese. We will first discuss some of these genetic influences and follow up with some of the environmental aspects. Lastly we will point out some disease driven influences.

#### 4.1 Genetic influence:

One important genetically influenced physical factor is that individuals vary in their "basal metabolic rates", i.e. the efficiency with which they utilise food. Those with a low metabolic rate utilise food efficiently and so need less, for a given expenditure of energy, than those with a high rate. Another important point is that some excess food energy may be converted into heat by so-called "brown adipose tissue". Individuals vary in their ability to do this.

#### 4.2 Environmental factors:

Among the environmental factors can be found the fact that some people of normal physiology tend to eat more than they need. There are many possible reasons why this is the case:

- \* Social pressure (to drink alcohol or to eat birthday cake)
- \* Habits (emptying of plates once filled)

- \* Palatability of certain foods (although one type of food may be intrinsically more palatable than another, according to one's personal taste, palatability also depends on what one has just eaten. Someone sated with a sweet food may still have an appetite for something savoury, and vice versa).
- \* Variety (it is certain [Rolls 1988] that if various types of food are available at a sitting, more will be eaten in total than if there is only one type.)
- \* Satiety (some bulky, high fibre foods give a greater feeling of fullness than more energy dense high fat foods). Carbohydrates cause greater satiety than fats.

#### 4.3 Psychological state:

The psychological state of people, like feeling lonely or out of love, can in certain individuals be an important factor. Certain people start eating when depressed while others stop feeling hungry. This obviously has an impact on bodyweight.

#### 4.4 Medication:

Certain drugs, like old-fashioned oral contraceptives or current anti-depressives, can also facilitate weight gain.

#### 4.5 Medical condition:

Some examples of disease driven influences and causes of obesity are:

- \* An unsatisfactory secretion of hormones by the thyroid.
- \* A certain chromosomal (also a genetic influence) disorder (the "Prader-Willi Syndrome")
- \* An abnormal tendency of the adipocytes (fat-containing cells) to accumulate and store fat.

#### 4.6 Food intake:

There is no evidence that any one food, calorie for calorie, is more fattening than any other. However research does seem to point out that a diet with a relatively high fat content, independent of the food sources, tends to facilitate weight gain more than a diet with a high carbohydrate content. Adipose tissue fat is derived largely from dietary fat. Carbohydrate is very difficult to convert into body fat. Fat is also more energy dense than carbohydrate: 9 kilocalories per gram with carbohydrate providing 4 per gram. Carbohydrate (also sugar) intake is inversely related to obesity, whereas fat intake is directly related. Alcohol provides 7 kilocalories per gram.

## 5. IMPLICATIONS OF OBESITY FOR PHYSICAL AND MENTAL HEALTH

Obese persons are more likely to suffer from one or more of several disorders and diseases. These include:

- diabetes mellitus
- high blood pressure
- high levels of cholesterol and triglycerides in the blood
- gout
- gall bladder and urinary calculus
- osteo-arthritis in the back, knees and feet
- coronary heart disease
- stroke
- cancer of the colon and prostate (in men) and of the breasts, uterus and ovaries (in women)

In addition, even minor surgery entails more risk for the obese.

The risk to health increases with the degree of obesity. Obese people are more likely to die prematurely from coronary heart disease, stroke, diabetes mellitus, and the cancers listed above.

There is now increasing data to show that the health implications of obesity are not homogenous. For example, those in the obese population with enlarged abdominal fat stores are more likely to suffer from the diseases outlined above than are those with excess fat stored in the buttocks and thighs (femoral fat). The abdominal obesity is more common in men while femoral obesity is more often found in women. Both types are defined by measuring waist and hip circumferences. The ratio of waist and hip circumference defines both obesities. A high ratio is abdominal obesity, a low ratio is femoral obesity. This difference between the two types of obesity is probably determined by hormones.

As well as being a risk to physical health, obesity often presents psychological problems. To be overweight is thought to be unattractive in affluent societies (also illustrated in section 2.) Obesity is held to be repugnant. These attitudes are primarily aesthetic and unrelated to health and medical considerations. They are often manifested by derision by children and aversion or even discrimination by adults. This constitutes a great risk to the mental well-being of the obese.

A National Health interview in 1985 found that in the US 46% of women and 27% of men were trying to lose weight, mainly by dieting.

It is worth noting that in poor societies where many are thin because ill-nourished, obesity is not despised, and is often regarded as an enviable symbol of wealth.

## 6. TREATMENT OF OBESITY

In the great majority of the cases obesity should be treated. Overweight needs to be treated whenever risk factors for other chronic diseases of affluence are present in addition to the overweight. The object of treatment is to get rid of excess weight permanently, meaning that after weight loss the achieved body weight should be maintained and new weight gain be prevented. Weight maintenance after weight loss presents the greatest difficulty.

Treatment normally involves reducing food intake and increasing exercise. Some of the difficulties are obvious. To change the habits of a lifetime is not easy. To ensure perpetually unsatisfied appetite amid plenty, makes a heavy demand on the will.

Ideally, an obese person should have individual expert treatment over a long period. This is not always, or even often, possible. For most diseases there is a recognised treatment and someone available who is qualified to give it. For obesity, there are too few real specialists in the subject to treat all those who could benefit.

A less obvious difficulty lies in the fact that if the intake of food energy is reduced below the level of energy expenditure, continuing weight loss is not necessarily maintained. This is because an individual's basal metabolic rate (BMR), i.e. the efficiency with which food is utilised, will reduce with reduced body mass due to weight loss. Thus if food intake is reduced, the body is likely to respond by utilising it more efficiently. Any loss of weight is then less than would be expected. Worse still, if an individual who has reduced his or her food intake allows it to increase again, the change in BMR which had previously occurred may persist for a time. In this event that individual could gain more weight than had been lost.

Exercise is therefore especially beneficial in weight maintenance after weight loss because it ensures maintenance of lean tissue. However, of itself, it is less effective in shedding weight than is often supposed. An hour's walking requires about 300 kilocalories of energy; but an hour's resting requires about 60 kilocalories, so the net requirement is only 240 kilocalories. Even if all this were met by reserves of body fat only about 27 grams would be lost. Nevertheless, long term moderate exercise should be encouraged as a preventive measure and for treatment.

The essence of obesity treatment is to reduce food intake without depriving the body of essential nutrients and to increase exercise, both with consideration of the individual patient's abilities.

## 7. WEIGHT REDUCTIONS

The reduction of overweight, though a less serious problem, should ideally be undertaken with professional advice. Schemes for losing weight abound in books and magazine articles, but not all of them are sound. "Crash diets" aimed at rapid and dramatic loss of weight should be avoided because of the danger of losing lean body mass.

The essential feature of any sound weight-reducing diet is, as with the treatment of obesity, the reduction of food energy intake and increase of energy expenditure, while maintaining an adequate intake of essential nutrients. This is best done by reducing fat (which at 9 kcal per gram is the most energy-dense nutrient); alcohol (which at 7 kcal per gram is almost as energy-dense as fat and is not a nutrient in any accepted sense). If further reductions are necessary, discretionary sugar at 4 kcal/g can also be reduced without loss of further nutrient.

One should always bear in mind however that just cutting down on sugar intake will never be an effective strategy for weight loss. It must always be done in combination with reductions of fat and alcohol intake, these nutrients being more energy dense.

All diets should contain ample fibre. Fibre helps to give a sense of satiety or repletion, without contributing significant amounts of energy.

## 8. OTHER EATING DISORDERS

Obesity is the result of eating too much over a long period. There is a contrasting disorder, "anorexia nervosa", which is eating too little. It differs from under-nourishment where the sufferer has no choice, in that it involves either a hormonal disorder which subdues appetite, or more usually, an act of will. In the latter case, anorexia nervosa is the consequence of a desperate desire to become as lean or slender as possible or an exaggerated fear of putting on weight. Anorexic people are characteristically anaemic and unpleasingly thin. Their health and even their lives can be at risk. About 1/2 to 1% of middle class white girls in the USA are thought to suffer from anorexia; there are few anorexic males.

Although a person who is obese must have been eating too much, he or she has done so only in the sense of taking in more food energy than he or she requires. The excess, day-to-day, need only be relatively small.

There is no implication of gross or wanton overeating. The latter is however the characteristic of another eating disorder, "bulimia". Paradoxically it is often found in anorectic people. Whenever severe abstinence from food becomes unsustainable, such a person may indulge in a single bout of voracious eating, often followed quickly by vomiting.

In the US 1% of women college students and 0.27% of men college students have been classified as bulimic. Among women undergraduates in group housing on

campus, 2.2% have been found to be bulimic. This disorder is generally characterised by normal weight and is therefore difficult to diagnose.

#### 9. IOCCC POSITION

The IOCCC recognises obesity as a serious disorder in developed societies, and encourages its avoidance. It should be avoided by balancing food intake with energy expenditure. This can be achieved by reductions in energy intake (especially from fat) and an increase in energy expenditure by regular moderate exercise.

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