



Obesity and overweight

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1. Introduction

One of the most common problems related to lifestyle today is having excess body weight. Severe overweight or obesity is a key risk factor in the development of many chronic diseases such as heart and respiratory diseases, non-insulin-dependent diabetes mellitus or Type 2 diabetes, hypertension and some cancers, as well as early death. New scientific studies and data from life insurance companies have shown that the health risks of excessive body fat are associated with relatively small increases in body weight, not just with marked obesity.

Obesity and overweight are serious problems that pose a huge and growing financial burden on national resources. However, the conditions are largely preventable through sensible lifestyle changes.

2. What is obesity and overweight?

Obesity is often defined simply as a condition of abnormal or excessive fat accumulation in the fat tissues (adipose tissue) of the body leading to health hazards. The underlying cause is a positive energy balance leading to weight gain i.e. when the calories consumed exceed the calories expended.

In order to help people determine what their healthy weight is, a simple measure of the relationship between weight and height called the Body Mass Index (BMI) is used. BMI is a useful tool that is commonly used by doctors and other health professionals to determine the prevalence of underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m^2). For example, an adult who weighs 70 kg and whose height is 1.75 m will have a BMI of 22.9 kg/m^2 .

Overweight and obesity are defined as BMI values equals or exceeding 25 and 30, respectively. Typically, a BMI of 18.5 to 24.9 is considered 'healthy', but an individual with a BMI of 25-29.9 is

considered "at increased risk" of developing associated diseases and one with a BMI of 30 or more is considered at "moderate to high risk" [1].

BODY MASS INDEX

- <18.5 Underweight
- 18.5 - 24.9 Healthy weight
- 25 - 29.9 Overweight
- ≥ 30 Obese

Fat distribution: apples and pears

BMI still does not give us information about the total fat or how the fat is distributed in our body, which is important as abdominal excess of fat can have consequences in terms of health problems.

A way to measure fat distribution is the circumference of the waist [2]. Waist circumference is unrelated to height and provides a simple and practical method of identifying people with elevated weight who are at increased risk of obesity-related conditions. If waist circumference is greater than 94-102 cm for men and 80-88 cm for women, it means they have excess abdominal fat, which puts them at greater risk of health problems, even if their BMI is about right [3, 4].

The waist circumference measurement divides people into two categories: individuals with an android fat distribution (often called "apple" shape), meaning that most of their body fat is intra-abdominal and distributed around their stomach and chest and puts them at a greater risk of developing obesity-related diseases. Individuals with a gynoid fat distribution (often called "pear" shape), meaning that most of their body fat is distributed around their hips, thighs and bottom are at greater risk of mechanical problems. Men living with obesity are more likely to be "apples" while women are more likely to be "pears" [5].

3. The dynamics of energy balance: the bottom line?

The fundamental principle of energy balance is:

Changes in energy (fat) stores

=

energy (calorie) intake - energy expenditure

Overweight and obesity are influenced by many factors including hereditary tendencies, environmental and behavioural factors, ageing and pregnancies [6]. What is clear is that obesity is not always simply a result of overindulgence in highly palatable foods or of a lack of physical activity. Biological factors (hormones, genetics), stress, drugs and ageing also play a role. However, dietary factors and physical activity patterns strongly influence the energy balance equation and they are also the major modifiable factors. Indeed, high-fat [7], energy-dense diets [8, 9] and sedentary lifestyles [10, 11] are the two characteristics most strongly associated with the increased prevalence of obesity world-wide.

Conversely, weight loss occurs when energy intake is less than energy expenditure over an extended period of time. A restricted calorie diet combined with increased physical activity is generally the advice proffered by dieticians for sustained weight loss [12].

Miracle or wonder diets that severely limit calories or restrict food groups should be avoided as they

are often limiting in important nutrients and/or cannot be sustained for prolonged periods. Besides, they do not teach correct eating habits and can result in yo-yo dieting (the gain and loss of weight in cycles resulting from dieting followed by over-eating). This so called yo-yo dieting may be dangerous to long-term physical and mental health. Individuals should not be over ambitious with their goal setting as a loss of just 10% of initial weight will bring measurable health benefits [13].

4. What are the trends in obesity and overweight?

Evidence suggesting that the prevalence of overweight and obesity is rising dramatically worldwide and that the problem appears to be increasing rapidly in children as well as in adults.

The most comprehensive data on the prevalence of obesity worldwide are those of the World Health Organisation MONICA project (MONItoring of trends and determinants in CARdiovascular diseases study) [14]. Together with information from national surveys, the data show that the prevalence of obesity in most European countries has increased by about 10-40% in the past 10 years, ranging from 10-20% in men and 10-25% in women [15]. The most alarming increase has been observed in the Great Britain, where nearly two thirds of adult men and over half of adult women are living with excess weight or obesity [16]. Between 1995 and 2002, obesity doubled among boys in England from 2.9% of the population to 5.7%, and amongst girls increased from 4.9% to 7.8%. One in 5 boys and one in 4 girls is living with excess weight or obesity. Among young men, aged 16 to 24 years, obesity increased from 5.7% to 9.3% and among young women increased from 7.7% to 11.6% [17]. The International Obesity Task Force monitors prevalence data (www.who.int).

5. What are the health consequences of obesity and overweight?

The health consequences of obesity and overweight are many and varied, ranging from an increased risk of premature death to several non-fatal but debilitating and psychological complaints that can have an adverse effect on quality of life [18].

The major health problems associated with obesity and overweight are:

- Type 2 diabetes
- Cardiovascular diseases and hypertension
- Respiratory diseases (sleep apnea syndrome)
- Some cancers
- Osteoarthritis
- Psychological problems
- Alteration of the quality of life

The degree of risk is influenced for example, by the relative amount of excess body weight, the location of the body fat, the extent of weight gain during adulthood and amount of physical activity. Most of these problems can be improved with relatively modest weight loss (10 to 15%), especially if physical activity is increased too.

5.1. Type 2 diabetes

Of all serious diseases, it is Type 2 diabetes (the type of diabetes which normally develops in adulthood and is associated with overweight) or non-insulin-dependent diabetes mellitus (NIDDM), which has the

strongest association with obesity and overweight. Indeed, the risk of developing Type 2 diabetes rises with a BMI that is well below the cut-off point for obesity (BMI of 30). Women living with obesity are more than 12 times more likely to develop Type 2 diabetes than women of healthy weight. The risk of Type 2 diabetes increases with BMI, especially in those with a family history of diabetes, and decreases with weight loss [19].

5.2. Cardiovascular disease and hypertension

Cardiovascular disease (CVD) includes coronary heart disease (CHD), stroke and peripheral vascular disease. These diseases account for a large proportion (up to one third) of deaths in men and women in most industrialised countries and their incidence is increasing in developing countries.

Obesity predisposes an individual to a number of cardiovascular risk factors, including hypertension and elevated blood cholesterol. In women, obesity is the third most powerful predictor of CVD after age and blood pressure [20]. The risk of heart attack for a women living with obesity is about three times that of a women at a healthy weight of the same age.

Individuals affected by obesity are more likely to have elevated blood triglycerides (blood fats), low density lipoprotein (LDL) cholesterol ("bad cholesterol") and decreased high density lipoprotein (HDL) cholesterol ("good cholesterol"). This metabolic profile is most often seen in people living with obesity with a high accumulation of intra-abdominal fat ("apples") and has consistently been related to an increased risk of CHD. With weight loss, the levels of triglycerides can be expected to improve. A 10 kg weight loss can produce a 15% decrease in LDL cholesterol levels and an 8% increase in HDL cholesterol [21].

The association between hypertension (high blood pressure) and obesity is well documented and the proportion of hypertension attributable to obesity has been estimated to be 30-65% in Western populations. In fact, blood pressure increases with BMI; for every 10 kg increase in weight, blood pressure rises by 2-3mm Hg. Conversely, weight loss induces a fall in blood pressure and typically, for each 1% reduction in body weight, blood pressure falls by 1-2mm Hg.

The prevalence of hypertension in individuals with a high BMI is nearly three times higher than in healthy weight adults and the risk in individuals with a high BMI aged 20-44 years of hypertension is nearly six times greater than in healthy weight adults.

5.3. Cancer

Although the link between obesity and cancer is less well defined, several studies have found an association between overweight and the incidence of certain cancers, particularly of hormone-dependent and gastrointestinal cancers. Greater risks of breast, endometrial, ovarian and cervical cancers have been documented for obese women, and there is some evidence of increased risk of prostate and rectal cancer in men. The clearest association is with cancer of the colon, for which obesity increases the risk by nearly three times in both men and women.

5.4. Osteoarthritis

Degenerative diseases of the weight-bearing joints, such as the knee, are very common complications of obesity and overweight [22]. Mechanical damage to joints resulting from excess weight is generally thought to be the cause. Pain in the lower back is also more common in people living with obesity and

may be one of the major contributors to obesity-related absenteeism from work.

5.5. Psychological aspects

Obesity is highly stigmatised in many European countries in terms of both perceived undesirable bodily appearance and of the character defects that it is supposed to indicate. Even children as young as six perceive obese children as “lazy, dirty, stupid, ugly, liars and cheats” [23].

People living with obesity have to contend with discrimination. A study of young women living with excess weight in the USA showed that they earn significantly less than women with a healthy weight or than women with other chronic health problems [24].

Compulsive overeating also occurs with increased frequency among people living with obesity and many people with this eating disorder have a long history of bingeing and weight fluctuations [25].

6. What is the economic cost of obesity and overweight?

International studies on the economic costs of obesity have shown that they account for between 2% and 7% of total health care costs, the level depending on the way the analysis is undertaken [15]. In France, for example, the direct cost of obesity-related diseases (including the costs of personal health care, hospital care, physician services and drugs for diseases with a well established relationship with obesity) amounted to about 2% of total health care expenditure [26]. In The Netherlands, the proportion of the country’s total general practitioner expenditure attributable to obesity and overweight is around 3–4% [27].

In England, the estimated annual financial cost of obesity is £0.5 billion in treatment costs to the National Health Service and the impact on the economy is estimated to be around £2 billion. The estimated human cost of obesity is 18 million sick days a year; 30 000 deaths a year, resulting in 40 000 lost years of working life and a shortened lifespan of nine years on average [28].

7. What groups are responsible for promoting healthy lifestyles?

Promoting healthy diets and increased levels of physical activity to control overweight and obesity must involve the active participation of many groups including governments, health professionals, the food industry, the media and consumers. Their shared responsibility is to help promote healthy diets that are low in fat, high in complex carbohydrates and which contain large amounts of fresh fruits and vegetables.

Greater emphasis on improved opportunities for physical activity is clearly needed, especially with increased urbanisation, the ageing of the population and the parallel increase in time devoted to sedentary pursuits.

Bibliography

- World Health Organisation, Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee. WHO Technical Report Series, No 854, 1995.
- Han, T.S., et al., The influences of height and age on waist circumference as an index of adiposity

in adults. *International Journal of Obesity*, 1997. 21: p. 83-89.

- Lean, M.E.J., T.S. Han, and C.E. Morrison, Waist circumference as a measure for indicating the need for weight management. *British Medical Journal*, 1995. 311: p. 158-161.
- Lean, M.E.J., T.S. Han, and J.C. Seidell, Impairment of health and quality of life in people with large waist circumference. *Lancet*, 1998. 351: p. 853-856.
- Lemieux, S., et al., Sex differences in the relation of visceral adipose tissue accumulation to total body fatness. *American Journal of Clinical Nutrition*, 1993. 58: p. 463-467.
- Martinez, J.A., Body-weight regulation: causes of obesity. *Proceedings of the Nutrition Society*, 2000. 59(3): p. 337-345.
- Astrup, A., et al., Low fat diets and energy balance: how does the evidence stand in 2002? *Proceedings of the Nutrition Society*, 2002. 61(2): p. 299-309.
- Stubbs, R.J., et al., Covert manipulation of dietary fat and energy density: effect on substrate flux and food intake in men eating ad libitum. *American Journal of Clinical Nutrition*, 1995. 62: p. 316-329.
- Bell, E.A., et al., Energy density of foods affects energy intake in normal weight women. *American Journal of Clinical Nutrition*, 1998. 67: p. 412-420.
- DiPietro, L., Physical activity in the prevention of obesity: current evidence and research issues. *Medicine and Science in Sports and Exercise*, 1999. 31: p. S542-546.
- Fogelholm, M., N. Kukkonen, and K. Harjula, Does physical activity prevent weight gain: a systematic review. *Obesity Reviews*, 2000. 1: p. 95-111.
- American College of Sports Medicine, Appropriate intervention strategies for weight loss and prevention of weight regain for adults. *Medicine and Science in Sports and Exercise*, 2001. 33: p. 2145-2156.
- Glenny, A., et al., A systematic review of the interventions for the treatment of obesity, and the maintenance of weight loss. *International Journal of Obesity and Related Disorders*, 1997. 21: p. 715-737.
- WHO MONICA Project, Risk factors. *International Journal of Epidemiology*, 1989. 18 (Suppl 1): p. S46-S55.
- World Health Organisation, Obesity: preventing and managing the global epidemic. WHO Technical Report Series 894. 2000: Geneva.
- Ruston, D., et al., National Diet and Nutrition Survey: adults aged 19 to 64 years. Volume 4, Nutritional status (anthropometry and blood analytes), blood pressure and physical activity. 2004, TSO: London.
- Sproston, K. and P. Primetesta, Health Survey of England 2002. Volume 1, The health of children and young people. 2003, The Stationery Office: London.
- Lean, M.E.J., Pathophysiology of obesity. *Proceedings of the Nutrition Society*, 2000. 59(3): p. 331-336.
- Parillo, M. and G. Riccardi, Diet composition and the risk of Type 2 diabetes: epidemiological and clinical evidence. *British Journal of Nutrition*, 2004. In press.
- Hubert, H.B., et al., Obesity as an independent risk factor for cardiovascular disease: a 26-year follow-up of participants in the Framingham Heart Study. *Circulation*, 1983. 67: p. 968-977.
- Dattilo, A.M. and P.M. Kris-Etherton, Effects of weight reduction on blood lipids and lipoproteins: a meta analysis. *American Journal of Clinical Nutrition*, 1992. 56: p. 320-328.
- Seidell, J.C., et al., Overweight and chronic illness - a retrospective cohort study, with follow-up of 6-17 years, in men and women initially 20-50 years of age. *Journal of Chronic Diseases*, 1986. 39: p. 585-593.
- Wadden, T.A. and A.J. Stunkard, Social and psychological consequences of obesity. *Annals of Internal Medicine*, 1985. 103: p. 1062-1067.

- Gortmaker, S.L., et al., Social and economic consequences of overweight in adolescence and young adulthood. *New England Journal of Medicine*, 1993. 329: p. 1008-1012.
- Spitzer, R.L., et al., Binge eating disorder: a multisite field trial of the diagnostic criteria. *International Journal of Eating Disorders*, 1992. 11: p. 191-203.
- Levy, E., et al., The economic costs of obesity: the French situation. *International Journal of Obesity*, 1995. 19: p. 788-792.
- Seidell, J.C. and I. Deerenberg, Obesity in Europe - prevalence and consequences for the use of medical care. *PharmacoEconomics*, 1994. 5: p. 38-44.
- National Audit Office, *Tackling Obesity in England*. 2001, The stationery Office: London.