Obesity as a medical problem

Peter G. Kopelman

St Bartholomew's & The Royal London School of Medicine, Queen Mary & Westfield College, London E1 2AD, UK
(e-mail: P.G.Kopelman@mds.qmw.ac.uk)

Obesity is now so common within the world's population that it is beginning to replace undernutrition and infectious diseases as the most significant contributor to ill health. In particular, obesity is associated with diabetes mellitus, coronary heart disease, certain forms of cancer, and sleep-breathing disorders. Obesity is defined by a body-mass index (weight divided by square of the height) of 30 kg m^{-2} or greater, but this does not take into account the morbidity and mortality associated with more modest degrees of overweight, nor the detrimental effect of intra-abdominal fat. The global epidemic of obesity results from a combination of genetic susceptibility, increased availability of high-energy foods and decreased requirement for physical activity in modern society. Obesity should no longer be regarded simply as a cosmetic problem affecting certain individuals, but an epidemic that threatens global well being.

O besity causes or exacerbates many health problems, both independently and in association with other diseases[1]. In particular, it is associated with the development of type 2 diabetes mellitus, coronary heart disease (CHD), an increased incidence of certain forms of cancer, respiratory complications (obstructive sleep apnoea) and osteoarthritis of large and small joints. The Build and Blood Pressure Study has shown that the adverse effects of excess weight tend to be delayed, sometimes for ten years or longer[2]. Life-insurance data and epidemiological studies confirm that increasing degrees of overweight and obesity are important predictors of decreased longevity[3]. In the Framingham Heart Study, the risk of death within 26 years increased by 1% for each extra pound (0.45 kg) increase in weight between the ages of 30 years and 42 years, and by 2% between the ages of 50 years and 62 years[4]. Despite this evidence, many clinicians consider obesity to be a self-inflicted condition of little medical significance. Here I will review the epidemiology and factors influencing obesity and the health consequences of excessive body fat.

Definition of overweight and obesity

In clinical practice, body fat is most commonly and simply estimated by using a formula that combines weight and height. The underlying assumption is that most variation in weight for persons of the same height is due to fat mass, and the formula most frequently used in epidemiological studies is body-mass index (BMI). Box 1 details the practical methods used in clinical practice to assess body fatness. A graded classification of overweight and obesity using BMI values provides valuable information about increasing body fatness. It allows meaningful comparisons of weight status within and between populations and the identification of individuals and groups at risk of morbidity and mortality. It also permits identification of priorities for intervention at an individual or community level and for evaluating the effectiveness of such interventions. It is important to appreciate that, owing to differences in body proportions, BMI may not correspond to the same degree of fatness across different populations. Nor does it account for the wide variation in the nature of obesity between different individuals and populations. A World Health Organization (WHO) expert committee has proposed the classification of overweight and obesity that applies to both men and women and to all adult age groups (Table 1)[5,6].

Defining a 'healthy weight' for a particular society presents problems. First, the definition is based on total mortality rates, which can be misleading. People frequently lose weight as a consequence of illness, which may go unrecognized at the time of survey, but results in death. This implies a higher mortality among those with lower weights and is referred to as reverse causation. A second major concern is the confounding factors, such as smoking, that

Method	Definition	Advantages/limitations
BMI	Weight in kilograms divided by square of the height in metres	BMI correlated strongly with densitometry measurements of fat mass; main limitation is that it does not distinguish fat mass from lean mass
Waist circumference	Measured (in centimetres) at midpoint between lower border of ribs and upper border of the pelvis	Waist circumference and waist-to-hip ratio provide measures for assessing upper body fat deposition; neither provide precise estimates of intra-abdominal (visceral) fat
Skinfold thickness	Measurement of skinfold thickness (in centimetres) with callipers provides a more precise assessment if taken at multiple sites	Measurements are subject to considerable variation between observers, require accurate callipers and do not provide any information on abdominal and intramuscular fat
Bioimpedance	Based on the principle that lean mass conducts current better than fat mass because it is primarily an electrolyte solution; measurement of resistance to a weak current (impedance) applied across extremities provides an estimate of body fat using an empirically derived equation	Devices are simple and practical but neither measure fat nor predict biological outcomes more accurately than simpler anthropometric measurements