

The obesity pandemic



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'Obesity is no longer a cosmetic issue, but is a major health issue accounting for billions of dollars each year.'

Obesity is now reaching epidemic proportions, not only in westernized/industrialized countries, but also in developing countries. It affects all age groups, children, adolescents, adults and the elderly. Adults with a BMI of 30 kg/m² or higher are considered obese. According to the American Medical Association Expert Committee, for children aged 2–18 years a BMI over or equal to the 95th percentile for age and sex, or a BMI exceeding 30 kg/m² (whichever is smaller) is considered obese. National Health and Nutrition Examination Survey (NHANES) data show that age-adjusted prevalence of obesity (BMI >30 kg/m²) was 30.5% in 1999–2000 compared with 22.9% in 1988–1994. Extreme obesity (BMI >40 kg/m²) went from 2.9–4.7% [1]. This is the commonest nutritional problem in North America. Annual hospital costs for children with obesity have tripled from the 1980s to 1990, rising from US\$35 million to US\$127 million [2]. Medical expenses for obese adults are 36% higher than their nonobese counterparts.

Obesity is no longer a cosmetic issue, but is a major health issue accounting for billions of dollars each year. Medical complications associated with obesity include diabetes mellitus (DM), dyslipidemia, heart disease (coronary artery disease, heart failure and atrial fibrillation), cerebrovascular disease, respiratory disease (obstructive sleep apnea, asthma), gastrointestinal diseases (gastroesophageal reflux, cholelithiasis and nonalcoholic fatty liver disease), osteoarthritis, cancer (breast, colon, endometrium kidney and esophagus) and gynecological and obstetric complications [3]. They also have an increased risk of surgical and anesthetic complications. In addition, obesity is a social stigma and is associated with discrimination with respect to educational and job opportunities. In the elderly it is associated with poor quality of life and frailty.

Central obesity is linked with hyperinsulinemia, insulin resistance, dyslipidemia and proinflammatory and prothrombotic clinical states. Adipose tissue synthesizes and secretes biologically active molecules that may affect cardiovascular disease (CVD) risk factors. These chemical messengers include adiponectin, resistin, leptin, plasminogen activator inhibitor-1, tumor necrosis factor- α and IL-6. In overweight and obese individuals, weight loss may improve insulin sensitivity leading to a reduction in risk factors for CVD and, consequently, the potential for CVD and chronic kidney disease [4].

The etiology of obesity is multifactorial. Causes include genetic, metabolic, behavioral and environmental factors. Increased prevalence of obesity in the last 20 years is mainly due to changes in environmental and behavioral factors, rather than changes in genetic factors. When we exclude genetic and metabolic causes, the positive balance between energy intake and energy expenditure seem to be the root cause for obesity. Over nutrition and sedentary lifestyle have resulted in this positive energy balance. But not everybody gains weight to the same extent with the same amount of food and activity level. So where is the problem? Today's obesity pandemic is probably due to the exposure of a genetically predisposed group of people to a 'toxic environment'.

It is more difficult to lose weight than gain weight. This is probably, in part, the result of natural selection pressure during evolution when rapid accumulation and efficient maintenance of energy reserves represented a biological advantage – the 'thrifty gene' theory [5]. Unfortunately, the same mechanisms also oppose the efforts to get rid of excess body fat.

Treatment options for obesity include lifestyle interventions, pharmacological therapy and bariatric surgery. In spite of all this, the obesity epidemic continues.

Lifestyle interventions are the cornerstone of treatment. Reduced energy intake or increased energy expenditure should be associated with weight loss, but usually both of these are used together.

Canadian clinical practice guidelines on the management and prevention of obesity in adults and children recommend an energy-reduced diet and regular physical activity as the first treatment option for overweight and obese adults and children to achieve clinically important weight loss and reduce obesity-related symptoms. Patients who are willing to participate should be provided with behavior-modification techniques, cognitive-behavioral therapy and dietary counseling [6]. Obese adults and children should have regular medical follow ups for their obesity with their physicians, just like any other chronic medical condition. Obese children need strong family support. In the absence of behavioral modifications and continued positive reinforcement and input from healthcare professionals, diets will be ineffective in the long term.

Physical activity should go hand in hand with diet for weight reduction and weight maintenance. Endurance exercise is associated with cardiovascular benefits. Frail obese elderly may benefit more from resistance exercise to build up muscle and reduce fat loss, which will improve quality of life. Patients need to understand that even without additional significant weight loss, exercise is associated with many health benefits.

In a study carried out on patients on the National Weight Control Registry, which includes over 3000 subjects who have maintained a weight loss of 30 kg for more than 5 years, it has been shown that most of them exercised for more than 1 h a day in addition to their dietary interventions to maintain this weight loss [7].

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The diabetes prevention program (DPP) had 3234 individuals with elevated fasting and post-load glucose concentrations. This study demonstrated that a lifestyle modification program with a goal of at least 7% weight loss and at least 150 min of physical activity a week reduced the incidence of DM by 58%. By contrast, metformin reduced the incidence of DM by 31%. This study demonstrated that lifestyle intervention is superior to metformin in preventing DM in patients with prediabetes [8].

In addition to formal regular exercise, nonexercise activity is also associated with energy expenditure. This is called nonexercise activity

thermogenesis (NEAT). This includes all energy expenditure, except that used during sleeping, eating and formal exercise.

For children, ‘screen time’ (i.e., computer, television and video games) should be limited. They should get more involved in activities associated with energy expenditure rather than sitting in one place and exercising their fingers to use the TV remote, computer mouse or the video game. ‘Walking school bus program’ is a fun way of improving physical activity for elementary school children. This is a program where children who live within 1 mile of the elementary school walk there together with an adult supervisor team.

Unfortunately, there is no ‘magic pill’ for obesity. Orlistat is the hydrogenated derivative of lipstatin, a naturally occurring lipase inhibitor of bacterial origin. The drug acts in the lumen of the gut where it blocks the activity of gastrointestinal lipases [9]. A meta-analysis of orlistat trials have revealed an average reduction in body weight of 2.89 kg (corrected for weight changes in the placebo group) after 12 months of treatment [10].

Interestingly, this moderate effect on body weight was sufficient to improve several metabolic parameters. There were reductions in triglyceride and cholesterol levels, improved oral glucose tolerance and a fall in systolic and diastolic blood pressure [11]. However, patients are reluctant to use orlistat owing to the side effects. Side effects include steatorrhea flatulence and fecal incontinence. The US FDA recently approved orlistat as an over-the-counter medication in the USA.

Sibutramine is a centrally acting inhibitor of noradrenaline, serotonin and, to a lesser degree, dopamine reuptake. It acts mainly as an appetite suppressant. In a placebo-controlled 1-year trial using sibutramine, small decreases in plasma glucose and glycosylated hemoglobin were observed. Plasma triglycerides were reduced and high-density lipoprotein (HDL) cholesterol levels slightly increased. In the same trial, systolic and diastolic blood pressures were increased by 4.6 and 2.8 mmHg, respectively, and heart rate rose by 5.9 beats/min (all results corrected for the corresponding changes in the placebo group) [12]. A large clinical trial the sibutramine cardiovascular outcome trial (SCOUT), is currently underway.

Rimonabant belongs to a new class of drugs that block the cannabinoid-1 (CB-1) receptor subtype. The Rio Lipid study showed that rimonabant, at a dose of 20 mg, in addition to the hypocaloric diet, reduced triglycerides,

increased HDL cholesterol, distributed low-density lipoprotein particles towards larger size, improved glucose tolerance, increased adiponectin levels, decreased leptin and C-reactive protein levels and lowered blood pressure. There was an 8.6 kg weight loss associated with rimonabant and only 2.3 kg weight loss with placebo [13]. Owing to FDA concerns regarding the associated increase in incidence of depression and suicidal ideation, this drug is not currently approved in the USA, but it is available in some European countries.

Bariatric surgery seems to be the best treatment for obesity, especially morbid obesity. The Swedish Obese Subjects Study involved obese subjects who underwent gastric surgery and contemporaneously matched, conventionally treated obese control subjects. This study analyzed 4047 subjects who had been enrolled for at least 2 years, and 1703 subjects enrolled for 10 years before analysis. After 2 years, weight had increased by 0.1% in the control group and had decreased by 23.4% in the surgery group ($p < 0.001$). After 10 years, the weight had increased by 1.6% in the control group and decreased by 16.1% in the surgery group ($p < 0.001$). Energy intake was lower and the proportion of physically active subjects was higher in the surgery group than in the control group throughout the observation period. 2- and 10-year rates of recovery from diabetes, hypertriglyceridemia, low levels of HDL cholesterol, hypertension, and hyperuricemia were more favorable in the surgery group than in the control group, whereas recovery from hypercholesterolemia did not differ between the groups. The surgery group had lower 2- and 10-year incidence rates of diabetes, hypertriglyceridemia and hyperuricemia than the control group. Differences between the groups in the incidence of hypercholesterolemia and hypertension were not significant. This shows that, as compared with conventional therapy, bariatric surgery appears to be a viable option for the treatment of severe obesity, resulting in long-term weight loss, improved lifestyle and amelioration of risk factors except hypercholesterolemia [14].

A retrospective cohort study of 9628 severely obese patients who underwent bariatric surgery in the US and 7925 severely obese control subjects has shown very impressive results with gastric bypass surgery. During the mean follow-up period of 7.1 years, the long-term mortality from any cause decreased by 40% in the surgery group as compared with the control group. Cause-specific mortality in the surgery group decreased by 56% for coronary artery disease, 92% for diabetes and 60% for cancer compared with the control group. This study shows that bariatric surgery as the best mode of reducing mortality in obese diabetic patients [15].

‘Money currently used to treat obesity should be considered as an investment for the future’

Healthcare providers and patients should consider obesity as a major health risk. Millions of people are affected and billions of dollars are spent for obesity-related medical problems. Prevention is better than a cure. We should prevent or aggressively manage childhood obesity to prevent adolescent and adult obesity. There should be more funding for obesity research to get a better understanding of this deadly disease and for the development of new therapeutic modalities. Management of obesity cannot be performed in a single office visit. It requires a commitment by a multidisciplinary team. Healthcare systems should recognize the danger of this problem and obesity should be treated like any other chronic medical problem. Insurance carriers should acknowledge that this is no longer a cosmetic issue but a serious medical condition and be prepared to cover the costs associated with interventions to prevent and treat obesity. Prevention or treatment of obesity will prevent or cure serious medical conditions like DM, thereby reducing the long-term cost of management due to complications. Money currently used to treat obesity should be considered as an investment for the future.

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