

Obesity: Risk factors, Complications, and Strategies for Sustainable Long-term Weight Management

Introduction

1. Obesity is an increasing, global public health issue. Patients with obesity are at major risk for developing a range of comorbid conditions, including cardiovascular disease (CVD), gastrointestinal disorders, type 2 diabetes (T2D), joint and muscular disorders, respiratory problems, and psychological issues, which may significantly affect their daily lives as well as increasing mortality risks. Obesity-associated conditions are manifold; however, even modest weight reduction may enable patients to reduce their risk for CVD, diabetes, obstructive sleep apnea (OSA), and hypertension among many other comorbidities. A relatively small and simple reduction in weight, for example, of around 5%, can improve patient outcomes and may act as a catalyst for further change, with sustainable weight loss achieved through a series of incremental weight loss steps. Through assessing the patient's risk, establishing realistic weight-loss targets, providing motivation and support, and supplying patients with the necessary knowledge and treatment tools to help achieve weight loss, followed by tools for structured lifestyle support to maintain weight lost, a patient can be successful in weight loss and overall health targets.

The Obesity Epidemic

2. The World Health Organization (WHO) defines overweight and obesity as abnormal or excessive fat accumulation that presents a risk to health. A body mass index (BMI) ≥ 25 kg/m² is generally considered overweight, while obesity is a BMI ≥ 30 kg/m². It is well known that obesity and overweight are a growing problem globally with high rates in both developed and developing countries.

3. In the United States in 2015, all states had an obesity prevalence more than 20%. Approximately 35% and 37% of adult men and women, respectively, in the United States have obesity. Adult obesity is most common in non-Hispanic black Americans, followed by Mexican Americans, and non-Hispanic white Americans. Individuals are also getting heavier at a younger age. Additionally, the prevalence of childhood obesity in 2- to 17-year-olds in the United States has increased from 14.6% in 1999–2000 to 17.4% in 2013–2014. Childhood obesity is an increasing health issue because of the early onset of comorbidities that have major adverse health impacts, and the increased likelihood of children with obesity going on to become adults with obesity (50% risk vs. 10% for children without obesity.)

Association of obesity with mortality and comorbid disease

Mortality

4. Obesity is associated with a significant increase in mortality - with a life expectancy decrease of 5–10 years. There is evidence to indicate that all-cause, CVD-associated, and cancer-associated mortalities are significantly increased in individuals with obesity. Mortality related to cancer is, however, also increased at Stage 1, when the physical symptoms of obesity are marginal. Recently, a large-scale meta-analysis that included studies that had enrolled over 10 million individuals, indicated that, relative to the

reference category of 22.5 to $<25 \text{ kg/m}^2$, the hazard ratio (HR) for all-cause mortality rose sharply with increasing BMI (Body Mass Index.)

Comorbidities

5. Obesity is a chronic disease that is associated with a wide range of complications affecting many different aspects of physiology. To examine these obesity-related morbidities in detail is beyond the scope of this review and therefore only a brief overview of some of the key pathophysiological processes is included next.

6. The metabolic and cardiovascular aspects of obesity are closely linked. Obesity is a contributing factor in the development of diabetes. Furthermore, central obesity defined by waist circumference is the essential component of the International Diabetes Federation (IDF) definition of the metabolic syndrome (raised triglycerides, reduced HDL cholesterol, raised blood pressure, and raised fasting plasma glucose.) Obesity is also closely associated with sleep apnea.

7. The development of certain cancers, including colorectal, pancreatic, kidney, endometrial, and postmenopausal breast - just to name a few, have also been shown to be related to excess levels of fat and the metabolically active nature of this excess adipose tissue. The wide range of morbidities associated with obesity represents a significant clinical issue for individuals with obesity. However, as significant as this array of risk factors is for patient health, the risk factors can be positively modified with weight loss.

Obesity-related morbidities in children and adolescents

8. As was referred to earlier, children and adolescents are becoming increasingly affected by obesity. This is particularly concerning because of the long-term adverse consequences of early obesity. Obesity adversely affects the metabolic health of young people and can result in impaired glucose tolerance, T2D, and early-onset metabolic syndrome. There is also strong support in the literature for relationships between childhood obesity and asthma, poor dental health (caries), non-alcoholic fatty liver disease (NAFLD), and gastroesophageal reflux disease. Additionally, obesity is also associated with psychological problems such as ADHD, anxiety, and depression.

Modest weight loss and its long-term maintenance: Benefits and risks

9. Guidelines recommend weight-loss targets of 5%–10% in individuals with obesity or overweight with associated comorbidities, as this has been shown to significantly improve health-related outcomes for many obesity-related comorbidities including T2D prevention, and improvements in dyslipidemia, hyperglycemia, osteoarthritis, stress incontinence, GERD, hypertension, and PCOS. Further benefits may be evident with greater weight loss, particularly for dyslipidemia, hyperglycemia, and hypertension. For NAFLD and OSA, at least 10% weight loss is required to observe clinical improvements. Also, a recent meta-analysis of 15 studies demonstrated that relatively small amounts of weight loss, on average 5.5 kg in the treatment arm versus 0.2 kg with placebo from an average baseline BMI of 35 kg/m^2 , resulted in a substantial 15% reduction in all-cause mortality.

. Cardiovascular health

10. Weight loss is associated with beneficial changes in several cardiovascular risk markers, including dyslipidemia, pro-inflammatory/pro-thrombotic mediators, arterial stiffness, and

hypertension. Importantly, weight loss was found to reduce the risk for CVD mortality by 41% up to 23 years after the original weight-loss intervention. Weight loss also is effective in stroke prevention.

Cancer

11. Intentional weight loss of >9 kg reduced the risk for a range of cancers including breast, endometrium, and colon in the large-scale Iowa Women's Health Study. The overall reduction in the incidence rate of any cancer was 11% (relative risk, 0.89; 95% CI 0.79, 1.00) for participants who lost more than 9 kg compared with those who did not achieve a more than 9 kg weight loss episode. Additionally, weight loss in participants with obesity has been established to be associated with reductions in cancer biomarkers.

Additional health benefits

12. The substantial weight loss associated with bariatric surgery has been shown to improve asthma with a 48%–100% improvement in symptoms and reduction in medication use. However, there is a potential threshold effect so that modest weight loss of 5%–10% may lead to clinical improvement. Similarly, modest weight loss of 5%–10% improves GER and liver function. A study utilizing MRI scanning to examine the effects of weight loss on NAFLD has reported a reduction in liver fat from 18.3% to 13.6% ($p = .03$), a relative reduction of 25%. Additionally, weight loss can reduce the joint-pain symptoms and osteoarthritis. This weight loss must be done slowly, or other risks may enter such as gallstones.

Strategies to help individuals achieve and maintain weight loss

13. The focus here is on some of the clinical strategies for delivering weight loss and weight loss maintenance lifestyle programs. Structured lifestyle support plays an important role in successful weight management. A total of 34% of participants receiving structured lifestyle support from trained-nursing staff achieved weight loss of $\geq 5\%$ over 12 weeks compared with approximately 19% with usual care. This structured program, delivered in a primary healthcare setting, included initial assessment and goal setting, an eating plan and specific lifestyle goals, personalized activity program, and advice about managing obstacles to weight loss. Additionally, data from the National Weight Control Registry (NWCR), which is the longest prospective compilation of data from individuals who have successfully lost weight and maintained their weight loss, confirm expectations that sustained changes to both diet and activity levels are central to successful weight management. Lifestyle factors can help achieve and maintain weight loss. These include the following: modified food intake, increased physical activity (1 hour of exercise a day), eating breakfast daily, weekly weighing, watching less than 10 hours of television a week, losing weight with an organized weight loss program and walking.

Realistic weight-loss targets

14. From the outset, a patient's estimate of their achievable weight loss may be unrealistic. Setting realistic weight-loss goals is often difficult because of misinformation from a variety of sources, including friends, media, and other healthcare professionals. Many individuals with obesity or overweight have unrealistic goals of 20%–30% weight loss, whereas a more realistic goal would be the loss of 5%–15% of the initial body weight. Promoting realistic weight-loss expectations for patients was identified as a key difficulty for nurse practitioners,

primary care nurses, dietitians, and mental health workers. Healthcare practitioners should focus on open discussion about, and re-enforcement of, realistic weight-loss goals and assess outcomes consistently according to those goals.

Maintaining a food diary

15. The 2013 White Paper from the American Nurse Practitioners Foundation on the Prevention and Treatment of Obesity considers a food diary as an important evidence-based nutritional intervention in aiding weight loss (ANPF). Consistent and regular recording in a food diary was significantly associated with long-term weight-loss success in a group of 220 women. This group lost a mean of 10.4% of their initial body weight through a 6-month group-based weight-management program and then regained a mean of 2.3% over a 12-month follow-up period, during which participants received bimonthly support in person, by telephone, or by e-mail. It has been proved that frequent and consistent food monitoring should be encouraged, particularly in the weight-maintenance phase of any program.

Motivating and supporting patients

16. Motivational interviewing is a technique that focuses on enhancing intrinsic motivation and behavioral changes by addressing uncertainty. Interviews focus on “change talk,” including the reasons for change and optimism about the intent for change in a supportive and nonconfrontational setting and may help individuals maintain behavioral changes. For patients that have achieved weight loss, the behavioral factors associated with maintaining weight loss include strong social support networks, limiting/avoiding disinhibited eating, avoiding binge eating, avoiding eating in response to stress or emotional issues, and being accountable for one's decisions. Continued support from healthcare staff may help patients sustain the necessary motivation for lifestyle changes.

Educational and environmental factors

17. It is important to consider a patient's education and environment when formulating a weight loss strategy as environmental factors may need to be challenged to help facilitate weight loss. A family history of obesity and childhood obesity are strongly linked to adult obesity, which is likely to be because of both genetic and behavioral factors. Families can also impart cultural preferences for less healthy food choices and family food choices may be affected by community factors, such as the local availability and cost of healthy food options. Thus, it is possible that a family's genetic profile could contribute to eating choices.

18. Family mealtimes are strongly associated with better dietary intake and a randomized controlled trial to encourage healthy family meals showed a promising reduction in excess weight gain in prepubescent children. Another study showed that adolescents with any level of baseline family meal frequency, 1–2, 3–4, and ≥ 5 family meals/week, had reduced odds of being affected by overweight or obesity 10 years later than adolescents who never ate family meals.

Conclusions/summary

19. The importance of obesity management is underscored both by the serious health consequences for individuals, but also by its increasing prevalence globally, and across age groups. Obesity promotes a chronic, low-grade, inflammatory state, which is associated with vascular dysfunction, thrombotic disorders, multiple organ damage, and metabolic dysfunction. These physiological effects ultimately lead to the development of a range of morbidities, including CVD, T2D, Obstructive Sleep Apnea (OSA), and certain cancers along with many others, as well as causing a significant impact on mortality. Even modest weight loss of 5%–10% of total body weight can significantly improve health and well-being, and further benefits are possible with greater weight loss. Weight loss can help to prevent development of T2D in individuals with obesity and prediabetes and has a positive long-term impact on cardiovascular mortality. In addition, weight loss reduces the risk for certain cancer types and has positive effects on most comorbidities including asthma, GERD, liver function, urinary incontinence, fertility, joint pain, and depression.

20. Weight-loss programs that include realistic weight loss goals, frequent check-in, and meal/activity diaries may help individuals to lose weight. Setting realistic weight-loss goals can be difficult; however, visual resources showing the health and wellness benefit of weight loss may be helpful in discussing realistic goals and help motivate the patient in maintaining the weight loss. Techniques such as motivational interviewing that focus on addressing resistance to behavioral change in a supportive and optimistic manner may help individuals in integrating these changes to allow them to become part of normal everyday life and thus help with maintaining the weight loss. Positive reinforcement in terms of marked early-weight loss may also assist in improving adherence, so this should be a key goal for weight-loss programs. Encouraging feelings of “self-worth” or “self-efficacy” can help individuals to view weight loss as being within their own control.

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