

## Review Article

# Updated modalities for management of obesity

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## ABSTRACT

Obesity treatment has become vastly more challenging as our comprehension of weight control has grown. Its treatment needs a close collaboration between a dedicated multidisciplinary healthcare team and a motivated patient. The team can include dietitian, health educator, physical activity mentor, personal trainer, clinical psychologist, and physician will be among the team members. Successful obesity care should overcome both the medical and social burdens of the condition. New prevention methods have Aby health care professionals since it is a condition with significant health implications. Obesity management consists of many options surgically, pharmacologically, dietary and physical activity. The best management option for each patient is determined by a healthcare professional. Bariatric surgery results in a larger decrease in BMI in the short and long term, when compared to non-surgical interventions. However, doctors and patients should recommend bariatric surgery at a lower threshold where lifestyle and pharmacological treatments have failed. Updates in obesity management are regular, and healthcare workers should continuously be updated with these management modalities.

**Keywords:** Obesity, Management, Overweight, Body mass index

## INTRODUCTION

The world health organization (WHO) has identified obesity as the leading global chronic health condition in adults, and it is becoming a more significant problem than malnutrition.<sup>1</sup> Obesity is becoming more common in both

developed and developing nations. It is accountable for around 80% of type 2 diabetes instances, 35% of ischemic heart disease instances, and 55% of hypertensive disease cases.<sup>2</sup> Per year, they cause over a million deaths and 12 million life-years of illness. Excess weight is thought to be responsible for one out of every

13 deaths in the EU.<sup>3</sup> The consequential economic inferences and the load on national health expenses are quite significant.

Although BMI is a straightforward tool for determining the magnitude of overweight and obesity, waist circumference is a preferable indicator for abdominal obesity as it has a stronger association with the likelihood of metabolic and cardiovascular diseases. Body fatness is the culmination of differences between developmental, environmental, and genetic causes.<sup>4</sup> Obesity has an undesirable impact on quality of life and decreases life expectancy. Obesity, central obesity, and the risks of cardiometabolic disorders, obstructive sleep apnea, asthma, and nonalcoholic fatty liver disease (NAFLD) are well known.<sup>5</sup>

Obesity treatment has become vastly more challenging as our comprehension of weight control has grown. Successful obesity care should overcome both the medical and social burdens of the condition. New prevention methods have struggled to control the worldwide obesity epidemic. Diet, exercise, and behavioral changes continue to be the critical components of obesity recovery. Obesity care must include low-calorie, low-fat meals, elevated physical exercise, and behavioral change measures.<sup>6</sup>

Anti-obesity medications aid in weight loss and lead to more reductions in obesity-related health hazards. Quick weight loss, lasting up to 6 months, is ordinarily easy. Nevertheless, long-term weight loss is often associated with decreased compliance, setbacks, and high drop-out rates. Daily fitness exercise, cognitive-behavioral lifestyle changes, anti-obesity medication, and, in some cases, surgery all help with weight loss control.<sup>7</sup>

Over six months, the initial aim of weight loss therapy should be to decrease body weight by 10%. If this goal is met, additional weight loss can be considered. Most patients, however, find it impossible to begin losing weight after a six-month cycle, and the patient's challenge may be to retain the lower body weight. This can only be accomplished if the patient adheres to an ongoing regimen of food, physical exercise, and behavioral therapy. Treatment goals also include the management of co-morbidities, as well as the improvement of quality of life and well-being in obese individuals. In addition to weight control, proper management of obesity risks should include dyslipidemia, optimizing glycemic control in type 2 diabetic patients, normalizing blood pressure in hypertension, managing pulmonary disorders, sensitivity to pain management and mobility needs in osteoarthritis, and management of psychosocial disturbances.<sup>8</sup>

Many treatments have been identified for obesity, including diet, physical exercise, psychiatric treatment, medications, and surgery. In practice, a mixture of these approaches is used, based on the patient's weight, co-

morbidities, and desired targets. Several recent studies have established various novel pathways that predispose to obesity, including the function of intestinal microflora and even social networks. The care of obese patients is also a complicated problem.<sup>5</sup> Obesity prevention should target high-risk people or communities. Individuals with pre-existing weight-related issues and those at increased risk of having obesity co-morbidities such as cardiovascular disease and type 2 diabetes should be given top priority in this preventive plan.<sup>9</sup>

## **BARIATRIC SURGERIES**

Bariatric surgery is widely regarded as the most important tool in the battle against obesity and metabolic syndrome. Patients should predict significant, long-term weight loss and a longer, healthy life when used to affect a lifetime lifestyle improvement. It has the most reliable and long-lasting results.<sup>10</sup>

Roux-en-Y gastric bypass, sleeve gastrectomy, and adjustable gastric banding are the most popular bariatric operations. A slew of clinical tests has shown that bariatric surgery is the most powerful tool for losing weight and keeping it off, thus improving fitness and life expectancy. Obesity-related conditions have been shown to improve and potentially resolve with bariatric surgery. According to current studies, the efficacy of bariatric surgery is attributed not only to volume limitation but also to the metabolic impact.<sup>11</sup>

### ***Roux-en-Y gastric bypass***

This technique entails making a narrow gastric pouch (which restricts food intake) and connecting it to a roux limb (typically 75 to 150 cm long) that bypasses a significant portion of the small intestine (preventing the absorption of nutrients). Consequently, the food bolus obviates the bulk of the stomach (the portion of the stomach housing the majority of the parietal cells and stomach acid), the duodenum, and the first 40 to 50 cm of the jejunum.<sup>12</sup> Foods can only be absorbed distal to such bypassed parts, with the remainder absorbed in the "normal tube," which is located distal to the junction of the biliopancreatic and Roux limbs. Roux-en-Y gastric bypass yields an average loss of 70% of excess weight.<sup>13</sup>

### ***Sleeve gastrectomy***

It is a modern, safe, and effective approach for treating obesity, with better patient survival rates. A significant portion of the stomach, responsible for appetite control, is resected in this process. Sleeve gastrectomy has piqued the attention of surgeons in recent years, owing to the fact that it does not necessitate a gastrointestinal anastomosis or intestinal bypass.<sup>14</sup> It is less invasive and less technically demanding than laparoscopic Roux-en-Y gastric bypass (LRYGB). Sleeve gastrectomy does not involve the insertion of an artificial device around the

stomach. In contrast, the laparoscopic adjustable gastric banding technique (LAGB) involves the placement of an inflatable silicone device around the upper portion of the stomach to reduce food intake. The sleeve gastrectomy results in an overall weight loss of around 60%.<sup>15</sup>

### ***Laparoscopic adjustable gastric banding***

It is regarded as a healthy and reliable way of losing weight and reducing the comorbidities related to obesity. Despite its enhanced, early protection profile compared to Roux-en-Y gastric bypass, patients with laparoscopic adjustable gastric banding (LAGB) will experience unique symptoms unique to the LAGB and necessitate a special evaluation and management procedure.<sup>16</sup> The band is positioned just below the gastric-esophageal junction. The pouch has a capacity of 50-80 mL. The band should be placed at a 45° angle toward the left shoulder, with the medial side of the band juxtaposed to the left pedicle of the vertebra. The gastric band is the least successful and has a high failure rate in the long run. The flexible gastric band was found to have a far more significant metabolic impact than the Roux-en-Y gastric bypass and sleeve gastrectomy.<sup>17</sup>

### ***Biliopancreatic diversion with duodenal switch***

A horizontal gastric resection was combined with the closure of a duodenal stub, gastroileal anastomosis, and ileoileal anastomosis to create a 50 cm normal channel and a 250 cm alimentary channel. Because of the increased risk of short- and long-term complications, this treatment is seldom used.<sup>18</sup>

### ***Intra-gastric balloon***

This technique incorporated a horizontal gastric resection with the closure of a duodenal stub, gastroileal anastomosis, and ileoileal anastomosis create a 50 cm normal channel and a 250 cm alimentary channel. Because of the increased risk of short- and long-term consequences, this operation is rarely undertaken.<sup>19</sup>

### ***Aspiration therapy***

The Aspire assist kit is used, which comprises a large-bore percutaneous gastrostomy hose, skin port, and attachable drainage system with remote control. The gastrostomy tube is implanted endoscopically under sedation in the same way as a percutaneous endoscopic gastrostomy, except it works in reverse, enabling removal of approximately 30% of gastric material post-meal. At the same time, the drainage device is connected to the gastrostomy tube via a skin port. Aspiration is done 20 minutes after a meal by cycles of water irrigation into the stomach, depending on positive pressure from inside the stomach to void fluids containing food particles out of the gastrostomy tube.<sup>20</sup>

### ***Gastric artery embolization***

It is an endovascular procedure that uses a femoral or radial method to inject 300-500-µm embolic microparticles into the left gastric artery to occlude it (LGA). The basic idea behind this strategy is to reduce appetite arousal and modulate metabolism by conquering the hunger hormone ghrelin. Ghrelin is a hormone primarily released in the gastric fundus and is a potent central appetite stimulant that promotes positive energy balance.<sup>21</sup>

### ***Vagal nerve blockade***

EnteroMedics' pacemaker-like technology is used to do this. Via minimally invasive laparoscopic procedure, electrodes are added to the gastro-esophageal junction to obstruct conduction and thereby facilitate and extend satiety. These are linked to a neuro-regulator that is subcutaneously inserted and can be charged transcutaneously. Despite minimally invasive surgery, VBLOC bears the risk and contraindications of a general anesthetic during implantation.<sup>22</sup>

### ***Dual-path enteral bypass: incisionless anastomosis system***

In which a linkage is created between sections of the small intestine to shorten the length necessary for nutrient absorption and therefore aid weight loss IAS is a novel anastomosis procedure that employs magnets. Concurrent enteroscopy and colonoscopy are used to deploy and coordinate self-forming magnets that compress the jejunum and ileum together.<sup>23</sup>

### ***Duodenal-jejunal bypass sleeve liner***

It is an endoscopic implant (EndoBarrier) made up of a 60-cm fluoropolymer impermeable sleeve with nitinol anchors on the proximal end. The system, which is designed to imitate a gastric bypass, is anchored in the duodenal bulb and extends the length of the proximal small intestine, stopping nutrients from being ingested here. It is deployed endoscopically. This comes with a number of effects that promote satiety and weight loss, such as food delivery distally and bile flow, and gut hormone regulation.<sup>24</sup>

## **DIETARY APPROACHES**

Popular weight-loss dietary techniques have sparked public concern and heated discussion. Though energy management continues to be the foundation of weight control (i.e., calories still count), new recipes and books offering weight reduction by reducing certain foods or macronutrients rather than energy are increasingly appearing.<sup>25</sup>

### ***A low-carbohydrate diet***

It is amongst the most well-known weight-loss methods. LC diets often have a low carbohydrate intake (20-50 grams per day, or around 10% of total calories), increasingly increased with time, and a moderately large fat intake (approximately 60 percent fat). LC approaches to promote the consumption of nutrient-dense carbohydrate-containing foods (e.g., low GI vegetables, whole grain products), thus discouraging the consumption of processed carbohydrates.<sup>26</sup>

### ***High protein diet***

Intakes of more than 25% raw energy or 1.6 gm/kg a day of body weight can be considered strong. Several previous studies have shown that high protein diets result in stronger weight reduction as well as enhancements in a body structure (i.e., reductions in waist size, waist-to-hip ratio, and intra-abdominal adipose tissue, as well as higher retention of lean body mass) than low-fat diet diets.<sup>27</sup>

### ***Moderate-fat diet***

Comprise up to 35% fat, whereas moderate fat (MF) diets usually contain 35%-45% fat. The Mediterranean diet is low in fat. Previous research has found that people who adopted an MF diet retained their weight loss more effectively over time, implying that MF diets could be easier to stick to in the long run than LF diets.<sup>28</sup>

### ***Low-fat diet***

Consuming an low-fat (LF) (20-35%) diet aids in weight management, promotes fitness and lowers the risk of chronic disease. The instructions contain requirements for “foods to reduce” (i.e., saturated and trans-fat, cholesterol, salt, added sugar, processed grains, alcohol) and “foods to increase” (i.e., fruits, vegetables, whole grains, low-fat dairy, and protein foods, oils) in order to improve the nutritional quality and health-promoting ability of the diet.<sup>29</sup>

### ***Very-low-fat diet***

Diets containing 10% to 20% fat are classified as very low-fat. Unlike LF schedules, which include all ingredients, very low-fat diets actively prohibit the intake of foods rich in processed carbohydrates.<sup>30</sup>

### ***Low-glycemic index diet***

Low-glycemic index (GI) foods have a GI of 0 to 55, large GI foods have a GI of 70 or higher, and moderate GI foods have a GI between these two sizes. A number of influences, including carbohydrate type, fiber volume and type, the extent of production, cooking, storage, acidity, food composition, and macronutrient content, can all influence GI. Previous research found no benefits in

terms of weight reduction when the GI was changed while the energy and macronutrient content remained unchanged. However, the findings do indicate that low glycemic index diets can play an important role in the prevention and treatment of metabolic and cardiovascular disease.<sup>31,32</sup>

## **PHARMACOLOGICAL MANAGEMENT**

Anti-obesity medications act on various receptors in the central nervous system or peripheral tissues, with the goal of normalizing regulatory or metabolic abnormalities implicated in the pathogenesis of obesity. There are two types of obesity medications: those licensed for short-term use (diethylpropion, phendimetrazine, benzphetamine, and phentermine) and those licensed for long-term use (orlistat, phentermine/topiramate ER, lorcaserin, naltrexone/bupropion ER, and liraglutide).<sup>33</sup>

The appetite suppressant phentermine HCl is authorized for short-term monotherapy in persons 16 years of age and older. For the long-term treatment of obesity, sibutramine (Meridia, Abbott) and orlistat (Xenical, Roche) have been approved. Long-term treatment is recommended for obese patients with a body mass index (BMI) of 30 kg/m<sup>2</sup> or higher, as well as patients with a BMI of 27 kg/m<sup>2</sup> who either have diabetes, dyslipidemia, or hypertension.<sup>34</sup>

Furthermore, type 2 diabetes (T2DM) is widespread in obese patients, necessitating the evaluation of pharmacological solutions that do not impede patients' weight loss. Weight-centric prescribing is also an essential part of obesity pharmacological treatment. It is essential for health care providers to carefully monitor their patients' prescription lists to decide whether any of these agents could be leading to weight gain.<sup>35</sup>

In clinical trials, several possible new agents targeting weight loss in obesity through central nervous system pathways or peripheral adiposity signals are being investigated. Gut hormones and/or their derivatives can aid in the treatment of obesity by targeting specific appetite pathways within the brain without causing undesirable side effects. Cetilistat (pancreatic lipase inhibitor), oxyntomodulin (dual GLP-1 receptor agonist and glucagon receptor precursor), and sodium-dependent glucose co-transporter and diglyceride acyltransferase inhibitors (DGAT-1).<sup>36</sup>

Monoamine reuptake inhibitors such as tesofensine (originally developed for neurodegenerative diseases) and zonisamide-bupropion (where zonisamide was initially developed for epilepsy). There are also experimental D3 dopamine antagonists -opioid inverse agonists, AgRP inhibitors, and neuropeptide YY5 receptor antagonists such as velneperit in the clinical trial process, both of which are central nervous system agents.<sup>37</sup>

## PHYSICAL ACTIVITY

Physical exercise should be incorporated into holistic weight control and should be adjusted to each subject's level of obesity, age, and prevalence of comorbidities. Physical exercise not only increases energy consumption and weight loss but also protects against lean body mass loss, enhances cardiorespiratory fitness, lowers obesity-related cardiometabolic health risks, and elicits feelings of well-being. Aerobic exercise improves oxygen delivery to muscle, allowing for greater use of ample fat reserves rather than small glycogen stores.<sup>38</sup> It is advised to engage in moderate-intensity physical exercise for 30 minutes a day, five days a week. This operation carried out for a month, reflects an energy imbalance that will lead to a weight loss of 0.5 kg. Patients should be mindful of achievable targets for exercise-induced losing weight as well as the positive impact of exercise in general on cardiometabolic complications. Exercise can be raised to 60 minutes five days a week to maximize weight loss. Obesity is commonly caused by a lack of normal habitual physical exercise. Flying, riding, and stair climbing, for example, can be promoted.<sup>39</sup>

## DISCUSSION

Obesity care should be carried out by a multidisciplinary team.<sup>40</sup> Dietitian, health educator, physical activity mentor, personal trainer, clinical psychologist, and physician will be among the team members. Obesity treatment needs a close collaboration between a dedicated healthcare team and a motivated patient. Beyond weight reduction, obesity therapy increases the patient's quality of life and overall wellbeing, as well as lowering the likelihood of obesity-related complications. Also, moderate weight loss (5-10% of baseline weight), dietary changes, and enhanced physical activity will result in significant health benefits.<sup>41</sup> Not only the BMI target is the target, controlling and handling co-morbidities will increase QoL and the patient's well-being, and improving body composition leads to improved risk management. Obesity treatment also decreases the need for prescription drugs to treat co-morbidities.

When administered on-site with face-to-face contact on an average of one to two therapy sessions every month for at least six months, a comprehensive lifestyle intervention results in greater weight reduction than normal care.<sup>42</sup>

The systematic review and meta-analysis of Selvendran et al was conducted to determine the comparative effectiveness of weight-loss therapies in obese young patients. The study concludes that, as opposed to non-surgical obesity therapies, bariatric surgery results in a larger decrease in BMI in the short and long term.<sup>43</sup> As a result of these findings, doctors and patients should recommend bariatric surgery at a lower threshold where lifestyle and pharmacological treatments have failed.

According to McGovern et al, a combined lifestyle intervention approach is more successful than a single lifestyle intervention approach in terms of BMI improvement, and pharmacological treatment (for example, sibutramine) may be useful in the short term approaches.<sup>44</sup> This is supported by the study of Selvendran et al that also concluded that overall lifestyle and pharmacological treatments have similar effects on BMI reduction, and that metformin has similar effects on BMI reduction independent of the time period over which it is prescribed.<sup>43</sup> Another review showed that metformin has little discernible weight-loss effect following long-term use.<sup>45</sup> Regarding surgical interventions, the RCT of O'Brien et al showed that the surgical arm lowered mean BMI by 12.7 kg/m<sup>2</sup> (95% CI -11.3 to -14.2), relative to a decrease of 1.3 kg/m<sup>2</sup> (95% CI 0.4 to 2.9) in the lifestyle change management arm in this RCT of 50 patients.<sup>46</sup>

## CONCLUSION

Obesity should be addressed by health care professionals since it is a condition with significant health implications. Effective obesity management necessitates a multilevel obesity management network and the active participation of the health and general insurance sectors, as well as legislatures. Obesity management consist of many options surgically, pharmacologically, dietary and physical activity. The best management option for each patient is determined by healthcare professional. Updated in obesity management are regular and healthcare workers should always be updated with these management modalities.

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