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Review Article

Obesity in adults: a review

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ABSTRACT

Obesity is a chronic complex disease that is caused by excessive fat deposits in the human body, and it is considered as one of the major causes of health impairment. It increases the risk of type 2 diabetes and heart diseases in addition to affecting bones and reproduction system that can increase the risk of certain types of cancer. Furthermore, it has a major impact on the quality of living, such as sleeping disorder or physical movement. Its early diagnostic procedure involves a regular monitoring of the human's body mass index (BMI): weight (kg)/height^2 (m^2). The body mass index is an initial surrogate marker to confirm fatness and waist circumference that helps to diagnose obesity. It is an emerging and growing public health issue in the Western world as well as in the Middle East countries. More specifically, obesity in Qatar is the focus in this article which is among the top-ranked obese countries with a high obesity rate among its population and only a limited number of studies focused on the systematic identification of potential risk factors using multimodal datasets. This article aims to focus on the main causes of obesity, its diagnosis, management approach and pharmacological and non-pharmacological treatments.

Keywords: Obesity, Body mass index, Waist circumference, Type 2 diabetes

INTRODUCTION

Obesity is defined as an excess accumulation of body fat that presents a risk to health. An obese person is 20% or more heavier than their ideal weight. Normal body mass index (BMI) range is from 18.5 kg/m^2 to 24.9 kg/m^2.[1] According to the World Health Organization (WHO) report, a person is overweight if the BMI greater than or equal to 25 and obese if the BMI is greater than or equal to 30.[2] One out of eight people in the world were living with obesity in 2022 and worldwide adult obesity has more than doubled since 1990 while adolescent obesity has quadrupled. The report also revealed that 43% of adults (aged 18 years and over) and 37 million children under the age of 5 were overweight while 16% adults were living with obesity. Obesity can lead to increased risk of type 2 diabetes and heart disease. It can also affect bone health, reproduction system and can be a cause of certain types of cancer.

A recent study on the economic impact of overweight and obesity reveals that 31% population in the South-East Asia and African regions while 67% population in the Americas regions are overweight.[3] Also, one third of adult's population in United States have obesity. Obesity is associated with range of comorbidities, including diabetes, cardiovascular diseases, obstructive sleep apnoea, and cancer; however modest weight loss in the 5-10% range and above can significantly improve health related outcomes.

Obesity and its related comorbidities have a negative impact on the health care systems in several countries. In this regard, Qatar is not an exception as reported by Mandeya et al, where the negative impact of obesity on the community, healthcare services, and economy of the country is described.[5] In the last three decades, Qatar witnessed a significant increase in the number of overweight and obese individuals.

In 2006, the World Health Survey (WHS) reported that 16% of children in Qatar were overweight based on BMI levels set by the World Health Organization (WHO).[6] Subsequently, in 2012, following the guidelines of the WHO stepwise approach to surveillance (STEPS), the national survey reported that about 70% of the Qatari population are overweight (BMI >25 kg/m^2), and 41% are obese (BMI >30 kg/m^2).[7] As a result, the rate of obesity-related comorbidities is relatively higher in Qatar, but this rate is comparable to the neighbouring Gulf countries. Therefore, identifying obesity risk factors can help to improve the health and well-being of obese people as well as support individuals suffering from obesity-related comorbidities.

AETIOLOGY OF OBESITY AND WEIGHT GAIN

The pathophysiology of obesity is a complex and multifactorial process. Obesity depends on many factors including genetic, endocrine and environmental that disrupt energy balance, fat storage and metabolic processes. If a person consumes a large amount of energy, particularly found in high fat and high sugar foods, and do not use all the consumed energy through physical activities, the remaining consumed energy is stored in the body as fat.[4]

The average physically active man needs about 2,500 calories a day to maintain a healthy weight, and the average physically active woman needs about 2,000 calories a day. Although, it seems a large amount of calories intake per day, but it can easily be taken by consuming certain types of food. For example, a large takeaway hamburger, fries' box and a milkshake glass include 1,500 calories in total in just a single meal.[1,2]

Therefore, diet and lifestyle are among the main factors that contribute to the development of obesity and overweight. Some of the most common ones are, eating large amounts of processed or fast food, drinking too much alcohol, eating out food cooked in a restaurant may be higher in fat and sugar, eating larger portions than you need, drinking too many sugary drinks like including soft drinks and fruit juice, comfort eating. Changes in society have also made it more difficult to have a healthy diet. High calorie food has become cheaper and more convenient and is heavily advertised and promoted.

On the other hand, a lack of physical activity is another important factor contributing to obesity. Many people have jobs that involve sitting at a desk for most of the day. They also rely on their cars, rather than walking or cycling. For relaxation, many people tend to watch TV, browse the internet or play computer games, and rarely take regular exercise.

According to the Department of Health and Social Care recommendations, adults should do at least 150 minutes of moderate-intensity aerobic activity, such as cycling or fast walking, every week. This does not need to be done in a single session but can be completed in multiple shorter activity sessions. For example, an exercise for 30 minutes a day for 5 days a week. However, a person living with obesity and trying to lose weight, needs to do more exercise than these recommendations. It can be started with a slow pace and gradually increase the duration of physical activities each week.[6]

There are some genes associated with obesity and overweight.[3] In some people, genes can affect how their bodies change food into energy and store fat. Genes can also affect people's lifestyle choices. There are also some rare genetic conditions that can cause obesity, such as Prader-Willi syndrome. Certain genetic traits inherited from your parents such as having a large appetite may make losing weight more difficult, but they do not make it impossible. In many cases, obesity is more to do with environmental factors, such as not having easy access to healthy food, or unhealthy eating habits learned during childhood.

In some cases, underlying medical conditions may contribute to weight gain.[4] These include an underactive thyroid gland (hypothyroidism) and Cushing's syndrome. However, if conditions such as these are properly diagnosed and treated, they should pose less of a barrier to weight loss.

Certain medicines including some steroids also contribute to obesity and weight gain. For example, medications use for epilepsy and diabetes, antidepressants for mental health treatment and medicines for schizophrenia. Weight gain can sometimes be a side effect of stopping smoking.[8]

DIAGNOSIS

The recommended measure for overweight and obesity is BMI. BMI is calculated as body weight (kilograms) divided by height (metre square). An obese patient is 20% or more heavier than their ideal weight. Healthy weight BMI range is from 18.5 kg/m^2 to 24.9 kg/m^2 and overweight BMI range is from 25 kg/m^2 to 29.9 kg/m^2. Furthermore, there are three types of obesity based on the BMI values.[1] These are when: BMI is from 30 kg/m^2 to 34.9 kg/m^2, BMI is from 35 kg/m^2 to 39.9 kg/m^2, and BMI is more than 40 kg/m^2.

Another criterion to diagnose a person with obesity and overweight is the measurement of waist circumference. For men, waist circumference below 94 cm is considered normal while 94-102 cm and above 102 cm are considered high and very high respectively.

Similarly, for women, waist circumference below 80 cm is considered normal while 80-88 cm and above 88 cm are considered high and very high respectively. Obesity is also one of the major risk factors for numerous non-communicable diseases (NCDs), such as cardiovascular disease, diabetes, and cancer.

OBESITY MANAGEMENT

Obesity management plays an important role in its treatment and control.[1] It proposes a comprehensive approach to reduce the weight while improving overall health and controlling obesity or obesity related conditions (like diabetes, hypertension, and heart disease). An effective obesity management approach is a combination of various strategies such as a non-pharmacological treatment which include general advice on healthy weight, lifestyle changes, diet, physical activity, and pharmacological treatment that include medical interventions like drugs or surgery.

NON-PHARMACOLOGICAL TREATMENT FOR OBESITY

The non-pharmacological treatment for obesity primarily focuses on lifestyle changes that promote weight loss and improve overall health. These strategies are typically considered the first line of treatment before resorting to medications or surgery.[9,10] The main components include the following.

Dietary changes

Dietary changes include reducing the number of calories consumed is essential for weight loss. This involves eating a balanced diet with fewer calories than the body expends. Monitoring portion sizes can help prevent overeating and contribute to weight loss. Emphasize whole foods such as fruits, vegetables, whole grains, lean proteins, and healthy fats. Reducing the intake of refined sugars, processed foods, and unhealthy fats is crucial. Different dietary patterns have been shown to be effective for weight management, including, Mediterranean diet which is rich in fruits, vegetables, whole grains, and healthy fats (especially olive oil). Low-carbohydrate diets such as the ketogenic diet or Atkins diet, which limit carbs in favour of higher protein and fat intake. Low-fat diets focus on reducing fat intake while emphasizing carbohydrates and proteins. Mindful eating, meal planning, and monitoring food intake can help individuals make healthier choices and reduce overeating.

Physical activity

Physical activity includes regular physical activity for both weight loss and maintenance. The general recommendation is at least 150 minutes of moderate-intensity aerobic activity (e.g., brisk walking) or 75 minutes of vigorous-intensity activity (e.g., running) per week. Strengthening training exercises at least two days per week to build muscle mass.

Cognitive behavioural therapy

Cognitive behavioural therapy (CBT) focuses on changing unhealthy eating behaviours, addressing emotional eating, and overcoming triggers for overeating. Techniques may include setting goals, self-monitoring, and developing problem-solving strategies. Keeping track of food intake, physical activity, and weight can help individuals stay accountable to their goals. Group therapy or individual counselling sessions can help individuals stay motivated, manage stress, and receive emotional support throughout their weight loss journey.

Lifestyle modifications

Adequate sleep is essential for weight management. Sleep deprivation can lead to hormonal imbalances that increase hunger and cravings. High stress can contribute to emotional eating and weight gain. Mindfulness, relaxation exercises, yoga, or meditation can help reduce stress and improve overall well-being. Having a support from family, friends, or a community can provide motivation and accountability in making healthy lifestyle changes.

Behavioural modification programs

Programs such as weight watchers, Jenny Craig, or other structured diet and exercise programs can offer help. Healthcare providers may recommend programs based on individual needs, preferences, and health status.

Surgical options for severe obesity

While non-pharmacological approaches are usually the first-line treatment, in cases of severe obesity where other methods have not been effective, bariatric surgery may be considered. This includes procedures i.e. gastric bypass, sleeve gastrectomy, or adjustable gastric bands, which help with weight loss by limiting food intake or altering the digestive process.

PHARMACOLOGICAL TREATMENT FOR OBESITY

Pharmacological treatment for obesity involves the use of medications to help individuals lose weight or maintain weight loss when lifestyle changes alone are insufficient.

These medications are typically prescribed when the patient has a BMI $\geq$30 or BMI $\geq$27 with obesity-related comorbidities (e.g., type 2 diabetes, hypertension, or dyslipidaemia). Pharmacological treatment is generally considered as a complementary approach to lifestyle changes, such as diet and exercise.[11]

There are several classes of medications approved by regulatory bodies like the U.S. Food and Drug Administration (FDA) or the European Medicines Agency (EMA) for the management of obesity. These drugs can work by reducing appetite, increasing energy expenditure, or interfering with fat absorption.[12]

Here's a breakdown of the main pharmacological treatments for obesity.

Appetite suppressants (anorexigenic drugs)

These medications help reduce appetite or increase satiety (the feeling of fullness), which can lead to a reduction in food intake.[13] These include the following.

Phentermine

Phentermine (Adipex-P, Lomaira) is a sympathomimetic that stimulates the release of norepinephrine in the brain, which suppresses appetite. It is used for short-term weight loss. Common side effects are increased heart rate, elevated blood pressure, nervousness, insomnia, dry mouth, and constipation. It is not recommended for long-term use due to its potential for dependency and side effects.

Diethylpropion

Diethylpropion is like phentermine, it works by stimulating norepinephrine release, leading to reduced appetite and for short-term treatment. It can cause dry mouth, dizziness, insomnia, and nervousness.

Phentermine/topiramate combination

Phentermine/topiramate combination (Qsymia) works as phentermine suppresses appetite, while topiramate (an anticonvulsant) contributes to weight loss by affecting appetite regulation and enhancing satiety. It is used for long-term management of obesity. Side effects include insomnia, dry mouth, constipation, and potential cognitive effects (e.g., memory problems). It is not recommended for people with a history of glaucoma, hyperthyroidism, or recent heart disease.

Gastrointestinal lipase inhibitors

These medications reduce the absorption of fat from the gastrointestinal tract, leading to reduced calorie intake.[14] This include the following.

Orlistat

Orlistat (Alli, Xenical) works by inhibiting the action of lipases in the gastrointestinal tract, preventing the breakdown and absorption of dietary fats. It is approved for both over-the-counter use (Alli) and prescription use (Xenical). It is typically used for long-term weight management. Gastrointestinal symptoms like diarrhoea, flatulence, and oily stools are common side effects. It can also reduce the absorption of fat-soluble vitamins (A, D, E, and K), so vitamin supplements may be recommended.

GLP-1 receptor agonists

Glucagon-like peptide-1 (GLP-1) receptor agonists are primarily used to treat type 2 diabetes but have been shown to help with weight loss as well. These medications mimic the effects of GLP-1, a hormone that helps regulate insulin secretion, slow gastric emptying, and increase satiety.[15] This group includes the following.

Liraglutide

Liraglutide (Saxenda) which is a synthetic GLP-1 analog that enhances insulin secretion, slows stomach emptying, and reduces appetite. It is approved for long-term weight management in obese adults (BMI ≥30) or overweight adults (BMI ≥27) with weight-related comorbidities. Nausea, vomiting, diarrhea, constipation, and abdominal pain are common side effects. Rarely, may cause pancreatitis or gallbladder problems. It is not recommended for people with a history of pancreatitis, thyroid cancer, or multiple endocrine neoplasia type 2 (MEN2).

Semaglutide

Semaglutide (Wegovy, Ozempic) is like liraglutide, semaglutide is a GLP-1 receptor agonist that promotes satiety, reduces food intake, and enhances weight loss. It is also approved for weight loss under the brand Wegovy and also used for type 2 diabetes (Ozempic). Common side effects are gastrointestinal issues such as nausea, diarrhoea, and abdominal discomfort, though these often lessen over time. Like liraglutide, it may have a risk of pancreatitis. Studies have shown that semaglutide can lead to significant weight loss, often around 15% of body weight, which is a higher rate than many other obesity treatments.

Bupropion/naltrexone combination

Bupropion/naltrexone combination (Contrave) is an antidepressant that also acts on the central nervous system to reduce hunger and cravings. Naltrexone is a medication that is used to treat alcohol and opioid addiction, which helps reduce food cravings.

Other investigational and off-label medications

Other investigational and off-label medications in addition to the above FDA-approved drugs, several other medications are sometimes used off-label for obesity management.[12] These include, topiramate (an anticonvulsant), zonisamide (another anticonvulsant) and metformin which is primarily used for type 2 diabetes, but can help in weight loss in people with obesity, though it is not typically prescribed for obesity management.

There are several new and emerging drugs for obesity, including: setmelanotide, approved for the treatment of certain rare genetic disorders associated with obesity, such as POMC deficiency, cagrilintide is GLP-1-based treatment currently under investigation for weight loss and MOR107 and other dual receptor agonists are in clinical trials and show promise in enhancing weight loss through multiple pathways.[12]

CONCLUSION

Obesity is excess accumulation of body fats that presents a risk to health. Obesity is associated with range of comorbidities, including diabetes, cardiovascular diseases, obstructive sleep apnoea, and cancer etc. 10% weight loss decrease mortality by 20-25% reduction in premature death by 30% reduction in the risk of dying from diabetes-related complications and by 40% reduction in the risk of dying from cancer. Also, 10 mmHg decrease in systolic blood pressure and 20 mmHg decrease in diastolic blood pressure. In diabetes, 50% fall in fasting blood glucose levels, and 10% fall in total cholesterol 15% fall in LDL cholesterol and 8% increase in HDL cholesterol.

By 2030 estimated 38% of the world's adult population will be overweight and another 20% will be obese. It is diagnosed by calculating BMI or body shape. Lifestyle, mental wellbeing, previous history is also contributing factors. Obesity can be treated by adapting healthy lifestyle and building activities in daily routine. Medications aren't just the whole answer to the weight loss. Food and Drug Administration approved common drugs are ozempic, semaglutide and/or tirzepatide, liraglutide, orlistat.

If you have class III obesity, bariatric surgery may be the option. Bariatric surgery work by changing your digestive system, usually stomach and sometimes small intestine to regulate how many calories you can consume and absorb. Bariatric surgery includes duodenal switch, gastric band, gastric bypass and gastric sleeve.

Preventing obesity is easier than treating obesity. Make small changes and count calories, add physical activity, reduce screen time, manage your stress, focus on positive changes, adequate sleep are all important factors in preventing obesity. Having obesity increases your risk of some serious medical conditions. But having obesity doesn't mean you have those conditions or there's nothing you can do to prevent them. Remember, weight loss of just 5% to 10% can significantly improve your health risks. Sticking with a long-term treatment plan can help you maintain weight loss.

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