

Diagnosis and Management of Obesity: A Joint Statement by Practicing Endocrinologists

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How to cite this paper: Barake, M., Ehtay, A., Hirbli, K., Saab, C., Medlej, R. and Atallah, P. (2023) Diagnosis and Management of Obesity: A Joint Statement by Practicing Endocrinologists. *Journal of Diabetes Mellitus*, 13, 77-92.

<https://doi.org/10.4236/jdm.2023.132008>

Received: January 10, 2023

Accepted: April 8, 2023

Published: April 11, 2023

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Abstract

Obesity is not always recognized as a primary disease, leading to shortage of insurance coverage, clear dispositions about therapeutic strategies, prevention programs and legislation. Worldwide, physicians face the challenge to design affordable and effective treatments against obesity, to improve patient health and wellbeing and reduce the burden on healthcare systems. While international guidelines for obesity management are available, straightforward recommendations applicable in developing countries are needed. In order to develop local consensus recommendations, a panel of endocrinologists with experience in overweight and obesity convened and provided opinions about obesity aetiology, diagnosis, and management, in a structured discussion. Opinions were then developed into recommendations. There was unanimous agreement on recognizing obesity as a disease, which could be diagnosed by any trained physician and best managed by endocrinologists or obesity-trained physicians. The panel reiterated that lifestyle and behaviour changes remain the cornerstone of treatment; underscoring, however, the need for pharmacotherapy or bariatric surgery in some cases. They also identified stakeholders in the fight against obesity (ministries, third-party payers, healthcare providers and others). The establishment of an obesity registry was encouraged, which will pave the way for enhanced obesity research and prevention programs. These recommendations, endorsed by the World Obesity Federation, would be of interest to clinicians worldwide.

Keywords

Obesity, Nutrition, Clinical Management, Developing Countries, Consensus

1. Introduction

Obesity is a growing problem worldwide, with an estimated global prevalence of 13% among adults in 2016. According to the World Health Organization (WHO), 650 million adults suffer from obesity, and more than 1.9 billion are overweight [1]. In Lebanon, a study published in 2012 pointed at an alarming increase in obesity prevalence between 1997 and 2009 [2], and between 1975 and 2016 [3]. Obesity prevalence figures for Lebanon were at a soaring high of 27.4% (25.8% males, 29.0% females) in 2014 [4], closely matching reports from a more recent study in 2016 [5]. The prevalence of overweight among adults in Lebanon was reported at 67.9% in 2016, according to the Global Health Observatory (GHO) data [3]. More importantly, recent attention has been drawn towards the increasing prevalence of overweight and obesity in children and adolescents worldwide. In Lebanon, the prevalence of obesity in adolescents nearly doubled between 1997 and 2009 [6] [7], with a parallel significant increase in obesity in children [4]. In 2016, over one-third of children and adolescents below the age of 19 years had overweight or obesity [3]. The increasing rates of weight excess in this age group are concerning as this young population may progress to obesity in adults, with increased likelihood of cancers, metabolic disease and diabetes [8].

Obesity is most commonly defined as a body mass index greater than 30 kg/m² [1], but waist circumference is also measured to diagnose and characterize obesity [9]. Different factors may contribute to the development of obesity, including certain medical conditions and some medications. However, obesity remains a primary disease by itself, often determined by genetic predisposition, and further amplified by an increased caloric intake and decreased energy expenditure.

Obesity increases the risk of all-cause mortality [10] [11] and is often accompanied by diabetes, dyslipidemia, hypertension and cardiovascular disease. Besides these established comorbidities, obesity may also lead to infertility [12], obstructive sleep apnea and depression [13] [14], in addition to increasing the risk of many types of cancer and compromising cancer survival chances [15].

A proper diagnosis is indispensable for the design and implementation of the appropriate management approach to treating overweight and obesity in Lebanon.

Rationale and Objective

While several international guidelines for obesity management can be consulted [16] [17], straightforward recommendations for the treatment of obesity in developing countries such as Lebanon are still lacking but highly needed, as highlighted recently by The Pan Arab Society for Metabolic and Bariatric Surgery [18]. The present work aimed at proposing an evidence-based consensus and practical approach for the screening and clinical management of adult patients with overweight and obesity.

The present paper does not address obesity in childhood, adolescence or in special situations like during pregnancy.

2. Methods

In an attempt to develop local consensus recommendations, a panel of six endocrinologists who have experience in treating patients with overweight and obesity gathered to carry out a structured discussion about obesity diagnosis, management, and recognition as a disease. They provided, as well, opinions about stakeholders involved in the fight against obesity. Opinions and discussions were developed into recommendations, which the panel reviewed for relevance and usability in the local context.

Structured discussions took place according to guided questions, organized in topics as shown in **Figure 1**. A total of 30 questions were elaborated to guide discussions and reach consensus on the management of obesity in all its aspects: diagnosis, management, recognition as a disease and relevant healthcare approach. Questions were reviewed individually by each participating endocrinologist. Answers were then reviewed in details in a meeting gathering all participants and consensus recommendations were elaborated.

The World Obesity Federation reviewed this consensus and the recommendations expressed by the Lebanese experts; and then offered advice to finely tune the present manuscript to fit with the requirements for endorsement.

3. Consensus Recommendations

3.1. Obesity Diagnosis

3.1.1. The Body Mass Index

The body mass index (BMI) is widely accepted as an appropriate tool in the initial assessment of a person's weight status, to classify weight surplus and to follow-up success of weight loss strategies, though it presents some limitations in reflecting body adiposity [19] [20] [21] and might give misleading information, and focusing on reducing BMI alone rather than waist circumference (and adiposity) might not yield the required outcomes [22].

It can be easily calculated by dividing the weight (in kg) over the squared height (in m) of a person and is reported in kg/m^2 . According to the WHO, BMI categories for Caucasians are as follows: $\text{BMI} < 18.5 \text{ kg}/\text{m}^2$ indicates underweight, $18.5 \leq \text{BMI} \leq 24.9 \text{ kg}/\text{m}^2$ indicates normal weight, $25 \leq \text{BMI} \leq 29.9 \text{ kg}/\text{m}^2$



Figure 1. Topics discussed among panel members. Questions pertaining to each category were used for a structured exchange of opinions and experience in diagnosing and management obesity.

indicates overweight and BMI ≥ 30 kg/m² indicates obesity. In turn, obesity is categorized as class I ($30 \leq \text{BMI} \leq 34.9$ kg/m²), class II ($35 \leq \text{BMI} \leq 39.9$ kg/m²) or class III (BMI ≥ 40 kg/m²). The BMI should also be matched against the patient's ethnicity and age.

3.1.2. Other Measurements

Besides calculating the BMI for all patients, measuring waist circumference is also advisable, as it reflects fat distribution, thus providing further information.

Waist circumference is measured at the midpoint between the lower border of the rib cage and the iliac crest, as per the protocol described by the WHO guidelines [23]. A waist circumference of 88 cm for adult females and 102 cm for adult males is considered the upper limit of healthy [24]. Increased waist circumference, an indicator of abdominal fat deposition, was reported to strongly correlate with all-cause and cardiovascular mortality [24] [25]. In addition, it is of particular interest in elderly patients (above the age of 65) with normal BMI, since abdominal fat deposition increases with age in parallel to a decrease in muscle mass, which might falsely decrease BMI.

If technology is available, body composition can be further described using dual-energy X-ray absorptiometry (DEXA), but it is not necessary for diagnosing obesity.

3.1.3. Establishing the Diagnosis

Once excessive weight has been determined from BMI or other measurements, the patient requires further evaluation to establish the proper diagnosis.

Obesity is considered a disease by itself [26] [27]. The overwhelming cause of obesity is genetic. Indeed, as shown in twin studies, the BMI of identical twins were significantly correlated whether they were raised together or separately [28]. Similarly, fat gain and pattern of fat distribution in response to feeding was the same among monozygotic twins [29]. Obesity is thus often a primary condition that may be further amplified by an increase in energy intake and decreased energy expenditure. In fact, the food culture, lifestyle (active or sedentary), and the built environment are all players in weight loss, gain or maintenance. In Lebanon, around 90% of the population lives in urban settings [30], which often associates with limited daily physical activity. This is particularly concerning when it comes to children and adolescents.

A number of diseases are associated with weight gain, further modulating the weight of individuals already at high genetic risk for obesity. These diseases include hypothyroidism, hypercortisolism, hypogonadism and certain genetic conditions [28] [29] [31]. Similarly, certain medications might unintentionally cause weight gain. Most importantly, drugs known to cause weight excess include glucocorticoids, certain anti-psychotics and anti-depressants.

Evaluation for a secondary cause is best done by a detailed history and physical examination, followed by comprehensive laboratory testing. **Table 1** lists major causes of obesity, categorized as primary and secondary causes [3] [28] [32]-[37].

Table 1. Causes of obesity [3] [28] [32]-[37].

Primary Causes	
Genetic causes	
Monogenic disorders	Syndromes
Melanocortin-4 receptor mutation	Prader-Willi
Leptin deficiency	Bardet-Biedl
Proopiomelanocortin deficiency	Cohen
	Alström
	Froehlich
Secondary Causes	
Neurological	Drug-Induced
Brain injury	Psychiatric medications (tricyclic antidepressants, antipsychotics, anticonvulsants)
Brain tumour	Anti-diabetes drugs (sulfonylureas, glitazones, thiazolidinediones, insulin)
Consequences of cranial irradiation	Other (glucocorticoids, oral contraceptives, beta-blockers)
Hypothalamic obesity	
Endocrine	
Hypothyroidism	
Cushing syndrome	
Growth hormone deficiency	
Pseudo-hypoparathyroidism	
Polycystic ovary syndrome	
Psychological	Socioeconomic
Eating disorders	Urban environment
Depression associated with eating disorders	Work and school exercise opportunity
Sleep disorders	

3.1.4. Assessment of Comorbidities

Patients with overweight or obesity might also suffer from a number of diseases such as hypertension, pre-diabetes and diabetes, dyslipidemia, obstructive sleep apnea, fatty liver disease, osteoarthritis, depression, urinary incontinence in addition to impaired kidney function, gastroesophageal reflux and infertility [16] [31] [38]. In fact, people with obesity are threefold more likely to be hypertensive [9] and with a 20-fold higher risk of suffering from coronary heart disease [39]. **Table 2** lists required screens that may be performed during the first encounter with the patient who suffers from obesity and then re-evaluated at follow-up, as needed.

Fertility (hormone levels, ovulation and sperm quality) may be assessed in younger patients with overweight or obesity who express their wish to become pregnant.

3.1.5. Assessment of Diet and Physical Activity History

Obesity may compromise the person's ability to perform daily life tasks due to impaired posture and flexibility and perturbed gait parameters [9]. Patients with overweight or obesity should be asked about their motility and ability to independently carry out their daily activities. Patients who report limitations in their

Table 2. Screening of comorbidities.

	Obesity-associated morbidities [16] [31] [38]	In all patients with obesity?
By history and physical examination^a	• Hypertension	Yes
	• Gastroesophageal reflux disease	Yes
	• Asthma and reactive airway disease	Yes
	• Cardiovascular disease	Yes
	• Hypogonadism	Yes
	• Obstructive sleep apnoea	Yes
	• Osteoarthritis	Yes
	• Urinary stress incontinence	Yes
	• Depression	Yes
By blood tests	• Type 2 diabetes mellitus/Prediabetes (FBG, HbA1c)	Yes
	• Hyperlipidaemia (LDL-C, HDL-C, triglycerides)	Yes
	• Fatty liver disease (liver function tests)	yes
	• Kidney disease (creatinine)	yes
	• Hypogonadism (Testosterone)	Optional
Other assessments	• Fatty liver disease (Ultrasound abdomen)	Optional
	• Obstructive sleep apnoea (Polysomnography)	Optional
	• Reactive airway disease (Spirometry)	Optional

FBG: Fasting Blood Glucose; HbA1c: Glycated haemoglobin; HDL-C: High-Density Lipoprotein Cholesterol; LDL-C: Low-Density Lipoprotein Cholesterol. a. Further testing can be done as needed after history and physical examination.

physical activity can be specifically evaluated for: gait parameters (distance between steps and number of steps per minute), ability to climb stairs, balance, performing body hygiene activities [9].

Patients' diet and eating habits should be evaluated; several methods can be employed, separately or together, including diet history, 24-hour recall, diet records, and food frequency [40] [41]. Collected information should also include the type of diet (Mediterranean home cooking, fast food, vegan diet, etc.), description of meals and snacks per day (number of meals and timing, and type of snacks: sugary foods, fruits, nuts and seeds, etc.), eating behaviors (excessive appetite, craving lipid and/or carbohydrate-rich foodstuffs, triggers), fruit and vegetable intake, frequency of meat and dairy consumption. Patients should also be evaluated in terms of undertaking prior diets (type of diet, extent of adherence to program and outcome).

In addition, patterns of physical activity should also be evaluated for each patient. Parameters should include type of activity (walking, running, swimming, aerobic activities, ball games, intense workout, and housework), frequency (daily, weekly, occasionally) and the duration of the activity.

It is also useful to understand the living setting of the patient with obesity and whether they are provided with healthy food, or if they are able to cook, or exercise (urban or rural living, the built environment, physical ability to move, etc.) [40].

3.2. The Healthcare Team

3.2.1. Qualified Physicians

Screening for obesity and its related morbidities should be performed at any level of healthcare, as per aforementioned screening strategies. Patients with overweight and obesity should then be referred to endocrinologists or clinicians with expertise in obesity to establish the diagnosis and do any required work-up, as well as start a management strategy and maybe enrol in programs to promote weight loss and improved health status. Patients with obesity-associated comorbidities should also be evaluated by specialists as needed. Patients fulfilling criteria for bariatric surgery may also need to be seen by a specialized surgeon.

3.2.2. Nutritionists and Dieticians

Nutritionists and registered dieticians are qualified to recognize overweight and obesity, based on recommended screening strategies. A proper analysis of the patient's health and screening for secondary causes of obesity warrants the involvement of endocrinologists or other physicians with expertise, who will prescribe blood tests and other appropriate diagnostic methods to establish the diagnosis of obesity and decide on the most appropriate obesity treatment strategy.

Different nutrition-based strategies and diet plans are available for the treatment of obesity and are best customized by registered dietitians. Nutrition specialists are also involved in the pre- and post-operative nutrition care of patients undergoing bariatric surgery.

3.2.3. Multidisciplinary Teams

The management of patients with obesity often requires the multidisciplinary care and expertise of different specialists, namely endocrinologists, bariatric surgeons, nutritionists, psychologists or behavioral therapists, physical therapists and others [42]. When available, multidisciplinary care should be offered to patients.

3.3. Obesity Management

3.3.1. Lifestyle Management

Lifestyle therapy needs to be initiated in all patients with overweight or obesity. Lifestyle intervention may be given alone, or in association with pharmacotherapy and bariatric surgery [16] [43]. Lifestyle intervention consists of a planned healthy dietary modification, physical activity and behavioral changes. The benefits of comprehensive lifestyle interventions on weight loss and comorbidities have been illustrated in the large randomized trials Diabetes Prevention Program (DPP) and Look AHEAD [44].

Dietary interventions namely consist in modifying caloric intake. Different macronutrient compositions with same caloric composition have been shown to

result in similar degrees of weight loss. The superiority of a specific diet type has not been shown in well-designed controlled trials [45] [46] [47]. However, studies have shown that dietary adherence to a specific diet plan dictates the success of any nutrition program [46]. Moreover, the presence of specific comorbidities like hypertension, diabetes or cardiovascular disease may direct to a preferable macronutrients' distribution, and there might be individual variability in the response to different diets [48]. Irrespective of the dietary plan selected, it is advisable to choose healthy diet constituents, *i.e.* healthy carbohydrates or healthy fats [49]. It is noteworthy that Mediterranean diets are associated with decreased mortality and cardiovascular benefits [50] [51]. Their availability in Lebanon should be taken into consideration in the selection of a specific diet plan. The use of approved liquid or bar meal replacements may be helpful in certain dietary interventions [46]. The best dietary intervention remains individualized and best selected by the caring team after discussion with the patient.

Physical activity is important, in association with diet, to promote weight loss and for weight maintenance. It also impedes the establishment of sarcopenic obesity, especially in older adults [52]. It is encouraged to include both aerobic physical activity and resistance training to allow for appropriate fat loss and muscle preservation. The choice and intensity of any physical activity should take into account the individual preferences and the patient's medical condition and exercise tolerance [46]. One way to promote physical activity is by encouraging taking 10,000 steps a day [53], which can be achieved by taking the stairs when possible, walking to work, working around the house, working out, avoiding car use to attend places that are at a walking distance.

Behavioral interventions are encouraged as part of lifestyle management strategies. They aim at promoting adherence to the diet and exercise plan and at building healthy habits, while addressing barriers to weight loss [46]. The presence of multidisciplinary care teams may help in providing such interventions. Trained physicians, dietitians, psychologists or life coaches can provide these services.

3.3.2. Pharmacological Management

In accordance with practice recommendations from international societies, pharmacotherapy may be offered to patients with BMI ≥ 30 kg/m² or ≥ 27 kg/m² with comorbidities [54]. Medical therapy should be given in association with lifestyle therapy [16] [46]. Dietary management and physical activity should then be maintained throughout treatment for better response.

Medications promote weight loss through different mechanisms. They often work centrally to control appetite; increasing satiety, decreasing hunger, and controlling food cravings. They may also work in the gastrointestinal system by decreasing fat absorption or delaying gastric emptying [55].

In Lebanon, the three available anti-obesity drugs are orlistat, naltrexone/bupropion and liraglutide. They are all approved by the Food and Drug Administration (FDA) [56] [57] [58] and the European Medicines Agency (EMA) [59]

[60] [61]. According to Lebanese regulations, the prescription of medications is only allowed by medical doctors. Though these medications can be given at the primary care level, it is advisable to have them prescribed by endocrinologists [54]. The choice of the most appropriate medication should be based upon the patient's profile, in terms of comorbidities, medical history, medications used and the anti-obesity drug mechanism of action, safety profile and potential for drug-drug interaction. This is thus best achieved on a case-by-case basis. Efficacy and safety of a prescribed medication should be evaluated closely by the treating physician. An anti-obesity treatment is considered effective if 5% or more weight loss is achieved after 3 months of drug initiation [16] [55] [62]. Medical therapy can then be maintained after that.

3.3.3. Bariatric Surgery

Patients with a BMI ≥ 40 kg/m² or a BMI ≥ 35 kg/m² with one or more obesity-related co-morbidities (such as diabetes, hypertension, and dyslipidemia) may be considered for bariatric surgery, in accordance with guidelines from the Endocrine Society [16] and from other international societies for endocrinology, obesity and bariatric surgery [63] [64]. A thorough case-by-case clinical evaluation will determine the patient's eligibility for bariatric surgery, factoring in age, overall health, willingness to adopt and sustain a healthier lifestyle and the net benefit from undergoing surgery.

Currently recommended primary bariatric procedures include laparoscopic sleeve gastrectomy, laparoscopic Roux-en-Y gastric bypass, laparoscopic adjustable gastric banding and laparoscopic biliopancreatic diversion with or without duodenal switch (LBPD/DS), or related procedures [65]. Choice of metabolic surgery depends on target weight loss, patient comorbidities and available surgical expertise.

Despite a potential for complications with bariatric surgery, perioperative mortality and serious complications are rare [66] and the benefits for individuals with severe obesity cannot be underestimated [48].

In addition to weight loss, benefits of bariatric surgeries include prolonged satiety, glycemic control, control of co-morbidities and overall improved life expectancy [64].

Post-operative follow-up of patients undergoing metabolic surgeries is essential to ensure adequate weight loss, prevent weight regain and replace potential vitamin/nutritional deficiencies. The presence of multidisciplinary teams helps in this long-term follow-up.

3.4. Obesity as a Disease

3.4.1. The Lebanese Situation

Obesity is a chronic disease, and the Lebanese population has been experiencing a rise in overweight and obesity [5]. However, national figures are not recent, not comprehensive and do not cover all the Lebanese territory. A national obesity registry is thus an essential need.

Education on obesity as a disease is often lacking at the population level. This was first addressed in 2019 with the first national obesity campaign, conducted by the Lebanese Ministry of Public Health in association with the Lebanese Society for Endocrinology, Diabetes and Lipids.

Screening for obesity is not often undertaken at general healthcare visits, and weight problems are often not addressed.

Furthermore, the distribution of roles in the management of obesity is not always clear. Medications are not always prescribed by specialists, leading to misuse or abuse. Bariatric surgery is not consistently done within its indications and with the needed expertise, increasing the potential for complications. Dietary strategies are often not designed by registered dietitians, leading to inappropriate plans and possible nutritional deficiencies. There is resistance in complying with international recommendations by some national practitioners, and there is a lack of local consensus and/or recommendations for management.

3.4.2. Insurance Coverage of Obesity Treatment

There are no clear cut guidelines regarding the coverage of bariatric surgery by the Lebanese National Social Security Fund (NSSF). The decision is made on a case by case basis, but often entails coverage of cases with more advanced or morbid obesity (often with BMI ≥ 40 kg/m² and co-morbidities). Coverage of bariatric surgery should become possible by the NSSF, in accordance with approved indications (BMI ≥ 40 kg/m² or a BMI ≥ 35 kg/m² with one or more obesity-related co-morbidities), to pave the way for consistent and complete coverage of this morbid disease by private insurance schemes. In addition, a case-by-case decision may be made for patients in need for surgery and with lower treatment thresholds. With regards to pharmacotherapy, the NSSF does not cover any medical treatment for weight loss, increasing the burden on treated patients. The situation might be similar in developing countries and in countries that do not see obesity as a primary disease, which requires clinical attention and follow-up by metabolism and nutrition specialists.

3.4.3. Stakeholders

Different stakeholders are to be involved in the care for obesity. The Ministry of Public Health tops the list of governmental institutions who should be involved in the battle against obesity, recognizing first obesity as a chronic disease and coordinating efforts among other ministries and public administrations to implement a multi-faceted obesity management strategy. Schools and universities, as well as media and non-governmental institutions, should be implicated to promote healthier living. The Ministry of Public Health should design training workshops for all necessary personnel, endorse national guidelines and recommendations elaborated by specialists, make subsidies available to control the price of healthy foodstuffs available for students and in the workplace and enforce collaboration between dieticians and physicians. In addition, walkability and the built environment should be studied and fitted to accommodate heal-

thier lifestyles [67]. Involved specialists (endocrinologists, bariatric surgeons, registered dietitians, physical trainers, psychologists) and their local professional societies need to collaborate for a consistent approach in the management of obesity.

4. Conclusions

The increasing prevalence of overweight and obesity and their associated morbidities worldwide and in Lebanon prompted the development of consensus recommendations for obesity management, which can be adopted by clinicians treating patients with obesity. Given the fact that obesity is a chronic disease with multifaceted implications on health, a multidisciplinary approach for treating it holds the potential of better outcomes. Recommendations communicated in this consensus have been reviewed and endorsed by the World Obesity Federation for the diagnosis of obesity and its management.

In a nutshell

- Recognize obesity as a disease by itself
- Screen for overweight/obesity at all levels of healthcare, by obtaining the BMI and waist circumference of patients
- Refer to endocrinologists or qualified physicians in obesity for appropriate diagnosis and management strategy
- Rule out secondary causes of obesity (neurological, endocrine, drug-induced, psychological, socioeconomic)
- Screen for comorbidities, to decide on best management
- Collect information on diet patterns, eating behaviours and physical activity of patients, as part of the history taking
- Refer for psychological evaluation at signs of eating disorder or other mental health problem, which can compromise nutritional habits
- Educate patients on calorie intake/expenditure and ways to avoid eating triggers
- Prioritize lifestyle and behavioural changes
- Pharmacotherapy can be started at BMI > 27 kg/m², and can include one of the three available treatments in Lebanon (orlistat, naltrexone/bupropion and liraglutide)
- Bariatric surgery can be offered at BMI³ 40 kg/m² or BMI³ 35 kg/m² with co-morbidities, after proper multidisciplinary evaluation
- Promote collaboration between all concerned specialists

Acknowledgements

Writing support was provided by KBP-Biomak, a contract research organization.

All six authors contributed to this work, from identifying the need for a national consensus on obesity management in Lebanon, to the development of consensus recommendations with global reach, reviewing all drafts of the manuscript and approving the final version. This work was supported by an unrestricted grant

from Novo Nordisk.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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