Assessment of obesity

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Obesity is a chronic, progressive and relapsing disease, characterised by the presence of abnormal or excess adiposity that impairs health and social wellbeing. It is associated with obesity-related disease complications, health inequalities and premature death. Clinical evaluation of obesity requires a thorough history and examination. Assessment should focus not only on anthropometric measurements, but also on the mental, metabolic, mechanical and monetary impact of adiposity, including multiple health conditions. Increased awareness and knowledge will help reduce weight stigma and biases. A focused non-judgemental assessment will help guide further investigations, timely referral and management.

KEYWORDS: obesity, overweight, assessment of obesity, weight stigma, BMI

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Introduction

Obesity is a major public health challenge that contributes directly and indirectly to multiple health conditions, health inequalities and premature death. Since 1975, obesity has tripled worldwide. The UK has the highest rates of obesity in Europe with most of the adult population (64%) now classed as overweight, of which 26% are classed as obese. Obesity-related disease complications include type 2 diabetes mellitus (T2DM), hypertension, cardiovascular disease, chronic kidney disease, obstructive sleep apnoea (OSA), gastro-oesophageal reflux, osteoarthritis, metabolic-associated fatty liver disease, subfertility/infertility and cancer.

Definition and classification

Obesity is a complex, relapsing chronic disease process and is defined by the World Health Organization as abnormal or excessive fat accumulation that presents a risk to health. Body mass index (BMI), calculated as weight in kilograms divided by height in metres squared, is universally used to define the degree of overweight or obesity (Table 1). A lower cut-off is used for certain ethnicities because they have higher visceral adiposity with increased predisposition to cardiometabolic disease.

BMI is easy to measure, inexpensive and useful in population studies; however, it has limitations as a measurement tool for obesity because it does not necessarily correlate with body fat. It does not take into account other factors, such as gender, age, bone structure, muscle mass or fat distribution. Hence, there is a group of people classified as overweight or obese without overt cardiometabolic abnormalities who are said to have ‘metabolically healthy obesity’ (MHO). Although they are at a lower risk of obesity-related complications compared with individuals with metabolically unhealthy obesity (MUO), their risk is still higher compared with metabolically healthy lean people. Even among people with early T2DM and a normal BMI, substantial weight loss results in normal glucose tolerance, an observation that led to the hypothesis of a personal fat threshold (PFT). This appears to be independent of BMI.

BMI does not take into account the complexity of obesity, hence the shift in defining obesity and the coining of the term ‘adiposity-based chronic disease’ (ABCD). There is a need to shift the focus toward improving patients’ overall health rather than simply losing weight. Hence, current staging criteria consider risk factors, multiple health conditions, and quality of life to aid decision-making regarding treatment. The King’s Obesity Staging Criteria (Table 2) comprise the following health domains: airways, BMI, cardiovascular disease, diabetes, economic complications, functional limitations, gonadal axis, health status (perceived) and body image.

The Edmonton Obesity Staging System (EOSS) is a five-stage classification system that considers the presence of obesity-related risk factors, physical and psychological symptoms, and functional limitations as a result of obesity. This approach helps identify individuals with obesity who are at a greater mortality risk. These staging systems not only link to prognosis, but can also be practically used to stratify risk and obesity-related complications, which can be down-staged with treatment.

However, there is a need for clinical and biological criteria for the diagnosis of obesity to be established to focus on the effects of obesity and help guide clinicians and policy makers.
Initiating the conversation

Discussing weight should be done in a sensitive and respectful manner and permission to do so should be sought initially.15 Weight stigma has a negative impact on mental and physical health and needs to change across society.16 In healthcare settings, weight stigma is detrimental to health of people with obesity and all healthcare professionals have a responsibility to help with its eradication.17 We must explore our assumptions and biases about obesity and ensure that these are not relayed to the patient.18

The language used can have a profound effect on people with obesity, leading to stigma and discrimination, and it is vital to use inclusive and supportive language. Language Matters: Obesity is a set of evidence-based principles that encourages positive interactions and outcomes among healthcare professionals and individuals with obesity.18 Table 3 highlights quotes adopted from real conversations included in this document that provide guidance with regards to initiating the conversation.

Assessing readiness to change

Although it is important to base the readiness to adopt change, eliciting behaviour change can be challenging.79 Helping people to change behaviour remains complex. Motivational Interviewing (MI) is an evidence-based psychological method designed to support change. The aim of MI is to promote a helpful conversation within an empathic and accepting environment that allows the person to consider their own motivations to change. People are frequently ambivalent about change in their own lives and can struggle to decide whether to make any changes, even when attending specialist obesity services. The traditional approach of placing pressure on people to change by persuasion through education and information often results in a negative effect, potentially increasing the desire not to change. MI in its guiding style recognises that, to help people change, we need their expertise and engagement, which can support change to happen. MI delivers a specific skill set within a series of tasks that is both relational (engaging) and directional in focusing on the language of change (Change Talk).20 Rollnick et al21 suggest using a specific style of practice to harness change for patients that requires a specific clinician’s mindset (Spirit) in which:

- you view your patient as a person first, patient second
- you place high value on connecting well
- you champion choice and believe that patients are capable of making wise decisions about their lives
- you offer advice rather than impose it.

Clinical staff require initial training as well as ongoing coaching and supervision in the skills and strategies of MI to increase their competency in the method.

History and examination

A basic clinical assessment should be undertaken, which will help the treatment to be tailored accordingly.22 Although changes leading to an ‘obesogenic’ environment have resulted in an increased prevalence of obesity, genetic factors have a significant role in determining body weight.23 Although the causes of obesity are discussed in detail elsewhere, it is worth thinking about whether the root cause of weight gain in the individual is because of increased intake, decreased metabolism, or reduced activity. Addressing the root cause will help tailor the management plan. The obesity system map can help highlight the systemic structure.

Table 1. Classification using BMI

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Stage 0</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>Normal</td>
<td>At risk of disease</td>
<td>Established disease</td>
<td>Advanced disease</td>
</tr>
<tr>
<td>Overweight</td>
<td>&gt;25</td>
<td>Snoring 35–40% risk</td>
<td>Requires CPAP 40–60</td>
<td>Cor pulmonale</td>
</tr>
<tr>
<td>Obesity Class 1</td>
<td>30 – 34.9</td>
<td>Impaired fasting</td>
<td>Type 2 diabetes mellitus</td>
<td>Heart failure</td>
</tr>
<tr>
<td>Obesity Class 2</td>
<td>35–39.9</td>
<td>Expensive travel/clothes</td>
<td>Workplace discrimination</td>
<td>Uncontrolled type 3 diabetes mellitus</td>
</tr>
<tr>
<td>Obesity Class 3</td>
<td>&gt;40</td>
<td>Expensive travel/clothes</td>
<td>Infertility</td>
<td>Unemployed because of obesity</td>
</tr>
</tbody>
</table>

CPAP = continuous positive airway pressure; PCOS = polycystic ovarian syndrome; QoL = quality of life.

Table 2. Modified King’s Criteria for obesity scoring

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Stage 0</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airways</td>
<td>Normal</td>
<td>At risk of disease</td>
<td>Established disease</td>
<td>Advanced disease</td>
</tr>
<tr>
<td>Body mass index</td>
<td>&lt;35</td>
<td>Normal</td>
<td>Expensive travel/clothes</td>
<td>Cor pulmonale</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>&lt;10% risk</td>
<td>Normal</td>
<td>Expensive travel/clothes</td>
<td>Cor pulmonale</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Normal</td>
<td>Impaired fasting</td>
<td>Workplace discrimination</td>
<td>Cor pulmonale</td>
</tr>
<tr>
<td>Economic</td>
<td>Normal</td>
<td>Expensive travel/clothes</td>
<td>Infertility</td>
<td>Cor pulmonale</td>
</tr>
<tr>
<td>Functional</td>
<td>Can manage three flights of stairs</td>
<td>Expensive travel/clothes</td>
<td>Infertility</td>
<td>Cor pulmonale</td>
</tr>
<tr>
<td>Gonadal</td>
<td>Normal</td>
<td>Expensive travel/clothes</td>
<td>Infertility</td>
<td>Cor pulmonale</td>
</tr>
<tr>
<td>Health perceived</td>
<td>Normal</td>
<td>Expensive travel/clothes</td>
<td>Infertility</td>
<td>Cor pulmonale</td>
</tr>
<tr>
<td>Body image</td>
<td>Normal</td>
<td>Expensive travel/clothes</td>
<td>Infertility</td>
<td>Cor pulmonale</td>
</tr>
</tbody>
</table>

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History

History should also include the following points:

- Onset of weight gain: early onset of obesity with dysmorphic features can point toward genetic causes.
- Developmental delay and intellectual deficits: indicative of genetic causes of obesity.
- Menstrual irregularities can occur in polycystic ovarian syndrome (PCOS), Cushing’s syndrome, hypothyroidism, menopause or even pregnancy. Deprivation might make it more difficult.
- Presence of other medical conditions, such as T2DM, fatty liver disease, osteoarthritis, cardiovascular disease, OSA, cardiovascular disease, heart failure and cancer.
- History of cranial radiotherapy or surgery leading to hypothalamic disorders.
- Family history of excess weight and other medical conditions.
- Drug history, including medication that can cause weight gain. These include antidepressants, antipsychotics, insulin, anti-epileptics, corticosteroids, even topical formulations.
- Social history, including alcohol intake, socioeconomic background and ethnicity. Deprivation might make it more challenging to adopt a healthier lifestyle.
- Diet history, including speed of eating and eating environment. Eating disorders, mental health conditions and hypothalamic disorders can result in overeating. Autonomy in creating meals might not always be possible for all, such as for people in supported living.
- Allergies and intolerances.
- Physical activity and sleep. Insufficient sleep and circadian misalignment can contribute to weight gain. Modern working patterns and lifestyles, such as shift work and late-night screen time, result in sleep disruption and should be taken into consideration.
- History of weight-loss attempts, and lifestyle and treatment modalities used.

Table 3. Guidance on how to initiate a conversation around obesity with a patient

<table>
<thead>
<tr>
<th>Avoid</th>
<th>Try instead</th>
</tr>
</thead>
<tbody>
<tr>
<td>I’m sure the problems you’ve had are all related to your weight.</td>
<td>Would you mind if we spoke about your weight? Where do you think you’re at?</td>
</tr>
<tr>
<td>You’re a bit on the chunky side shall we say?</td>
<td>Some people with your symptoms find that losing a bit of weight and a little exercise can be useful.</td>
</tr>
<tr>
<td>Ideally your BMI, which is your height in relation to your weight,</td>
<td>And as you said, your weight’s crept up a bit… You said you’d like to lose some weight because you’re feeling quite breathless…</td>
</tr>
<tr>
<td>should be somewhere between 18 and 25… between 30 and 35 you’re</td>
<td></td>
</tr>
<tr>
<td>considered clinically obese… from the measurements you’ve had today,</td>
<td></td>
</tr>
<tr>
<td>you certainly fall into that category.</td>
<td></td>
</tr>
</tbody>
</table>

BMI = body mass index.

Genetic causes of obesity

Early onset of obesity and hyperphagia are very strong predictors of monogenic obesity if found together, or with a combination of other factors, such as a learning disability, syndromic features or central endocrine abnormalities, which suggest rare genetic causes. Rapidity of progression, increased severity and resistance to treatment can point toward genetic obesity. These characteristics observed in isolation can be seen in polygenic obesity, which is the most common form of obesity. This is covered in more detail in another article within this special issue.

Anthropometric measures

BMI is commonly used and easy to measure. In terms of BMI, sarcopenic obesity should be kept in mind. With age, muscle mass decreases and the combination of sarcopenia and obesity results in a high-risk geriatric syndrome in which there might be complications resulting from further weight loss. Apart from BMI, other measures can be used. Waist circumference (WC) measured with a tape around the waist midway between the bottom of the ribs and top of the pelvis (Fig 1) is a good measure of central adiposity. Waist to height ratio (WHR) is calculated by dividing the WC by the height in the same units. Increased health risks are associated with a WHR of 0.5 to 0.59 and further increased risk if the ratio is >0.6. The target range is a ratio of <0.5; that is, the weight should be less than half the height. Although there are many indicators using WC to help assess central adiposity, WHtR appears to be a preferable indicator for the assessment of cardiovascular disease. The remainder of the examination should be focused on the effects of obesity, secondary causes, complications and multiple health conditions of obesity.

Moderate weight loss (5–10%) can be beneficial but the overall target should be health improvement. Weight regain following weight loss is a complicated issue beyond patient motivation. There is a natural tendency for weight regain, which should be acknowledged because of mechanisms such as changes in
The patient cannot be managed adequately in Tier 2 services. Underlying causes of obesity need to be assessed. Fat levels: even if their overall weight does not change, a reduction in visceral fat percentage decrease and muscle mass increase even if their overall weight does not change. This is especially true of visceral fat levels and basal metabolic rate. Patients who have nutritional deficiencies, such as Vitamin D and folate acid and a bone profile. Nutritional assessment should be done at least once. Haemoglobin (Hb) A\textsubscript{1c} glucose should be done if the patient has, or is suspected to have, diabetes. The Fibrosis-4 (FIB-4) score is an inexpensive but valuable tool scoring system to rule out advanced liver fibrosis among individuals, and we should consider interpersonal variability. There is a need to move away from the one-size-fits-all approach and consider precision medicine so that people with obesity derive maximum benefit. This exciting and evolving area includes increased information in many fields, such as genetic, epigenetic, metabolic, pharmacologic, biotechnology, nutrition and clinical. Phenotyping to identify the obesity subtype appears to be the way forward but can only be done in specialist centres. Hence, timely referral to an obesity service is vital.

Conclusions

In summary, obesity is common and, although a detailed clinical assessment might not always be possible for healthcare professionals who are not obesity specialists, a focused assessment will help timely referral and appropriate management. Obesity assessment should focus on not only anthropometric measurement, but also identifying the cause and effects of abnormal adiposity. For effective assessment, an environment devoid of stigma is essential.

References


Investigations

Blood tests, including full blood count (FBC), liver function tests, renal function tests, thyroid function tests and a lipid profile should be done at least once. Haemoglobin (Hb) A\textsubscript{1c} and plasma glucose should be done if the patient has, or is suspected to have, diabetes. The Fibrosis-4 (FIB-4) score is an inexpensive but valuable tool scoring system to rule out advanced liver fibrosis by utilizing FBC, aspartate aminotransferase (AST) and alanine aminotransferase (ALT), but might not be clinically useful in patients with Class 3 obesity. Some centres also request uric acid and a bone profile. Nutritional assessment should be done because nutritional deficiencies, such as Vitamin D and folate deficiencies, are very common and will need replacement. The ESS can be used to assess the risk of OSA, but, in the absence of clinical symptoms, assessment for obesity hypoventilation syndrome/OSA might be warranted. For screening patients who are candidates for bariatric surgery, the STOP-BANG questionnaire is preferable to ESS for OSA. Echocardiography should be performed if there are features of heart failure.

Body composition can be accurately measured using bioelectrical impedance, and imaging techniques, such as dual energy X-ray absorptiometry (DEXA), but these are not routinely done. At Barts Health NHS Trust, we use bioelectrical impedance analysis (BIA) equipment to measure patients’ muscle, total fat, visceral fat levels and basal metabolic rate. Patients who increase their activity levels can be motivated by seeing their fat percentage decrease and muscle mass increase even if their overall weight does not change. This is especially true of visceral fat levels: even if their overall weight does not change, a reduction in this type of fat will have great health benefits.

The machine also calculates basal metabolic rate (BMR), that is, the amount of energy the body needs for basic functioning. In some people, this can be very low as a result of low muscle mass and high fat mass, implying that a person’s energy requirements can be very low. The BMR reading enables the team to calculate a patient’s individual daily energy needs more accurately for weight loss, which they usually find very useful.

Other investigations should be targeted at presenting complaints and examination findings.

Referral

The UK response to obesity is structured around tiered management (Tiers 1–4). Tier 1 refers to universal prevention services, Tier 2 offers lifestyle multicomponent weight management, Tier 3 offers specialist multidisciplinary weight management and Tier 4 refers to bariatric surgery. A comprehensive MDT assessment is an excellent start to a Tier 3 or equivalent programme. This allows each specialist the opportunity to provide their unique assessment within a shared space and facilitate discussion. A shared care plan can then be devised with the patient. Referral to Tier 3 services should be considered if any of the following apply:

- Underlying causes of obesity need to be assessed
- Conventional treatment is not working
- The patient cannot be managed adequately in Tier 2 services
- Specialist interventions or surgery is being considered

Communication with other specialists might be needed depending on associated multiple health conditions, and cross-specialty pathways are important to develop.

Precision medicine

The cause, presentation and complications of obesity differ among individuals, and we should consider interpersonal variability. There is a need to move away from the one-size-fits-all approach and consider precision medicine so that people with obesity derive maximum benefit. This exciting and evolving area includes increased information in many fields, such as genetic, epigenetic, metabolic, pharmacologic, biotechnology, nutrition and clinical. Phenotyping to identify the obesity subtype appears to be the way forward but can only be done in specialist centres. Hence, timely referral to an obesity service is vital.


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