Measurement and assessment of overweight and obesity – ADULTS

Tool 3

Measuring overweight and obesity using Body Mass Index (BMI)

Adults

Overweight and obesity can be measured by recording the Body Mass Index (BMI) which is calculated by dividing an individual's weight in kilograms by the square of their height in metres (kg/m^2).

For example, an individual weighs 95kg and is 180 cm tall. To calculate their BMI:

$$\text{BMI} = \frac{95}{(1.80 \times 1.80)} = \frac{95}{3.24} = 29.32 kg/m^2$$

Thus their BMI would be approximately $29kg/m^2$.

There is little disagreement about the classification of 'overweight' and 'obese' using BMI in adults. A BMI between $18.5kg/m^2$ and under $25kg/m^2$ is accepted to be within normal ranges, whereas a BMI of between $25kg/m^2$ and $30kg/m^2$ is classified as overweight and a BMI of $30kg/m^2$ and over as obesity. Further classifications linked with morbidity are shown below. These cut-off points are based on epidemiological evidence of the link between mortality and BMI in adults.[1]

Classification of overweight and obesity among adults

Classification	BMI (kg/m^2)	Risk of co-morbidities*
Underweight	Less than 18.5	Low (but risk of other clinical problems increased)
Healthy weight	18.5 - 24.9	Average
Overweight (or pre-obese)	25 - 29.9	Increased
Obesity, class I	30 - 34.9	Moderate
Obesity, class II	35 - 39.9	Severe
Obesity, class III (Severely or morbidly obese)	40 or more	Very severe

Note: Co-morbidities are the health risks associated with obesity, ie type 2 diabetes, hypertension (high blood pressure), stroke, coronary heart disease, cancer, osteoarthritis and dyslipidaemia (imbalance of fatty substances in the blood).

Source: National Institute for Health and Clinical Excellence, 2006,[2] adapted from World Health Organization, 2000 [1]

Adults of Asian origin

Asian populations have a higher proportion of body fat in comparison to people of the same age, gender and BMI in the general UK population. Thus, the proportion of Asian people with a high risk of type 2 diabetes and cardiovascular disease is substantial even at BMIs lower than the existing WHO cut-off point for overweight. However, levels of morbidity vary between different Asian populations and for this reason it is difficult to identify one clear BMI cut-off point.[3] * Thus, NICE recommends that the current universal cut-off points for the general adult population (see table above) be retained for all population groups.[2] This is in agreement with the WHO expert

* A proposed classification of overweight and obesity for Asian adult populations has been developed by the World Health Organization.[4] The proposed cut-offs are 18.5-22.9kg/m^2 (healthy weight), 23kg/m^2 or more (overweight), 23-24.9kg/m^2 (at risk), 25-29.9kg/m^2 (obesity I), 30kg/m^2 or more (obesity II).

consultation group which also recommends trigger points for public health action for adults of Asian origin – 23kg/m^2 for increased risk and 27.5kg/m^2 for high risk.[3] NICE has recommended that healthcare professionals should use clinical judgement when considering risk factors in Asian population groups, even in people not classified as overweight or obese using the current BMI classification.[2]

Using the BMI measurement in isolation

Although BMI is an acceptable approximation of total body fat at the population level and can be used to estimate the relative risk of disease in most people, it is not always an accurate predictor of body fat or fat distribution, particularly in muscular individuals, because of differences in body-fat proportions and distribution. Some other population groups, such as Asians and older people, have co-morbidity risk factors that would be of concern at different BMIs (lower for Asian adults as detailed above and higher for older people). Therefore, NICE recommends that waist circumference should be used *in addition* to BMI to measure central obesity and disease risk in individuals with a BMI less than 35kg/m^2. [(2, 5)] (See 'Measuring BMI and waist circumference in adults to assess health risks' on the next page.)

Measuring waist circumference in adults

Waist circumference has been shown to be positively, although not perfectly, correlated to disease risk, and is the most practical measurement for assessing central obesity.[6] It can be used as a valuable measure in adults with a BMI of less than 35kg/m^2.[(2)] However, where BMI is greater than 35kg/m^2, waist circumference adds little to the absolute measure of risk provided by BMI.[5] This is because patients who have a BMI of 35kg/m^2 will exceed the cut-off points (detailed below) used to identify people at risk of the metabolic syndrome.[6]

Waist circumference thresholds used to assess health risks in the general adult population

At increased risk	Male	Female
Increased risk	94cm (37 inches) or more	80cm (31 inches) or more
Greatly increased risk	102cm (40 inches) or more	88cm (35 inches) or more

Source: National Institute for Health and Clinical Excellence, 2006,[2] International Diabetes Federation (2005),[7] WHO/IASO/IOTF (2000),[4] World Health Organization (2000)[1]

Adults of Asian origin

Adults of Asian origin have higher cardiovascular risk factors at lower BMIs and waist circumferences than Western populations.[8] However, different Asian populations differ in the level of risk associated with a particular waist circumference. For example, a study evaluating the average waist circumference of more than 30,000 individuals from East Asia (China, Hong Kong, Korea, and Taiwan), South Asia (India and Pakistan) and South-east Asia (Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam) found that there were major differences between regions. Thus, the researchers concluded that the impact of obesity may begin at different thresholds in different Asian populations and that a unique threshold for all Asian populations would therefore appear to be inappropriate.[9] *

Note: The National Institute for Health and Clinical Excellence (NICE) does not recommend different waist circumference cut-offs for Asian populations in the UK.[2]

* The International Diabetes Federation (IDF) and the World Health Organization have proposed separate waist circumference thresholds for adults of Asian origin of 90cm (35 inches) or more for men, and 80cm (31 inches) or more for women. Note that the IDF definition is for South Asians and Chinese populations only. [1, 4, 7]

Waist circumference should never be used in isolation, as a proportion of subjects who require weight management may not be identified.[5] Thus NICE recommends the use of the table below to assess the level of weight management required.[2]

NICE states that: "The level of intervention should be higher for patients with comorbidities, regardless of their waist circumference."[2]

Assessing the level of weight management: a guide

BMI classification	Waist circumference			Co-morbidities present
	Low	High	Very high	
Overweight				
Obesity I				
Obesity II				
Obesity III				

General advice on healthy weight and lifestyle

Diet and physical activity

Diet and physical activity; consider drugs

Diet and physical activity; consider drugs; consider surgery

Source: National Institute for Health and Clinical Excellence, 2006 [2]

Measuring BMI and waist circumference in adults to assess health risks

The World Health Organization (WHO) has recommended that an individual's relative health risk could be more accurately classified using both BMI and waist circumference.[1] This is shown below for the general adult population.

Combining BMI and waist measurement to assess obesity and the risk of type 2 diabetes and cardiovascular disease – general adult population [1, 2, 5]

Classification	BMI (kg/m^2)	Waist circumference and risk of co-morbidities	
		Men: 94-102 cm	Men: More than 102 cm
		Women: 80-88 cm	Women: More than 88 cm
Underweight	Less than 18.5	-	-
Healthy weight	18.5 - 24.9	-	Increased
Overweight	25 - 29.9	Increased	High
Obesity	30 or more	High	Very high

Source: National Institute for Health and Clinical Excellence, 2006 [2]

Measuring waist-hip ratio in adults

Another measurement of the deposition of abdominal fat is the waist-hip ratio (WHR). This can be defined as waist circumference divided by hip circumference, ie waist girth (m)/hip girth (m). Although there is no consensus about appropriate waist-hip ratio criterion levels, a raised waist-hip ratio has been taken to be 1.0 or more in men, and 0.85 or more in women.[2, 4]

Assessment

Management should begin with the assessment of overweight and obesity in the patient. BMI should be used to classify the degree of obesity, and waist circumference may be used in people with a BMI less than 35kg/m^2 to determine the presence of central obesity. NICE recommends that

the assessment of health risks associated with overweight and obesity in adults should be based on BMI and waist circumference as shown below.[2]

Assessing risks from overweight and obesity

BMI classification	Waist circumference		
	Low	**High**	**Very high**
Overweight	No increased risk	Increased risk	High risk
Obesity I	Increased risk	High risk	Very high risk
For men, waist circumference of less than 94cm is low, 94-102cm is high and more than 102cm is very high. For women, waist circumference of less than 80cm is low, 80-88cm is high and more than 88cm is very high.			

Source: National Institute for Health and Clinical Excellence, 2006 [2]

Assessments also need to include holistic aspects focusing on psychological, social and environmental issues. There is a need for training for professionals who carry out assessments due to the sensitive and multifaceted nature of overweight and obesity. Professionals need to be aware of patients' motivations and expectations. Effective assessment and intervention require support, understanding and a non-judgemental approach.

Assessing and classifying overweight and obesity in adults

NICE recommends the following approach to assessing and classifying overweight and obesity in adults.

Determine degree of overweight or obesity

- Use clinical judgement to decide when to measure weight and height
- Use BMI to classify degree of obesity…but use clinical judgement:
  - BMI may be less accurate in highly muscular people
  - for Asian adults, risk factors may be of concern at lower BMI
  - for older people, risk factors may become important at higher BMIs
- Use waist circumference in people with a BMI less than 35 kg/m^2 to assess health risks
- Bioimpedance is not recommended as a substitute for BMI
- Tell the person their classification, and how this affects their risk of long-term health problems.

Assess lifestyle, comorbidities and willingness to change, including:

- presenting symptoms and underlying causes of overweight or obesity
- eating behaviour
- comorbidities (such as type 2 diabetes, hypertension, cardiovascular disease, osteoarthritis, dyslipidaemia and sleep apnoea) and risk factors, using the following tests – lipid profile and blood glucose (both preferably fasting) and blood pressure measurement
- lifestyle – diet and physical activity
- psychosocial distress and lifestyle, environmental, social and family factors – including family history of overweight and obesity and comorbidities
- willingness and motivation to change
- potential of weight loss to improve health
- psychological problems
- medical problems and medication.

Source: Reproduced from National Institute for Health and Clinical Excellence, 2006 [2]

Tool 17 *Dealing with overweight and obesity – Guidance for health professionals* provides further information on NICE guidance for assessing and managing overweight and obesity in a clinical setting.

Note: The NHS Local Delivery Plan monitoring line on adult obesity status requires general practices to monitor and return data on the obesity status (BMI) of GP-registered adults within the past 15 months.

References

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