

Anthropometric screening for obesity in the Asian adult population

Abstract

The prevalence of obesity in the Asia-Pacific region is rising rapidly to meet levels observed in Western populations. The impact of obesity is significant on both the patient and the affected national health systems, increasing morbidity and mortality associated with cardiovascular disease and diabetes. However, prevention programmes may slow the development of the obesity epidemic. In order to be effective, these programmes must target correctly identified, at-risk individuals. Anthropometric measurements such as body mass index (BMI), waist-to-height ratio (WHtR) and waist circumference (WC) are practical and inexpensive indices for identifying overweight and obese patients. There is growing concern that the widely recommended BMI cut-offs may not be universally applicable across all populations. In light of this, the current BMI cut-offs must be reviewed and WHtR and WC must be given greater consideration when designing primary prevention programmes for Asian populations, particularly as recommended guidelines are frequently based predominantly on data from European and North American regions. This means that the guidelines currently being used by healthcare providers simply may not be relevant to Asian patients. These patients may be incorrectly stratified into a given weight category that could result in missed opportunities to prevent serious health problems such as hypertension and diabetes. Clearly, there is a need to reassess the current guidelines and explore indices that are most suitable for this population.

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Obesity as a global trend

As of 2008, the World Health Organisation (WHO) recognises more than 1.4 billion adults worldwide as overweight and at least 500 million as obese.¹ Traditionally a predominantly Western disease, obesity – defined as a condition of abnormal or excessive fat accumulation in adipose tissue – is rapidly increasing to epidemic proportions on a global scale. In recent years it has seen a dramatic rise in developing and newly developed nations in the Asia-Pacific region (specifically Japan, China and Malaysia). For instance, in 1994 the prevalence of obesity in the US was 19-24%, compared to a mere 0.8% in China for the same time period.² However, in 2011 this figure had risen dramatically to 37-42% in some regions of China.³ Clearly, Asian nations are catching up with the trend. This is likely due to decreasing levels of physical activity, dietary changes that occur with Westernisation, and stresses associated with an urban society. Recent immigration trends make this shift an issue that also concerns Ireland.

According to data from the Irish census in 2011, 18,000 residents identified themselves as being of Chinese ethnicity, an increase from 16,500 in 2006. Over the same time period there was an 87% increase in the number of residents identifying themselves as being from an Asian background other than Chinese.⁴

The burden of obesity

Obesity increases the risk of morbidities and mortalities, including hypertension and cardiovascular disease (CVD), diabetes mellitus, stroke and respiratory disease.⁵ Studies have estimated that $\geq 75\%$ of hypertension (defined as systolic pressure of ≥ 140 mmHg or diastolic pressure of ≥ 90 mmHg) can be attributed directly to obesity, and that weight loss is effective in lowering blood pressure.^{6,7,8,9} The increasing prevalence of obesity in the Asian population is paralleled by skyrocketing prevalence of hypertension; this number has been estimated at

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27.2% of adults aged 35 to 74 years in China alone.¹⁰ Obesity is also a known risk factor for stroke, the second leading cause of deaths and leading cause of long-term disability worldwide.^{6,11,12} In 2005, 5.7 million deaths were attributed to stroke. This is projected to rise to 6.5 million in 2015, with the majority of these deaths occurring in low to middle income countries such as China.¹¹

Anthropometric screening for obesity

Given the increasing diversity of the Irish population, and the demonstrated association between obesity and chronic disease, Irish healthcare providers need to be aware that current screening protocols being used in their practices may not be adequate for all patients. Classically at-risk individuals have been identified via anthropometric measurements such as body mass index (BMI) and waist circumference (WC). However, there is growing concern as to whether these measurements are universally applicable across all populations.

Anthropometry is the study of the measurement of the human body in terms of the dimension of bone, muscle and adipose tissue. Cut-off points for BMI, waist-to-height ratio (WHtR) and WC can aid in absolute risk assessment, determining type and intensity of treatment needed, and monitoring for the effects of treatment.² Of these, BMI is the most widely recommended, but there is growing evidence that it may not be the most effective index in screening for cardiometabolic risk.^{2,13}

Body mass index

In 2000, the WHO standardised classification of overweight and obese based on the use of BMI, equal to weight in kilograms divided by height in metres squared (kg/m²) (Table 1).^{1,2} It is a simple index, largely independent of height, that has long been considered a predictor of morbidity and mortality due to chronic disease.¹⁴

Table 1: WHO BMI classifications.

Category	BMI (kg/m ²)	Level of risk
Underweight	<18.5	Low
Normal range	18.5-24.9	Average
Overweight	25.0-29.9	Increased
Obese class I	30.0-34.9	Moderate
Obese class II	35.0-39.9	Severe
Obese class III	≥40.0	Very severe

These classifications are intended for international use, with guidelines suggesting weight loss interventions when BMI reaches 25kg/m². However, they are based on data from Western European or American populations, and therefore may not be appropriate for all ethnic groups. The mean BMI is 26.19kg/m² in the UK and 22.86kg/m² in China.^{1,2,15} By the above definition, 8-15% of Caucasians are considered to be obese compared to only 2.2-4.8% of ethnically Chinese Hong Kong people.¹⁶ This does not reflect the prevalence of obesity-related disease, which raises the question of whether inappropriately high cut-offs have resulted in an

underestimation of obesity and its related risks.⁷ The WHO recently proposed the following additional trigger points for public health action in the Asian population: ≥23kg/m² representing increased risk and ≥27.5kg/m² representing high risk.⁷ In other words, in the Asian population there exists an increased risk of developing hypertension at a BMI that is still deemed to be within the healthy range as defined by the WHO.¹⁷

Although BMI has classically been the most widely used indicator of weight status, it is not without its limitations. Firstly, BMI does not account for variations in body fat distribution. This is significant, as the location of excess adiposity is a strong determinant of cardiometabolic risk.¹⁸ Additionally, BMI does not distinguish between overweight due to muscle versus fat accumulation. In order to avoid faulty risk approximation, BMI should not be used as a universal measure of obesity as a risk factor for disease.¹⁹

Waist circumference

WC is a simple and accurate method of assessing a patient's abdominal fat.¹³ WC correlates closely with BMI and total body fat, and is associated with cardiovascular disease (CVD) risk factors independent of BMI.¹⁹ Risk stratification by WC is biased by height, and cut-off points cannot be used universally across gender or race.²⁰ Bei Fan *et al.* (2002) showed that when WC was kept below 85cm for men and 80cm for women in the Chinese population, it could prevent 47-58% of clustering of risk factors.²¹ Meanwhile, optimal WC cut-off values for Taiwanese were defined as 80.5cm for men and 71.5cm for women.²² As a comparison, the WHO identifies Caucasian Europeans being at increased risk at WC of ≥94cm in men and ≥80cm in women.^{1,2}

Waist-to-height ratio

The simplest proposed method for anthropometric measurement may be WHtR, which only involves one variable. Waist circumference reflects abdominal obesity and is subject to change with weight loss and gain. Height may be considered to be constant when referring to an adult; its inclusion in the ratio makes WHtR applicable in populations with a wide range of heights. WHtR is significantly associated with all CVD risk factors to a greater extent than BMI.²² Individuals with normal BMI but high WHtR are at greater risk than those with low WHtR, indicating that it may be able to identify risk in individuals who would otherwise be classified as "healthy".²⁴ WHtR is also more easily applied across ethnicities and sexes. A value of 0.5 is applicable to both men and women regardless of race as an action level to identify at-risk patients with increased CVD risk. WHtR, therefore, provides a simple message that clinicians can easily illustrate to patients: "keep your waist circumference to less than half your height".²⁵

Conclusion

Obesity places enormous financial burdens on both the affected individuals and governments funding their healthcare. In 2009, Finkelstein and colleagues reported that, in the US, compared with normal weight patients, obese patients incur 46% greater inpatient costs, 27% more physician visits and 80% increased spending on prescription drugs.²⁶ While more studies need to be conducted in

Asian populations, Reinhold and colleagues reported in 2011 that annual spending in China due to overweight and obesity may be as high as 7.4 billion US dollars.²⁷ The indirect effects of obesity generate substantial costs through work absenteeism, reduced productivity, increased mortality before retirement and decreased years of disability-free life.²⁸ A Chinese case study in 2005 demonstrated that the indirect effects of obesity accounted for 8.73% of gross national product.²⁹ With Asian populations following the rising obesity trends in Western populations, it can be reasonably assumed that the

economic impact of obesity will also continue to escalate. BMI may have been the classical anthropometric index used to detect obesity but it is time to consider using WHtR as the primary screening tool in the Asian population. Continuing to use the existing guidelines may fail patients who do not match the traditional Western physique, leaving them at risk of death due to largely preventable causes. Considering Ireland's changing demographics, it is time for practitioners to explore alternative anthropometric indices for identifying obesity.

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