

ABSTRACT

Obesity can be defined as a condition of excessive fat accumulation to the extent that health and well-being are adversely affected. The increase in prevalence of obesity worldwide is now a major public health problem. Obesity is associated with various health problems including hypertension, diabetes, hyperlipidemia, cardiovascular morbidity, fatty liver, metabolic syndrome, certain types of cancer, osteoarthritis, gall stones and sleep disorder. The current WHO BMI cut-offs of 25 and 30 kg/m² did not properly reflect the higher risk of diabetes mellitus and cardiovascular disease in Asian populations. WHO recommended that Asian countries consider introducing additional BMI cut-off values for public health action (23 kg/m² or higher, as representing moderate risk, and 27.5 kg/m² or higher as representing high risk); these have now been adopted by the Ministry of Health, Singapore in 2004. The new BMI cut-offs will enable physicians to pick up high risk individuals for early screening and management of associated risk factors locally. The primary option for weight management should be a combination of dietary caloric restriction, physical activity and behavioral modification.

INTRODUCTION

Obesity can be defined as “a condition of excessive fat accumulation to the extent that health and well-being are adversely affected”.¹ The increase in prevalence of obesity among both developed and developing countries has been described as a ‘worldwide epidemic’, and a major public health problem in the 21st century.²

Obesity is known to be associated with various chronic diseases including ischaemic heart disease, hypertension, diabetes mellitus, sleep apnea, osteoarthritis and some forms of cancer. Psychologically, the perception of obesity as being physically unattractive can be a source of emotional trauma.

At the community level, obesity increases health care costs. It is estimated that obesity accounts for 2 to 7% of the total health care cost of developed countries.³ These include the direct cost of the treatment of the associated complications. In addition there is the indirect costs associated with lost of productivity, absenteeism and loss of future earnings due to premature mortality. Despite the health and economic burden of obesity, studies show that health professionals do not consistently advise overweight and obese patients that they should lose weight.⁴

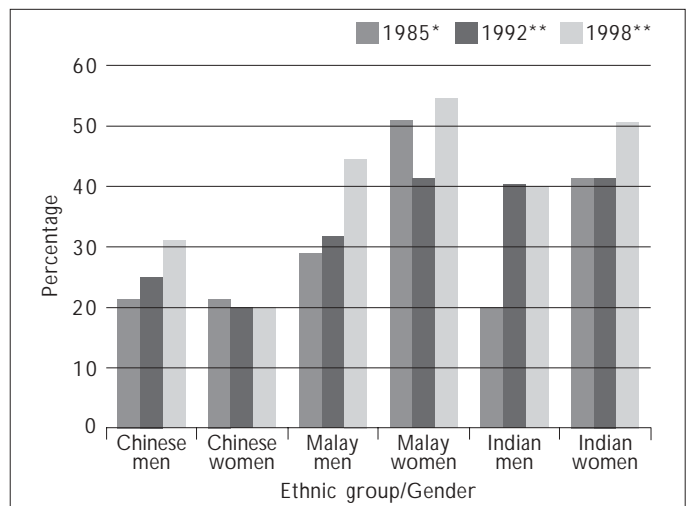
PREVALENCE OF OBESITY

Increase in the prevalence of obesity seems to be a global phenomenon in developing and developed countries. Studies

conducted in Europe and Asia shows that over the past one to two decades, the rates of obesity have increased by 1.5 to 2.0 fold in many countries.⁵ A variety of factors have been put forward to account for the rising prevalence of obesity, however, the root cause could normally be traced to an imbalance between energy intake and energy expenditure. Weight gain is the result of excessive caloric intake and insufficient physical activity,

The prevalence of obesity in adult Singaporeans has shown an increasing trend between 1985 and 1998.⁶ The prevalence of obesity as defined by body mass index (BMI, kg/m²) in Singapore is shown in Figures 1 and 2. Data shows significant differences in the prevalence of obesity between the ethnic groups and between the sexes.

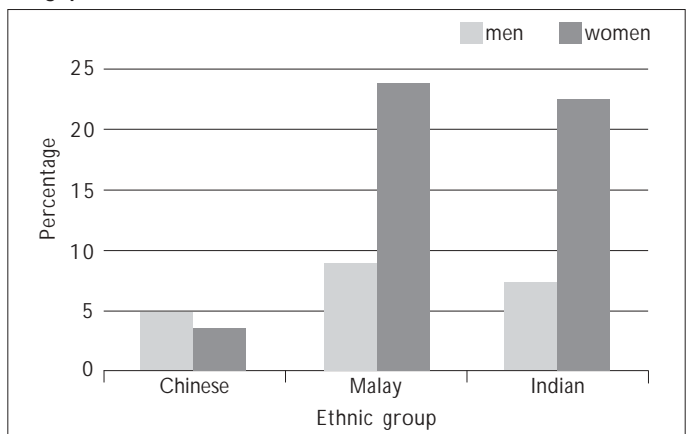
Fig 1. Prevalence of Overweight (BMI > 25 kg/m²) among Singaporeans from 1985-1998



* Data from the Singapore Thyroid and Heart Study.

** Data from 1992 and 1998 National Health Surveys from the Ministry of Health in Singapore. Data is weighted to age, ethnic group and gender distribution of the Singapore population at the time of the survey.

Fig 2. Prevalence of Obesity (BMI > 30 kg/m²) among Singaporeans in 1998



Source: MOH Clinical Practice Guidelines for Obesity 2004

OBESITY AND HEALTH RISKS

Obesity is a major risk factor for non-communicable diseases including diabetes mellitus, coronary heart disease, stroke and certain types of cancer.

Obesity can be looked upon as a chronic, relapsing disease that is associated with significant complications.

Cardiovascular morbidity

Obese individuals have an increased risk of strokes and myocardial infarction that are both independent of and additive to the increased risk associated with the elevated blood pressure, diabetes, and elevated cholesterol frequently associated with obesity. This increased risk appears to be related to substances produced by adipose tissue that make it easier for blood clots to form. Whilst weight gain in later years of life increases the risk cardiovascular mortality and morbidity, weight loss reduces the risk primary by its beneficial effect on risk factors such as blood pressure, glucose tolerance and lipid profile. The relationship between obesity and stroke is unclear. Their relationship may be indirect, through the effect obesity on blood pressure.

Hypertension

Hypertension is one of the most common complications associated with obesity. Weight gain is related to the development of hypertension and weight loss is associated with decreases in systolic and diastolic blood pressure. The etiology of obesity related increase in blood pressure is uncertain but it may be related to substances produced by adipose tissue and to the increase in insulin levels. It is well known that substantial weight reduction in obese patients with hypertension often results in better blood pressure control. Non-pharmacological treatment (weight reduction, reduced sodium intake and exercise) can normalize blood pressure in some patients.

Diabetes mellitus

Obesity is a leading cause of Type 2 diabetes. Diabetes in juveniles is often assumed to be Type 1. However with the increase in childhood obesity a rising proportion of “juvenile onset” diabetes are Type 2 diabetes. Type 2 diabetes appears to be related to cytokines produced by adipose tissue and to the increase of blood lipids that occurs in diabetes. In the many obese patients who have diabetes, reducing body weight by more than 10% can result in eliminating or reducing the need for medication.

Hyperlipidaemia

Hyperlipidemia is commonly associated with obesity. Most people can improve their blood lipid levels by reducing both their fat intake and weight.

Fatty Liver

Fatty liver disease or Non-Alcoholic Steato-Hepatitis (NASH) is caused by deposits of lipids in the liver. It is associated with excess calorie consumption and excessive dietary fat intake. This excess liver fat results in inflammation and injury to the hepatocytes which is usually asymptomatic. It is often discovered during routine blood investigations where the transaminases are found to be elevated. If untreated there is a risk of developing cirrhosis. The most effective treatment is weight reduction, reduce in fat intake and regular exercise.

Metabolic Syndrome

Obesity itself is forms one of the diagnostic criteria of this syndrome (Table 1). Individuals with this syndrome are at increased risk for cardiovascular mortality and morbidity. Weight reduction is central to the management of this syndrome.

Table 1. Criteria of Metabolic Syndrome

	WHO diagnostic criteria (insulin resistance* plus two of the following)	ATP III diagnostic criteria (three of the following)
Abdominal/central obesity	Waist to hip ratio: >0.90 (men), >0.85 (women), or BMI >30 kg per m ²	Waist circumference: >102 cm (40 in) in men, >88 cm (35 in) in women
Hypertriglyceridemia	>=150 mg per dL (>=1.7 mmol per L)	>=150 mg per dL
Low HDL cholesterol	< 35 mg per dL (< 0.9 mmol per L) for men, <39 mg per dL (<1.0 mmol per L) for women	<40 mg per dL (<1.036 mmol per L) for men, <50 mg per dL (<1.295 mmol per L) for women
High blood pressure	>=140/90 mm Hg or documented use of antihypertensive therapy	>=130/85 mm Hg or documented use of antihypertensive therapy
High fasting glucose	Impaired glucose tolerance, impaired fasting glucose, insulin resistance, or diabetes	>=110 mg per dL (>=6.1 mmol per L)
Microalbuminuria	Urinary albumin to creatinine ratio: 30 mg per g, or albumin excretion rate: 20 mcg per minute	

Cancer

Obesity results in an increased risk of some cancers. In women there is an increased risk for breast, uterine, cervical, and ovarian cancer. For men, there is an increased incidence of colon and prostate cancer. The effect of obesity on the production of hormones by the ovaries and testes may contribute to cancer risks. The higher risk of colorectal cancer is suspected to be related to increased fat intake in obese individuals.

Osteoarthritis

Obesity is frequently complicated by degenerative arthritis. It is believed that the increased weight causes a greater degree of “wear and tear” of the weight bearing joints. Weight reduction does not reverse the degenerative process but it slows down the progress of the disease. Significant weight reduction may even diminish the symptom of pain and improve tolerance to activities. The association of obesity with arthritis of non-weight bearing joints such as the carpometacarpal joints of the hand is thought to be caused by a different mechanism, probably due to systemic factors resulting in abnormalities of bone and cartilage metabolism.

Gallstones

Obesity is associated with cholelithiasis in both men and women. Central obesity is associated with gall bladder disease in women but not men. It is postulated that the increase in cholesterol that results from obesity increases the incidence of gallstones.

Sleep disorders

Although the exact cause of sleep apnea is not known, there is a strong association with obesity. Fat distribution in an individual is thought to be predictive of the presence and severity of obstructive sleep apnea. Few patients have an obvious abnormality such as large tonsils. For most people, the condition is due to a combination of factors like obesity, bone structure around the face and neck, and upper airway muscle function. Obesity around the neck is one of the most studied factors and research has shown a correlation between neck size and obstructive sleep apnea. Sleep apnea is by itself a risk factor for cardiovascular morbidity, independent of obesity. Conversely, weight loss is associated with a reduction of the severity of sleep apnea.

Psychosocial problems

Obesity could predispose to a myriad of psychosocial problems. Obese individuals may face pressures both at the social, home and in the work environment and thus are at higher risks of stress and psychosocial problems. Many suffer from low self-esteem and depression. In some individuals who react to stress by eating, a vicious circle of obesity and low self-esteem is started which complicates intervention to reduce weight and improve the psychosocial condition.

DEFINITION OF OBESITY IN ASIAN POPULATIONS

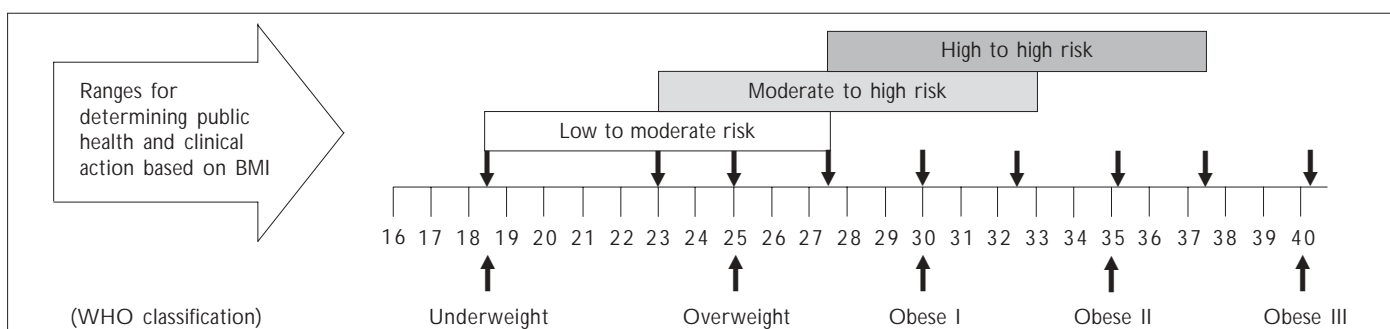
The definition of obesity is based on the BMI. BMI generally correlates well with percent body fat and is used universally as a surrogate measure of body fatness. The World Health Organisation (WHO) has used cut offs of 25 and 30 kg/m² to define overweight and obesity among adults⁷. These cut offs are based on studies relating BMI to morbidity and mortality in Caucasians.

However, studies among Singaporeans have shown that they have more body fat when compared to Caucasians with the same BMI and that Singaporeans adults’ experienced elevated risk for recognised cardiovascular risk factors (hypertension, diabetes mellitus, dyslipidaemia) at fairly low BMI levels⁸. These studies have been confirmed by other studies performed in different parts of Asia.

In 2002, a WHO expert consultation panel met to address the debate over appropriate interpretation of BMI cut-off points for overweight and obesity in Asian populations, corresponding to levels of health risk. The consultation concluded that current WHO BMI cut-offs of 25 and 30 kg/m² did not properly reflect the higher risk of diabetes mellitus and cardiovascular disease in Asian populations. They recommended that Asian countries consider introducing additional BMI cut-off values for public health action (23 kg/m² or higher, as representing moderate risk, and 27.5 kg/m² or higher as representing high risk).⁹

These recommendations are now adopted by the Ministry of Health, Singapore and published in the MOH Clinical Practice Guidelines for Obesity 2004.

Figure 3. zzzzzBody-mass index (BMI) cut-off points for public health action



Source: Reference 9

In addition to BMI, it is also important to consider fat distribution using waist circumference when assessing health risks. The CPG for Obesity’s recommendations for BMI and waist circumference for Asians are:

B Classifications in Obesity

i) The WHO classification of adults according to BMI, and the proposed BMI cut-off points for public health action in Asians.

WHO classification	WHO BMI cut-off points for definition (kg/m ²)	Cardio-vascular disease risk	Asian BMI cut-off for action* (kg/m ²)
Underweight	<18.5		<18.5
Normal range	18.5 to 24.9	Low	18.5 to 22.9
Overweight	>25.0		
Pre-Obese	25.0 to 29.9	Moderate	23.0 to 27.4
Obese class I	30.0 to 34.9	High	27.5 to 32.4
Obese class II	35.0 to 39.9	Very High	32.5 to 37.4
Obese class III	>40.0		>37.5

* Although the cut-off points for action based on the risk of co-morbid diseases are lower among Asians, retention of the international WHO classification to define weight category in Asians has been recommended.

ii) Waist circumference: high-risk, gender-specific thresholds.

Guideline	Waist circumference (cm)	
	Men	Women
WHO	>102	>88
Asia-Pacific Consensus	>90	>80

Source: MOH Clinical Practice Guidelines for Obesity (Revised Card), 2004

IMPLICATIONS OF NEW BMI CUT OFFS

It is important for physicians to communicate the concept of continuum of risk with increasing BMI and that it is important to reduce ‘fat’ rather than weight per se. Health improvements can be achieved through intentional weight-loss in obese adults with co-morbidities. Even in the modest range of 5-10%, weight-loss has improved cardiovascular risk profiles, quality of life, osteoarthritis of the knee, and decreased onset of diabetes. For patients able to achieve weight-loss of more than

10%, conditions such as sleep apnoea can be improved. Studies also show that modest weight loss of around 5-10% can lead to decreased risk of mortality.

The recommended clinical approach to weight management can be found in the CPG for Obesity. Briefly, 3 main approaches are available for weight loss: behavioural modification, drug therapy and surgery.

- o The primary option for weight management should be a combination of dietary caloric restriction, physical activity and behavioural modification.
- o Drug therapy can be considered for obese individuals, and overweight individuals with co-morbidities. Drug therapy is most effective when combined with diet, physical activity and behaviour modification.
- o For severely or morbidly obese individuals, surgery is the most effective method to reduce weight and maintain weight loss. However, surgery is only recommended after failure of non-surgical attempts at weight reduction.

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LEARNING POINTS

- o Obesity can be defined as a condition of excessive fat accumulation to the extent that health and well-being are adversely affected.
- o Prevalence of obesity is significantly different between different ethnic groups and the sexes.
- o Obesity is associated with various health problems including hypertension, diabetes, hyperlipidemia, cardiovascular morbidity, fatty liver, metabolic syndrome, certain types of cancer, osteoarthritis, gall stones and sleep disorder.
- o The current WHO BMI cut-offs of 25 and 30 kg/m² did not properly reflect the higher risk of diabetes mellitus and cardiovascular disease in Asian populations.
- o WHO recommended that Asian countries consider introducing additional BMI cut-off values for public health action (23 kg/m² or higher, as representing moderate risk, and 27.5 kg/m² or higher as representing high risk); these have now been adopted by the Ministry of Health, Singapore in 2004.
- o The new BMI cut-offs will enable physicians to pick up high risk individuals for early screening and management of associated risk factors locally.
- o The primary option for weight management should be a combination of dietary caloric restriction, physical activity and behavioral modification.