Relationship between bmi and health status

The definition of Metabolic health

A recent study defined metabolic health as having optimal levels of high-density lipoprotein (HDL) cholesterol, blood sugar, triglycerides, waist circumference and blood pressure without taking any related medication (" Prevalence of Optimal Metabolic Health in American Adults: National Health and Nutrition Examination Survey 2009–2016 | Metabolic Syndrome and Related Disorders", 2019).

What exactly is BMI?

Body Mass Index (BMI) is a calculation of your size based on your height and weight. It is calculated by dividing weight in kgs by your height in meters squared kg/m2.

A Belgian mathematician, astronomer and statistician named Lambert Adolphe Jacques Quetelet invented the BMI formula in the 19th century to determine public health policies. Quetelet concluded that weight increased as a square of the height, excluding growth squirts that followed birth. Originally known as the Quetelet Index (Eknoyan, 2007) but later changed to and Body Max Index in 1972 by Keys et al, after their studies disagreed with the validity of data published discussing desirable weight (Keys, Fidanza, Karvonen, Kimura & Taylor, 1972).

BMI is an inexpensive and simple method of screening for weight category, placing someone as either underweight, healthy weight, overweight or obese. The BMI scores gives an indirect measure of body fat.

- Underweight is less than18. 5

- Healthy weight range is between 18. 5-24. 9

- Overweight is between 25-29. 9

- Obese is anything over 30

Are BMIs useful?

The BMI has been useful in population-based studies. It is simple and inexpensive and can identify people with high BMIs as being at an increased risk for developing many diseases and health conditions (" Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: executive summary. Expert Panel on the Identification, Evaluation, and Treatment of Overweight in Adults", 1998) including:

- All-causes of death (mortality)

- High blood pressure (Hypertension)

- High LDL cholesterol, low HDL cholesterol, or high levels of triglycerides (Dyslipidaemia)

- Type 2 diabetes

- Coronary heart disease

- Stroke

- Gallbladder disease

- Osteoarthritis

- Sleep apnoea and breathing problems

- Chronic inflammation and increased oxidative stress

- Some cancers (endometrial, breast, colon, kidney, gallbladder, and liver)

- Low quality of life

- Mental illness such as clinical depression, anxiety, and other mental disorders

- Body pain and difficulty with physical functioning

Is BMI measured the same way for children and teens as it is for adults?

Although the BMI is calculated using the same formula as adults, it is interpreted differently for children and teens. The amount of body fat differs between boys and girls and changes with age making their BMIs age and sex specific. Children and teens BMIs are shown as a percentile ranking. (Kuczmarski, Kuczmarski & Roche, 2002).

Whyis BMI inaccurate and misleadingas an indicator of body fatness?

In several studies BMI is criticized for disregarding fat distribution and not differentiating fat from lean muscle mass and bone density (Bell et al., 2018). For example, a person with increased lean mass and a low body fat percentage such as an athlete or someone with a lot of muscle compared to another person with limited lean mass and a high body fat content can have the same BMI over 25 making the BMI unable to predict long-term health outcomes (Romero-Corral et al., 2008).

BMI can only be compared to those of the same sex, age and race as BMI varies by age, sex and race (Wagner & Heyward, 2000).

Elderly people have lower BMIs due to less muscle mass. Which, regarding fat percentage, isn't an expression of normal weight range (Elizabeth DeVita Raeburn, 2019).

Pregnant women will also have a higher BMI due to their increased weight associated with pregnancy. The excess weight can be due to a build-up of fluid and not fat. BMI calculations will overestimate body fat in this case.

What are some of the other ways to assess excess body fat besides BMI?

There are alternative measures that reflect abdominal fat such as waist circumference and waist–hip ratio both have been suggested to be superior to BMI in predicting a risk of Cardiovascular Disease (Huxley, Mendis, Zheleznyakov, Reddy & Chan, 2011).

Theses forms of measurements provide a better indication of the amount of fat around vital organs such as your heart, liver, pancreas and kidneys (Siren, Eriksson & Vanhanen, 2012). It is measured by using a tape measure around your waist.

The ranges for waist circumference are as follows:

Men

Greater than 94 cm– increased risk

Greater than 102 cm – substantially increased risk

For women

Greater than 80 cm– increased risk

Greater than 88 cm– substantially increased risk

For the waist-hip ratio in addition to the waist measurement as detailed above, the hip circumference is taken around the largest circumference of the buttocks.

The Ranges for Waist-hip ratio are as follows:

Men

Greater than or equal to 90 cm – Substantially increased

Women

Greater than or equal to 85 cm – Substantially increased

In a recent study it was found that calculating a person's waist-to-height ratio is the most accurate and efficient way of identifying whether or not they are at risk of obesity. This measurement is done by dividing waist circumference by height. The waist measurement should be less than half of your weight (Swainson, Batterham, Tsakirides, Rutherford & Hind, 2017).

Other methods that are not always readily available, can be expensive, and require a professional to assist include underwater weighing, dual-energy x-ray absorptiometry (DXA), skinfold thickness measurements (with calipers), bioelectrical impedance, and isotope dilution (Wohlfahrt-Veje et al., 2014)

The bottom line

It is clear and has been proven over and over that as a single measure BMI is clearly not a perfect measure of health. However, it is still considered a useful starting point for those who may need further testing to identify

health risks. In my view, it's a good idea to know your BMI, keeping in mind its limitations. Further research is needed to identify a suitable alternative.

Eating a nutritious diet and exercising regularly is key to attaining and maintaining metabolic health.

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