

Letter to the Editor

Simple index for screening overweight and obesity

Sir,

Your readers may be interested to learn of a recent study undertaken in Chiang Mai, Thailand, to develop a simple index for screening overweight and obesity.

Currently, body mass index (BMI) is the favourite index for assessing nutritional status in adults. It is calculated from body weight (in kg) divided by the square of height (in m) and can be used for assessing both undernutrition and obesity^{1,2}. However, it needs a means, such as a calculator or a nomogram, for obtaining BMI from height (cm) and weight (kg)³. It may be difficult to determine individual BMI without one means or another of performing the calculation.

In the Chiang Mai study, the investigators wanted to find a simple index for screening nutritional status in Thai adults without using BMI. The study involved 2234 subjects (including males and females), aged between 20 and 35 years, enrolled in a community cohort project.

Height and weight were measured. BMI was calculated from weight and height (kg m^{-2}) and classified as proposed by the World Health Organization³. A height-weight difference index (HWDI) was calculated using the formula: height (cm) – weight (kg). The relationship between HWDI and BMI of the subjects was established by using the Pearson product moment correlation coefficient (r). The correlation between HWDI and BMI was used to develop a prediction equation by using the simple linear regression method. Analysis was performed using the Statistical Package for the Social Sciences, version 7. Nutritional status of the subjects, as assessed by HWDI, was compared with that assessed by BMI. Then the percentages of sensitivity and specificity were calculated. The kappa statistic was used to measure agreement between the assessment of nutritional status by HWDI and BMI. There was a negative correlation between BMI and HWDI ($r = -0.97$, $P < 0.001$, $n = 2234$) with the linear regression equation: $\text{HWDI} = 158.69 - 2.54 \times \text{BMI}$ ($P < 0.001$), as shown in Fig. 1. From the equation, the values of HWDI for predicting underweight, normal weight, overweight and obesity were calculated (see Table 1). The percentages of sensitivity and specificity, and agreement, when HWDI was used as an index for screening underweight, overweight and obesity from normal nutritional status, were obtained (Table 2).

As shown in Table 1, the following apply when individuals are classified according to HWDI: obesity, ≤ 82.5 cm–kg; grade 1 of overweight, > 82.5 – 95.2 cm–kg; normal range, > 95.2 – 111.7 cm–kg; and thinness, > 111.7 cm–kg. When the results of using HWDI as an index for predicting thinness were compared with those using BMI, it was found that the specificity was 92.2% and the kappa statistic (0.52) indicated good agreement, but the sensitivity was only 66.7%. From this it may be inferred that HWDI might not be a suitable index for screening thin adults from those who have normal nutritional status. However, when HWDI was used as an

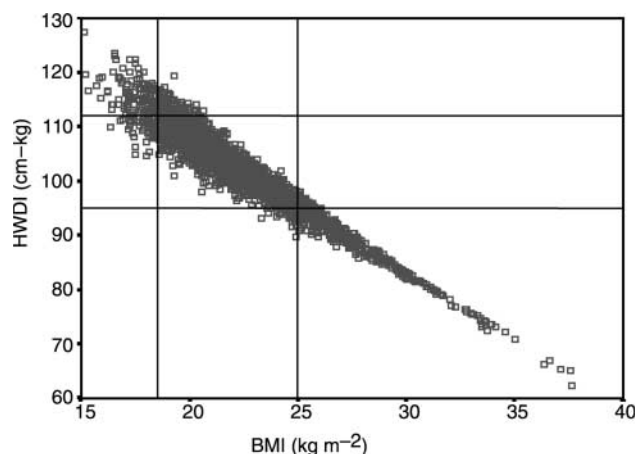


Fig. 1 The relationship between height-weight difference index (HWDI, cm–kg) and body mass index (BMI, kg m^{-2})

Table 1 Nutritional status, body mass index (BMI) and height-weight difference index (HWDI)

Nutritional status	BMI* (kg m^{-2})	HWDI (cm–kg)
Grade 3 overweight	≥ 40.00	≤ 57.1
Grade 2 overweight	30.00–39.99	> 57.1 – 82.5
Grade 1 overweight	25.00–29.99	> 82.5 – 95.2
Normal range	18.50–24.99	> 95.2 – 111.7
Grade 1 thinness	17.00–18.49	> 111.7 – 115.5
Grade 2 thinness	16.00–16.99	> 115.5 – 118.0
Grade 3 thinness	< 16.00	> 118.0

* Source: World Health Organization³, p. 452.

Table 2 Sensitivity, specificity and agreement when using height–weight difference index (HWDI) as an index for screening nutritional status

	Nutritional status		
	Thinness	Grade 1 overweight	Grades 2 & 3 overweight
Sensitivity (%)	66.7	90.9	100.0
Specificity (%)	92.2	96.1	100.0
Kappa	0.52	0.87	

index for screening grade 1 overweight and obese adults from those who had normal nutritional status and the findings compared with those using BMI, the results showed high percentages of both sensitivity and specificity. The kappa statistic also indicated excellent agreement (see Table 2).

The study findings suggest that HWDI could be used as a simple and effective index for screening overweight and obesity in Thai adults.

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References

- 1 Garn SM, Leonard WR, Hawthorne VM. Three limitations of the body mass index. *American Journal of Clinical Nutrition* 1986; **44**: 996–7.
- 2 James WP, Ferro-Luzzi A, Waterlow JC. Definition of chronic energy deficiency in adults. *European Journal of Clinical Nutrition* 1988; **42**: 969–81.
- 3 World Health Organization (WHO) Expert Committee on Physical Status. *The Use and Interpretation of Anthropometry*. WHO Technical Report Series No. 854. Geneva: WHO, 1995.