Original Article

Anthropometric measurement - An easy approach for evaluation of obesity

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Abstract

Now a day's obesity is a burden worldwide. The prevalence of obesity is increasing in both the developed and developing countries. To investigate the anthropometric measurement in obesity. This cross study was carried out in the Department of Physiology, Mymensingh Medical College, Mymensingh, Bangladesh. Inclusion and exclusion criteria are strictly maintained for selection of study and control groups. Anthropometric measurements were performed in 150 cases of overweight and obese. BMI, WC, WHR, blood pressure were high in obese group. Obesity affects various anthropometric measurements and may be used to routinely evaluate obese patients.

Key Words: Body mass index, waist circumference, waist hip ratio, blood pressure, obesity

Introduction

Simple anthropometric measurements have been used as surrogate measurements of obesity and have more practical value in both clinical practice and for large-scale epidemiological studies. Body mass index (BMI), which relates weight to height, is the most widely used and simple measure of body size, and is frequently used to estimate the prevalence of obesity within a population.[1,2] BMI has been found to be consistently associated with an increased risk of cardiovascular disease (CVD) and type 2 diabetes,[3] yet this measurement does not account for variation in body fat distribution and abdominal fat mass, which can differ greatly across populations and can vary substantially within a narrow range of BMI.[4] Excess intra-abdominal fat is associated with greater risk of obesity-related morbidity than is overall adiposity.[4,5] Thus, measurements of waist circumference and waist–hip ratio (WHR) have been viewed as alternatives to BMI, with both measures regularly used in the clinical and research settings. Waist circumference has been shown to be the best simple measure of both intra-abdominal fat mass and total fat.[6,7]

Several studies in adults have reported a stronger positive association between cardiovascular risk factors such as hypertension, and lipid and glucose concentrations, with abdominal adiposity which is measured by waist circumference ratio (WHR) or with overall adiposity which is measured by BMI.[8-14] although BMI has also been reported as being one of the most important risk factors for type 2 diabetes[15] Despite the fact that a close relationship is apparent between abdominal adiposity and risk of CVD, the current waist circumference cut-off points suggested by the World Health Organization (WHO) are not based on associations with CVD risk factors, but rather on their correlation with corresponding values of BMI.[4,16]

Methods

This was a cross sectional case control type of study, carried out in the department of Physiology, Mymensingh Medical College, Mymensingh, Bangladesh during the period of January 2009 to December 2009. A total number of 100 subjects male and female of obese aged 30-60 years were included in this study. Fifty (50) individual of same age group were considered as control.

Inclusion criteria – Those who have no history of diabetes, hypertension, chronic renal disease, endocrine dysfunction, smoker, alcohol consumer, cardiovascular disease.

Exclusion criteria – Those who are known case of diabetes, hypertension, chronic renal disease, endocrine dysfunction, smoker, alcohol consumer, cardiovascular disease.

Data collection and recording – Informed consent was obtained from each volunteer. Each subject answered a detailed questionnaire that includes questions on dietary habit, socio-economic condition, family history and other relevant concerned information.

Height was measured to the nearest 5 mm in stadiometer. Weight to the nearest 0.1 Kg with the subject with light clothing without shoes. BMI was calculated as weight in Kg divided by height in square meter (Table-I). Waist circumference (WC) in centimeter was measured midway between the lower costal margin and the iliac crest during the end expiratory phase. Hip circumference (HC) in centimeter was measured at the level of greater trochanters.

Waist to hip ratio – It is the ratio of waist circumference to hip circumference.

Table-I: BMI in SI units & imperial units

Unit	Formula
SI unit	$BMI = \frac{Weight\,(kg)}{Height\,(m^2)}$
Imperial unit	$BMI = \frac{Weight(lb) \times 703}{Height\,(in^2)}$
	$BMI = \frac{Weight(lb) \times 4.88}{Height\,(ft^2)}$

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Results

The mean (±SD) of BMI values of control group and those of study group were 22.08 ±2.97 and 27.54±1.80 respectively. The values were higher in study group. The result was highly significant (P<0.001).

The mean (±SD) of WHR values of control group and those of study group were 0.95 ±0.11 and 1.0049±0.04 respectively. The values were higher in study group. The result was highly significant (P<0.001).

The mean (±SD) of waist circumference values of control group and those of study groups were 85.22 ± 3.97 and 92.03 ±3.47 respectively. The values were higher in study group. The result was highly significant (P<0.001) (Table-II).

Table-II: Comparative study of different anthropometric parameters between study and control group

	Minimum		Maximum		Mean (Standard deviation)	
	Study group	Control group	Study group	Control group	Study Group	Control Group
Age in years	30	30	60	60	44.95 (9.74)	43.74 (9.57)
Height in meter	1.44	1.52	1.727	1.650	1.61 (0.59)	1. 59 (4.55)
Weight in Kg	54	48.00	87.00	68.00	70.97 (5.75)	57.25 (0.04)
BMI Kg/m^2	25	20.50	32.88	24.60	27.54 (1.80)	22.08 (2.97)
WC in cm	84	76	104	92	92.03 (3.47)	85.22 (3.97)
Hip in cm	80	83	105	98	91.28 (3.16)	89.52 (4.07)
WHR	0 .91	0.92	1.090	0.98	1.0049 (0.04)	0.95 (0.11)
Systolic BP (mm of Hg)	90	90	150	140	124.45 (14.82)	114.00 (8.27)
Diastolic BP (mm of Hg)	60	60	100	90	79.60 (8.58)	73.90 (6.09)

Discussion

Several studies in adults have reported a stronger positive association between cardiovascular risk factors such as hypertension, and lipid and glucose concentrations, with abdominal adiposity (measured by waist circumference or WHR) than with overall adiposity (as measured by BMI)[8-14] although BMI has also been reported as being one of the most important risk factors for type 2 diabetes[15] Despite the fact that a close relationship is apparent between abdominal adiposity and risk of CVD, the current waist circumference cut-off points suggested by the World Health Organization (WHO) are not based on associations with CVD risk factors, but rather on their correlation with corresponding values of BMI.[4,16]

Obesity affect various Health Problem like Diabetes, Hypertension, Strock, myocardial infarction, sleep apnea, rheumatic problem, various types of cancer etc. Large sample size, long duration study is necessary for the study.

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