

Assessment of Health Status by BMI and BP among Adult Men from Punjab, India

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ABSTRACT To analyse the relationship between various anthropometric indices and various health risks, population based cross-sectional study has been conducted on 600 adult men (mean age 34.23 years) residing in different areas of Punjab. Mean values for Height (cm), Body Mass (Kg), Circumferences (cm): waist and hip, Systolic and Diastolic Blood Pressure (mmHg), BMI and WHR for subjects were 167.62 ± 6.02 cm, 62.38 ± 8.89 kg, 22.18 ± 2.89 kg/m², 84.91 ± 9.98 cm, 92.73 ± 8.35 cm, 0.92 ± 0.14 , 124.12 ± 9.48 mmHg and 83.99 ± 8.69 mm Hg, respectively. After classifying the data using criteria for WHR, BMI and Blood pressure given by WHO, it has been found that approximately 30% of the adult men are under the risk of developing various adverse health hazards like obesity, diabetes, hypertension, metabolic syndrome etc. Anthropometric indices BMI, WHR and Blood pressure classification criteria are helpful in predicting various serious adverse health related disorders.

INTRODUCTION

Morphometric analysis of the body is virtually the investigation of the process of life which reflects the general health status of an individual. Various anthropometric indices that is, BMI, WHR etc. and parameters that is, skinfold thicknesses and body circumferences are available that play an important role in predicting the various health risks and show good correlation. Deposition of excessive adipose tissue mass in the trunk region of the body is linked with an increased risk for hypertension (Harris et al. 2000 and Pausova et al. 2002), type-II diabetes mellitus (Seki et al. 2002 and Mokdad et al. 2003) and hypercholesterolemia (Garrison et al. 1980 and Ishikawa-Takata et al. 2002). Obesity is another important public health problem in most of the countries and is clearly associated with increased mortality and the incidence of various cardiovascular disorders, metabolic syndrome, osteoarthritis and even some cancers (WHO 2000). We investigated the relationship of various anthropometric parameters and indices in predicting

the various health risks in adult men of Punjab.

MATERIAL AND METHODS

A total of 600 men ranging in age from 30 to 40 years residing in different areas (Ludhiana, Muktsar, Patiala, Amritsar, Moga, Kapurthala and Bathinda) of Punjab and were involved in different traditional occupational groups that is, tailors, farmers, carpenters and blacksmiths and were measured for various anthropometric parameters that is, Height (cm), Weight (Kg), Circumferences (waist and hip) following the standard techniques given by Lohmann et al. (1988). BMI was calculated by dividing body mass (kg) by body height squared (m²) and was categorised into different grades of overweight and thinness using the criteria given by WHO (2002). Classification given by Willet et al. (1999) has been used for waist-hip-ratio. Blood pressure was measured twice with a standard mercury manometer with the participant seated, and was used for the second measurement. Prevalence of hypertension is isolated with the help of criteria given by WHO/ISH (1999).

RESULTS AND DISCUSSION

Mean and standard deviation of anthropometric measures and blood pressure are pre-

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sented in Table 1. Mean age of men was 34.23 ± 4.05 years. Mean height, body mass, BMI, waist circumference, hip circumference, WHR, systolic and diastolic blood pressure for subjects were 167.62 ± 6.02 cm, 62.38 ± 8.89 kg, 22.18 ± 2.89 kg/m², 84.91 ± 9.98 cm, 92.73 ± 8.35 cm, 0.92 ± 0.14 , 124.12 ± 9.48 mm Hg and 83.99 ± 8.69 mm Hg, respectively.

Table 1: Mean and standard deviation (S.D.) of anthropometric parameters and blood pressure in Punjabi men

Parameters/Ratios	Men (n = 600)	
	Mean	S.D.
Age	34.23	4.0
Height (cm)	167.62	56.02
Body Mass (Kg)	62.38	8.89
BMI (kg/m ²)	22.18	2.89
Waist circumference (cm)	84.91	9.98
Hip circumference (cm)	92.73	8.35
WHR	0.92	0.14
Systolic blood pressure	124.12	9.48
Diastolic blood pressure	83.99	8.69

The pattern of body fat distribution is a more important determinant of disease risk. Regional adiposity measures have been proposed as alternatives to the measurement of body mass index for diagnosing the persons at risk of developing future diseases and further is recommended index of obesity by World Health Organisation. Measurements of central adiposity and magnitude of association of BMI with the incidents of coronary heart diseases and cardiovascular disorders are found to be similar and shows positive correlation with all-cause mortality (Folsom et al. 1993; Wei et al. 1997; WHO 1997; Pi-Sunyer 2000; Taylor et al. 2010). BMI classifications of the subjects are shown in Table 2. About 53.5 percent of the total men lie under the normal range of the BMI (18.5-22.99), 10.65 percent of men having BMI values lower than the normal range (16-18.49) and 35 percent lies under the grade-1-overweight and 0.83 percent under the grade-2-overweight. According to BMI classification, the men having BMI value more than the normal range is under the risk of developing obesity, diabetes, hyperlipidemia etc. like disorders. Further, it has been found that graded increase in the values of BMI is positively related with the prevalence of metabolic syndrome and overweight and men have significantly higher prevalence than the women (Erdembileg et al. 2003). BMI generally correlates highly with

adiposity over 25.0 in BMI but it can sometimes misclassify body fat content of a person with a BMI less than 25.0 and aged people (Prentice and Jebb 2001). Further, aging is progressively accompanied with the increase in ratio of fat to lean body mass and occurs even in the people who manage to maintain the constant body mass index as they grow older (Willett et al. 1999).

Table 2: BMI classification using WHO (2002) criteria

Body Mass Index (BMI)	Grade	(n=600)
< 16	Grade-3-Thinness	01 (0.16%)
16- 16.99	Grade-2-Thinness	20 (3.33%)
17- 18.49	Grade-1-Thinness	43 (7.16%)
18.5-22.99	NORMAL	321(53.5%)
23-29.99	Grade-1-Overweight	210(35.0%)
30-39.99	Grade-2-Overweight	05 (0.83%)
≥40	Grade-3-Overweight	-

The waist to hip ratio is commonly used as an indirect measure of lower and upper body fat distribution and most widely used indicator of abdominal obesity in the population studies. Higher values of WHR are associated with increased visceral fat area and contribute to the risk of developing central fat distribution disorders and in relatively lean adolescents waist circumference and percentage body fat (quintile 05) are most consistently and strongly associated with decreased insulin sensitivity. (Gallagher et al. 1996; Molarius et al. 1998 and Ouyang et al. 2010). The results of WHR classification are shown in Table 3. About 70.16 percent of the men have the WHR of 0.95, 19.83 percent of men have the WHR between 0.96-0.99 and 10 percent of the population have the WHR more than equal to 1 and elucidated that they are at higher risk for adverse health consequences such that metabolic disturbances including dyslipidaemia, hypertension, diabetes, cardiovascular diseases, hyper-insulinaemia etc. Body morphology indices are independently related with increased risk of developing coronary artery calcification (CAC) while showing significant prediction of coronary calcium (Allison and Wright 2004).

Table 3: WHR classification (Willett et al. 1999)

Waist -Hip-Ratio (WHR)	n = (600)	Percentage
0.95	421	70.16%
0.96-0.99	119	19.83%
≥1.00	60	10%

Table 4: WHO/ISH classification of blood pressure levels

Category	Systolic (MmHg)	Diastolic (MmHg)	N = 600
Optimal	<120	<80	70 (11.6%)
Normal	<130	<85	354 (59.0%)
High-Normal	130-139	85-89	121 (20.16%)
Grade-1-Hypertension	140-159	90-99	38 (6.33%)
Grade-2-Hypertension	160-179	100-109	07(1.16%)
Grade-3-Hypertension	≥180	≥110	01(0.16%)
Isolated Systolic Hypertension	≥140	<90	09 (1.50%)

Adiposity shows positive correlation with hypertension (Novotny et al. 1998). Prevalence of hypertension is depicted in the Table 4. A total of 59.0 percent of the men showed normal values of blood pressure, 11.66 percent of men having blood pressure under optimal category and 29.81 percent of the men were under various grades of hypertension. Out of total sample size, only 9 cases of isolated hypertension (ISH) have been analysed. Higher values of blood pressure levels associated with various clinical conditions such that ischaemic stroke, cerebral haemorrhage, transient ischaemic attack, myocardial infarction, angina, coronary revascularisation, congestive heart failure, diabetic nephropathy, renal failure, dissecting aneurysm, symptomatic arterial disease and advanced hypertensive retinopathy includes haemorrhage or exudates and papilloedema (WHO/ISH 1999).

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