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A Study of Relationship among Age, Height, Weight, Body Mass Index & Waist to Hip Ratio in Wrestlers and Football Players

Kuldeep Singh and Ashok Kumar

Abstract

Aim: The aim of the study was to observe a relationship among age, height, weight, body mass index and waist-to-hip ratio in wrestlers and football players.**Materials and Methods**: The present study was conducted on 14 male wrestlers of different weight categories and 19 male football players and their age ranged from 12-20 years.**Results**: It was found that BMI of wrestlers was statistical significant positively correlated with height, weight, hip and waist circumference. The waist-to-hip ratio (WHR) of wrestlers was statistical significant negatively correlated with age. The result of the present study shows that BMI of football players was statistical significant positively correlated with weight, hip circumference, waist circumference and waist-to-hip ratio (WHR).The waist-to-hip ratio (WHR) of football players was statistical significant positively correlated with waist circumference.**Conclusion**: It was concluded from the results of the present study that body mass index (BMI) of wrestlers and football players was statistical significant positively correlated with weight, hip circumference and waist circumference. .

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Introduction

The 1997 WHO Expert Consultation on Obesity recognized the importance of abdominal fat mass (referred to as abdominal, central or visceral obesity), which can vary considerably within a narrow range of total body fat and body mass index (BMI). It also highlighted the need for other indicators to complement the measurement of BMI, to identify individuals at increased risk of obesity-related morbidity due to accumulation of abdominal fat (WHO, 2000a). Waist–hip ratio (i.e. the waist

circumference divided by the hip circumference) was suggested as an additional measure of body fat distribution. The ratio can be measured more precisely than skin folds, and it provides an index of both subcutaneous and intra- abdominal adipose tissue (Bjorntorp, 1987). The suggestion for the use of proxy anthropometric indicators arose from a 12-year follow-up of middle-aged men, which showed that abdominal obesity (measured as waist–hip ratio) was associated with an increased risk of myocardial infarction, stroke and premature death, whereas these diseases were not associated with measures of generalized obesity such as BMI (Larsson et al., 1984). BMI was associated with increased risk of these diseases; however, waist–hip ratio appeared to be a stronger independent risk factor than BMI (Lapidus et al., 1984). The 2002 WHO Expert Consultation on Appropriate Body Mass Index for Asian Populations and Its Implications for Policy and Intervention Strategies (WHO, 2004) reviewed the issue of ethnic differences in the meaning of BMI cut-off values. In populations with a predisposition to central (i.e. abdominal or visceral) obesity and the related increased risk of developing metabolic syndrome, the consultation recommended that, where possible, waist circumference should be used to refine action levels based on BMI. For example, levels based on BMI might be increased by one level if the waist circumference were elevated above a specified level. The choice of the action level for waist circumference should be based on population-specific data and health considerations. An expert working group was formed by the 2002 consultation, to start examining data on the relation between waist circumference and morbidity, and on any association between BMI, waist circumference and health risk. The aim was to develop recommendations for using waist measurements to further define risks (WHO, 2004). Both generalized and abdominal obesity are associated with increased risk of morbidity and mortality. The main cause of obesity-related deaths is CVD, for which abdominal obesity is a predisposing factor (WHO, 2008). BMI has traditionally been the chosen indicator by which to measure body size and composition, and to diagnose underweight and overweight. However, alternative measures that reflect abdominal adiposity, such as waist circumference, waist–hip ratio and waist– height ratio, have been suggested as being superior to BMI in predicting CVD risk. This is based largely on the rationale that increased visceral adipose tissue is associated with a range of metabolic abnormalities, including decreased glucose tolerance, reduced insulin sensitivity and adverse lipid profiles, which are risk factors for type 2 diabetes and CVD (WHO,2008).

Materials and Methods

The present study was conducted on 14 male wrestlers of different weight categories and 19 male football players of Punjabi University Patiala and their age ranged from 12-20 years after obtaining their consent. The waist circumference was measured at the midpoint between the lower margin of the least palpable rib and the top of the iliac crest, using a stretch-resistant tape. The hip circumference was measured around the widest portion of the buttocks, with the tape parallel to the floor. For both measurements, the subject was stood with feet close together, arms at the side and body weight evenly distributed, and was worn little clothing. The subject was relaxed, and the measurements was taken at the end of a normal expiration (Westat inc, 1998).Each measurement was repeated twice; if the measurements were within 1 cm of one another, the average was calculated. If the difference between the two measurements exceeded 1 cm, the two measurements were repeated (Westat inc, 1998).

Results and Discussion

The mean age of wrestlers and football players was 16.07±2.36 year, and 13.84 ±1.57year. The mean height of wrestlers and football players was 168.28±10.68 cm and 154.31±12.51cm.The mean weight of wrestlers and football players was 71.57 ±16.47 kg, and 45.05 ±13.85kg. The mean hip circumference of wrestlers and football players was 37.00±4.15cm and 32.36±3.97cm.The mean waist circumference of wrestlers and football players was 31.50±3.67 cm and 26.89±4.22 cm. The mean WHR of wrestlers and football players 0.88±.12 and 0.82±.04.The mean body mass index of

wrestlers and football players was 25.01±3.70kg/m and 18.57±4.11 kg/m (Table 1). Further it was found that the mean waist circumference, WHR and BMI of wrestlers and football players were normal as per WHO Expert Consultation on Obesity (WHO 2000b) and NHLBI Obesity Education Initiative (NHLBI 2000).Changes in body weight and BMI are strongly related to changes in fat-free mass, and explain 54% of the variance in those changes (Forbes, 1999). While the associations between BMI and body fat are linear, the association with percent body fat is curvilinear, with the slope steeper at lower BMIs than at higher BMIs (Welch & Sowers, 2000).

Table 1. Mean± SD of Age, height, weight, hip circumference, waist circumference, WHR & BMI of Wrestlers & Football Players

	Group	N	Mean	Std. Deviation
Age (year)	Wrestlers	14	16.07	2.36
	Football Players	19	13.84	1.57
Height (cm)	Wrestlers	14	168.28	10.68
	Football Players	19	154.31	12.51
Weight (kg)	Wrestlers	14	71.57	16.47
	Football Players	19	45.05	13.85
Hip Circumference (cm)	Wrestlers	14	37.00	4.15
	Football Players	19	32.36	3.97
Waist Circumference (cm)	Wrestlers	14	31.50	3.67
	Football Players	19	26.89	4.22
WHR	Wrestlers	14	.88	.12
	Football Players	19	.82	.04
BMI (kg/m^2)	Wrestlers	14	25.01	3.70
	Football Players	19	18.57	4.11

Table 2 shows the correlation between age, height, weight, hip circumference, waist circumference, WHR (waist-to-hip ratio), and BMI (body mass index) of wrestler. Age of the wrestlers was statistical significant positively correlated with height (r = 0.59), weight (r = 0.57), hip circumference (r = 0.68) but negatively correlated with WHR (r = -0.55). Body height of wrestlers was statistical significant positively correlated with weight (r = 0.84), hip circumference (r = 0.75), waist circumference (r = 0.63) and BMI (r = 0.57). Body weight of wrestlers was statistical significant positively correlated with hip circumference (r = 0.931), waist circumference (r = 0.863) and BMI (r = 0.92). Hip circumference of wrestlers was statistical significant positively correlated with waist circumference (r = 0.75) and BMI (r = 0.89).Waist circumference of wrestlers was statistical significant positively correlated with BMI (r = 0.870). The result of the present study shows that BMI of wrestlers was statistical significant positively correlated with height, weight, hip

and waist circumference. The waist-to-hip ratio (WHR) of wrestlers was statistical significant negatively correlated with age.

Table 2. Correlation among Age, Height, Weight, hip circumference, waist circumference, WHR & BMI of Wrestlers

Variable(s)	Height	Weight	Hip Circumference	Waist Circumference	WHR	BMI
Age	.595*	.570*	.689**	.517	-.554*	.487
Height	-	.841**	.750**	.633*	-.373	.570*
Weight		-	.931**	.863**	-.348	.921**
Hip Circumference			-	.751**	-.447	.892**
Waist Circumference				-	-.069	.870**
WHR					-	-.266

**Correlation is significant at the 0.01 level ; * Correlation is significant at the 0.05 level

Table 3 shows the correlation between age, height, weight, hip circumference, waist circumference, WHR (Waist-to-Hip Ratio), and BMI (Body Mass Index) of football players. Age of the football players was statistical significant positively correlated with height (r = 0.75). Body height of the football players was statistical significant positively correlated with weight (r = 0.74) and hip circumference (r = 0.64). Body weight of the football players was statistical significant positively correlated with hip circumference (r = 0.95), waist circumference (r = 0.89), and BMI (r = 0.82). Hip circumference of the football players was statistical significant positively correlated with waist circumference (r = 0.93) and BMI (r = 0.88).

Table 3. Correlation among Age, Height, Weight, hip circumference, waist circumference, WHR & BMI of Football Players

Variable(s)	Height	Weight	Hip Circumference	Waist Circumference	WHR	BMI
Age	.756**	.452	.356	.181	-.256	.062
Height	-	.741**	.640**	.420	-.228	.263
Weight		-	.959**	.894**	.348	.829**
Hip Circumference			-	.935**	.367	.888**
Waist Circumference				-	.672**	.963**
WHR					-	.671**

**Correlation is significant at the 0.01 level ; * Correlation is significant at the 0.05 level

Waist circumference of the football players was statistical significant positively correlated with WHR (r = 0.67) and BMI (r = 0.96). Waist-to-hip ratio (WHR) of the football players was statistical significant positively correlated with BMI (r = 0.67).The result of the present study shows that BMI of football players was statistical significant positively correlated with weight, hip circumference, waist circumference and waist-to-hip ratio (WHR).The waist-to-hip ratio (WHR) of football players was statistical significant positively correlated with waist circumference.

Conclusion

It was concluded from the results of the present study that body mass index (BMI) of wrestlers and football players was statistical significant positively correlated with weight, hip circumference and waist circumference.

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Conflict of Interest: None declared