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Analysis of body composition among all India inter university male athletes

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Abstract

The purpose of the study is to compare body composition among All India Interuniversity Male Athletes. The present was conducted on 180 male university athletes which constitutes Sprinters (n = 36), Middle distance runners (n = 36), Long distance runners (n = 36), Jumpers (n = 36) and Throwers (n = 36). These players were selected from 77th All India Inter University Athletic organised by Anna University, Chennai at Coimbatore (Tamil Nadu) in January 2017. The study was conducted only on male throwers of age between 18 to 25 years. The result of the study showed that percent body fat (PBF), fat mass (FM) and fat free mass (FFM) of elite male athletes differ significantly. Throwers displayed greater PBF, FM and FFM than others. It is concluded that throwers showed greater level of body composition than sprinters, middle distance runners, long distance runners, and jumpers.

Keywords: Percent body fat, fat mass, fat free mass

Introduction

The history of human body composition begins circa 400 BC with Hippocrates, who theorized health as the balance of the four body fluids, and expands into the early Greek concept that the components of the immediate environment (earth, water, fire, and air) are the basic constituents of the human body. Body composition generally affects cardio respiratory performance and function. The model body composition demonstrated that maximal oxygen consumption was highly dependent on the fat free mass of a diverse group of men whose usual physical activity ranged from sedentary to trained endurance athletes [1, 2]. Fat-free mass is beneficial in physical activities that require development and application of force [3]. Generalizations regarding fat-free mass and performance should be tempered with awareness of the needs for muscle mass in sport-specific functions. Activities that require strength and power (e.g., throwing and pushing) and include body movement should optimize muscle mass and, hence, fat-free mass [4, 5]. Therefore, the purpose of the study is to compare body composition among All India Interuniversity Male Athletes.

Methods

Subjects

The present was conducted on 180 male university athletes which constitutes Sprinters (n = 36), Middle distance runners (n = 36), Long distance runners (n = 36), Jumpers (n = 36) and Throwers (n = 36). These players were selected from 77th All India Inter University Athletic organised by Anna University, Chennai at Coimbatore (Tamil Nadu) in January 2017. The study was conducted only on male throwers of age between 18 to 25 years.

Variables

Height

To measure the stature of the subject's stadiometer was used. The subjects were asked to stand erect on the platform of the stadiometer without shoes, by keeping the heels together, back and head touching the scale and the face looking straight. The height was recorded to the nearest centimetre.

Body mass

To measure the body mass of the players weighing machine was used. The subjects were

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instructed to stand on weighing machine with minimum cloth. The weighing machine used to measure body mass was placed in an area, which was smooth and even surface and with sufficient light, so that, the investigator is capable of properly recording the observation. The zero point of the weighing machine was checked often during the measurements. The weight of the subjects was recorded to the nearest kilogram.

Percent body fat, fat mass & lean body mass

Measuring percentage of body fat by taking the ‘skinfold’ thickness at selected points on the body with a skinfold 651calliper. The skinfold measurement was taken from three to nine anatomical sites, that too only on the right side of the body. In this study, four sites (abdominal, triceps, thigh and suprailiac) as proposed by Jackson and Pollock (1985) was considered. The tester pinched the skin at the appropriate site to raise a double layer of skin and the underlying adipose tissue, but not the muscle. The calliper was then applied 1 cm below and at right angles to the pinch, and a reading in millimetres (mm) taken two seconds later. The mean of two measurements was taken. Whenever the two measurements differed greatly, a third was done, and then the median value was taken.

Abdominal: A mark was made 5 cm adjacent to the umbilicus (belly – button), to the right side. Then a vertical pinch was made at the marked site, and the 651calliper placed just below the pinch.

Triceps: A mark was made at the mid-upper arm, midline of the posterior aspect of the arm over the triceps muscle, measured with the elbow bent at 90°, used for identifying the biceps and triceps SFT. During the measurement, the arm was

hang down freely by the side, palms inwards towards the thighs.

Thigh: The mid-point of the anterior surface of the thigh, midway between patella and inguinal fold was marked. After making anterior thigh landmarks, a vertical pinch was taken. This measurement was taken with the subject in sitting position and the knee bent at right angles.

Suprailiac: It was marked a centimetre above the anterior superior iliac spine in the mid-axillary line. The measurement was done horizontally when the subject breathed gently.

Formula to Calculate

Percentage of body fat was calculated using the following equation of Jackson and Pollock (1985):

$$\text{Percent body fat} = \{ (0.29288 \times \text{sum of skinfolds}) - (0.0005 \times \text{square of the sum of skinfolds}) + (0.15845 \times \text{age}) - 5.76377 \}$$

$$\text{Fat mass} = \text{Body mass (kg)} \times (\text{Percent body fat}/100)$$

$$\text{Fat Free mass} = \text{Body mass} - \text{Fat weight}$$

Statistical Techniques

Statistical analyses were performed using SPSS version 16.0 for windows (SPSS Inc, Chicago, IL, USA). The data was presented as descriptive statistics such as mean, standard deviation. One Way Analysis of Variance (ANOVA) was employed to compare body composition between the athletes. Where ‘F’ values were found significant, Scheffe S Post-hoc test was applied to find out the direction and degree of difference. The level of significance was set at 0.05.

Result

Body composition

The data on body composition of the athletes was analysed and the results thus obtained was tabulated and given in Table 1.

Table 1: Means and standard deviations on height among athletes

Variable	S	MD	LD	J	T	F
	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD	
PBF (%)	8.37±0.98	8.55±0.85	7.77±0.89	7.63±0.83	12.59±0.88	189.27 (p = 0.000)
FM (kg)	6.10±0.78	5.99±0.62	4.91±0.59	5.41±0.60	10.35±0.80	356.3 (p = 0.000)
FFM (kg)	66.64±1.18	64.03±1.24	58.28±1.87	65.52±1.48	71.87±2.88	248.0 (p = 0.000)

The results show that PBF, FM and FFM of elite male athletes differ significantly. Throwers displayed greater PBF, FM and

FFM than others. Since F is significant Scheffe S Post hoc test applied and presented in Table 2.

Table 2: Scheffe S post hoc test on Body Composition

Variable	Team	Teams to be compared	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
PBF	S	MD	.946	-.8382	.4760
		LD	.089	-.0524	1.2619
		J	.017*	.0859	1.4002
		T	.000*	-4.8730	-3.5587
	MD	LD	.009*	.1287	1.4430
		J	.001*	.2670	1.5813
		T	.000*	-4.6919	-3.3776
		J	.980	-.5188	.7955
FM	LD	T	.000*	-5.4777	-4.1634
		J	.000*	-5.6160	-4.3018
		S	.981	-.4016	.6133
		LD	.000*	.6814	1.6963
	MD	J	.002*	.1781	1.1930
		T	.000*	-4.7580	-3.7431
		J	.000*	.5756	1.5905
		J	.015*	.0723	1.0872
LD	T	.000*	-4.8638	-3.8489	
	J	.053	-1.0108	.0041	

		T	.000*	-5.9469	-4.9320
	J	T	.000*	-5.4436	-4.4287
FFM	S	MD	.000*	1.2475	3.9852
		LD	.000*	6.9978	9.7355
		J	.171	-.2489	2.4889
		T	.000*	-6.5905	-3.8528
	MD	LD	.000*	4.3814	7.1191
		J	.024*	-2.8652	-.1275
		T	.000*	-9.2069	-6.4692
	LD	J	.000*	-8.6155	-5.8778
		T	.000*	-14.9572	-12.2195
	J	T	.000*	-7.7105	-4.9728

*Significant

Discussion

The results of the present study show that the throwers had greater proportionate on body composition than others. Body composition is having a definite relationship with performance in different groups has come to the surface. Low level of fat percentage and greater lean body mass would achieve better performance since more the lean body mass the greater will be the energy output and strength production. Power-to-weight ratio is an important determinant of performance therefore maximizing muscle mass and maintaining low body fat levels is desirable for achieving high performance. The high percentage body fat might be detrimental for performance in sports as the additional body fat adds to the weight of the body without contributing to its force production or energy producing capabilities ^[6].

Conclusion

It is concluded that throwers showed greater level of body composition than sprinters, middle distance runners, long distance runners, and jumpers.

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