

## **Relationship of body composition with the throwing skill among the male softball players**

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### **Abstract**

The purpose of this study was to determine relationship of body composition components with the throwing skill among softball players. Total 45 male softball players from the various colleges affiliated to Guru Nanak Dev University, Amritsar were selected to participate in the study. The subjects were assessed for height, weight and skinfold thicknesses. Height of the subjects was measured by using the standard anthropometric rod (HG-72, Nexgen ergonomics, Canada). Body weight of the subjects was measured with the help of portable weighing machine. Skinfold thicknesses of the body parts were measured with the Harpenden skinfold caliper. Throwing skill of the softball players was assessed by AAHPERD softball skill test battery. The statistical analysis revealed that the height, weight, BMI, skinfold thicknesses and various components of body composition did not show significant relationship with the throwing skill among the softball players.

**Keywords:** percent body fat, softball, throwing, performance, lean body mass

### **Introduction**

Physique essentially encompasses the study of body structure, body size and body composition, fitness and performances are descriptive of the applied interaction of morphological, muscular, cardiovascular, motor and metabolic component capacities, abilities, and skills that are developed and acquired through exercise and physical fitness training. The appropriate sizes, shape, build and composition of the athlete's body is of major importance to success in almost all athletic endeavors [1]. In the last 20 years, much progress has been made in the estimation of body composition, allowing one to determine with accuracy with the proportion of body composition. Body composition is the relative percentage of muscles, fat, bone, and other tissues of the body [2]. Body composition is considered a component of health related fitness but can also be considered a component of metabolic fitness. According to Thomas Battinelli; body composition is the determination and analysis of the fat and lean components of the body. So, the body composition generally divided into fat body weight and fat free body weight. Fat free body weight also known as the lean body mass, and the fat mass is the total amount of essential and storage fat in the body [3]. Interest in the study of human body composition spans at least a hundred years. The importance of body composition research as a distinct science is evident during at least two main periods during this century. Body composition studies have found a high, negative relationship between performance in various activities and the body fat [1]. Higher the percentage of body fat, the poorer the performance of the individual. This was true of all activities in which the body weight had to be moved either vertically or horizontally through space. Many athletes are under the impression that they must be big to be good in their sport. Size has been associated with the quality of the athlete's performance; the bigger the athlete, the better the performance. It is now recognized that this is true only if the

size increases is due to an increase in the lean tissue. Physical characteristics and body composition have been known to be fundamental to excellence in athletic performance [4]. Specific athletic events require different body types and weights for maximal performance [5]. Body composition also makes an important contribution to an individual's level of physical fitness for performance, particularly in such sports that require one to carry one's body weight over a distance, which is facilitated by a large proportion of active tissue (muscle) in relation to a small proportion of fat tissue [6].

In softball, anthropometric characteristics, body composition, physical performance and skills of an individual player are the most important factors that contribute to the competitive success of a whole team. Apart from the considerations of body size, the constitutional make up of body composition components are also important. Body composition is an important aspect of fitness [7] and can be used to predict the performance of the softball players. The present study, therefore, aims to study the relationship of body composition and performance parameters of the college level male softball players.

### **Methodology**

For the present study, 45 male softball players were purposively selected from the various colleges affiliated to Guru Nanak Dev University, Amritsar. The players were from Layalpur Khalsa College Jalandhar, Khalsa College, Amritsar and DAV College Amritsar. The players who represented their respective college in the inter-college competition were selected for this study. Height of the subjects was measured by using the standard anthropometric rod (HG-72, Nexgen ergonomics, Canada) to the nearest 0.5 cm. Body weight of the subjects was measured with the help of portable weighing machine to the nearest 0.5 kg. Skinfold thicknesses of the body parts were measured with the Harpenden skinfold caliper.

**Body Mass Index**

Body mass index (BMI) was calculated by the following form

$$\text{BMI (Kg/m}^2\text{)} = (\text{Body mass in Kg}) / (\text{Stature in meters})^2 \text{ [8]}$$

**Body Composition**

Percentage body fat as estimated from the sum of skin folds was calculated using equations of Siri [9] and Durnin and womersley [10]. The regression equations for the prediction of body density from the log of the sum of skin fold thickness at four sites in mm are as follows

For 17 to 19 years age group:

$$\text{Body Density (gm/cc)} = 1.1620 - 0.0630 (X) \text{ [10]}$$

For 20 to 29 years age group:

$$\text{Body Density (gm/cc)} = 1.1631 - 0.0632 (X) \text{ [10]}$$

Where X = log (biceps+ triceps+ sub scapular+ supra iliac).

% Body Fat = [4.95/ body density- 4.5] \* 100

**Throwing Test**

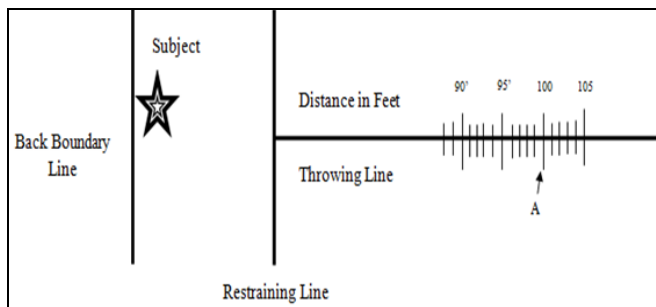
Throwing skill of the players was assessed as given in the AAHPERD softball skill test battery edited by Dr. Roberta Rikli [11]. This test assesses the skill in the overhand ball throw by measuring distance and placement of ball. In addition to logical validity claim, concurrent validity has been reported by finding the correlation coefficient between the test scores and judges' ratings. This validity correlation coefficient ranged from 0.64 to 0.94. The test retest reliability coefficient from intra class reputed scores ranged from 0.90 to 0.97 among both male and female students from grade 5 to college level. A perpendicular line is marked from a restraining line as shown in fig. 1. A scale of one foot is also marked as shown.

**Test Administration**

All the subjects are required to warm up with short throws. The tester gives a demonstration to a group of examinees and explains the general instructions regarding test procedure and scoring. Then the test is performed individually, usually by allotting serial numbers to the examinees. The first subject after proper warming up is asked to take position just in front of the back boundary line (fig. 1) after getting ready; the subject is required to throw the ball as far and as straight as possible, along the throwing line. The ball is to be released after taking few steps and must be released before the restraining line. Each subject may avail two trials

**Scoring**

The better of the two trials is considered for final score. Each ball is scored by subtracting the deviation score from the scaled perpendicular distance on the throwing line. e.g. if the ball lands at a point shown as in fig. 1. The perpendicular distance is measured from throwing line to point A say it comes 4', 8" then of rounded of 5' feet is subtracted from the corresponding distance on the throwing line say from 99' in the present case. The score for this ball thrown will be 99' - 5' = 94 feet.



**Fig 1:** Field Marking for Throwing Test of Softball Skill.

**Statistical Analysis**

The data was presented as descriptive statistics such as mean, standard deviation etc. Karl Pearson's product moment coefficient of correlation was computed to assess the relationship between anthropometric variables, physical fitness parameters and playing ability among the softball players.

**Results**

**Table 1:** Descriptive data of the height, weight and body mass index of the college level softball players.

Variables	N	Mean	SD	SEM	Minimum	Maximum
Height(cm)	45	170.49	5.12	0.76	160.00	181.00
Weight(kg)	45	68.89	4.05	0.60	59.00	76.00
Body mass index(kg/m <sup>2</sup> )	45	23.72	1.46	...	20.41	26.02

SD: Standard Deviation, SEM: Standard Error of Mean

The study collected the data on 45 male college level softball players. The descriptive data of the height, weight and body mass index of the college level softball players are presented in table 1. The mean height of the players was 170.49 cm with 5.12 of standard deviation. The mean weight of the players was 68.88 kg with 4.05 of standard deviation. The mean body mass index (BMI) of the players was 23.72 and 1.46 standard deviation.

**Table 2:** Descriptive data of the skinfold thickness of the body parts of the college level softball player

Variables	N	Mean	SD	SEM	Minimum	Maximum
Biceps(mm)	45	7.64	3.25	0.48	3.00	16.00
Triceps(mm)	45	13.04	4.02	0.59	6.00	21.00
Subscapular(mm)	45	19.02	6.61	0.98	9.00	34.00
Supra-iliac(mm)	45	12.71	5.10	0.76	5.00	26.00

SD: Standard Deviation, SEM: Standard Error of Mean.

The descriptive data of the skinfold thickness of the body parts of the college level softball players is depicted table 2. The mean biceps skinfold of the players was 7.64 mm with standard deviation of 3.25. The mean triceps skinfold of the players was 13.04 mm, whereas, the standard deviation of triceps skinfold was 4.02. The average subscapular skinfold of the players was 19.02 mm with 6.61 mm of standard deviation. The mean and standard deviation for supra-iliac were 12.71 and 5.10 respectively.

**Table 3:** Descriptive data of the percent body fat, total body fat and lean body mass of the college level softball players.

Variables	N	Mean	SD	SEM	Minimum	Maximum
Percent Body fat (%)	45	19.13	4.185	0.623	11.83	26.19
Total Body fat(kg)	45	13.2530	3.281	0.489	7.57	19.38
Lean body mass(kg)	45	55.6359	3.38	0.50	49.38	66.37

SD: Standard Deviation, SEM: Standard Error of Mean.

The descriptive data of the Body composition of the college level softball players is depicted table 4. The mean percent body fat of the players was 19.13 with standard deviation of 4.18. The mean total body fat of the players was 13.25 and the standard deviation was 3.28. The average lean body mass of the players was 55.63 with 3.38 of standard deviation.

**Table 4:** Descriptive statistics for scores on the throwing skill of the college level softball players.

Variables	N	Mean	SD	SEM	Minimum	Maximum
Throwing(m)	45	128.89	11.99284	1.78779	112.00	156.00

SD: Standard Deviation, SEM: Standard Error of Mean.

The descriptive statistics for score on the throwing skill of the college level softball players is presented in table 5. The softball players had the mean score for softball throwing test 128.89 and standard deviation 11.99.

**Relationship of body composition components with softball throwing test**

**Table 5:** Correlations of height, weight and body mass index with the softball throwing test of the softball players.

Variables	N	Coefficient of correlation (r)	p-value
Height (cm)	45	0.194	0.203
Weight (kg)	45	0.037	0.809
Body Mass Index (kg/m <sup>2</sup> )	45	0.004	0.978

Table: 5 presents the correlation coefficient between the softball throwing test and weight, height and body mass index of the college level softball players. No significant correlations were found between softball throwing test and height, weight and body mass index.

**Table 6:** Correlations between skinfold thicknesses of the body parts and the softball throwing test of the softball players.

Variables	N	Coefficient of correlation (r)	p-value
Biceps (mm)	45	-0.100	0.513
Triceps (mm)	45	-0.021	0.893
Subscapular (mm)	45	-0.143	0.348
Supra-iliac (mm)	45	-0.140	0.360

The correlation coefficient between the softball throwing test and the skinfold thicknesses of the body parts are depicted in table 7. There were no significant relationship between the softball throwing test and biceps, triceps, subscapular and supra-iliac skinfolds among college level softball players.

**Table 7:** Correlations of percent body fat, total body fat and lean body mass with the softball Throwing test of the softball players.

Variables	N	Coefficient of correlation (r)	p-value
Percent Body fat (%)	45	-0.081	0.595
Total Body fat (kg)	45	-0.070	0.649
Lean body mass (kg)	45	0.112	0.463

The correlation coefficient between the softball throwing test and percent body fat, total body fat and lean body mass of the college level softball players are presented in table 8. No significant correlations were found between softball throwing test and percent body fat, total body fat and lean body mass among college level softball players.

**Discussion**

Body composition refers to the characterization of body weight in terms of absolute and relative amounts of fat mass and fat-free mass. Measurement and evaluation of these characteristics is a vital aspect of health, nutritional status and physical fitness assessment [12, 13]. Body composition is an important aspect of fitness [7] and can be predicted from anthropometric measures [14]. Body composition of athletes is an important tool to evaluate the health of the athlete, monitor the effects of a training program, and to determine optimal competitive body weight and body composition [15]. In the present study, the association of body composition components with the throwing skill was assessed among the college level male softball players. The skinfold thicknesses and percent body fat did not demonstrate a significant association with throwing skill among male softball players. The high amount of fat mass and lack of muscle mass among the players may have a negative effect on the performance as it reduces the force production capacity. Many studies showed that the lean body mass have significant association to success in sport [1, 4, 16]. In softball, large amount of strength is required to throw the ball for longer distance and strength is produced by the forceful contraction of muscles in the body. The greater muscular make-up of the players would be advantageous in throwing the ball for longer distance [17].

**Conclusion**

In conclusion, it is established that the skinfold thicknesses and the body composition components did not show any significant association with the throwing skill among the college level male softball players.

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