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Body Composition and Physiological Relationship of Basketball Players

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Abstract

The scientific study of human size, shape, proportion, composition, maturation and gross function in order to understand human growth, exercise, performance and nutrition. Body composition analysis is an integral part of it. In the present study randomly selected 60 Basketball male players aged 18-25 years were considered from Amravati City and Nagpur City. The Basketball players were farther divided into two categories viz., 30 trained and 30 untrained. Maximal oxygen consumption (VO2 max), biceps, triceps, subscapular, suprailiac and medial calf skinfold were recorded. Skinfold measurement were used to estimate body composition components i.e. % body fat, fat mass, fat free mass and lean body mass. Statistical analysis were performed using student's t' test and Pearson correlation coefficient.

The trained Basketball players have significantly higher VO2max than untrained Basketball players while no significant differences were noted in body composition components, i.e. body fat %, fat mass, and fat free mass and lean body mass between these groups. No significant association between body composition components and V02 max was seen in both groups. Keywords: V02Max, body composition, Basketball players.

Introduction

Research has indicated that appropriate sports specific levels of relative fat and fat-free weights are beneficial to performance in most sports. Basketball players carry out all sorts of explosive actions such as intermittent sprinting in game, running between the fast break. To perform at the highest level, players need a well developed interval endurance capacity. This is the ability to perform high intensity activities such as running and sprinting, as well as the ability to recover well during low intensity activities such as walking and jogging. Great anaerobic capacity is needed during the many brief bursts of high energy released, it is the aerobic capacity that is needed for efficient recovery during the short rest periods. So, interval endurance capacity is related to both aerobic and anaerobic capacity. Various factors affect the development of aerobic and anaerobic capacity and therefore interval endurance capacity are multidimensional. Anthropometric characteristics such as body height, lean body mass and percentage body fat influence the physiological aspects of a sports performance such as interval endurance capacity. A gain in lean body mass is related to an increase in muscle mass and therefore positively influences endurance, in contrast with a gain in body fat, which negatively influences endurance. A very few studies have reported the relation between body fat or sum of skinfolds and interval endurance capacity in Basketball players. In the present study, attempt has been made to investigate the body composition and VO2 max in basketball players of Amravati City and Nagpur City.

Methods

For this study, 60 randomly selected Basketball male players from Amravati city and Nagpur City, Aged 18-25 years were considered. They were divided into 2 groups, viz. trained Basketball players (30), those who used to undergo sprint-type interval training for 3 times/week with rest interval ratio of 1:1.5 for at least 3 month duration, as told by the coach and untrained Basketball players (30), those who don't under go any specific training. All participants were selected from intercollegiate levels. The players completed the multi stage fitness test on basketball ground. Body composition measurements were taken and the players filled in questionnaires about training sessions.

Skinfold thickness was measured, by the same experienced investigator, at the biceps, triceps, subscapular, suprailiac and medial calf. Skinfold fat data were obtained using lange skinfold calipers and recorded to the nearest 0.2 mm. The upscale pressure of the caliper was checked according to the manufactures specification by Beta calibration check block for lange skinfold caliper and was constant at l0g/mm. Measurements were taken, on the right side, and the mean of three measurements was used for the analyses. The use of the mean of three measurements and median did not affect the findings. The technical error of measurements, inter observer and intra observer was less than 5% for skinfold. The skinfold measurements were recorded on the fourth second after application of the caliper as this has been shown to improve the reliability of measurement. Relative adiposity were calculated from the sum of four skinfolds: biceps, triceps, subscapular suprailiac.

Training

Outcome variables of the questionnaire were ground Basketball training (hours/day) and additional training /conditioning (hours/ week). Time spent in basketball training, on average live hours a day and time spent in physical conditioning, on average 2 hours a week, were noted.

Data Analysis

Statistical analysis was performed with the Microsoft excel. Data are expressed as means (SD). Changes in endurance capacity and body composition components between trained and untrained Basketball players were assessed using the unrelated student “t”' test. To assess the relation between endurance capacity and body composition components (% body fat, fat mass, fat free mass, % lean body mass) within trained and untrained group was conducted through a Pearson correlation coefficient

Result

Table 1
Comparison of mean of VO2 Max and body composition components between trained and untrained Basketball players.

Variables	Trained Basketball Players (N-15)			Untrained Basketball Players (N-15)			
	Mean	SD	SE	Mean	SD	SE	t value
VO_2Max	55.29	8.21	12.77	38.44	4.03	11.0	2.16*
Body Fat %	16.0	3.75	4.73	16.54	4.05	7.22	0.71
Fat Mass	9.67	3.43	2.70	10.0	3.78	5.27	0.30
Fat Free Mass	49.70	8.71	12.65	48.64	6.11	14.24	0.70
Lean Body Mass %	83.71	6.0	22.0	83.46	4.05	19.51	0.24

*=Significant

Table 1 shows the comparison of mean values of VO2 max and body composition components between trained and untrained Basketball players. Trained Basketball players have higher mean value in VO2 max (55.29 mi/kg/min), fat free mass (49.70 kg) and in percent lean body mass (83.71%) than untrained Basketball players (38.44 ml/kg/min, 48.64kg and 83.46% respectively). On the other hand untrained Basketball players have higher mean values for percent body fat (16.54%) and fat mass (10.0 kg) than trained Basketball players (16.0% and 9.67 kg respectively). However statistically significant difference were noted only in VO2 max (t=2.16)

Table 2
Correlation of V02Max and body composition components of Amravati city and Nagpur city Basketball players

Variables	Amravati City		Nagpur City	
	Trained (N-15)	Untrained (N-15)	Trained (N-15)	Untrained (N-15)
Body Fat %	0.26	0.25	0.012	0.03
Fat Mass	0.31	0.26	0.004	0.04
Fat Free Mass	0.35	0.002	0.004	0.11
Lean Body Mass%	0.08	0.25	0.02	0.03

Table 2 gives correlation of VO2 max and body composition components of Amravati city and Nagpur city Basketball players. In trained Basketball players of Amravati city negative correlations were found in VO2 Max and all 4 body composition components whereas in untrained Basketball players of this state negative correlation were found with percent body fat and fat mass while positive with fat free mass and percent lean body mass. In trained Basketball players of Nagpur city negative correlation were found in fat Free Mass and percent

lean body mass, and positive is noted in percent body fat and fat mass where as in untrained of this state negative correlation were noted only in percent body fat. However all these correlations were found statistically non significant.

Table 3

Correlation of V02 Max and body composition components of Basketball players.

Variables	Trained (N-30)	Untrained (N-30)
Body Fat %	0.0715	0.101
Fat Mass	0.060	0.0012
Fat Free Mass	0.03	0.21
Lean Body Mass %	0.04	0.101

Table 3 gives correlation of VO2 max and body composition of trained and untrained Basketball players. In trained Basketball players, positive correlations were found in VO2 Max and body fat percent, fat mass, fat free mass while negative correlations were found in lean body mass percent. In untrained Basketball players, negative correlation were found in VO2 Max and body fat percent, fat mass while negative were found in fat free mass and lean body mass percent. However all these correlations were found statistically no significant.

Discussion

In a review of seasonal variation in fitness variables in competitive athletes, reported that about 50% of studies suggested a lack of changes in subcutaneous fat during different seasons of training and competition in different sports. The possibility that the competitors involved reach optimal body fat levels of given genetic types may be a reason for this lack of seasonal changes and the low initial body fat levels, may be another reason for the lack of change during a season of high physical activity. Significant body fat improvements may therefore be possible in certain competitors only if the initial fitness levels are relatively low, given that the response to training dosage is dependent on baseline fitness comprises of both endurance capacity and subcutaneous fat.

Present study (Table 1) states no significant differences between mean values of body fat % (16.0%), fat mass (9.67 kg), fat free mass (49.70), fat mass (9.67), percent lean body mass (83.71%) in trained and untrained Basketball players 16.54%, 10.0kg, 48.64kg, 83.46% respectively, which coincides with the above study. So, significant body fat improvements may therefore be possible in certain players only if initial body composition levels are relatively high, given that the response, to training dosage is dependent on baseline fitness / body composition. Increasing duration from 60 minute and frequency above 3 days / week may not prove profitable for improving physiologic function instead of representing considerable caloric expenditure. Interval training can provide sufficient cardio ¬respiratory overload and training immediate, short or long-term energy system.

In the present study (table 1) shows significant ($p<0.05$) rise in VO2 Max of trained Basketball players of both Amravati city and Nagpur city. (1995) found that plasma glucose and free fatty acid availability increased from 30-120 minutes on 65% VO2 maximum condition. This suggests that less than or up to 30 minute, 65% VO2 Max exercise does not sufficiently alter free fatty acid availability, while significantly provide cardio vascular overload by means of increasing cardiac output and stroke volume, hypertrophy of left ventricle, increasing capillarization etc. All these changes cause improvement in VO2 Max in trained athletes.

In this study (table 2) no significant correlation was found between VO2 Max and percent body fat, fat mass, fat free mass and lean body mass percent. Early studies on heterogeneous population of subjects found that measurement of physical performance were negatively related to the amount of body fat and positively related to amount of fat free weight. Legaz et at (2005) confirmed in their study that it was the decrease in lower limb skinfold, i.e. calf skinfold and thigh skinfold with running performance but not the sum of six skinfolds.

Conclusion

On the basis of these finding, it may be concluded that there is no significant relationship between body composition components i.e. body fat, lean body mass %, fat mass and fat free mass with VO2 Max among Basketball players. Sprint type interval training increases the VO2 Max significantly while decreases body composition components only in players having fat above baseline value i.e. (10-15) % for lean and (15-18)% for normal players.
In order to increase aerobic capacity during pre-¬season training among Basketball players, it may not necessary to include fat reduction program and restrict fat content in diet.

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