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Comparative study of Anthropometric measurements and body Composition between individual and team game of Punjab University Chandigarh

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Abstract

The purpose of the study was to compare the Anthropometric measurements and Body Composition between Individual and Team Game of Punjab University, Chandigarh. The subjects for this study were thirty male students, each from football and Track and Field Intervarsity teams of Punjab University, Chandigarh. They were selected with the view of obtaining scores on selected Anthropometric measurements and Body Composition. The age of the subjects ranged between 18 to 25 years. The variables selected for the study under Anthropometric measurements were Standing Height, Sitting Height, Total Arm Length, Total Leg Length, Upper Arm Girth, Hand Girth, Thigh Girth, Calf Girth and Chest Girth while under Body Composition the variables under taken were body Weight, Percentage of Body Fat and Lean Body Mass. To determine the significant difference between the mean scores of subjects belonging to football and Track and Field on Anthropometric measurements and Body Composition variables, the 't' ratio was employed. The level of significance chosen was 0.05. The results of the present study indicate that football and Track and Field Athletes did not differ much on selected Anthropometric measurements and Body Composition, however a significant difference in Total Leg Length, Total Arm Length and Standing Height was obtained.

Keywords: Anthropometric measurements and Body Composition.

Introduction

A successful sport engagement demands continuous training from an early age. Apart from training sessions, in order to succeed in contemporary sport it is essential for an athlete to possess certain genetically conditioned abilities and features. To meet the demands of state-of-the-art football continual guided selections are necessary from early on all the way to the national team selection. Body composition, anthropometric dimensions, and morphological characteristics play a vital role in determining the success of an athlete.

Contemporary football presupposes the existence of a certain body structure, of strong enduring football players marked by great football intelligence, controlled aggressiveness, and highly developed functional and motor abilities, with a sense for improvisation and a collective game. The analyses up to date that have researched anthropometric dimensions point to the fact that contemporary football is dominated by football players of above-average height compared to the selection pool population, and their build tends to be athletic. The relation between height and body mass is equally important due to the fact that modern football implies duel play, jump head play, fast activities (alternating offense and defense), all of which are linked to efficient realization and the obligatory playing time during the entire match.

In contemporary football, there are fewer football players of lower body height. In case they belong to this category, they must have other qualities to ensure achieving the same results as taller players (Joksimovic *et al.*, 2009). Research findings of a study showed that the athletes' somatotype and anthropometric characteristics are related to the type of each sport. In addition, there is a relationship between high athletic performance and physical characteristics, like height, low percentage of body fat and high muscle mass (Hatzimanouil, 2005). Anthropometry is the branch of anthropology that is concerned with the measurement of human body.

The definition has confined to the kind of measurements commonly used in associating physical performance with body build. Anthropometry involves the measurement of external part of the body, including body diameters, body circumferences somatotypes. Specific anthropometric characteristics are needed to be successful in certain sporting events. It is also important to note that there are some differences in body structure and composition of sports persons involved in individuals and team sports.

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Successful participation in these sports requires from each player a high level of technical and tactical skills and suitable anthropometric characteristics. All ball games require comprehensive abilities including physical, technical, mental and tactical abilities. Among them, physical abilities of players are more important as these have marked effects on the skill of players and the tactic of the teams because ball games require repeated maximum exertion such as dashing and jumping (Tsunawake, 2013). Such physical abilities are important for volleyball, handball and basketball players to achieve higher levels of performance. To evaluate these physical abilities, the anthropometric measurements, parameters of body composition such as the percent body fat (% Fat) fat free mass (FFM) and somatotype components are often used. Studies on the physical characteristics of the human body to date indicate that the morphological characteristics of athletes successful in a specific sport differ in somatic characteristics from the general population. Basketball and volleyball require handling the ball above the head; therefore, having a greater height is an advantage in these sports (Kansas *et al.* 1986). Higher body mass however, is a hurdle for handball and volleyball players in achieving good jumping height (Bandyopadhyay, 2007).

The tasks in some events, such as shot put or high jump, are quite specific and different from each other and so are the successful physiques. This process whereby the physical demands of a sports lead to selection of body types best suited to that sports is known as "morphological optimization" (Bloomfield *et al.*, 1995) [2] Body Composition is concerned in part with the obesity of the individual. In measuring this aspect of body composition, the total body weight is divided into two components: Lean Body Weight and Fat Body Weight. Lean Body Weight include muscle, bone and vital organs. They underlying assumption is that total Body Weight equals Lean Body Weight plus Fat Body Weight. The higher percentage of Fat Body Weight in relation to Lean Body Weight, the higher the degree of Obesity (Verducci, 1980). In athletes, body composition measures are widely used to prescribe desirable body weights, to optimize competitive performance, and to assess the effects of training (Sinning, 1996) [7]. It is generally accepted that a lower relative body fat is desirable for successful competition in most of the sports. This is because additional body fat adds to the weight of the body without contributing to its force production or energy producing capabilities, which means a decrease in relative strength.

It is obvious that an increased fat weight will be detrimental in sporting activities where the body is moved against gravity (e.g. high jump, pole vault, volleyball spiking action) or propelled horizontally (e.g. running). Physical characteristics and body composition have been known to be fundamental to excellence in athletic performance (Mathur & Salokun, 1985) [4]. Specific athletic events require different body types and weights for maximal performance (American Dietetic Association, 1987). Today it has been widely accepted by the experts that top performance in sports is achieved if an athlete possesses the basic anthropometric characteristics suitable for the event.

There are numerous factors which are responsible for the performance of a sportsman. The physique and body composition, including the size shape and form are known to play a significant role in this regard. At present, sportsman for superior performance in any sports is selected on the basis of physical structure and body size. Structural measurement include anthropometric measurements which consist of

objective measurement of structures such as height, weight, width, depth and the circumference of the various part of body. Therefore, the athletes in a particular sport must possess such typical characteristics which are of advantage to their performance.

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.

Review of related literature

Canhadas *et al.* (2006) investigated to determine anthropometric and physical fitness characteristics of Brazilian boy children and adolescents at the beginning of soccer training. Results showed, the boys' height increased significantly with age as expected, whereas a significant difference in body weight was only observed between 13-year-old boys and the other age groups ($p \leq 0.001$). The BMI of 13-year-old boys was significantly higher than that of 11-year-old boys ($p = 0.003$). No significant difference in skin fold thickness was observed between age groups, except for sub scapular skin fold thickness which was significantly lower in 11-year old boys compared to 10- and 13-year-old boys ($p = 0.047$). ANOVA also revealed an increase in bone diameter with age, but statistically significant differences ($p \leq 0.001$) were only observed for 12-year-old boys (bistyloid and humeral biepicondylar diameters) and 13-year-old boys (bistyloid and femoral biepicondylar diameters). Girth measurements increased with age, but statistically significant differences were only observed for 12-year-old boys (forearm and relaxed arm girths) and 13-year-old boys (flexed arm, leg and thigh girths). Adiposity, evaluated based on the sum of TR and SS skin folds, sum of 11 skin folds (11SF) and %fat, did not differ significantly between the age groups studied. Lean body mass was significantly higher in 13-year-old boys when compared to the other participants ($p \leq 0.001$). Arm muscularity increased with age: 10 years = 11 years = 12 years < 13 years ($p \leq 0.001$). Thirteen-year-old boys were also significantly stronger than 10- and 11-year-old boys in the elbow flexion exercise. No difference in back or hamstring flexibility was observed between groups. Lower limb power was greater in 12- and 13-year-old boys compared to 10- and 11-year-old boys ($p \leq 0.001$). The results of the agility test indicated a significant increase in agility with age ($p \leq 0.001$). Finally, V. O₂max increased significantly with age ($p < 0.001$): 10 years < 11 years < 12 years < 13 years. No significant differences in the different strength/lean body mass ratios were observed between age groups.

Nikolaidis and Karydis (2011) There were also indications of the importance of body composition for soccer performance in younger age. Child and adolescent players, aged 9-14.9 years had a significantly lower BF than reference population. Starter's players, aged 10-14 years, were leaner than substitutes. Variation of body composition according to playing position was reported in players with 14-21 years of age, and in players with 16-18 years of age, in which defenders were characterized with lower BF. Moreover, 14-17-year-old successful players were taller, heavier and leaner than their non-selected counterparts. Since there was no consensus regarding the development of body composition, especially of BF, these results should be viewed with some caution until they get confirmed in other samples.

Method and Materials

The subjects for this study were thirty male students, each from Football and Track and Field Intervarsity teams of Punjab University, Chandigarh. They were selected with the view of obtaining scores on selected Anthropometric measurements and Body Composition. The age of the subjects ranged between 18 to 25 years. The required data in Anthropometric measurements and Body Composition were taken during the course of seven days in research laboratory of Punjab University, Chandigarh. The variables selected for the study under Anthropometric measurements were Standing Height, Sitting Height, Total Arm Length, Total Leg Length,

Upper Arm Girth, Hand Girth, Thigh Girth, Calf Girth and Chest Girth while under Body Composition the variables under taken were body Weight, Percentage of Body Fat and Lean Body Mass.

Statistical Procedure: To determine the significant difference between the mean scores of subjects belonging to Soccer and Track and Field on Anthropometric measurements and Body Composition variables, the, 't' ratio was employed. The level of significance chosen was 0.05.

Results and Discussion

Table 1: Significance of Differences in the mean scores of Anthropometric Measurements and Body Composition variables of Soccer Players and Track and Field Athletes

Sr. No	Variables	Units	Means		SD		SE	't'ratio
			Football	Track and Field	Football	Track and Field		
1	Leg Lenth	cms	84.61	91.32	4.31	3.55	1.02	3.66*
2	Calf Girth	cms	32.27	34.71	1.15	7.91	1.40	0.96
3	Thigh Girth	cms	51.50	50.54	2.51	3.80	0.85	1.14
4	Chest Girth	cms	85.20	85.02	3.84	3.47	0.97	0.18
5	Total Arm length	cms	71.70	74.50	2.80	3.61	0.85	3.45*
6	Upper Arm Girth	cms	24.22	24.06	1.51	1.46	0.42	0.34
7	Hand Girth	cms	21.20	22.21	1.10	1.11	0.31	0.82
8	Standing Heighth	cms	161.70	174.61	5.64	5.26	1.42	3.40*
9	Sitting Heighth	cms	85.30	88.16	2.65	2.42	0.61	0.23
10	Body Weighth	Kgs	60.21	60.72	5.20	6.06	1.45	1.04
11	Percent Body Fat	mms	15.15	11.98	1.89	3.04	0.64	1.65
12	Lean Body Mass	kgs	53.58	53.40	4.03	4.96	1.16	1.60

*Significant at 0.05 level

Discussion of Findings

The results of the present study indicate that Football and Track and Field Athletes did not differ much on selected Anthropometric measurements and Body Composition; however a significant difference in Total Leg Length, Total Arm Length and Standing Height was obtained. The comparison of the subjects did not reveal any significant difference between football players and Track and Field Athletes. Statistical analysis of the data reveals that Track and Field Athletes Total Leg Length, Total Arm Length and Standing Height is higher than the football players. Probably the reason in case of Track and Field has some advantages in Standing Height, Total Leg Length and Total Arm Length. These factors are very less trainable. On realizing the advantages of body structure, the Athletes select Track and Field events as their main sports. In case of Calf Girth, Thigh Girth, Chest Girth, Upper Arm Girth, Hand Girth, Sitting Height, Body Weight, Percent Body Fat and Lean Body Mass were not significant. It may be due to the training effect the football players and Track and Field Athletes developed these variables equally.

Physical characteristics and body composition have been known to be fundamental to excellence in athlete's performance (Mathur & Salokun, 1985) [4]. It has been found that the athletes with lower body fat percentage had higher maximum oxygen uptake (VO₂max). In other words, the athletes with lower body fat percentage seemed to utilize oxygen most efficiently (Heck, 1980) [3], while the excess of body fat was reported to be a deterrent to physical performance (Leelarthaepin, Chesworth & Boleyn, 1983) [3]. Minimum level of fatness are particularly advantageous for gymnasts, figure skaters, wrestlers, distance runners and other endurance athletes (Smith, 1984) [5]. Thus in retrospect it seems justifiable to suggest that the distinct sports selected for

this study did not differ significantly in their Anthropometric measurements and Body Composition.

Conclusions: Track and Field Athletes have significantly higher score in Total Leg Length, Total Arm Length and Standing Height as compared to Football players. In case of Calf Girth, Thigh Girth, Chest Girth, Upper Arm Girth, Hand Girth, Sitting Height, Body Weight, Percent Body Fat and Lean Body Mass, there were no significant differences between Football players and Track and Field Athletes.

References

1. American Dietetics Association (1987). Position of the American Dietetics Association Nutrition for the physical fitness and athletic performance for adults. *J Am Diet Assoc* 76: 437-443.
2. Bloomfield, J., Fricker, Peter A. and Fitch, Kenneth D. (1995). Can running injuries be effectively prevented? *Sci. Med. Sports*. 1, 161.
3. Heck, K. (1980). Nutrition, diet and weight control for athletes. *JOPER Jun*: 43-45. Leelarthaepin, B., Chesworth, E. and Boleyn, T. (1983).
4. Physical performance, physical activity and body fatness. *J Food Nutr* 40: 164-168. Mathur, D.N. and Salokun, S.O. (1985).
5. Body composition of successful Nigerian female athletes. *J Sports Med* 25: 27-21. Smith, N.J. (1984).
6. Nutrition and athletic performance. In: Scott WN, Nisonson B & Nicholas JA (Eds). *Principles of Sports Medicine*. William & Wilkins Baltimore 27-30.
7. Sinning, W. E. (1996). Body composition in athletes. In: *Human Body Composition*. Human Kinetics. Roche AF, Heymsfield SB, Lohman TG (Eds.), Champaign, IL. pp. 257-269.

8. De Garay, A.L. "Genetic and Anthropological studies of Olympic Athlets" Academic Press Inc. New York, 1974.
9. Kamlesh, M.L. (1985). „Methodology of Research in Physical Education and sports“ Metropolitan, New Delhi
10. De Rose, E. H. (1975). Determination of the ideal body weight and corporal composition of 16 professional soccer players, in Questions of Athletes Nutrition: Abstracts of the Reports of the International Symposium. Leningrad: Leningrad Institute of Physical Culture.
11. Fox. E.L,D.K. Mathews, The Physiological Basis of Physical Education and Athletics, Third Edition, Saunders College Publishing Halt, Philadelphia, 1985.
12. Garret, H.E., "statistics in psychology and Education" (Delhi): Paragon International Publishers, p.223-234, 2009.
13. Garrett, H.E., 1973, statistics in Psychology and Education, Bombay; Vakils, Fetter and Simnos Private Ltd. Pp. 230-235.
14. Heyward V.H; Wagner, D.R. Applied Body Composition Assessment, 2nd edition. Congress cataloging, 2004, pp 27-45, 49-65, 3-12.
15. Jackson AS, Pllock, M (1985), M (1985) practical assessment of the body composition physical sport med, 13:76-90.
16. Jones M.M. Olds Tim, Stewart. A. and Corter L International Standards for Anthropometric Assessment, ISAK, 2006, pp. 3-119.
17. Karpovich, P.V. and Sinning, W.E., Physiology of Muscular Activity. Phila: W.B. Saunders Co., p. 151, 1971.
18. Malhotra, D.N. "Body composition of classes of Indian athletes ". Ind. J. Physiology and pharmacy.Vol. 16, p. 301, 1972.
19. Parizkova, J. "Body Composition and physical fitness and Current anthropometry". Vol.9, no.4, p.275, 1968.
20. Singh, S. P. and Malhotra, P. " Kinanthropometry" Lunar Publication, Patiala, pp. 69- 74,1989.
21. Siri, W.E. Gross composition of the body. In advance in biological and medical physique S.Vol.4, Edited by J.H. Lawrance and C.A. Fobies, Newyork, Academic press, 1956.
22. Sodhi, H.S. and Sahota, A.S. Body Composition and Indian Top Ranking Sport man. Seminar Presenatation, IASSPE, held at K.U. organized by Department of Physical Education from 18- 20, May, 1990.
23. Sodhi, H.S. and Sidhu, L.S. Physique and selection of sportsman, Patiala: Punjab Publishing House, p. 151, 1984.