Comparasion Body Composition And Somatotype Characteristics of Sprinter Atlhete at AUE and YSU

by Edi Purnomo

Submission date: 14-Apr-2020 02:46PM (UTC+0700)
Submission ID: 1297230480
File name: comparison-body-composition-and-somatotype-characteristic.pdf (4.63M)
Word count: 576
Character count: 3026

PROCEEDING

ASEAN FORUM AND INTERNATIONAL CONFERENCE ON SPORT SCIENCE AND TECHNOLOGY (AFICSST)

Bali, Indonesia, 8-11 August 2014

"Bridging The Gap In The Advancement Of Sport Sciences And Technology Implementation Among South East Asia Countries"

The Deputy Asistant of Sport Science and Technology Division
Deputy Minister of Elite Sports Enhancement
Ministry of Youth and Sports

ISBN 978-602-8998-22-2

9 786028 998222

http://www.kemenpora.go.id/AFICSST/

COMPARASION OF BODY COMPOSITION AND SOMATOTYPE CHARACTERISTICS OF SPRINTER ATHLETES AT AUE AND YSU

Eddy Purnomo, Ria Lumintuarso, Norikatsu Kasuga, Hideki Suzuki
State University of Yogyakarta

e-mail: eddy_purnomo@uny.ac.id

ABSTRACT

In an efforl to describe the physique and body composition associated with pet1ormance of University ievel sprinter athletes of AUE and YSU. This study was conducted on 12 sprinter athletes from AUE and 8 sprinter athletes from YSU. Sprinter athletes from AUE on average are 20 years old, 171.6 cm tall and weigh 62.01 kg; sprinter athletes from YSU on average are 20.57 years old, 168.87 cm tall, and weigh 61.62 kg. Besides height and weight, six skinfo/ds, two bicondylar breadths and two girths were measured. Somatbtype evaluations were made according to the Heath & Carter method. Body fat percentage was assessed *using the equation prescribed by Berzetk et al. BM/ was calculated* as *body* mass *divided by height squared (kg/m2). The somatocharl indicated that sprinters at AUE and YSU are ectomorphic mesomorphs The body fat percentage at AUE is (10,9 ± 2,8%) and at YSU is (10,34 ± 1, 7) This* was *reflected in their endorriorphic components which is lowest in sprinter athletes at AUE (2,47±0,59) and YSU (2,39±0,41). Mesomorphy component sprinter athletes at AUE is (3,77±1,22), which is lower than the sprinter athletes at YSU (4.85±0,67), but the ectomorpic components sprinter athietes at AUE* is *(3, 11±1,04), which* is *higher than sprinter athletes at YSU (2, 79±0,45). This* means *that sprinter athletes at YSU are more muscled than at AUE.*

Keywords: Body Composition, Somatotype.

INTRODUCTION

The measurement and apprehension of the basic morphological characteristics of athletes is the foundation on which a training process may be built. 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 individual and team sports. The tasks in some events, such as sprinting, are quite specific and different from each other and so are the successful physiques. This process where by the physical demands of a sport lead to selection of body types best suited to that sport is known as "Morphological Optimisation". Running events in track-and-field are marked by an exceptional variety of duration of a single event, energetic demands and the tempo of energy release. The fact that runners need to carry their body weight, which means they need to overcome the force of.gravity on different-d,istance~; stipulates a specific {lean}body composition as a prerequisite for more efficient and economic performance in a single event. Athletes who haveor acquired the optimal physique for a particular event are more likely to succeed than those who lack the general characteristics. Studies on somatotype of athletes, elite athletes and Olympic athletes have generally shown that strength and speed dependent athletes tended to be basically mesomorphic while distance dependant athletes were found to be more ectomorphic with limited amount of mesomorphic muscularity.

A somatotype is a description of present morphological confirmation. It is expressed in ratings consisting of three sequential numbers always recorded in the same order. Each number represents evaluation of one of the three primary components of physique, which describe individual variation in human morphology and composition. Endomorphy, or the first component, refers to relative fatness and

leanness of the physique; mesomorphy, or the second component, refers to musculo-skeletal development relative to height; and ectomorphy, or the third component, refers to the relative linearity of individual physique.

In athletes, body composition measures are widely used to prescribe desirable body weights, to optimize competitive performance and to assess the effects of training. 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). In running at any sub maximal speed, the oxygen requirement is increased with any increment in body weight, that is, oxygen consumption is increased due to the greater energy demand required to initiate and sustain movement of a larger weight. Previous research has demonstrated that athletes in all running events have less body fat compared to most other disciplines.

Despite concern about the fact that morphological parameters are an essential part of the evaluation and selection of sports persons for diverse fields of sports, standard data on such parameters are still lacking in the Indonesian context in track and field athletic events. The present study was therefore aimed at evaluating the physical parameters, anthropometric measurements, body composition and somatotype of male track and field athletes from YSU, and to compare the data with their AUE.

MATERIAL AND METHODS

Subjects

Twenty sprinter athletes from both universities, consists of twelve sprinter athletes from AUE and 8 from YSU. All the sprinter athletes enrolled in the athletic sports organization of each college, the average old sprinter athletes have nineteen to twenty-one years old and following exercise at least 3 times per week, and have physical healthy, and once represented the university in sports competition in his country. And all subject and coachs gave written informed consent to particiate

Procedures

Twelve morphological body measures were taken: height, weight, breadth of femur and humerus, girths of upper arm and lower leg on the right side, skinfolds of triceps, supra-iliac, sub-scapular, chest, abdomen and calf. The height was measured by means of stadiometry to the nearest 0.5 cm and a bathroom scale was used to measure body mass to the nearest 0.1 kg. Skinfold measurements were taken using Lafayette Skin-fold caliper (U.S.A) with constant tension. Vernier Caliper was used for assessing breadths and steel measuring tape used for measuring circumferences. Guidelines of Johnson and Nelson (1982) were followed for these measurements. Body composition (percentage of lean body mass and body fat), body mass index and body somatotype (according to Heath-Carter, 1984) were calculated from anthropometric measures using the following equations.

Body Density or BD (gm/cc)

$= 1{,}089733 - 0{,}0009245(\sum ABC) + 0{,}0000025(\sum ABC)^2 - 0{,}000079 \times age$

Where:(A) = triceps Skinfold

(B) = Suprailliaca skinfold and

(C) = Abdomen (larry G.Shaver 1982)

Percent of Body Fat or PBF (Berzerk et al., 1963) = (4,570/BD- 4,142) x100

Lean Body Weight or LBW (kg) = (Total Body Weight – Total Weight of Fat)

Total Weight of Fat = (Weight x percent of fat)/100
BMI (Kg/m2) = (Body mass in Kg) /(Stature in Meters)., (Meltzer et al., 1988)
Ideal Body Mass = (Height -100)- 10%(Height-100)
Lean Body Mass = 100%-TWF%

Statistical Analysis

Considering the purpose of the study mean and standard deviation were computed for the statistical treatment of the data. The obtained data was treated with anlaysis of independent t-test for finding out the difference between groups when the obtained t ratio found to be significant at 0.05 level.

RESULTS

Based on Table 1, we can conclude that physical and anthropometric parameters between athlete sprinters at AUE and YSU occur. Almost all the parameters are very significant differences except in weight, BMI and calf circumference. While the ideal height and body mass for sprinters at AUE is higher than at YSU, sprinters at YSU have humerus and femur components larger than sprinters at AUE. The circumference of biceps at YSU are also greater than sprinters at AUE.

Table 1. Varius physical parameters and athropometric characters of the sprinters

Variables	AUE	YSU	t	p =0,05
Age (yrs)	20±1,2	20,6±1,1	2,727	p < 0,05**
Height (cm)	172,3±5,4	168,9±3,3	3,478	p < 0,05 ***
Weight (kg)	62±2,7	61,6±4,8	0,530	p > 0,05
BMI(kg/m^2)	21,2±1,6	21,6±1,1	1,356	p > 0,05
Ideal body mass	64,05±4,49	61,9±2,75	3,864	p < 0,05***
B.Humerus (cm)	6,7±0,3	7,8±0,3	17,742	p < 0,05***
B.femur (cm)	9,8±0,5	9,4±0,7	3,287	p < 0,05***
B.Biceps (cm)	25,5±1,7	31,5±2,4	14,423	p < 0,05***
G.Calf (cm)	35,4±4,6	35±1,7	0,508	p > ,05

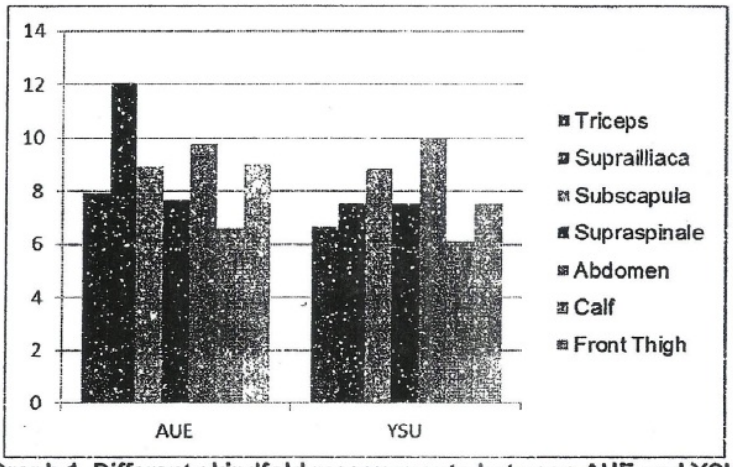
The skinfold measurement results presented in Table 2 show that among athlete sprinters at AUE and YSU there is no significant difference in fat thickness in the components supraspinale, subscapular, abdominal and calf. However, the thickness of fat in the triceps, front thigh and supra-illiiaca have a very significant difference, which AUE has greater of than sprinters at YSU.

Table 2. Different skinfold measurment of the sprinter

Variables	AUE	YSU	t	p
Triceps (mm)	7,92±2,11	6,62±1,85	3,102	p<0,05***
Supraspinale (mm)	7,67±2,39	7,5±1,77	0,378	p>0,05
Sub-scapular (mm)	8,92±2,53	8,87±1,36	0,102	p>0,05
Suprailliaca (mm)	12,08±3,85	7,5±1,77	4,958	p<0,05***
Abdomen (mm)	9,75±4,14	10±3,25	0,254	p>0,05
Calf (mm)	6,58±3,39	6,12±1,36	0,641	p>0,05
Front thigh (mm)	9±3,91	7,5±1,31	2,257	P<0,05**

Table 3 summarizes the body composition and somatotype values of the sprinter athletes. There were no significant differences in body composition

components between AUE and YSU sprinter athletes, but there are very significant differences in somatotype components, namely the components mesomorphy, where athletes at YSU have a greater value than the AUE athletes, as well as the components ectomorphy where AUE athletes have a higher value than YSU. All skindfold measurements are illustrated in the Graph 1.



Graph 1. Different skindfold measurments between AUE and YSU

Table 3. Values of somatotype and body composition of the sprinter athletes

Variables	AUE	YSU	t	p =0,05
Body fat (%)	14,52±2,78	14,12±2,12	0,760	p > 0,05
TWF (kg)	9,22±2,39	8,69±1,48	1,225	p > 0,05
LBM (%)	90,78±2,04	91,30±1,48	1,269	p > 0,05
LBW (kg)	54,07±3,80	52,93±4,50	1,344	p > 0,05
Endomorphy	2,47±0,6	2,39±0,42	0,725	p > 0,05
Mesomorphy	3,77±1,22	4,86±0,67	5,098	p < 0,05***
Ectomorphy	3,11±1,04	2,79±0,45	1,790	p < 0,05*

DISCUSSION

Research on somotype athletes and their suitability with the sport needs to be done to support and improve performance in sports in Indonesia. In addition, it will also simplify the search for talent scouts in every sport. However, until now, research on body composition and somatotype athletes in each sport in Indonesia, especially in athletics, namely sprint, still rare. In it, somatotype is one determinant of success in athletes achievements.

Several other countries in the world have been doing research on somatotype and its relation to performance in sports. One of the results of research conducted at the University of New South Wales in the field of anatomy-anthropometric profile getting the anatomy-somatotype of Australian athletes. Womens basketball athletes somatotype were slightly muscular and the fat had a greater percentage than ectomorphy with a value of the somatotype at 3.7 - 4.0 - 2.9 (endo-mesomorphy).

The same thing is also expressed by Mathur et al. (1985). He reported that somatotype for Nigerian athletes in the sport of badminton is a lower percentage of fat and muscle and a little thinner with somatotype value 2.2 - 3.9 - 2.9 (ecto-mesomorphy). Basketball athletes 1.9 - 5.3 - 3.4 (ecto-mesomorphy) have a lower percentage fat and is a taller compared to the more muscular soccer athlete 2.2 - 5.4 -

2.9 (ecto-mesomorphy). The same was reported by Shafeeq VA, et al (2010) in the results of research on Indian students somatotype athlete sprinters 2,53 - 4.31 to 3.06 (ecto-mesomorphy).

Results of this study reported that for the sprinter AUE students, somatotype value is 2.47 - 3.77 - 3.11 (ecto-mesomorphy) while for YSU student sprinters, somatotype value is 2.39 - 4.86 - 2.79 (ecto -mesomorphy). The value that is a component of somatotype mesomorphy in sprinters at YSU is higher than at AUE. This means that YSU sprinters are more muscular than sprinters at AUE. Thus, it appears that for a sprinter athlete who requires strength and speed, the somatotype value must be a 4 -5 for mesomorphy and a 3 for ectomorphy value and the value 2 for endomorphy (Norton K., et al (1996).

Likewise, the components of body composition are not significant differences in value of body fat percentage as a whole, but the value for the triceps skinfold, front thigh and suprailliaca at AUE was higher than at YSU. Furthermore, the value of TWF (Total Weight of Fat), LBM (Lean Body Mass) and LBW (Lean Body Weight) had no significant differences between athlete sprinters AUE and YSU.

CONCLUSION

The results of the present study indicate that in comparison to sprinters at AUE, YSU athletes have a lower body fat percentage. The analysis showed that sprinter athletes statistically differ in morphological measures, especially in dimensions of body volume and body fat. On the manifest level, only triceps, suprailliaca, and front thigh statistically differ, being significantly higher in sprinters at AUE than YSU.

The lowest value of %body fat was present among sprinters at YSU which are reflected in their lower values of skinfold measurement. It was also evident that in relation to their skeletal dimensions, they tend to be more heavily muscled than AUE and this may be advantageous for them at the start of the race and in the initial stages of acceleration as greater force is created by these muscles. In all groups, the mesomorphic component is highly dominant while the endomorphic component is the least marked. The present data may be considered to serve as a reference standard for the anthropometry and body composition of AUE and YSU sprinter athletes.

REFERENCES

Amatya D L (2009), Comparative study of Somatotype of Nepalese sportsmen. Indian Journal of Sports Science and Physical Education, Vol 7 No.2, 21-26

Brozek J, Grande F, Anderson JT and Keys A (1963) Densitometric Analysis of Body Composition: Revision of Some Quantitative Assumptions. Ann New York Acad Sci. 110:113-140

Carter, J.E.L. (1984). Physical structure of Olympic Athletes. Part II: Kinanthropometry of Olympic Athletes. Medicine and Sports Science. Karger Basel; New York.

Carter J.E.L., B.H.Heath (1990) Somatotyping: Development and application, Cambridge University Press, Cambridge).

Chatterjee S, Chatterjee P, Bandyopadhyay A (2006) Skinfold thickness, body fat percentage and body mass index in obese and non-obese Indian boys. Asia Pac J Clin Nutr 15: 232–235

Fleck S.J (1983), Body composition of elite American athletes. American Journal of sports Medicine, December 1983 vol. 11 no. 6 398-403.

Gore, C.J. (2000). Physiological tests for elite athletes. Champaign, IL. Human Kinetics.

Jackson, A.S., Pollock, M.L. (1985). Practical Assesment of Body Composition. The Physican and Sports Medicine, 5: 76 – 90.

John Bloomfield, Peter A. Fricker, Kenneth D. Fitch 1995, Science &Medicine in

ports,1995, ch.1, p 161.
Johnson BL, Nelson JK (1982) Practical measurement for evaluation in physical education. Surjeet Publication, Delhi- India, 165–167
Larry G. Shaver (1982), Essentials of Exercise Physiology (Surjiet Publication, Kamal Nagar, New Delhi, 194
Martin, D.E., Coe, P.E. (1997). Better Training for Distance Runners.Human Kinetics. USA.
Matković, Br., Mišigoj-Duraković, M., Matković, B., Janković, S.,Ružić, L., Leko, G., Kondrič, M. (2003). Morfological Differences of Elite Croatian Soccer Players According to the Team Position. Coll. Antropol. 27 Suppl.1: 167-174.
Meltzer A, Mueller W, Annegers J, Grimes B, Albright D (1988) Weight History and Hypertension. J Clin Epidemiol 41: 867–874
Ridder H.D, Monyeki, D., Amusa, L., Toriola, A., Wekesa, M. and Carter L. (2000) Kinanthropometry in African Sports: body composition and somatotype of world class male African middle-distance, long-distance and marathon runners. ISAK Publication,Adelaide, pp:37-52.
Sodhi, H.S. (1986). Skinfold Pattern Of Top Indian Athletes and Sportsmen. In modern Perspectives in Physical Education and Sports Sciences. Harnam Publications, New Delhi.pp: 53.
Tanner, J. M (1964) : The physique of the Olympic Athletes (Allen &Unwin London
Thomas Battinelli, Physique, fitness, and performance, Boca Raton, Fla. : CRC Press, 2000, 18
Thorland, William C, Glen O. Johnson, Thomas G. Fagot, Gerald D. Tharp, and Richard W Hammer. Body composition and Somatotype Characteristics of Junior Olympic Athletes. Med.Sci. Sports Exercise, Vol. 13, No. 5, pp. 332-338, 1981.

Comparasion Body Composition And Somatotype Characteristics of Sprinter Atlhete at AUE and YSU

ORIGINALITY REPORT

66%	66%	25%	36%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	jexpsciences.com Internet Source	61%
2	staff.uny.ac.id Internet Source	4%

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	Off		

Comparasion Body Composition And Somatotype Characteristics of Sprinter Atlhete at AUE and YSU

GRADEMARK REPORT

FINAL GRADE

/100

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7