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Original Article

Relationships between somatotype, anthropometry and physical fitness variables in untrained university students

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Abstract
The purpose of this study was investigate relation Between anthropometrics and Body type endomorph,mesomorph and Ectomorph with factors aerobic fitness, speed and power. The sample includes 45 unathletic male students of Tehran University (aged 19-25 years old) who forms three groups of 15 as a whole, that is, 15 ones endomorph, 15 ones mezomorph and 15 ones ectomorph. The physical fitness factor was measured through a special related method designed by Heath, carter and Seldon. Physical fitness tests included: running in 60 meter; vertical jump; board jump; medicine ball throw; Harvard step test. The statistical analysis of correlation coefficient has best reflected the conception that there are meaningful relationships between ectomorph component and aerobic fitness .The relationship Between body fat, body weight and aerobic fitness was negative; The relationship between body weight and feet power, hand power was negative .The relationships between skin fold fat, foot power and body's general speed were considered being as negative. Finally the relationship between girth arm and hand power was considered being as meaningful. Thus somatotype and anthropometry are two indicators for predict physical fitness of adult men.and They can also help coaches in identifying and choosing new sport athletes.
Keywords: somatotype, physical fitness factors, anthropometry,

Introduction

Studies by Tanner, (1964); Laubach and McConville, (1969); Ross, Hebbelink and Brown, (1977); Carter and Lindsay (1980); Thorland & et al., (1981); Berg, Latin and Coffey, (1997); Chaouachi & et al., (2005); Diniz Campos& et al., (2009) Showed that successful ones had somatotypes similar to those older outstanding athletes. in spite of some interpretational differences, the investigating of the relationship between somatotype and physical fitness factors seemed to indicate that mesomorphy was associated positively and endomorphy was associated negatively with physical fitness. Laubach, and McConville (1969); Malina, (1975) showed that about 25 to 65%of the variance in physical fitness tests could be explained by somatotype in adult sportsmen and also found that somatotype in children was highly related to motor ability test scores.
The anatomic and physiological differences related to people's physical ability were considered being as hard to verify and required us to accomplish some empirical studies (Malousarisa & et al.2008).

Since the physical-ability are considered being as a basic factor to take part in sport-related activities and achieve accomplishments, we are mainly focused on verifying such factors to be able to direct the people involved in different sport fields as best (Cabello manrique& et al.2003; Faude & et al.2007). The results achieved can be regarded as a basis to classify and arrange the physical education classes based on the people's physical fitness and their own physical- ability capabilities. In such a way the trainer can better plan a program appropriate to what the groups actually need. Naturally, verifying such factors among students and directing them towards a sport field can have a crucial role in partially achieved success (Diniz Campos& et al. 2009). Since people are generally successful and competent in a special sport field they are required to be directed as best. In such a way they will be happier, healthier and more creative among the society they live. The worse case is when people involve in sport fields they don't know them as best and may fail due to the lack of ability to accomplish the skills related. Consequently, they all will be disappointed and lose their motivation to involve in other sport activities. In such a way, their physical and mental fitness may be exposed to danger and there may be a society with people not happy and healthy as expected. Besides, directing people towards a special sport field based on their physiological and structural features may lead to achieving great successes in special sport fields and even getting higher degree or championship (Faude & et al.2007). The researcher in this research is essentially focusing on factors related to physical fitness, body's general agility, feet power, hand power and aerobic competency among athletic and untrained students. The recent researches show that there is a meaningful relationship between body shape and person's sport ability in a way the physical or bodily shape of

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strengthening runners is closer to ectomorph and the one of speed runners is close to mesomorph. The other groups like jumpers and mid-strengthening runners have a mix of ectomorph and mesomorph (Malousarisa & et al.2008).

The point to be mentioned here is that the research was mainly performed on athletic persons but in the present research there are some untrained people to increase the bodily structure interference in performing the tests included because the exercise is of crucial role on physical education and makes the body ready and flexible. So, controlling the mentioned factor through selecting untrained persons, we will be more competent to verify the role of bodily shape in such field.

Methods

Participants: it includes Tehran university students who chose the physical education course.
Research samples: in this research, the samples are 37 students (aged 18 to 25 years old) with no continuous activity in any sport fields and was chosen based on the following factors:

- Through estimation and visionary methods in one of bodily shapes; endomorph, mezomorph, ectomorph (Sheldon 1980).
- Based on the information included in questionnaires related to physical fitness and the scores between the ranges of 35 to 45 (Sharky,1986) .
- Through the use of shape-recognizing method designed by Heath and Carter. The number for their body shape was estimated in a way No 1 was considered being as dominated to two other components.

Therefore, the participants involved have in categorized in three groups: 15 ones with dominated endomorph factor, 15 ones with mesomorph factor and 15 ones with ectomorph factor. Each is being considered as the representative of a special bodily shape.

The measurements are of two parts in the present research: one related to body and the other one related to the factors related to bodily education and fitness as follow:
Measuring the bodily shape: as mentioned earlier, a method designed by Heath and Carter was used to measure the bodily shape. Like Sheldon method, each three mentioned components are being measured in figures but in Sheldon method the number 1 is considered being as the least and the number 7 is being considered as the maximum rate. In this method, number 1 is regarded as the least representative and number 12 is considered being as the maximum rate in case of endomorph and number 9 in case of ectomorph and mesomorph. So, each person may be of a three-digit figure, in which the first digit shows the obesity factor, the second show the fitness and the third reflects the thin factor. For example a person with grade 371 and another one with grade 941. The mentioned method is a real and objective measurement. It is of high use in medical areas. To estimate the bodily fitness in this method, we are required to estimate ten features related to body which are as follow: height, weight, upper arm and calf circumferences, skin fold thickness (triceps, super illus, sub scapula and calf), hummer's biepichondylar and femur biepichondylar. After that, the measured figures were depicted in a special table based on the number of bodily shape.

In this research, tests related to speed and field running have been used. They include all sorts of running, jumping and throwing. In case of running, a test named Harvard step test was used to measure the aerobic fitness. To measure the body's general speed, a running test 60 meter was used. In case of throwing, a test of throwing the balls was used to measure the power of hands and in case of jumping, vertical and paired-feet jumping have been used to measure the power and strength of feet. After that, the correlation coefficients have been measured, as seen in table 2.

Results

Means and standard divation of physical fitness test scores and somatotype components are given in Table 1, correlation coefficients are shown in Table 2, anthropometric values are presented in Table 3, and concerned correlation coefficients are shown in Table 4.
The significant finding as shown in Table 2 and 4 including:
1. There was negative correlation between endomorphy and feet power.
2. There was positive correlation between ectomorphy and vo2max.
3. There was negative correlation between endomorphy and general speed.
4. There was positive correlation between body weight and hands power.
5. There was negative correlation between body weight and feet power.
6. There was negative correlation between body weight and vo2max.
7. There was negative correlation between skin fold and feet power.
8. There was negative correlation between skin fold and vo2max.
9. There was positive correlation between arm diameter and hands power. In other elements there was no significant correlation.

Table1. Means and standard divation of physical fitness test
Scores and somatotype components

Variable	M±SD
Medicine ball put	7.35 ± 1.73
Vertical jump	50.0 ± 8.4
Standing board jump	2.14 ± 0.21
Harvard step test	42.4 ± 5.0
Speed 60 meter	9.37 ± 0.93
ENDO	695 ± 142
MESO	301 ± 79
ECTO	228 ± 86

Table2. correlation coefficients between physical fitness test scores and somatotype components

	Endo	Meso	Ecto
n	15	15	12
Speed 60 meter	0.49*	0.30	0.02
Medicine ball put	-0.24	0.38	0.033
Vertical jump	-0.52*	0.18	0.042
Standing board jump	-0.48*	0.06	0.12
Harvard step test	-0.29	0.01	0.57*

Table3. means and standard divation of Anthropometry values

Variable	M±SD
Body height (cm)	168.3 ± 2,3
Body mass (kg)	67.5 ± 13.4
Fat Skinfolds(mm)	49.2
Arm circumference (cm)	30.8 ± 3.2
Calf circumference (cm)	33.7 ± 6.4

Table 4. correlation coefficients between physical fitness test scores and Anthropometry values

	Body height	Body mass	Fat Skinfolds	Arm circumference	Calf circumference
speed 60 meter			0.53*		0.05
Medicine ball put	0.20	0.35*	0.016	0.49*	
Vertical jump	0.26	0.35*	0.58*		-0.20
Standing board jump	0.22		0.72*		-0.12
Harvard step test	0.04	0.62*	0.72*		

Discussion

As the results show, there is no meaningful relationship between the unathletic students' physical fitness and bodily preparedness except for three cases. The studies performed by Bolonchuk, Siders and Lykken, (2000) strongly approve the negative relationship between endomorph and factors related to physical and motor abilities except for throwing the ball and standing power. Results achieved on endomorph factor are as follow:

1- There is negative correlation between endomorph-based bodily shape and body's general speed
2- There is negative correlation between endomorph-based bodily shape and feet power
3- There is no meaningful relationship between aerobic exercise and endomorph-based bodily shape
4- There is no meaningful relationship between hands power and endomorph-based bodily shape

As seen there is no meaningful relationship between endomorph and aerobic preparedness. What we expected was a negative relationship between these two because the extra weight and fat were considered being as limiting factors. This issue was best verified in case of the fact under skin and weight body through Harvard platform test. The correlation of fat (r= 0/72) and weight (r=0/62) best reflects the strongly negative relationship between body mass and aerobic preparedness. Durnin and Womersley (1974); Eston and Reilly, (1996) considered the body mass as effective factor in throwing field but here there is no meaningful relationship

between endomorph and throwing the ball. Probably it is due to the fact obese people are less active. So, we come to this conclusion an effective body mass can be of crucial role in throwing the ball. That is to mention, there is positive correlation between the body weight and ball-throwing test. The endomorph was of negative relationship with length jumping, vertical jumping and speed running. There was a strong correlation between the fat under the skin and vertical jumping. Endomorph was of negative relationship with vertical and length jumping test. Since they were expected to be of higher skeletal mass, a mesomorph person can have positive correlation with body movements (Malousarisa & et al.2008).What is really important here is the role of body exercise as the best factor to perform the test. Since the samples selected for present research were untrained and unathletic, this test had a considerable effect on their records randomly and hereby there were some non-meaningful relationships. Ectomorph was of positive relationship with Harvard platform test. Besides, in comparing the height with test materials, there was no meaningful relationship. There was a positive relationship between ectomorph factor and aerobic preparedness as expected because it was best clarified in recent researches performed in this field, (Carter & Heath, 1990). It shows that the rate of ectomorph factor is higher in strength-directed athletics compared with other group of athletics. Such groups of athletics are of lower rate of weight and fat. The lower weight makes the heart beat better and the heart will be able to beat effectively (Duncan & et al.2006). The other results show that powerful exercise can make some changes in muscular textures which may not lead to increased diameter. The mentioned issues best show that the unathletic physical shape can be considered being as an indicator to perform sport and bodily exercise. This research is mainly focused on reflecting the ways to understand the physical capacity and ability in young generation. It may be considered being as a guide to search about other issues related to body structure and physical fitness and also their effects on doing sports. The results and achievements can be a comprehensive source to accomplish other researches in this field.

Reffrences

Berg, K., Latin, RW., & Coffey, CH. (1998). Relationship of somatotype and physical characteristics to distance running performance in middle age runners. *Sports Medicin Physical Fitness Journal*, 38,253–7.

Bolonchuk, WW., Siders, WW., & Lykken, GI. (2000). Association of dominant somatotype of men with body structure, function during exercise and nutritional assessment. *American Journal of Human Biology*,12:167–80.

Carter, J., & Lindsay E. (1980). The Heath-Carter Somatotype Method, Revised. *A San Diego State University Syllabus, California*.

Carter, JEL., & Heath, BH. (1990). Somatotyping: development and applications. *Cambridge University Press.*

Chaouachi, M., Chaouachi, A., Chamari, K., Chtara, M., Feki Y., Amri, M., & Trudeau, F. (2005). Effects of ominant somatotype on aerobic capacity trainability. *British Journal of Sports Medicine,* 39, 954-959.

Cabello manrique, D, Gonzalez-badillo J.(2003). Analysis of the characteristics of competitive badminton. *Br J Sports Med* v. 37, p. 62–66.

Diniz Campos,F.A, Bobroff Daros,L, Mastrascusa,V, Dourado,A.C, Reeberg Stanganelli,L.C(2009). Anthropometric profile and motor performance of junior badminton.*Brazilian journal of biomotricity* v.3,n.2,p.146-151

Duncan, M, Woodfield L, AL-Nakeeb, Y. Anthropometric and physiologicalcharacteristics of junior elite volleyball players*. Br J Sports Med* v. 40, p. 649–651, 2006.

Durnin, JVA., & Womersley, J. (1974). Body fat assessed from total body density and its estimation from skinfold thickness: measurements on 481 men and women aged from 16 to 72 years. *British Journal Nutrrition*,32,77–92.

Eston, R., & Reilly, T. (1996). Kinanthropometrey and exercise. *human kinetics publisher*.

Faude, O, Meyer, T, Rosenberger, F, Fries, M, Huber, G, Kindermann,W. (2007) Physiological characteristics of badminton match play. *Eur J Appl Physiol* v. 100, p.479-485.

Laubach, L., & McConville, J. (1969). The relationship of strength to body size and typology. *Medicin and Science in Sports*,1 (4) , 189-194.

Malina, R. M. (1975). "Anthropometric correlates of strength and motor performance. *Exercise and Sports Sciences Review*, (ed. Wilmore, J. H. and Keogh, J. F.) Vol. 3, Academic Press, New York. 249-274.

Malousarisa G, Bergelssan, Barzoukak, Bayiosai, Nassis G, Koskoloum. (2008). Somatotype, size and body composition of competitive female volleyball players. *J Sci Med Sport* v. 11, p. 337-44.

Ross, WD., Hebbelink, M., & Brown, SR. (1978). Kinanthropometric landmarks andterminology. In: Shephard RJ, Lavalle´e H, eds. *Fitness assessment*, Charles C.Thomas: Springfield IL.44–50.

Sheldon,W. (1980), Prediction of adult Sheldon somatotypes. *annals of human biology,* VOL. 7, NO. 3, 213-224.

Tanner, J. M. (1964). The Physique of the Olympic Athlete. *George Allen andUnwin, London.*

Thorland, W. C., Johnson, G. O., Fagot, T. G., Thorp, G. D., & Hammer, R. W. (1981). Body composition and somatotype characteristics of junior Olympic athletes. *Medicin and Science in Sports*, 13 (5) , 332-338.