Research Article

Association of Selected Anthropometric Determinants with Agility among Collegiate Athletes

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Abstract

Agility is the ability of an individual to suddenly change the direction quickly and accurately, and the anthropometric determinants include height, weight, Body Mass Index (BMI), Waist-Hip Ratio (WHR), % of body fat etc. The purpose of the present research study was to determine any association between selected anthropometric determinants and agility. A total of 100 collegiate athletes voluntarily participated in this study. The mean age (Years), height (CM) and weight (KG) of participants were 20.44, 170.37 and 61.75 respectively. The height and weight of individuals are being measured using standard methods and the % of body fat was calculated by using the formula. The agility was measured by Illinois agility test. Pearson's correlation was applied to analyze the association, and statistical insignificant association found between agility and other anthropometric determinants. The finding of the present study suggests that there is no association between agility and different anthropometric determinants.

Keywords: Anthropometry; Agility; Illinois agility test; BMI; % of body fat; Waist-Hip ratio (WHR)

Introduction

BMI, % of body fat and Waist-Hip Ratio (WHR) are important determinants of body composition and physical fitness. These determinants are considered anthropometric characteristic measures of an individual and, taken together, account for the measurement of the/a body's fat mass [1].

Agility has been defined as the ability to quickly change direction [2-4], as well as the ability to change direction in an accurate manner [5,6]. It has also been defined as the sudden change of direction, and the movement of the whole body as well as the movement of the limbs [7,8]. Agility is particularly helpful in sports that requires quickness and alertness, and thus, it is effective in sports, such as basketball, handball, soccer etc [9].

Relation of BMI and other anthropometric characteristics have been done with variables like VO2 max [10], and similarly the relation of agility with such other variables like sprint have also been done [11]. However, there is a lack of research on the relation of anthropometric characteristics to agility. Furthermore, there are certain sports which require both body composition and agility like soccer [12], tennis [13], etc. Therefore, the purpose of the present research is to find the association of selective anthropometric determinants and agility among collegiate athletes. This study will help the athletes, coaches and physiotherapists to improve fitness level and performances in sports.

Methodology

A total of 100 volunteer collegiate athletes aged between 18 and 25 years were randomly selected for this present study based on Physical Activity Readiness Questionnaire (PAR-Q). The participants were selected from various colleges/universities in Delhi-NCR, India. A total of 250 participants volunteered to participate in this study. Using the inclusion criteria and the PAR-Q, only 197 of the 250 volunteers qualified for the study; and of the 197 qualifying volunteers, 100 were randomly selected for this study. The age of subjects was recorded from their birth certificate, which was submitted to their college/university. The data were collected in the morning session at room temperature. Subjects were asked to fill out and return the consent form for their voluntary participation.

Tools used

1. Stadiometer: Used to measure height

2. Digital weighing machine: Used to measure weight

3. Illinois agility test: Agility was measured using the Illinois agility test. The subjects were asked to report 30 minutes before the test. They consumed nothing, but well hydrated by drinking ample water so that they would not feel thirsty during testing session, from 2 hours prior to the test. Agility was recorded in seconds (s).

Procedure

Only 10 participants were asked to report on a single prescribed

Table 1: Descriptive Statistics.

	Mean	Std. Deviation
AGE	20.44	1.36567
HEIGHT	1.70E02	7.57869
WEIGHT	61.75	11.56394
BMI	21.1885	3.22064
WHRATIO	0.9055	0.0504
PERCENTBODYFAT	15.9002	4.29862
AGILITY	16.54	1.47313

Table 2: Correlation table.

		AGE	HEIGHT	WEIGHT	BMI	WHRATIO	PERCENTBODYFAT	AGILITY
AGE	Pearson Correlation	1	0.113	0.280**	0.269**	0.009	0.276**	0.257**
HEIGHT	Pearson Correlation	0.113	1	0.602**	0.148	0.166	0.147	0.034
WEIGHT	Pearson Correlation	0.280**	0.602**	1	0.875**	0.122	0.873**	0.189
BMI	Pearson Correlation	0.269**	0.148	0.875**	1	0.05	0.999**	0.203*
WHRATIO	Pearson Correlation	0.009	0.166	0.122	0.05	1	0.048	-0.043
PERCENTBODYFAT	Pearson Correlation	0.276**	0.147	0.873**	0.999**	0.048	1	0.199*
AGILITY	Pearson Correlation	0.257**	0.034	0.189	0.203*	-0.043	0.199*	1

date and at a specific time. Firstly, their height and weight were measured. The height was measured using a stadiometer to the nearest 0.1 cm during inspiration and weight was measured with digital standing scales to the nearest 0.1 kg. Hip and waist measurement was measured with a standard measuring tape to the nearest 0.1 cm, and % of body fat was measured after determining the BMI using the following formula (Gallagher et al., 2000) [14]:-

Gallagher's 4C model: BF%= 63.7-864*(1/BMI)-12.1*sex+0.12*age+129*Asian*(1/BMI)-0.091*Asian*age-0.030*African American*age

Where, sex= 1 for male and 0 for female,

Asian= 1 for Asians and 0 for other

African American= 1 for African American and 0 for others

After measuring all these components of anthropometric determinants, the subjects were asked to perform the Illinois agility test, and their measurement was recorded.

Statistical analysis

The mean, standard deviation, standard error, and percentile of all the readings were used to prepare summary statistics. Karl Pearson's correlation coefficient (r) was used to determine the association between different variables. The statistical analysis was done on Statistical Package for the Social Sciences (SPSS) v16.00. A 5% confidence level was used to determine statistical significance.

Result

A total of 100 male individuals participated in the present study with a mean age of 20.44 (±1.36) years, a mean height of 170.37 (±7.58) cm, and a mean weight of 61.75 (±11.56) kg, as shown in (Table 1).

The mean BMI was 21.19 (±3.22), the mean % of body fat was 15.90 (±4.29), the mean waist-hip ratio was 0.91 (±0.050) and the mean agility (in sec) was 16.54 (±1.47), as shown in (Table 1).

Pearson's Correlation was applied to analyze the relationship between height, weight, BMI, % of body fat, Waist-Hip Ratio (WHR), and agility which is shown in (Table 2).

Discussion

The purpose of the present study was to determine the association between selective anthropometric determinants like height, weight, BMI, waist-hip ratio and % of body fat and agility.

A statistical significant correlation (0.199) was found between agility and % of body fat, which suggests that an individual's % of body fat plays an important role in agility. This finding is supported by the finding of Arazi et al. 2016 [15], who suggested that body fat percentage and agility are significantly related to success and had more importance for Taekwondo athletes. However this finding is inconsistent with the finding of Mohammad 2016 [16], who claimed that there was no significant relationship between percentage of body fat with the speed, agility and reaction time of Bangladesh Krira Shikkha Protisthan (BKSP) male football players.

Moreover, a statistical significant correlation (.203) was also found between agility and BMI, which suggest a significant relationship between agility and BMI. This finding reveals that a person with good agility will likely to have a good BMI. This finding is inconsistent with the finding of Mathisen & Pettersen 2015 [11], who suggested that the relationship between agility performance and anthropometrics was insignificant apart from a moderate correlation found in 13 to 14 year olds. However, the finding of this study is supported by Arazi et al. 2016 [15], who suggested that body mass index and agility were significantly related to success and had more importance for Taekwondo athletes.

Furthermore, this study found an insignificant relationship (-0.043) between agility and waist-hip ratio. Again this finding supports the finding of Arazi et al. 2016 [15].

Additionally, the finding of this study also reveals a significant relationship between age and BMI (.269), age and % Body fat (.276), age and agility (.257), and BMI & % of body fat (.999).

Conclusion

The findings of the present study reveal that agility is associated with some of the anthropometric determinants, but not all. This study has found that the agility of an individual is related to an individual's % of body fat. Therefore, it can be said that, if a person has maintained his/her % of body fat then he/she can also excel in agility and vice versa.

BMI also plays important role in a person's agility. Therefore, in order to improve and maintain the agility one has to control their BMI and vice versa.

This finding can help athletes, coaches, physiotherapists, and team managers become acquainted with the need of maintaining athletes' body in order to ultimately improve BMI and agility.

Moreover, the finding of this study also reveals that there is no relationship between agility and waist-hip ratio. Hence by improving only agility one cannot maintain their waist-hip ratio or vice versa.

In conclusion, the study/the findings of this study indicate that while there is no positive correlation between collegiate athletes' waist-hip ratio and agility, there is a positive correlation between collegiate athletes' % of body fat and agility as well as their BMI and agility.

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