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IS THERE AN INTERRELATION BETWEEN THE KNEE PEAK ISOKINETIC TORQUE AND BODY COMPOSITION?

Maan Hasan Mahmood[i],
Moatasem Azeez Kahlid Albayati,
Ahmed Sadiq Niyazi
Kirkuk University,
College of Physical Education and Sports Science,
Iraq

Abstract:
This study aimed to examine the correlation between the isokinetic strength and body composition parameters. For this purpose, 10 healthy athletes participated in our study. The isokinetic strength measurement was carried out with an isokinetic dynamometer in $60^{o}s^{-1}$ motion angle. Body composition measurement is carried out with a body composition analyzer. When the data were analyzed; significant correlations were not detected between isokinetic and body composition parameters ($p>0.05$). As a result, it can be said that there is no significant positive or negative correlation some isokinetic strength parameters and body composition in athletes.

Keywords: correlation, strength, physical situation

1. Introduction

The factor that determines performance is the physical structure, that is, the physical properties. Because it shows the properties of physical structure or the capacities of physical properties. In general, it is not possible to achieve the desired level of performance if the functions offered are not suitable for the sport being practiced. General physique is only one indicator of an athlete's ability to perform at a high level and, when combined with other performance enhancements such as strength, power, endurance, speed, endurance, and quickness, has a positive effect on the athlete. The influence of body size on muscle strength was already discussed in Galileo's time, which brings us to the topic of anthropometric measurements (Ćopić et al., 2014). In recent years, a great deal of research has been conducted on the general effects of body size on various elements of exercise and a number of approaches to normalizing athletic performance have been developed (Jaric, 2003; Jaric et al., 2005). Researchers concluded that body fat,

[i] Correspondence: email maanhasan@uokirkuk.edu.iq

muscle strength, and power are indicators of body function. A number of reports suggest that leg strength accounts for a larger proportion of the variation in physical performance (Bean et al., 2003; Hruda et al., 2003). Strength, which is directly related to muscle mass, is one of the main factors determining muscle strength (Zatsiorsky et al. 1981). In fact, there is a close relationship between lean body mass (LBM) and muscle strength (Morrow et al., 1982). It is well known that excess body fat and lack of lean body mass have a negative impact on performance. Because fat tissue, like muscle tissue, does not contribute to the production of ATP, the body's energy store, and causes excessive energy consumption because it restricts the movements of the muscles. This reduces the applied force (Doré et al., 2000). It is still unknown how muscle strength, particularly leg strength, relates to anthropometric measures of body composition. In this study, the relationship between body composition and isokinetic strength of football players was examined.

2. Method

This study was designed using the relational screening model. Measurements of body composition and isokinetic strength were performed on the volunteers participating in the study. 10 healthy athletes took part in the study. G-power analysis was used to determine the number of subjects. Volunteers visited the laboratory twice. At the first visit, information about the study was given and body composition was measured. At the second and final visit, isokinetic strength measurements were performed using an isokinetic dynamometer.

Table 1: Descriptive characteristics

	X	**SD**
Peak Torque Extension	181,1	21,2
Peak Torque Flexion	114,21	9,8
Time-to-Peak Torque Extension	0,44	0,05
Time-to-Peak Torque Flexion	0,54	0,09
Fat mass (kg)	1,14	0,44
FFM (kg)	9,51	2,27
Fat percentage (%)	9,77	2,24

2.1 Isokinetic measurement

Isokinetic knee strength measurements were made using an isokinetic dynamometer (CSMI Humac Norm). The subject's dominant limb secured the isokinetic seat with a belt. Isokinetic tests were performed at $60^{o}s^{-1}$ motion angle with 15 repetitions at each angle with concentric contraction. Before the measurements, a 10-repetition warm-up period was performed on the isokinetic dynamometer at an angular speed of 3000 s-1. Each subject was informed about the baseline push/pull and the number of repetitions remaining, and during the test, the subjects were constantly verbally encouraged to maintain their peak torque (PT) values at the highest level (Perrin, 1993).

2.2 Body composition measurement

Measurements were made using the Tanita body composition analyzer (bioelectrical impedance analysis), whose validity and reliability in calculating the body composition of volunteers were tested.

2.3 Statistical analysis

SPSS 20.0 program was used to analyze the data. Pearson correlation analysis was used to determine the relationship between respiratory muscle strength and anaerobic capacity parameters. The data obtained were presented as mean standard deviation and significance was examined at $p<0.05$.

3. Results

Table 2: Examination of the relationship between the participants' isokinetic strength parameters and body composition

		Fat mass (kg)	FFM (kg)	Fat percentage (%)
Peak Torque Extension	r	-0,06	-0,22	0,04
	p	0,35	0,32	0,44
Peak Torque Flexion	r	-0,05	-0,49	0,21
	p	0,34	0,14	0,30
Time-to-Peak Torque Extension	r	0,41	0,49	0,24
	p	0,07	0,05	0,27
Time-to-Peak Torque Flexion	r	-0,19	-0,04	-0,22
	p	0,45	0,66	0,36

Table 2 shows the analysis of the correlation between the body composition and isokinetic strength parameters of the participants. When the data were examined there is no significant correlation was found between parameters ($p>0.05$)

4. Discussion

This study aims to examine the relationship between isokinetic strength and body composition in healthy athletes. For this purpose, measurements were made with 10 healthy athletes. When the data obtained was analyzed, no significant correlation was found.

Previous studies have investigated the effects of body fat-muscle ratios and other components of the body on the force output produced by muscles (De Ste Croix et al., 2001; Yoon et al., 2020). Some studies measure performance directly based on body fat percentage (Morrow et al., 1982; Jaric, 2003; Ćopić et al., 2014). The power a muscle can produce has a significant interaction with the muscle's own structure and other elements of the body. Therefore, when performing a physical performance, not only the capacity of the muscle itself but also other structures should be taken into account. De Ste Croix et al. (2001) reported that age, gender, body weight, skinfold thickness, and leg muscle

volume were effective on isokinetic leg strength. Therefore, although we obtained a statistically significant finding in our study, this result cannot be interpreted as positive. While the increase in lean mass can be interpreted positively, the increase in time to peak torque in isokinetic measurement cannot be interpreted positively. In isokinetic measurements, the shorter the time it takes for the torque to reach its peak, the better the force produced by the muscle is evaluated (Simpson et al., 2019).

As a result, it can be said that there is no significant positive or negative relationship between some isokinetic strength parameters and body composition in athletes.

Conflict of interest statement

There are no conflicts of interest for the contributing author.

About the Authors

All of the authors are lecturers in the College of Physical Education and Sports Science of Kirkuk University, Iraq.

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