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THE RELATIONSHIP BETWEEN THE BENCH PRESS MAXIMALS AND SHOT PUT THROWS OF SELECTED FEMALE ATHLETES COMPETING IN THE TURKISH ATHLETICS SUPER LEAGUE

TÜRKİYE ATLETİZM SÜPER LİGİ'NDE GÜLLE ATMA BRANŞINDA YARIŞAN BAZI KADIN ATLETLERİN BENCH PRESS MAKSİMALLERİ İLE GÜLLE ATMA DERECELERİ ARASINDAKİ İLİŞKİ

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ABSTRACT

Practiced in five continents, athletics are among the most widespread sporting events in the world. Disciplines that involve throwing, such as shot put, are more technical in nature and therefore require the most work to increase body strength. The "glide" technique, which is one of the preferred techniques in shot put, requires athletes to glide linearly through the throwing circle from a seated position to a power position. Strength can be improved in yearly periods. These periods can be planned according to the milestones of quick power, continuous power, and maximal power in order to improve performance. In shot put, athletes mostly prefer to perform bench presses, which focus on the pectoral and arm muscles. This strengthening exercise aims to work the triceps brachii and pectoralis muscles. These are the most important muscles used in shot put. The present study compared the bench press maximal and best shot put throws of four female individuals over a period of four years and then incorporated the results into a correlation study. A high degree of correlation was found between the bench press maximal and shot put throws of the female athletes.

Keywords : Athletics, Shot Put, Bench Press, Woman

ÖZ

Atletizm dünyada beş kıtada yapılan en yaygın sporlardan biridir. Atma branşları, teknik branşlar olmasıyla birlikte biyomotor özelliklerden kuvvete yönelik çalışmalara en çok ihtiyaç duyulan disiplindir. Gülle atmada tercih edilen tekniklerden biri olan "Glide" tekniği çemberi düzgün doğrusal olarak bir noktadan, merkezden geçerek diğer karşı noktaya kadar kat edilerek gerçekleştirilir. Kuvvet gelişimi yıllık periyot lama dikkate alınarak geliştirilir. Çabuk kuvvet, kuvvette devamlılık ve maksimal kuvvet ilkeleri ile periyodizasyon yapılır ve performans yükseltilir. Gülle atmada sporcular kuvvet gelişimi için en çok göğüs ve kol kaslarına yönelik olan bench press çalışmalarını tercih ederler.. Bu kuvvet çalışması triceps brachii ve pektoralis kaslarına yöneliktir. Bunlar gülle atma da itiş gerçekleşiren en önemli kaslardır. Çalışmada süper ligde yarışan dört kadın sporunun dört yıllık bench press maksimleri ile her yıl için en iyi atış dereceleri karşılaştırılmış ve korelasyon çalışması yapılmıştır. Bu çalışmada kadın sporcuların bench press maksimleri ile gülle atma dereceleri arasında yüksek bir ilişki bulunmuştur.

Anahtar Kelimeler: Atletizm, Gülle Atma, Bench Press, Kadın

1. INTRODUCTION

Athletics can be categorized into three main disciplines: running, jumping, and throwing events. Throwing events are termed as "closed" disciplines as they do not require strategies. One of these is shot put, which is usually practiced with either the "rotational" or "glide" technique. The "glide" technique mostly consists of a smooth linear movement. Strengthening exercises aimed at the perfection of this movement are more effective compared to rotational movements. Athletes who adopt and practice the glide technique use a

linear movement to put the shot. The shot put is a dynamic discipline demanding high power production (Terzis et al., 2003). This immense power is produced within a circle 2.13m in diameter. Shot putting requires great explosive strength, together with the ability to perform precisely timed movements in a confined space (Sugumar, 2014). The shot must be put from the shoulder using one hand and it must be held near the chin throughout any preliminary movements (IAAF, 2003). Developing the strength needed to perform this technique is made possible by practicing dynamic maximal strengthening exercises. A bench press exercise consists of supporting a weight while laying in a horizontal stance, the arms at a 90-degree angle to the body (with ankles and shoulders extended and horizontal shoulder adduction in the sagittal plane and on a transverse axis), bringing the weight down to the chest, and then lifting the weight in the counter direction (using concentric and then eccentric contraction). Training periods can be scheduled in yearly intervals and different levels of strengthening exercises can be practiced according to the competition schedule. Maximal strengthening exercises, especially those practiced during competition times, are very popular for increasing performance. It is believed that these dynamic maximum strengthening exercises are directly related to improvements in shot put performance.

2. METHOD

The study took the four best female shot put athletes competing in the Turkish Athletics Super League as its sample to examine their shot put throws and maximal bench press scores in a four-year period and record their best results. Shot put performances were taken from the athletes' competition results and the maximal bench press performance was determined using the one-repetition maximum (1RM) method. The barbell-throwing test was conducted, followed by a 1RM bench press test on the same apparatus as described elsewhere (Berger 1962; Wilson et al., 1992).

The data was analyzed using the SPSS 22.0 software program and then presented as average values with standard deviation. 0.05 was considered statistically significant. Spearman's correlation analysis was used to specify the relationship between the parameters.

3. FINDINGS

Table 1. Subjects' average shot put and bench press performances over four years

	Average	Std. Deviation
Shot put performance (mt)	13.9375	1.01183
Bench press performance (kg)	75.0000	14.43376

Table 2. Correlation analysis between subjects' shot put performances, bench press performances, and number of years into the study

		Shot put performance	Bench press performance	Year
Shot put performance	r	1	0.874	0.564
	p		0.000	0.023
Bench press performance	r		1	0.540
	p			0.031
Year	r			1
	p			

A correlation of $r:0.874$ was found between the subjects' four-year shot put performances. When examining correlation according to years, it was observed that bench press performance levels increased with the total years of training.

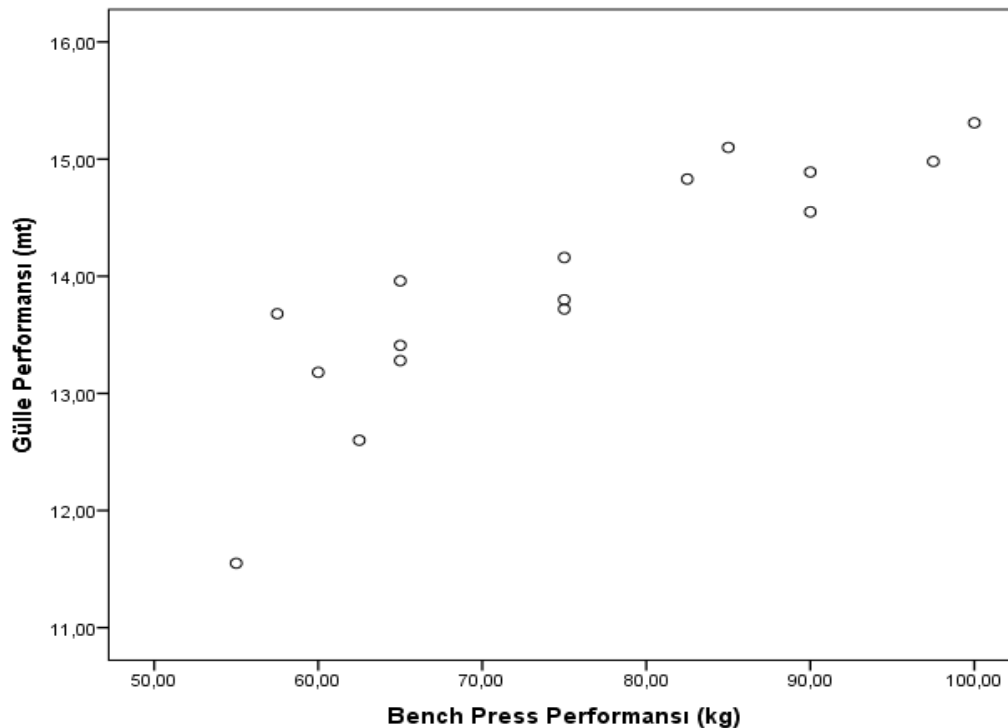
Table 3. Average shot put and bench press performances of every subject over four year

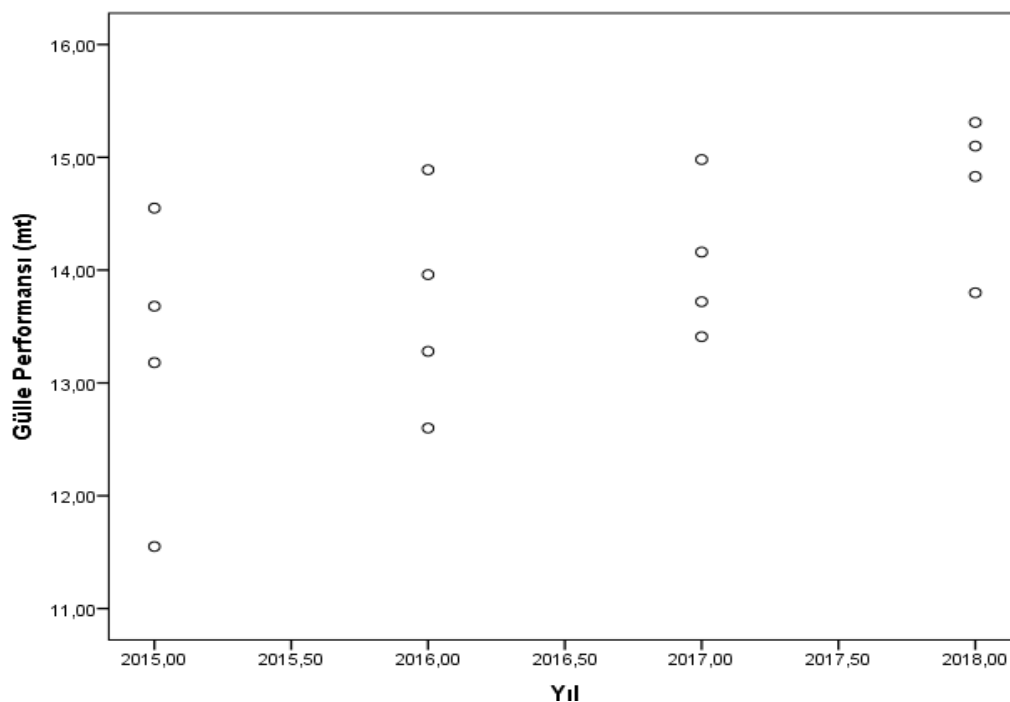
		Average	Std. Deviation
Aysel	Shot put performance (mt)	13.2425	1.52268
	Bench press performance (kg)	69.3750	13.28768
Yılmaz	Shot put performance (mt)	13.4175	0.27183
	Bench press performance (kg)	66.2500	6.29153
Raziye	Shot put performance (mt)	14.1575	0.48965
	Bench press performance (kg)	70.0000	10.99242
Çoban	Shot put performance (mt)	14.9325	0.31245
	Bench press performance (kg)	94.3750	5.15388

Table 4. Correlation analysis between each subjects' shot put performance, bench press performance, and number of years into the study

			Shot put performance	Bench press performance	Year
Aysel Yılmaz	Shot put performance	r	1	0.996	0.998
		p		0.004	0.002
	Bench press performance	r		1	0.996
		p			0.004
	Year	r			1
		p			
Raziye Çoban	Shot put performance	r	1	0.977	0.945
		p		0.023	0.045
	Bench press performance	r		1	0.923
		p			0.047
	Year	r			1
		p			
Sinem Yıldırım	Shot put performance	r	1	0.952	0.962
		p		0.048	0.038
	Bench press performance	r		1	0.998
		p			0.002
	Year	r			1
		p			
Sare Bostancı	Shot put performance	r	1	0.855	0.979
		p		0.045	0.021
	Bench press performance	r		1	0.939
		p			0.041
	Year	r			1
		p			

By examining the individual four-year shot put and bench press performances of the subjects, a correlation was found between Aysel Yılmaz ($r: 0.996$), Raziye Çoban ($r: =0.977$), Sinem Yıldırım ($r:0.952$), and Sare Bostancı ($r: 0.855$).

**Graph 1.** Graph showing the correlation between shot put performance and bench press performance



Graph 2. Graph showing the correlation between shot put performance and years of practice

The correlation between shot put performance and years of practice once again indicates a positive progress.

4. DISCUSSION AND CONCLUSION

The results of the study indicate that muscular strength is a very important parameter for throwing performance. This is because in order to put the shot, athletes must reach their top speed at the farthest point from where they start the technique within a circular area 2.13m in diameter. The physical constants that define an athlete's performance are their height and the angle of their arm, which collectively means the height of the shot at the moment of putting. The parameters that can be improved with practice, that is, correct technique, speed and strength, define an athlete's ultimate success. The purpose of training is "to maximize physiological adaptation within a desired amount of time through correct and optimal amounts of practice in order to achieve high efficiency" (Bompa and Haff, 2017). It is a known fact that during competition time, maximal strength values can be increased with periodical strengthening exercises. Athletes are currently achieving the highest levels of efficiency ever seen (Bompa and Haff, 2017). In weight training, shot put athletes almost always tend to put the focus on bench press exercises. A bench press mainly exercises the "pectoralis major, anterior deltoids, and triceps brachii" (Bompa et al., 2014) muscles. Previous studies have shown that having a high percentage of type II fibers is strongly related to isokinetic torque production at high movement velocities (Thorstensson et al., 1977; Gregor et al., 1979; Terzis et al., 2003). Isokinetic exercises are the exercises that increase muscular strength the most (Akgün, 1994; Şahin, 2010) and in isokinetic contraction there is contraction at a constant speed throughout a joint's spread of movement and at every angle of the movement the muscles are at maximal strength (Kalyon, 1997; Şahin, 2010). Weight training also increases the mass of the concerned muscles and extends the concerned fibrils, which in turn leads to the increased muscle mass producing more muscular power. It can also be observed that the action of throwing, which is carried out through gradually accelerating momentum in a smooth linear direction, is supported by bench press practices conducted in the same direction.

Analysis results indicate a highly positive correlation between all subjects' shot put and bench press performance averages in the four-year period ($r:0.874$, $p:0.001$). Looking at the correlation between each individual's parameters when measured separately, a significant relationship was observed between the three parameters. A strong relationship was found between bench presses – the subject matter of this study – and shot put performance in every subject. In their study, Patrick T. J. et al. also found a strong correlation between bench presses and shot put performance (Patrick et al., 2011). The same was found in a similar study by Georgiadis G. et al. (2015). It was also observed that in terms of shot put and bench press performances per year, shot put ($r:0.564$, $p:0.023$) and bench press ($r:0.540$, $p:0.031$) performances increased year-on-year. The findings of a case study by Terzis et al. indicated that elite rotational throwing

performance may not be directly related to lean body mass, and instead, may be more closely related to muscle strength measurements (Terzis et al., 2012).

As a result, it is safe to conclude that increased bench press performance translates to increased shot put performance in female shot put athletes, and that shot put performance increases with the number of years of practicing these exercises. Performance in athletics depends on muscle power production, where muscle strength is the product of strength and speed, and thus, either of these components, or both, need to be developed within training programs in order to develop muscle strength and thereby increase performance levels (Mustapha et al., 2019; Zatziorsky, 1995; Mohammed, 2015). In their study, Patrick et al. also state that “athletics coaches should dedicate time to building strength on the bench press” (2011).

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