



## **EFFECT OF TEN-WEEK PLYOMETRIC TRAINING ON THE PERFORMANCE OF AGILITY OF ELITE MALE VOLLEYBALL PLAYERS**

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### **ABSTRACT**

The aim of this study was to examine the effect of 10 weeks of plyometric training on the agility of elite male volleyball players. A total of 30 male volleyball players were selected in the study; the experimental group consisted of 15 players and the control group was composed of 15 players. The treatment group underwent 10 weeks of agility training followed by regular volleyball practices and control group does not underwent any treatment but perform regular volleyball practices. The agility was measured through T-drill test. For the analysis of data dependent t test was applied. The experimental group showed statistically significant differences between pre-test and post- test data whereas the control group did not show any statistically significant differences between pre- and post-test at ( $p < 0.05$ ).

**Key Words:** Plyometric training, T -drill, elite player, Experimental Group

### **INTRODUCTION**

Volleyball, with not having a set time limit, is a dynamic physical game that is based on a high tempo, agility, strength, mobility, flexibility, endurance, and jumping. (Şimşek B. et. al., 2007). Volleyball is one of the most active and exciting sport. Nowadays, it has got a special place among all other ones. In this sport, the presence of aerobic and anaerobic energy and also unpredicted fluctuations of biologic needs are completely observable. In the modern world, athletic experts are attempting to utilize new scientific methods to prepare professional athletes at different national and international competitions. Therefore, utilization of the best appropriate methods of training is the most important basis which must be performed by the experienced in professional fields. Nowadays, there is a wide range of scientific research on athletes, competitions and physical training. Agility, comprised of other motor functions like turning and speed, is the ability to move the body as fast, fluent, easy and controlled as possible during movement from one spot to another. Associated with an individual's speed of changing

positions, agility should also have balance, explosiveness, and coordination (Atacan, 2010). Plyometric drills consisting of explosive movements like stopping, beginning and turning help improve agility. Agility training is improving neuromuscular conditioning and strengthening motor functions of muscle fibers through neural adaptation of Golgi tendon organ and joint movement perception. Theoretically, agility improves by honing balance and body control skills during movement (Atacan, 2010). The modern training program prepares elite volleyball players to face semi-weekly or more high-level games (Mroczek et al., 2017). It is necessary to adopt training methods that increase vertical and lateral jumping abilities and improve leg strength to achieve a successful performance, jump faster and higher in volleyball and other jumping-based sports. Various training methods have been developed to increase jump strength. One of these is plyometric training that is also known as depth jumping or the shock method (Ateşoğlu, 2001). Therefore, the study aims to examine the effect of eight-week plyometric training on elite male volleyball players' agility

**METHOD**

**Participants**

There were 30 elite male volleyball players selected for the study from the Pondicherry region. Random method was applied to select the participants with ages ranging 20 to 22 year, the data was collected in the year 2017. Among 30 players 15 are received the 10 weeks agility training along with participated regular volleyball practices and remaining 15 players kept as control but perform regular volleyball practices. The training was given 3 times in a week and each secession was scheduled at 30 min.

**Exercise Protocol**

The warm-up protocol before start of plyometric training consisted of 5 minutes of warm-up running, 20 minutes of stretching and 5 minutes of running drills, approximately 30 minutes in total. The experimental group performed plyometric training in three alternative days. During the first day of plyometric training, the athletes performed depth jumps and lateral jumps. The athletes first jumped to the ground from a 40cm-high platform and then jumped on the 85cm-high platform from the ground. After

the full rest period, the athletes performed lateral jumps over aligned cones to both right and left. During the second plyometric training day, the athletes jumped over 8 aligned obstacles which are 85cm-high for the determined sets and repetitions. And the third day players perform the mixed exercises from first day and second day.

**Data Analysis**

The descriptive characteristics were obtained through mean and standard deviation. And comparison between pre and post test dependent ‘t’ test was applied at p<0.05 level of significant. All analysis was done through SPSS.

**RESULTS**

The mean pre-test measurement values for the experimental group were 14.01±0.43 seconds, while the control group's pre-test values were 14.89±0.4 seconds. The mean post-test measurement values for the experimental group were 13.20±0.4 seconds while mean values for the control group were 14.78 ±0.5 seconds (Table 1).

**Table 1: Descriptive information about volleyball players (T – drill) (in seconds).**

	Experimental Group				Control Group			
	n	Mean±SD	Max	Min	n	Mean±SD	Max	Min
Pre-test (sec)	15	14.01±0.43	15.60	14.31	15	14.89±0.4	16.06	13.89
Post-test (sec)	15	13.20±0.4	15.00	13.11	15	14.78 ±0.5	15.88	13.98

**Table 2: Statistically significant differences between pre- and post-test means**

	Experimental Group			Control Group		
	Mean ± SD	Difference	p	Mean ± SD	Difference	p
Pre-test (sec)	14.01±0.4			10.10±0.5		
Post-test (sec)	13.20±0.4		.000*	9.9±0.6		.673

\*: p&lt;0.05

Based on the statistical analyses, while there was a statistically significant difference between pre- and post-test agility values in the experimental group (p<0.05), there was no statistically significant difference in control group's pre- and post-test agility values (p<0.05)

## DISCUSSION

Plyometric training has a positive effect on the performances of athletes. Regular, systematic and correct plyometric training affects agility positively in jumping-based sports (Atacan, 2010).

In their study, Sheppard and Young (2006) describe agility as 'sudden body movement involving a change in speed and change of direction in response to a stimulus'. Atacan (2010) used the Illinois agility test to determine the effect of eight-week plyometric training on young male football players' agility and found a 6.88% increase in experimental group athletes, and a 2% increase in the control group. The analyses indicate statistically significant differences between pre- and post-test agility values of the experimental group (p<0.01).

Miller et al. (2006) investigated the effect of six-week plyometric training on agility in elite tennis players, and a significant increase of 4.86% in T-drill test agility values were found in their study. However, there was no statistically significant difference in the control group (p <0.05). In another study, they investigated the effect of plyometric training on subjects' Illinois agility performance and revealed a significant difference in the experimental group (Miller et. al., 2006). Asadi (2013) found that

after six weeks of semiweekly in-season plyometric training, elite male basketball players from the experimental group significantly improved their Illinois agility test performance by 7% from 17.36 ± 0.48 seconds to 16.14 ± 0.5 seconds. A significant increase in the performance of Taekwondo athletes' agility, isokinetic strength, and vertical jumps was observed after six-weeks of plyometric training (Singh et al., 2015).

According to the findings and studies in the relevant literature, one or two types of plyometric exercises improve motor performance significantly, if continued for eight weeks once to thrice a week. Additionally, producing these positive results may be possible with low- volume training programs like 10 repetitions for 2 to 4 sets or 8 repetitions for 4 sets.

In conclusion, it was found that 10-week plyometric training significantly increased the volleyball players' agility. Therefore, it may be advisable to use plyometric training and similar training methods in training plans to improve agility performance of volleyball players.

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