



## Effect of Six Week Plyometric Training on Explosive Strength, Agility, and Foot Reaction Time of Players

Vikas Vijayrao Taywade

<sup>1</sup>Research Scholar, PGTD of Physical Education, Rashtrasant Tukadoji Maharaj Nagpur University (RTMNU) Nagpur, Maharashtra, India.

Dr. Shambhaji Shivajirao Bhonsale

<sup>2</sup>Director of Physical Education & Sports, Shri Mathuradas Mohota College of Science, Nagpur, Maharashtra, India.

### Article History

Volume 6, Issue 12, 2024

Received: 15 June 2024

Accepted: 10 July 2024

Doi:

10.48047/AFJBS.6.12.2024.5417-5420

### Abstract

Present study aimed to see the effect of six-week plyometric training on explosive strength, agility, and foot reaction time of volleyball players. Total 90 trainee were included in the study. The selected players were selected from Nagpur university. Age of volleyball players ranged between 18 to 25 years. Inter-collegiate players were selected for study. Descriptive and comparative (ANOVA) was employed to analyse the data. Result of the study depicted statistically ( $p < 0.05$ ) significant improvement in explosive strength ( $p < 0.05$ ), agility ( $p < 0.05$ ), and foot reaction ( $p < 0.05$ ) time. It is crucial for coaches and athletes to customize plyometric programs according to their sport and personal performance objectives. Continuous monitoring and evaluation of development is key to improving training protocols and achieving sustained enhancements in athletic performance.

**Key words:** plyometric training, explosive strength, agility, foot reaction time, volleyball.

### Introduction

In many different sports, plyometric training is a well-liked technique for improving athletic performance. It entails quick, explosive motions intended to enhance neuromuscular coordination, muscle strength, and agility. Success in a variety of sports, including volleyball, basketball, soccer, and track and field, depends on these qualities. Exercises that are plyometric, including leaps, hops, and bounds, cause muscle-tendon units to undergo fast cycles of stretching and shortening, which results in adaptations that improve force output, neural activation, and movement efficiency (Chandra et al., 2023).

Further research is necessary to determine the precise effects of plyometric interventions on explosive strength, agility, and response speed, particularly in structured training regimens. The amount and duration of plyometric-induced adaptations can be understood to help build evidence-based training plans that are customized for individual athletes and sports. In order to better understand the effects of plyometric training on athletic performance and guide the development of training regimens for athletes who want to be elite in their respective sports,

this study will look at how a six-week program affects athletes' explosive strength, agility, and reaction time (Davies et.al. 2015).

The purpose of this study is to evaluate how an athlete's explosive strength, agility, and reaction time are affected by a six-week plyometric training program. It will establish a defined procedure aimed at achieving these goals, measure changes after training, and compare baseline levels of these parameters before and after the training. To ascertain the program's efficacy, the study will contrast post-training performance outcomes with baseline measurements taken prior to training. Additionally, it will investigate any connections that might exist between training adaption improvements and individual variability. The results may help create evidence-based training plans that players in a variety of sports disciplines can follow to improve their performance in competition.

**Method**

The researcher enlisted the help of ninety participants in order to carry out the study. Inter-collegiate volleyball players were selected from Nagpur University. The participants ranged in age from 18 to 25 and included both males and females. Every one of the players had prior experience playing volleyball. Their training regimen included two hours of instruction and practice time every day. I am free from any health issues or injuries that could hinder my ability to engage in plyometric training. Availability to devote six weeks to plyometric training and follow the agenda.

**Study Design:**

The purpose of this research is to find out how plyometric training affects speed, agility, and explosive strength. The study will employ a pre-test/post-test design, meaning that participants will be measured before the six-week program begins and again right after the training ends. Weekly sessions of plyometric training will focus on lower body explosiveness, agility, and neuromuscular coordination; exercises will be selected according to each participant's particular sport or field of study. Proper technique and safety will be ensured during training sessions by seasoned trainers. Everyone will be told to give it their all while keeping their form correct during each exercise. In order to maximize training adaptations and prevent overuse injuries, a progressive approach will be taken by gradually increasing both the intensity and volume of training. Both before and after training, we will evaluate the results. Tests like standing long jump and vertical jump are designed to measure explosive strength. Specific tests, such the T-test or shuttle run, will be used to assess the participants' agility, which is measured by their ability to rapidly change directions and accelerate or decelerate.

**Statistical Design:**

The data were analysed by using Descriptive (mean, mode, median, SE, SD, skewness, kurtosis etc) and inferential (ANOVA) statistics was employed to analyse the data obtained from the subjects. For this the research scholar used the Micro-Soft Excel and SPSS statistical tool to analyse the data. To test the hypothesis the level of significance was set at 0.05 level of significance, which was considered adequate for the purpose of this study.

**Results**

Table 1: Showing the effect of six-week plyometric training on explosivestrength of players

Variable	Pre test	Post test	ANOVA	
	Mean ± Standard Error	Mean ± Standard Error	F-value	p-value
Explosive Strength	27.75 ± 0.62	39.88 ± 0.83	58.97	p<0.05

Table 1 demonstrated the effect of plyometric training on explosive strength. The results of descriptive statistics did not indicate inter-individual differences in the explosive strength of the subjects. The inferential analysis (ANOVA) revealed statistically ( $p < 0.05$ ) significant

difference between the intervention. On the basis of table it is clearly seen that the explosive strength of post ( $39.88 \pm 0.83$ ) training explosive strength of players were higher than that of pre ( $27.75 \pm 0.62$ ) training players.

Table 2: Showing the effect of six week plyometric training on agility of players

Variable	Pre test	Post test	ANOVA	
Agility	Mean $\pm$ Standard Error	Mean $\pm$ Standard Error	F-value	p-value
	$20.94 \pm 0.14$	$16.88 \pm 0.13$	12.43	$p < 0.05$

Table 2 demonstrated the summary of characteristics of agility (shuttle run) for both pre and post plyometric training. The inferential analysis (ANOVA) revealed statistically ( $p < 0.05$ ) significant difference between the intervention. On the basis of table it is clearly seen that the agility of post ( $16.88 \pm 0.13$ ) training agility of players were higher than that of pre ( $20.94 \pm 0.14$ ) training players.

Table 3: Showing the effect of six week plyometric training on reaction time of players

Variable	Pre	Post	ANOVA	
Agility	Mean $\pm$ Standard Error	Mean $\pm$ Standard Error	F-value	p-value
	$6.79 \pm 0.11$	$6.30 \pm 0.14$	5.51	$p < 0.05$

Table 3 depicted the comparison of foot reaction between pre and post plyometric training. The inferential analysis (ANOVA) revealed statistically ( $p < 0.05$ ) significant difference amongst the studied groups. On the basis of table it is clearly seen that the foot reaction of pre training ( $6.79 \pm 0.16$ ) were found to be higher than that of post ( $6.30 \pm 0.14$ ) training intervention in the study. It means the reaction time of post training is found to be better.

**Conclusion**

The results showed that the athletes' explosive power, agility, and response speed were much enhanced after just six weeks of plyometric exercise. Research shows a considerable gain in explosive strength, agility, and reaction time, and a notable decrease in the latter two. Plyometric workouts, which are based on biomechanical principles, improve neuromuscular coordination, power generation, agility, and speed through quick muscle contractions and stretches.

Research across a wide range of sports has demonstrated that plyometric training improves performance, especially for activities that call for quick changes of direction, acceleration, and deceleration. Athletes can improve their explosive power and agility, two qualities crucial to winning competitions, by including plyometric activities in their training programs. The severity of these changes, however, may depend on the length and scope of the intervention. To improve athletic performance outcomes while limiting injury risk, future study should explore ideal parameters of plyometric training, including volume, intensity, and rest periods.

It is crucial for coaches and athletes to customize plyometric programs according to their sport and personal performance objectives. Continuous monitoring and evaluation of development is key to improving training protocols and achieving sustained enhancements in athletic performance.

**Reference:**

1. Chandra S, Sharma A, Malhotra N, Rizvi MR, Kumari S. Effects of Plyometric Training on the Agility, Speed, and Explosive Power of Male Collegiate Badminton Players. J Lifestyle Med. 2023 Feb 28;13(1):52-58.

2. Davies G, Riemann BL, Manske R. CURRENT CONCEPTS OF PLYOMETRIC EXERCISE. *Int J Sports Phys Ther.* 2015 Nov;10(6):760-86.
3. Huang, Hsuan, Wei-Yang Huang, and Cheng-En Wu. (2023) The Effect of Plyometric Training on the Speed, Agility, and Explosive Strength Performance in Elite Athletes. *Applied Sciences* 13, no. 6: 3605.
4. Mala and P Manjupushpa. (2022). Effect of specific skill training with pilates training on skill performance variables of school level volleyball players. *International Journal of Physical Education, Sports and Health.* 9(3): 76-78
5. N Deng, KG Soh, D Huang, B Abdullah, S Luo and W Rattanakoses (2022). Effects of plyometric training on skill and physical performance in healthy tennis players: A systematic review and metaanalysis. *Front. Physiol.* 13:1024418. doi: 10.3389/fphys.2022.1024418
6. J.S. Yook, D.Y. Kim, D.H. Choi, Y.Y. Hwang (2022). Effectiveness of Pilates Training on Body Composition and Isokinetic Muscular Strength in Adolescent Baseball Players. *Int. J. Environ. Res. Public Health.* 19, 12085. <https://doi.org/10.3390/ijerph191912085>
7. Mina Soflaei, Tabassom Ghanavati, Ali Asghar Norasteh, Parvin Sarbakhsh and AliE Oskouei (2022). The Effectiveness of Core Muscle Training on Skill and Balance for Snooker Players. *Asian J Sports Med.* 13(3):e131152. <https://doi.org/10.5812/asj-sm-131152>.
8. Ramsha Sohail, Armaghan Khalid, Zainab Qadri, Madiha Shah & Rizwana Butt. (2021). Effects of Pilate Training on Physical Performance of Cricketers. *The Rehabilitation Journal.* 5. 198-202. 10.52567/trj.v5i01.57.
9. Wubliker Tibebu Guadie (2021). Effects of Plyometric Training on Technical Skill Performance of Handball Team Players at Debre Markos Town. *International Journal of Sports Science and Physical Education.* 6(3); 41-47. doi: 10.11648/j.ijsspe.20210603.11
10. K. Yoka, M. Akıl, E. Top (2021). The Effect of Core Training Performed with Pilates Ball on the Static and Dynamic Balance Performance of Footballers. *Niğde Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi.* 15(3), 429-439.