Impact of Integrated Plyometric and Resistance Training on Shot Put Performance: A Contemporary Approach to Athletic Conditioning

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Abstract

The purpose of this study was to evaluate the impact of combined plyometric and weight training on Shot Put performance among intercollegiate male athletes over a 12-week training intervention. Thirty-two male students, aged 21 to 28, from Dr. Sivanthi Aditanar College of Physical Education, Tiruchendur, participated in the study. The intervention involved a structured training program with progressive intensity levels ranging from 60% to 80%, assessed at three key points: before, during, and after the 12-week period. Shot Put performance served as the dependent variable, while the timing of assessment acted as the independent variable. Data were analyzed using descriptive statistics and repeated measures ANOVA with a significance level set at 0.05, utilizing SPSS software. Post hoc tests were conducted when significant F-values were observed to identify the stages with notable performance differences. The results showed a consistent and statistically significant improvement in Shot Put performance, especially in the second half of the training period (weeks 6–12), as compared to the baseline and initial phase (weeks 1–6). These findings underscore the effectiveness of training cyclicity, neuromuscular adaptation, and the role of eccentric-concentric muscle contractions in power development. The study concludes that a combined plyometric and weight training approach, when applied with proper progression, significantly enhances Shot Put performance in collegiate athletes.

Keywords: **Shot Put Performance, Plyometric Training, Weight Training**.

1. Introduction

The Shot Put is a key track and field event for both men and women in athletics. It requires high explosive strength, with performance largely dependent on muscle power, a combination of force and velocity. Effective training focuses on developing strength and speed-strength, especially through resistance and Olympic-style lifting. While resistance training benefits novice and intermediate throwers, its overall impact remains under study. Throw distance depends on release velocity, angle, and height, with efficient technique and coordination critical. Around 50% of the throw's power comes from the legs, 30% from the trunk, and 20% from the arms. Explosive

strength is more vital than absolute strength, and performance in jumps and sprints strongly correlates with Shot Put success. Techniques include the Glide and Spin.

2. Methods

In this study, Shot Put performance was measured in the same group of individuals over a 12-week intervention period, which included assessments before, during, and after combined plyometric and weight training. This training program aimed to enhance the athletes' Shot Put performance through systematic progression. The dependent variable in the study was Shot Put performance, while the independent variables were the time points of measurement, specifically, the performance recorded before, during, and after the 12 weeks of the selected training intervention.

2.1 Research Design

In a repeated measures or within-groups design, a single group of participants is exposed to all conditions of the independent variable, measured at multiple time points. In this study, the independent variable—time—had three conditions: before, during, and after training. Each participant's Shot Put performance (dependent variable) was assessed at all three stages over 12 weeks. This within-subjects approach allows for observing performance changes over time within the same individuals, enhancing measurement reliability and control.

2.2 Participants and Procedures

To fulfil the purpose of this study, 35 male students from Dr. Sivanthi Aditanar College of Physical Education, Tiruchendur, were randomly selected as participants. After removing three outliers, 32 students aged between 21 and 28 years were finalized for the study. These participants underwent a 12-week combined plyometric and weight training program in addition to their regular physical education curriculum. The subjects were randomly assigned to the training program, which was conducted three days a week on alternate mornings and evenings. For effective management, they were divided into two groups of 16. The initial two weeks served as an introduction, with intensity gradually increasing from 60% to 80% of 1RM based on individual potential. Plyometric load was modified using box height and jump count. Performance data were collected before training, at six weeks, and after 12 weeks.

2.3 Instruments and Materials Used

The equipment used, including a plyometric box, barbell, weight plate, and Shot Put tools, was sourced from Dr. Sivanthi Aditanar College.

2.4 Data Analysis

Descriptive statistics were used to analyze Shot Put performance before, during, and after the combined plyometric and weight training program. To assess the significance of mean differences across these repeated measures, a Repeated Measures ANOVA was employed. This statistical method provides an F value to indicate whether significant differences exist among the means at various stages of the training intervention. When the F value was significant, a post hoc test was conducted to identify which specific stages differed. All hypotheses were tested at the 0.05 significance level, and data analysis was performed using the Statistical Package for Social Sciences (SPSS).

2.5 Ethical Considerations

Informed consent was obtained from all participants after explaining the study's purpose, procedures, risks, and benefits. Participation was voluntary with the option to withdraw anytime.

The study maintained confidentiality and followed ethical guidelines approved by the institutional ethics committee.

3. Results and Discussion

The study revealed that the 12-week combined plyometric and weight training program significantly improved Shot Put performance, with the greatest gains occurring between weeks 6 and 12. Shot Put demands explosive strength through coordinated movements and stretch reflexes across body segments. Plyometric training enhanced neuromuscular efficiency, crucial for elite performance. Training intensity, gradually increased from 60% to 80%, was carefully structured to optimize results. This progression contributed to consistent improvements in pre-, mid-, and post-test performance assessments throughout the intervention period.

3.1 Analysis of Descriptive Statistics

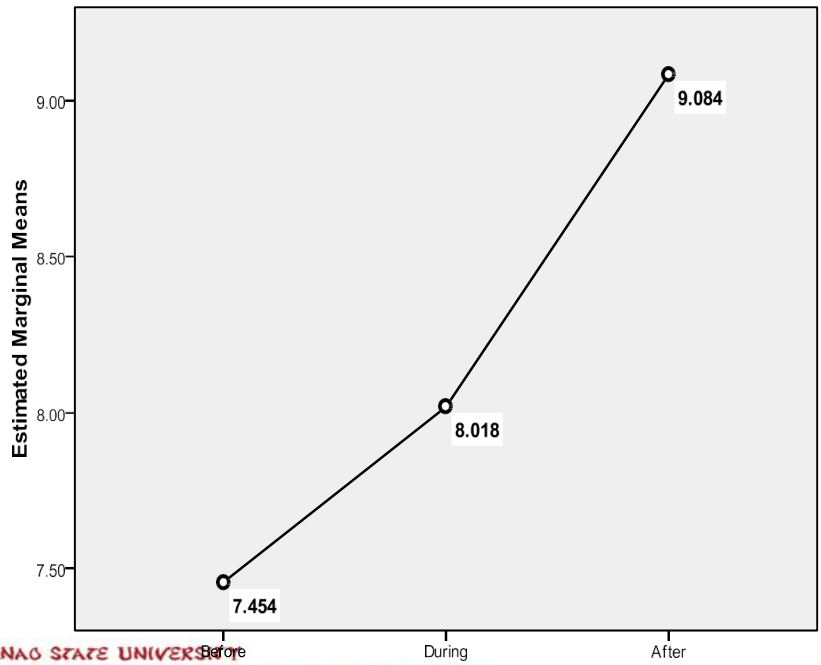
Table – I

Descriptive Statistics on Shot Put Performance due to Combined Plyometric and Weight Training Intervention Over 12 Weeks on Before, During and After Test

Variables	Mean	SD (±)	Minimum	Maximum	Range
Before Training Intervention	7.45	0.83	6.04	8.97	2.93
During Training Intervention	8.02	0.84	5.88	9.82	3.93
After Training Intervention	9.08	0.82	7.65	10.58	2.93

Table I shows increasing mean Shot Put performance scores across training phases: post-training (9.08), during (8.02), and pre-training (7.45), indicating consistent improvement with relatively equal variance and range differences.

Fig 1: Profile Plot shows the Mean Values of Combined Plyometric and Weight Training



Intervention before, during and after 12 weeks on Shot Put Performance

4. Conclusion

The study concluded that combined plyometric and weight training significantly improved Shot Put performance over 12 weeks, with progressive gains observed at each phase. The most substantial improvements occurred in the final six weeks, highlighting the effectiveness of sustained, structured training. Moderate gains were noted during the initial phase, while pre-training levels were the lowest. The findings emphasize the value of consistent, intensifying training for developing explosive strength. Future research should explore the influence of physical, physiological, psychological, and demographic factors. Limitations included the exclusion of nutritional status and regional influences, which should be addressed in future, more comprehensive studies.

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