The Effects of Multiple Training on the Performance of Shotput Players

Usama Maqbool[1], Sara Ijaz[2], Dr. Muhammad Zia ul Haq[3]

Abstract

This study aimed to examine the effect of plyometric and strength training on the performance of shot-put players. Ten shot put players were selected for plyometric training, (N = 10) for strength, and (N=10) for the control group, with (19.23 ± 2.18) years of age. These training programs are for eight weeks, with five days per week. The following variables were selected as pre- and post-training using tests shot put distance, standing broad jump, countermovement jump, tipple standing jump, 30m dash, sit-ups, and push-ups. Two-way repeated measurement ANOVA was applied for statistical analysis. Pearson's correlation was used to find the relationship between pre and post-test. The results showed that the strength group significantly improved the shot-put distance, standing broad jump, and 30m race after 8 weeks of training. This finding indicates that experienced players attended training sessions regularly. Therefore, the strength group showed the greatest improvement in shot put performance compared to the plyometric and control group. Therefore, it is recommended that shot put players participate regularly in training to improve their shot-put performance.

Keywords: Plyometric training, strength training, shot put performance, Shot Put Players, Performance Improvement

Introduction

In the shot put, competitors attempt to throw a heavy metal ball as far as possible by setting it on the ground and then propelling it forward with one hand. At the back of the circle, they use their powerful hamstrings, gluteus maximus, and quadriceps muscles to sprint across the field in pursuit of the heavy metal shot (Thaqi et al., 2021). Shot put athletes benefit greatly from plyometric training. These plans feature multiple training sessions and rest periods between drill loads. Athletes increase their shot-put performances by engaging in a variety of explosive actions in this program (Sharma & Mukhopadhyay, 2022). Power output in the upper limb muscles and maximal force transmission in the arm are both improved with plyometric training (Thompson et al., 2021). Fitness practitioners may use the term agility to describe the improved ability to quickly shift directions due to this training. Plyometric leg exercises emphasize

[1&2] M. Phil Scholar, Department of Physical Education and Sports Sciences, The Islamia University of Bahawalpur. usamaIUB24@gmail.com, saraijaz3694@gmail.com
[3] Associate Professor, Department of Physical Education and Sports Sciences, The Islamia University of Bahawalpur. muhammad.zia@iub.edu.pk

developing explosive power and quickness in the lower body through a variety of jumping and lunging motions (Anousaki et al., 2021). The power of the thrower's legs and the steadiness of his or her base of support during the shot put (Sharma & Mukhopadhyay, 2022).

Strength training is essential in the sport, and it is generally agreed that sit-ups and push-ups are the most useful workouts for shot putters looking to improve their grip, wrist flexion, and forearm extension(Lum et al., 2020). Throwing a shot put is a fast-paced, high-stakes activity. When it comes to whole-body performance, strength training is a key factor (Sakamoto et al., 2018). Strength training is utilized to improve the athletic performance of shot-put players. Strength training can be used as a safe and effective progressive overload strategy in preparation for and during competition. The improvements in the performance of inexperienced shot-put throwers after engaging in a brief strength training program (Hammami et al., 2020). The sit-ups, the push-ups, and the race 30 m are the three main strength exercises used for training groups. For eight weeks, three times a week, both groups worked to improve their upper and lower body strength by performing the same set of exercises in the same order (Zaras et al., 2019). Throwing a shot put is a fast-paced, high-stakes activity. When it comes to whole-body performance, strength training is a key factor (Xiao et al., 2022). The proposed study aims to inspect the effect of multiple training on the performance of shotput athletes. To attain the specific purpose the existing research suggests the following objectives. To examine the effect of plyometric and strength training on the performance of shot-put players and body composition. To investigate the significant effects of plyometric and strength training on the physical fitness of shot-put players.

Materials Method

The study was conducted using an experimental design. The subject consisted of ($n = 30$) young athletes (19.23 ± 2.18) years of age. There are three groups, 1st is plyometric, 2nd strength training groups and 3rd group is the control group. The plyometric and strength training groups participated in eight weeks of training with five days of work each week.

Training procedures

This 8-week, 5-days-per-week program combines plyometric and strength training. The program was structured around a weekly progression which increased workout duration and target counts. The training drills were based on actual shot put thrown throughout the regular season as guided (Thaqi et al., 2021). So, the plan was chosen to help shot putters retain and enhance their abilities. Twenty minutes warm-up before training and 20 minutes cool down exercise after training. The purpose of the training program was to enhance the strength, quickness, and aerobic power of shot-put players.

Instrumentation and Procedure of Data Collection

Most studies checking the fitness of shot-put athletes use a set of tests. These tests usually take place on the field and measure different parts of their shot-put performance. Physical fitness tests were conducted to assess the players' fitness. Speed and quickness were measured with a 30m dash test, strength was evaluated with a standing broad jump, and endurance and muscle development were tested using sit-ups and push-ups.

This test of explosive leg power is widespread and simple to administer. The standing wide jump is performed by lining up one's feet at a line painted on the ground and launching off at a 45-degree angle. To gauge a person's leg's explosive strength, the jump must be redone if the athlete stumbles or takes a step backwards during take-off. Jumping distance can be measured using a tape measure, and a soft-landing area and nonslip floor are both desirable. Evaluation of leg speed and power. In the event of a missed take-off or a regressed landing, the athlete must redo the leap (Caughey & Thomas, 2022).

For experienced shot putters of varying performance levels, the 30 m dash test is used to measure acceleration and is a solid indicator of speed. Every effort, both before and after sprinting, is displayed (Thaqi et al., 2021). It's done to run 30 meters in a straight line. Time should be noted precisely for each take. Sprints and other measures of speed can be administered over a range of distances, depending on the nature of the test and its practical application in the game being played. This is a summary of the 30-metre dash. The purpose of this evaluation is to establish velocity and acceleration (Abdelkader et al., 2020).

A staple of any fitness routine, sit-ups are akin to push-ups. The physical therapist you see will also likely endorse them as a smart strategy for building abdominal muscle and toning up overall. A strong core can help you avoid injuries in the car or at work, have better posture, and perform better in sports (Kontou et al., 2018). Athletes could complete an average of 15 sit-ups in a minute before training, but after training, that number increased to almost 30 by a statistically significant margin (Thaqi et al., 2021).

When doing push-ups, the person did it with their hands spread wide apart on the floor. Starting in a plank position with the body rigid from the neck down, the exercise was finished. First, I had my hands on my shoulders, fingers pointing ahead. The hands dangled directly below the shoulders inside views. From this position, the test volunteers were told to bend their elbows and lower their bodies until their chests almost touched the floor. As the subject got there, he abruptly turned around and went in a different direction. During the concentric portion of the movement, the cadence was held at a voluntary pace of 2 seconds per downbeat. A stronger arm and faster throw are possible benefits (Horst et al.,

2020).

Results

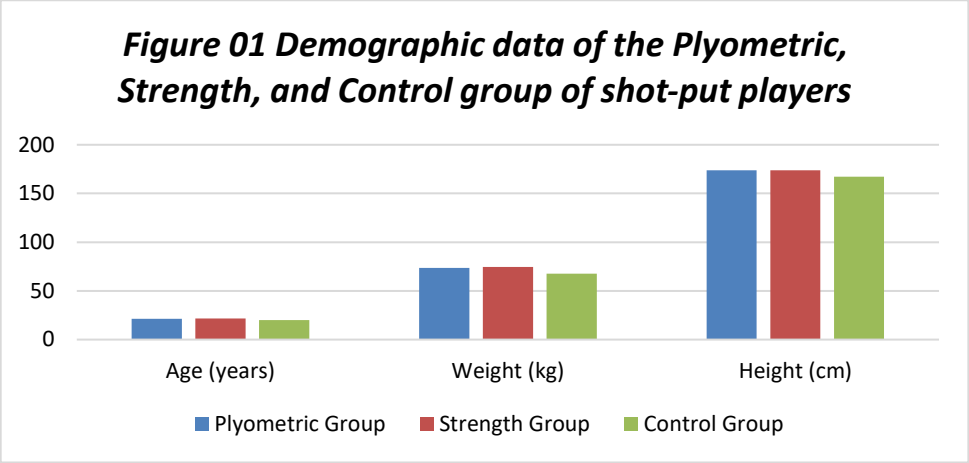
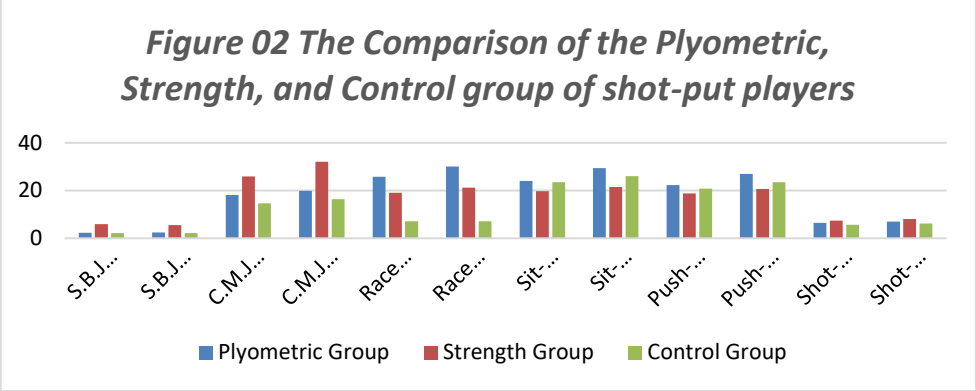


Figure 1 shows the mean age of the plyometric, strength, and control group was measured. There was no statistically significant difference among the control and plyometric, strength groups in age, weight, and height.



Significant value was adjusted at $P < 0.05$

Table 2: shows a statistically significance difference between the control and plyometric, strength groups, the strength group is significantly higher in the standing broad jump (F = 7.68 & P =.013).

There was a statistically significance difference between the control and plyometric, strength groups, the plyometric group was significantly higher in race 30m (F = 2.04 & P = .003). There was a statistically significance difference between the control and plyometric, strength groups were significantly higher in

setups than in other groups (F=0.531 & P = .047). There was a statistically significance difference between the control and plyometric, strength groups, The plyometric group is significantly higher in push-ups (F =0.354 & P = .013). There was a statistically significance difference between the control and plyometric, strength groups, The strength group is significantly higher in shot-put throwing performance (F = 2.63 & P = .001).

Discussion

A significant difference was also found in standing broad jump and 30m dash. The strength and plyometric group are significantly higher than the control group. The significance value of the standing broad jump of the strength group is (P=.013) and the 30m dash value of the plyometric group (P=.003) is significantly higher and found a relationship with a shot-put performance. The same fact was supported by(Horst et al., 2020) the study they revealed that strength group and plyometric perform better in standing broad jump and 30m dash with shot put performance. The significance value in their study was found standing broad jump (P=.012) and 30m dash (P=.003) was found significant. The results showed are same in past and present research. Additionally, both studies found a relationship between these two performance indicators (standing broad jump and 30m dash) and shot-put performance. It's interesting to note that both studies had similar results, with similar significance levels for the standing broad jump (P =.013) and 30m dash (P=.003).

The results showed a significant difference between the mean values observed in the sit-up test. The plyometric group was found significantly higher in sit-ups than the strength and control groups. The significance value (P=.047) was found significant. Similar results support the study of (Horst et al., 2020) in their study, the consequences presented that the plyometric group showed significantly higher results in sit-ups (P = .043). In the present study found plyometric group was found significantly higher than the strength and control group. This finding is consistent with the results of (Pisz et al., 2023) study, which also found that the plyometric group had significantly higher results in sit-ups compared to the strength and control groups, with a significance value of (P=.043). The fact that both studies found results adds further support to the idea that plyometric training may be particularly effective in improving strength and performance, as assessed by the sit-ups test. Results show that the plyometric group has significantly higher push-ups than the strength and control group. The plyometric group performs better in push-ups and is significantly higher than the strength and control groups. The significance value for this difference was (P=.013), indicating a statistically significant difference between the groups. Similar results support the study of (Thomas et al., 2022) in their study the presented results showed that the plyometric group was significant in their push-up test value (P

=. 012) as compared to the control group. The fact that both studies found similar results suggests that plyometric training may be particularly effective in improving upper body strength and endurance, as assessed by the push-ups test. This could have important implications for shot put performance.

The result in Table 2 showed a significant difference between mean values observed in shot put throwing performance. The strength group was found significantly higher shot-put throwing performance than the plyometric and control groups. The shot-put throwing performance value increased after the eight weeks of training in the strength group (P = .001). The similar results support the study of (Chen et al., 2022)in their study the shot put throwing performance increased after the strength and plyometric training. The increased value (P =.001). The strength group was significantly higher in the shot-put throwing performance as compared to the plyometric and control group. The fact that both studies found similar results suggests that strength training may be particularly effective in improving shot put throwing performance. This could have important implications for athletes who compete in events that require throwing, such as track and field.

The previous studies supported that there is conflicting evidence regarding the effects of plyometric training on the performance of shot-put athletes. Some studies have shown significant improvements in measures such as shot put distance and velocity following plyometric training interventions (Kontou et al., 2018; Thaqi et al., 2021) while others have found no significant effects (Caughey & Thomas, 2022). However, it should be noted that the effectiveness of plyometric training may depend on factors such as the duration and frequency of the intervention, the specific exercises used, and the individual characteristics of the athletes. Based on the current literature, it is difficult to make a definitive statement about the benefits of shot-put performance with plyometric exercises. However, it may be that plyometric training can be a useful addition to a comprehensive training program for shot put athletes, particularly when combined with other types of training such as strength and technique training. One recent study that supports this idea is the meta-analysis by (Finlay et al., 2022) which examined the effects of plyometric training on measures of power and strength in athletes. The authors found that plyometric training interventions were associated with small to moderate improvements in measures of power and strength, although the effect sizes varied depending on the specific outcome measure.

Several studies have examined the effect of strength training on shot put performance in athletes. One such study by (Zaras et al., 2019) investigated the effect of an 8-week strength training program on the shot put performance of 20 male athletes. The study randomly assigned the athletes to either an experimental

group or a control group. The athletes in the plyometric and control group underwent an 8-week strength training program consisting of three sessions per week, while those in the control group continued with their regular training routine. Results of the study showed that the experimental group experienced a significant improvement in shot put performance compared to the control group. Specifically, the experimental group increased their shot-put performance by an average of 9.6%, while the control group only showed a 1.6% improvement. Additionally, the study found that the strength training program had a positive effect on various physical parameters, such as maximal strength, power, and speed. Another study (Schofield et al., 2022) also investigated the effect of an 8-week strength training program on shot put performance. The study included 30 male shot-put athletes who were randomly assigned to either an experimental group or a control group. The experimental group underwent an 8-week strength training program consisting of three sessions per week, while the control group continued with their regular training routine.

The study's findings revealed that the strength group had a significant improvement in shot put performance compared to the plyometric and control group. Specifically, the strength group increased their shot-put performance by an average of 11.6%, while the plyometric group only showed a 1.6% improvement. Additionally, the study found that the strength training program had a positive effect on various physical parameters, such as maximal strength and power. In conclusion, these studies suggest that players' shot-put performance can be considerably improved by an 8-week strength training program. The training program should include exercises that target maximal strength, power, and speed. These findings may be helpful for coaches and athletes looking to improve their shot-put performance.

Conclusion

There is evidence to suggest that multiple training, including plyometric training and strength training, can have a significant positive effect on the performance of shot-put players. A study by (Sharma & Mukhopadhyay, 2022) investigated the effects of a multiple training program on the performance of elite shot-put athletes. The program included plyometric training and strength training and was carried out for 8 weeks. The control group only participated in their regular shot-put training. At the end of the study, the strength group showed significant improvements in shot put performance, including increased throwing distance and improved shot-put technique. The researchers concluded that a multiple training program that includes plyometric training and strength training can be effective in improving the performance of shot-put players. Another study by (Schofield et al., 2022) investigated the effects of strength training on the performance of shot put athletes. The program included heavy resistance training

and was carried out for eight weeks. At the end of the study, the strength group showed significant improvements in shot put performance, including increased throwing distance and improved shot-put technique.

Recommendations

on the research, the following recommendations can be made for coaches and shot-put players looking to improve their performance through multiple training Include plyometric training: Plyometric training can improve shot put performance by increasing explosive power and improving overall athleticism. Coaches should include exercises such as standing broad jump, triple standing jumps, and countermovement jumps. Include strength training training: Shot put athletes should also engage in strength training that focuses on improving technique and form. Coaches should provide feedback and guidance on proper technique, as well as drills and exercises that simulate the movements used in shot put throwing.

Develop a periodized training program: A periodized training program that gradually increases in intensity and volume over time can help prevent injury and improve performance. Coaches should work with shot put athletes to develop a program that includes different phases of training, such as hypertrophy, strength, and power phases.

Reference

Abdelkader, G., Madani, R., & Bouabdellah, S. (2020). Kinematical variables analysis of shot-put activity in para-athletics (class F32/33) and their relationships with digital level achievement. *International Journal of Sport Exercise and Training Sciences-IJSETS*, *6*(2), 65-72.

Anousaki, E., Zaras, N., Stasinaki, A.-N., Panidi, I., Terzis, G., & Karampatsos, G. (2021). Effects of a 25-week periodized training macrocycle on muscle strength, power, muscle architecture, and performance in well-trained track and field throwers. *The Journal of Strength & Conditioning Research*, *35*(10), 2728-2736.

Caughey, R. M., & Thomas, C. (2022). Variables associated with high school shot put performance. *International Journal of Exercise Science*, *15*(6), 1357.

Chen, C.-F., Chuang, M.-H., & Wu, H.-J. (2022). Joint energy and shot mechanical energy of glide-style shot put. *Proceedings of the Institution of Mechanical Engineers, Part P: Journal of Sports Engineering and Technology*, 17543371221123168.

Finlay, M. J., Bridge, C. A., Greig, M., & Page, R. M. (2022). Upper-body post-activation performance enhancement for athletic performance: a systematic review with meta-analysis and recommendations for future research. *Sports Medicine*, *52*(4), 847-871.

Hammami, M., Gaamouri, N., Suzuki, K., Shephard, R. J., & Chelly, M. S. (2020). Effects of upper and lower limb plyometric training program on components of physical performance in young female handball players. *Frontiers in Physiology*, *11*, 1028.

Horst, F., Janssen, D., Beckmann, H., & Schöllhorn, W. I. (2020). Can individual movement characteristics across different throwing disciplines be identified in high-performance decathletes? *Frontiers in psychology*, *11*, 2262.

Kontou, E. I., Berberidou, F. T., Pilianidis, T. C., Mantzouranis, N. I., & Methenitis, S. K. (2018). Acute effect of upper and lower body postactivation exercises on shot put performance. *The Journal of Strength & Conditioning Research*, *32*(4), 970-982.

Lum, D., Haff, G. G., & Barbosa, T. M. (2020). The relationship between isometric force-time characteristics and dynamic performance: a systematic review. *Sports*, *8*(5), 63.

Pisz, A., Blazek, D., Jebavy, R., Kolinger, D., Wilk, M., Krzysztofik, M., & Stastny, P. (2023). Antagonist activation exercises elicit similar post-activation performance enhancement as agonist activities on throwing performance. *BMC Sports Science, Medicine and Rehabilitation*, *15*(1), 44.

Sakamoto, A., Kuroda, A., Sinclair, P. J., Naito, H., & Sakuma, K. (2018). The effectiveness of bench press training with or without throws on strength and shot put distance of competitive university athletes. *European journal of applied physiology*, *118*, 1821-1830.

Schofield, M., Cronin, J. B., Macadam, P., & Hébert-Losier, K. (2022). Rotational shot put: a phase analysis of current kinematic knowledge. *Sports Biomechanics*, *21*(3), 278-296.

Sharma, B., & Mukhopadhyay, K. (2022). Analysis of selected physical parameters of Olympic gold medalist shot putters. *Педагогико-психологические и медико-биологические проблемы физической культуры и спорта*, *17*(4 (eng)), 17-25.

Thaqi, A., Berisha, M., & Asllani, I. (2021). The effect of plyometric training on performance levels of the shot put technique and its related motor abilities. *Pedagogy of physical culture and sports*, *25*(3), 144-151.

Thomas, K., Spyridon, M., Nikolaos, Z., Angeliki-Nikolleta, S., Giorgos, K., Giorgos, G., & Gerasimos, T. (2022). Effects of complex vs. compound training on competitive throwing performance. *The Journal of Strength & Conditioning Research*, 10.1519.

Thompson, H. A., Mousa, A., Dighe, A., Fu, H., Arnedo-Pena, A., Barrett, P., . . . Chaw, L. (2021). Severe acute respiratory syndrome coronavirus 2

(SARS-CoV-2) setting-specific transmission rates: a systematic review and meta-analysis. *Clinical Infectious Diseases*, *73*(3), e754-e764.

Xiao, Y., Zhang, H., Li, Z., Huang, T., Akihiro, T., Xu, J., . . . Lin, F. (2022). An amino acid transporter-like protein (OsATL15) facilitates the systematic distribution of thiamethoxam in rice for controlling the brown planthopper. *Plant Biotechnology Journal*, *20*(10), 1888-1901.

Zaras, N., Stasinaki, A.-N., Methenitis, S., Karampatsos, G., Fatouros, I., Hadjicharalambous, M., & Terzis, G. (2019). Track and field throwing performance prediction: Training intervention, muscle architecture adaptations and field tests explosiveness ability. *Journal of Physical Education and Sport*, *19*, 436-443.