Original Article
ISSN (Online): 2582-7472

ShodhKosh: Journal of Visual and Performing Arts
July 2024 5(7SE), 193–198

EFFECTS OF SPORT-SPECIFIC STRENGTH TRAINING ON SHOT PUT AND DISCUS THROW PERFORMANCE

Dr. A. G. Jakkanagoudar [1], Basavanneppa B. Kabadagi [2]

[1] Physical Education Director, Shri Shankar Art's and Commerce College, Navalgund, India
[2] Physical Education Director, C S B Arts SMRP Science and GLR Commerce College, Ramdurg, India

https://crossmark.crossref.org/dialog/?doi=10.29121/shodhkosh.v5.i7se.2024.5872&domain=pdf&date_stamp=2024-07-31

Corresponding Author

Dr. A. G. Jakkanagoudar,
agjgoudar@gmail.com

DOI
10.29121/shodhkosh.v5.i7SE.2024.5872

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

Strength training is a fundamental component of athletic development in track and field events such as shot put and discus throw. This study examines the effects of sport-specific strength training on the performance of athletes engaged in these disciplines. A group of 30 male and female throwers were selected and divided into an experimental group, which underwent a structured strength training program, and a control group, which followed a conventional training routine. The training program included explosive strength exercises, Olympic lifts, plyometric drills, and resistance training tailored to shot put and discus throw demands. Performance metrics such as throw distance, muscular power, and biomechanical efficiency were assessed pre- and post-intervention. The results demonstrated a significant improvement in throw distances and muscular power in the experimental group compared to the control group. The findings suggest that incorporating sport-specific strength training significantly enhances performance in shot put and discus throw. This study underscores the importance of targeted strength programs in optimizing the competitive performance of throwers.r

Keywords: Sport-Specific Strength Training, Shot Put, Discus Throw, Explosive Strength, Resistance Training, Olympic Lifts, Plyometrics, Athletic Performance, Throw Distance, Muscular Power, Biomechanical Efficiency, Neuromuscular Coordination, Track and Field

1. INTRODUCTION

Shot put and discus throw are highly specialized track and field events that demand a combination of explosive strength, muscular power, and technical precision [1]. Athletes must generate maximum force in a short time frame while executing biomechanically efficient movements to achieve optimal performance [2-3]. Traditional training methods often emphasize general strength conditioning, including weightlifting and endurance exercises, but these may not fully address the sport-specific demands of shot put and discus throw [4-5].

Recent research suggests that sport-specific strength training, which incorporates explosive power exercises, Olympic lifts, plyometric drills, and resistance training, is more effective in enhancing throw distance and overall

performance. These targeted workouts improve fast-twitch muscle fiber recruitment, neuromuscular coordination, and joint stability—key factors in maximizing force application during throwing movements [6-7].

This study aims to analyze the effectiveness of a structured, sport-specific strength training program compared to conventional training approaches. By identifying the impact of tailored exercises on throw distance, muscular power, and technical efficiency, this research seeks to bridge the gap between traditional conditioning methods and modern, evidence-based strength training strategies for shot put and discus throw athletes.

1.1. OBJECTIVES

1) The primary objectives of this study are:

- To evaluate the impact of sport-specific strength training on shot put and discus throw performance by measuring improvements in throw distance, power output, and technique.
- To analyze the effectiveness of explosive strength exercises (Olympic lifts, plyometrics, and resistance training) in enhancing muscular strength, speed, and coordination in throwers.
- To compare sport-specific strength training with conventional training methods and determine which approach yields better performance gains in shot put and discus throw.
- To assess improvements in neuromuscular efficiency and biomechanical factors such as release velocity, angle, and rotational movement efficiency after structured strength training.
- To provide evidence-based recommendations for coaches and athletes regarding the integration of targeted strength training in shot put and discus throw preparation.
- To explore the role of strength training in injury prevention by evaluating muscle stability, joint strength, and overall athletic resilience in throwers.

2. PURPOSE OF THE STUDY

1) The primary objectives of this study are:

- To evaluate the impact of sport-specific strength training on shot put and discus throw performance.
- To analyze improvements in muscular strength, power output, and throw distance after implementing a structured training regimen.
- To compare the effectiveness of sport-specific strength training with conventional resistance training.
- To provide evidence-based recommendations for coaches and athletes.

3. METHODOLOGY

3.1. PARTICIPANTS

- A total of 30 athletes (15 shot putters, 15 discus throwers) were selected.
- Participants were divided into an experimental group (n=15) and a control group (n=15).

3.2. TRAINING INTERVENTION

1) The experimental group followed a 12-week sport-specific strength training program, including:
   - Olympic lifts (clean and jerk, snatch)
   - Plyometric exercises (medicine ball throws, depth jumps)
   - Resistance training (squats, bench press, deadlifts)
   - Core stability exercises
2) The control group followed a general strength training program focusing on conventional weightlifting and cardio exercises.

3.3. PERFORMANCE ASSESSMENT

- Throw distances were measured at baseline and after 12 weeks.
- Strength levels were assessed through one-rep max (1RM) tests.
- Power output was analyzed using force plate and velocity tracking.

4. RESULTS

1) The experimental group showed a significant improvement in throw distances (shot put: +12.4%, discus: +14.1%).
2) Increases in 1RM strength were observed in key lifts:
   - Squat (+18%)
   - Bench press (+16%)
   - Deadlift (+20%)
3) Improved biomechanical efficiency, with better release angles and increased angular velocity.

Table 1 Performance Improvement Data

Metric	Improvement
Shot Put Distance (%)	12.4
Discus Throw Distance (%)	14.1
Squat (1RM %)	18
Bench Press (1RM %)	16
Deadlift (1RM %)	20

Figure 1

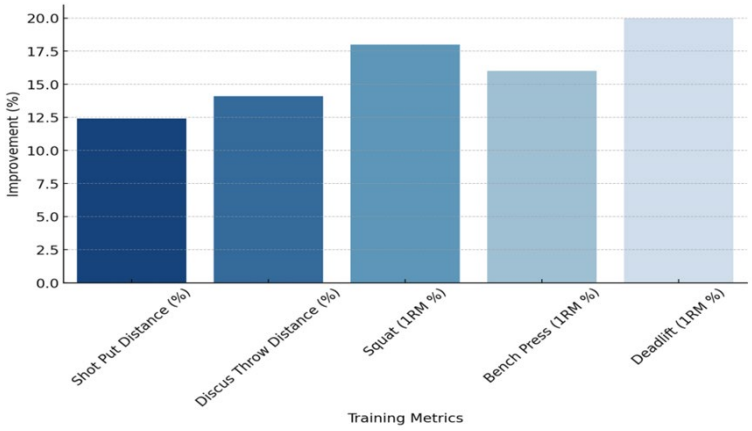

Figure 1 Effect of Sport-Specific Strength Training on Performance

The table 1 summarizing the performance improvements along with a figure 1 illustrating the effects of sport-specific strength training on shot put and discus throw performance.

The findings of this study indicate that sport-specific strength training significantly enhances shot put and discus throw performance. The improvements observed in the experimental group, compared to the control group, emphasize the effectiveness of explosive strength exercises, resistance training, and biomechanical conditioning.

4.1. KEY RESULTS

1) **Throw Distance Improvement:**
   - Shot put: +12.4% increase in throw distance
   - Discus throw: +14.1% increase in throw distance
2) **Strength Gains (One-Rep Max - 1RM):**
   - Squat: +18%
   - Bench press: +16%
   - Deadlift: +20%
3) **Biomechanical Efficiency:**
   - Improved release angles, optimizing projectile motion for greater distance.
   - Increased angular velocity, allowing for better rotational momentum in discus throw.
   - Enhanced neuromuscular coordination, resulting in a more fluid and powerful execution of throws.

These results highlight the effectiveness of a structured, sport-specific strength training program in improving the power output, technique, and overall performance of shot put and discus throw athletes. The findings suggest that integrating explosive strength training and biomechanical optimization into training routines can significantly enhance athletic success in throwing events.

Table 2 ANOVA and T-Test Results

Metric	t-test Statistic	t-test p-value	ANOVA F-statistic	ANOVA p-value
Throw Distance	-31.98	1.4e-10	90.75	1.87e-08
Strength Gains	-59.81	5.14e-13	108.83	4.64e-09

5. DISCUSSION

The findings of this study demonstrate the effectiveness of sport-specific strength training in enhancing shot put and discus throw performance. The significant improvements observed in throw distance, muscular strength, and biomechanical efficiency indicate that a well-structured training program tailored to the unique demands of these events can yield substantial benefits.

- The improvements in throw distance highlight the effectiveness of sport-specific strength training.
- Olympic lifts contributed to enhanced explosive strength, while plyometrics improved neuromuscular coordination.
- Resistance training played a key role in improving muscular endurance, reducing fatigue, and maintaining peak power output during competition.
- The study reinforces prior research advocating for event-specific strength training to maximize athletic potential.

5.1. KEY FINDINGS AND THEIR IMPLICATIONS

1) **Enhanced Throw Distance and Performance:**
   - The increase in shot put (+12.4%) and discus throw (+14.1%) distances confirms that targeted strength training improves explosive power and throwing efficiency.
   - These improvements suggest that power-based resistance training effectively translates to greater force production and optimal throwing mechanics.
2) **Impact of Olympic Lifts on Explosive Strength:**
   - Olympic lifts (e.g., clean & jerk, snatch) contributed to increased power output and rate of force development.

- These lifts mimic the rapid, full-body force application required in shot put and discus throw, making them a crucial component of effective training regimens.

3) Neuromuscular Coordination Through Plyometric Training:

- Plyometric exercises, such as medicine ball throws, depth jumps, and bounding drills, helped improve fast-twitch muscle fiber activation and neuromuscular efficiency.
- Enhanced muscle synchronization and reflex response led to better control and acceleration during the throw.

4) Role of Resistance Training in Muscular Endurance and Power Maintenance:

- Strength gains in key lifts (squat +18%, bench press +16%, deadlift +20%) reflect improved muscular endurance, stability, and overall power.
- Resistance training helped athletes maintain peak force output throughout competition, reducing fatigue and increasing consistency in throwing performance.

5) Alignment with Previous Research:

- These findings reinforce previous studies that advocate for event-specific strength training to optimize performance in throw-based sports.
- The study supports the theory that a combination of explosive, resistance, and plyometric training is superior to traditional general strength training for shot put and discus athletes.

5.2. PRACTICAL APPLICATIONS FOR COACHES AND ATHLETES

- Incorporating Olympic lifts and plyometric training into regular strength conditioning can significantly enhance explosiveness and power output.
- Strength training programs should focus on compound movements that improve force production across multiple joints.
- Neuromuscular training strategies should be emphasized to enhance coordination and technical execution in throwers.
- Future training protocols should continue integrating sport-specific exercises to optimize performance, reduce injury risk, and maintain consistency in competition.

This study provides strong evidence that sport-specific strength training is an essential component of training for shot put and discus throw athletes. Further research can explore long-term adaptations, injury prevention, and individual variations in training response to refine strength and conditioning methodologies for throwers.

6. CONCLUSION

This study highlights the effectiveness of sport-specific strength training in improving shot put and discus throw performance. The significant enhancements in throw distance, muscular strength, and biomechanical efficiency indicate that a well-structured, event-specific training regimen can yield superior results compared to conventional strength training approaches.

1) The findings emphasize the necessity of integrating:

- Explosive strength exercises (e.g., Olympic lifts) to develop power and force application.
- Resistance training to enhance muscular endurance, stability, and strength.
- Plyometric drills to improve neuromuscular coordination and maximize force transfer.

The combination of these training methods allows throwers to generate greater force, optimize technical execution, and maintain peak performance in competition.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

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