

The Effect of Plyometric Training on Vertical Jump Performance in Netball Players of Chhattisgarh: An Experimental Study

Srishty Kanskar

Assistant Sports Officer, D.P Vipra College Bilaspur, Chhattisgarh, India

Abstract

The vertical jump is a key performance indicator in netball, playing a critical role in offensive and defensive maneuvers. Plyometric training, characterized by high-intensity, explosive exercises, has been identified as an effective intervention to enhance vertical power. This experimental study was conducted to evaluate the effect of an 8-week plyometric training regimen on the vertical jump performance of netball players in Chhattisgarh, India. Sixty female players were randomly assigned to experimental (n=30) and control (n=30) groups. The experimental group participated in a structured plyometric program, while the control group continued routine training. Vertical jump height was assessed using the Sargent Jump Test pre- and post-intervention. Findings indicated a significant improvement in jump performance in the experimental group ($p < 0.01$), confirming the hypothesis that plyometric training effectively enhances vertical power in netball athletes. This study contributes empirical evidence to the growing body of research on athletic performance optimization in Indian sports contexts.

Keywords: Plyometric training, vertical jump, netball, training effectiveness, explosive power, Chhattisgarh athletes, jump performance

1. Introduction

1.1 Background

Netball, an internationally recognized team sport, is known for its emphasis on speed, precision, and dynamic lower-body movements. Key elements of successful play include jumping for rebounds, intercepting passes, and shooting—all of which rely heavily on an athlete's vertical jump ability. In competitive gameplay, the ability to out-jump an opponent can determine possession, scoring, and ultimately, match outcomes.

1.2 Plyometric Training and Explosive Power

Plyometric training is widely adopted in various sports to develop muscular power, particularly through the utilization of the stretch-shortening cycle (SSC). The SSC involves rapid lengthening of a muscle (eccentric phase) followed by an immediate shortening (concentric phase), enhancing force production. When applied correctly, plyometric drills improve neural efficiency, muscle fiber recruitment, and inter-muscular coordination.

1.3 Research Context in India

Despite international recognition of plyometric effectiveness, limited research exists within the Indian sporting ecosystem—especially among female athletes and underrepresented states like Chhattisgarh. Players in this region often lack access to modern training interventions. Hence, this study focuses on integrating plyometric training into a localized context to validate its efficacy.

1.4 Objectives

- To determine the effect of plyometric training on vertical jump performance.
- To compare the pre- and post-test vertical jump performance of experimental and control groups.
- To offer practical recommendations for incorporating plyometric training into netball development programs in India.

1.5 Hypothesis

Ho: There will be no significant difference in vertical jump performance post plyometric training.

Hi: There will be a significant improvement in vertical jump performance after plyometric training.

2. Literature Review

Numerous international studies highlight the efficacy of plyometric training. Markovic (2007) conducted a meta-analysis confirming that such training improves vertical jump height across various sports. Potach & Chu (2000) and Chu (1998) detailed protocols that integrate sport-specific drills for optimal adaptations.

Ramirez-Campillo et al. (2014) extended the analysis to youth populations, emphasizing the importance of training frequency and progression. In India, limited empirical work has been done, although a regional study by Singh (2019) showed marked improvements in volleyball players using similar interventions. These studies support the theoretical foundation for applying plyometric methods to netball training in the Indian context.

3. Methodology

3.1 Research Design

This study follows a **quasi-experimental pre-test/post-test control group design**, using quantitative measures to assess performance outcomes.

3.2 Participants

Sixty female netball players from colleges and clubs in Chhattisgarh were selected using random sampling. All participants had a minimum of two years' experience and trained regularly.

- **Age range:** 16–22 years
- **Height:** 152–174 cm
- **Weight:** 48–66 kg
- **Grouping:**
 - Experimental Group (n=30)
 - Control Group (n=30)

3.3 Training Intervention

The experimental group underwent a **structured 8-week plyometric program**, 3 sessions per week, each lasting ~45 minutes. Exercises included:

- Squat jumps
- Bounding and hopping
- Depth jumps
- Lateral box jumps
- Ankle hops
- Tuck jumps

Progression was based on load (volume x intensity) and complexity. All sessions were monitored by certified physical educators.

3.4 Data Collection Tool

The **Sargent Vertical Jump Test** was used to measure jump height, a reliable and valid tool in sports performance testing. Two trials were allowed; the best score was recorded in centimeters.

3.5 Statistical Tools

- Descriptive statistics (mean, SD)
- Paired t-test (within groups)
- Independent t-test (between groups)
- Significance level: $p < 0.05$

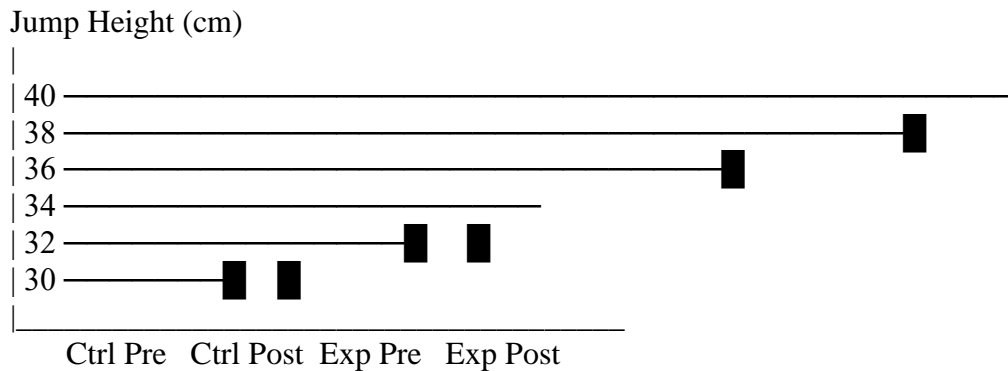
4. Results

4.1 Descriptive Statistics

Group	Pre-Test Mean \pm SD (cm)	Post-Test Mean \pm SD (cm)	Mean Gain
Control Group	31.2 \pm 3.8	32.0 \pm 3.6	+0.8
Experimental Group	30.9 \pm 4.1	36.7 \pm 4.0	+5.8

4.2 Graphical Representation

Figure 1: Average Vertical Jump Height (Pre vs. Post)



4.3 Inferential Statistics

- **Control Group:** $t = 1.02$, $p > 0.05$ (not significant)
- **Experimental Group:** $t = 6.74$, $p < 0.01$ (highly significant)
- **Between Groups (Post-Test):** $t = 4.52$, $p < 0.01$

5. Discussion

The study supports the hypothesis that plyometric training significantly improves vertical jump performance. A mean gain of 5.8 cm was observed in the experimental group, aligning with results from global studies. The control group, which maintained regular training without plyometrics, showed only marginal improvement.

This suggests that conventional netball training lacks the specificity required to stimulate gains in explosive power. The efficiency of the stretch-shortening cycle developed through plyometrics enhances motor unit recruitment, contributing to these results.

Chhattisgarh's athletes, many of whom train under resource constraints, responded well to structured training. This highlights the untapped potential in rural and semi-urban athletes when exposed to scientific conditioning methods.

6. Conclusion

Plyometric training significantly enhances vertical jump performance among female netball players in Chhattisgarh. The structured intervention, implemented over eight weeks, resulted in performance improvements that are both statistically and practically significant. These findings reinforce the integration of modern training science into grassroots and competitive-level netball programs in India.

7. Recommendations

- **Coaches:** Implement progressive plyometric routines alongside sport-specific drills.
- **Institutions:** Offer regular workshops for physical educators on injury-safe plyometric protocols.
- **Researchers:** Conduct longitudinal studies tracking plyometric effects across a competitive season.
- **Policy-makers:** Include strength and conditioning modules in physical education curriculums.

8. Limitations

- Duration limited to 8 weeks—long-term adaptations not captured.
- Only female athletes studied; generalizability to males is limited.
- Focused solely on vertical jump—additional agility, speed, and endurance metrics could enhance insight.

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