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IMPACT OF AN EIGHT-WEEK LOWER BODY STRENGTH TRAINING PROGRAM ON JUMP PERFORMANCE IN NETBALL PLAYERS: A CASE STUDY AT SABARAGAMUWA UNIVERSITY OF SRI LANKA

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ABSTRACT: Netball is a high-intensity, multidirectional sport that demands a high level of lower body power, especially during jumping actions essential for intercepts, rebounds, and aerial contests. Vertical jump performance is a critical measure of explosive strength and is often linked to success in netball. There is limited evidence on how structured strength training interventions impact university-level female netball players, particularly in South Asian contexts. This study aimed to evaluate the effectiveness of an eight-week lower body strength training program on vertical jump performance among female netball players at Sabaragamuwa University of Sri Lanka. This study was conducted with 14 female netball players (aged 22–24), randomly assigned to an intervention group (n=7) and a control group (n=7). The intervention group underwent an eight-week program incorporating resistance and plyometric exercises performed three times per week. Vertical jump performance was assessed using a standard vertical jump test before and after the intervention. Statistical analysis included the Wilcoxon Signed-Rank Test and Mann-Whitney U Test due to non-normal data distribution. The median vertical jump height increased from 29.8 cm to 32.9 cm, indicating overall improvement. The Wilcoxon Signed -Rank Test showed a significant increase within the intervention group ($p = 0.035$), and the Mann–Whitney U Test revealed a significant difference compared to the control group ($p = 0.0409$) thus confirming the effectiveness of the training program. The findings provide strong evidence that an eight-week lower body strength training program can significantly enhance vertical jump performance in university-level netball players. Incorporating such training into regular practice may offer substantial performance benefits in similar athletic populations.

Keywords: netball, lower body strength, vertical jump performance, female athletes

1 INTRODUCTION

Netball is a fast-paced, multidirectional team sport primarily played by women across commonwealth nations, with over 20 million active participants worldwide (Delextrat & Goss-Sampson, 2010). Netball, originating in England has evolved into a competitive sport demanding not only technical skills and strategic awareness but also high levels of physical fitness, particularly in jumping, agility, and speed (Impellizzeri et al., 2018). These physical demands are especially evident in defensive and rebounding actions, where players must explosively leap to intercept passes or gain possession. Previous research indicates that meaningful improvements in jump performance require a lower-body strength training duration of at least 6–8 weeks (Cormie et al., 2011; Markovic & Mikulic, 2010). An eight-week intervention was selected for this study to balance the physiological time needed for adaptation with the practical feasibility of a university sporting calendar.

1.1 Vertical Jump Performance and Lower Body Power

Vertical jump performance is a key physical attribute in netball, as it directly influences players' ability to block shots, contest high passes, and dominate aerial play. Research shows that

successful netball performance is associated with higher vertical jump capacity which allows athletes to execute the explosive movements required in both offensive and defensive scenarios (Sabadri & Zaki, 2022). The vertical jump is not only a measure of lower -body power but also reflects muscle coordination and power generation speed both crucial for rapid execution under match conditions (Markovic & Mikulic, 2010).

1.2 Strength and Plyometric Training as Performance Enhancers

Lower body strength plays a fundamental role in jump height and reactive strength. Resistance training targeting key muscle groups such as the quadriceps, hamstrings, and gluteus muscles enhances force production and joint stability. Exercises like squats, lunges, Romanian deadlifts, and leg presses contribute significantly to vertical force development (Grieco et al., 2012). Plyometric training, on the other hand, improves explosive strength and neuromuscular efficiency through the stretch-shortening cycle, enabling athletes to achieve greater jump height with faster execution (Faigenbaum et al., 2009). Combining resistance and plyometric exercises within a structured program has been shown to maximize improvements in vertical jump performance in multiple sports (Cormie et al., 2011). Despite a wealth of research on strength and conditioning in general sport populations, there is a paucity of evidence focusing on female university-level netball players, particularly within South Asian contexts. Most available studies emphasize elite or professional athletes in Western countries, leaving a research gap in understanding how structured strength training impacts amateur and university athletes in Sri Lanka. Furthermore, the academic setting poses unique challenges such as limited training time and recovery resources, making it essential to evaluate whether short duration, focused interventions like an eight-week lower body training program can produce measurable performance outcome (Rajesh., 2023) This study seeks to investigate the effectiveness of an eight-week lower body strength training program on vertical jump performance in netball players at Sabaragamuwa University of Sri Lanka. By integrating resistance exercises and plyometric within a progressive training structure, this research aims to contribute practical, evidence-based recommendations for improving explosive athletic ability in university-level netball, while addressing the existing knowledge gap in the South Asian sport science literature (Radnor et al., 2018). A progressive training structure is significant because it allows athletes to gradually increase load and intensity, ensuring continuous adaptation while minimizing the risk of overtraining or injury. Unlike non-progressive or random training methods, progressive overload systematically challenges the musculoskeletal and neuromuscular systems, leading to measurable improvements in strength, power, and explosive performance (Kraemer & Ratamess, 2004).

2 METHODOLOGY

This study employed an experimental research design using random sampling. Fourteen female netball players (aged 22–24) from the Sabaragamuwa University netball team were selected and randomly assigned to an intervention group (n = 7) and a control group (n = 7). There is limited research on structured lower body strength training interventions among female university-level netball players in South Asia, particularly within Sri Lankan universities. The intervention group completed an eight-week lower body strength training program 3 times per week. The eight-

week, three-session-per-week structure aligns with established guidelines for developing strength and power, providing an optimal balance of training stimulus and recovery (ACSM, 2009; Suchomel et al., 2018). Sessions were held for around 120 minutes in the afternoon to ensure high attendance following academic commitments. Sessions comprised resistance exercises such as squats, lunges, Romanian deadlifts, and plyometric drills and box jumps. The control group continued their routine netball training without additional strength training components. Their regular training consisted of technical drills (passing, shooting, and footwork), aerobic conditioning and match simulations, but excluded structured lower-body strength or Polymetric exercises. Vertical jump performance was assessed using a standardized vertical jump test conducted before and after the intervention (Topend Sports, 2025). Pre-test data were collected on the day before the intervention commenced, and post-test data were obtained within two days following the completion of the eight-week program. Data analysis involved Wilcoxon Signed-Rank Test and Mann-Whitney U Test due to non-normal data distribution. This eight-week lower body strength training program was structured with progressive overload principles. The program was designed to gradually increase in intensity while adjusting training volume appropriately. This eight-week program was designed with progressive overload principles, gradually increasing in intensity while adjusting volume. The duration was selected based on prior evidence indicating that a minimum of 6 to 8 weeks of targeted training is necessary to achieve significant neuromuscular and performance adaptations in vertical jump ability (Cormie et al., 2011; Markovic & Mikulic, 2010). Thus, the intervention balanced scientific validity with practical applicability within the university's training context. As the limitation of the study, the small sample size, short intervention period, and lack of control over external factors such as diet or additional training were identified.

HYPOTHESIS TESTING

To assess the effectiveness of the eight-week lower body strength training program, the following hypotheses were formulated:

- H_1: The eight-week lower body strength training programme significantly improved the vertical jump height of athletes.
- H_2: Athletes in the intervention group show a significantly greater improvement in vertical jump height compared to the control group.

Table 1. Weekly Progression of Lower Body Strength Training Programme

Week No	Volume (Sets × Reps)	Intensity (%1RM)
Week 1	3 × 12	50–60%
Week 2	3 × 10	60%
Week 3	3 × 10	65–70%
Week 4	4 × 8	70–75%
Week 5	4 × 6	75–80%
Week 6	4 × 6	80–85%
Week 7	3 × 6	85–90%
Week 8	2 × 6	50–60%

Each training session lasted approximately 120 minutes, including a 15-minute warm-up, 90 minutes of main lower body strength exercises, and a 15-minute cool-down. Rest intervals of 90 seconds were provided between sets, and 2-3 minutes between different exercises.

3 RESULTS AND DISCUSSION

Table 2. Comparison of pre and post test data for a vertical jump

Intervention Group			Control Group		
Athlete	**Pre-test (cm)**	**Post-test (cm)**	**Athlete**	**Pre-test (cm)**	**Post-test (cm)**
01	29.50	34.36	08	27.85	27.80
02	31.55	34.50	09	31.20	34.55
03	29.10	34.50	10	32.85	29.60
04	31.55	29.10	11	29.10	32.50
05	30.60	35.90	12	30.60	31.85
06	28.20	32.35	13	23.56	24.50
07	29.00	34.20	14	30.00	32.45
	Median: 29.8 cm			**Median: 32.9 cm**	
	IQR: 28.5-31.5 cm			**IQR: 29.9-34.5 cm**	

The median vertical jump height improved from 29.8 cm (IQR: 28.5cm - 31.5 cm) in the pre-test to 32.9 cm (IQR: 29.9 cm - 34.5 cm) in the post-test. This reflects a positive shift in performance across the group. A majority of athletes improved; for instance, athlete 1 increased from 29.5 cm to 34.4 cm, athlete 2 from 31.6 cm to 34.5 cm, and athlete 5 from 30.6 cm to 35.9 cm. However, a few participants showed minimal improvement or decline, such as athlete 4 (31.6 cm to 29.1 cm), athlete 8 (27.9 cm to 27.8 cm), and athlete 10 (32.9 cm to 29.6 cm). These results suggest that the training program had a generally beneficial effect on vertical jump performance, although the magnitude of improvement varied among participants. The Wilcoxon Signed Rank Test indicated a significant improvement in jump height between the pre- and post-test within the intervention group ($p = 0.035$). Furthermore, comparison with the control group using the Mann–Whitney U Test also revealed a statistically significant difference in performance gains ($p = 0.0409$). Together, these results provide strong evidence that the training intervention was effective in enhancing vertical jump performance, although the magnitude of improvement varied among individual athletes.

Table 3. Evaluation of Training Effects Using Wilcoxon Signed Rank Test

	Statistic	P	Median
Difference	27.0	0.035	4.340

The Wilcoxon Signed-Rank Test was conducted to evaluate changes in jump performance before and after the eight-week lower body strength training program. With 7 paired observations, the test produced a Wilcoxon statistic of 27.0 and a p-value of 0.035, which is less than the significance level of 0.05. This result indicates a statistically significant median improvement in jump height following the intervention. The estimated median difference was 4.34 cm, confirming that the training program had a meaningful and positive effect on vertical jump performance.

Table 4. Comparison of differences in pre and post-test vertical jump performance in treatment and control group

Groups	Median
IG	4.860
CG	1.250

The Mann-Whitney U test was used to compare the effectiveness of the training intervention between the intervention group (IG) and the control group (CG). The intervention group had a median improvement of 4.86 cm, while the control group showed a median improvement of only 1.25 cm. The difference in medians ($\eta_1 - \eta_2$) was 2.75 cm, with a 95.9% confidence interval ranging from 0.499 to 5.249 cm. The test yielded a statistically significant result ($p = 0.0409$), leading to the rejection of the null hypothesis. These findings indicate that the strength training program produced a significantly greater improvement in jump performance compared to the control group, supporting the effectiveness of the intervention.

4 CONCLUSION

The present study demonstrated that an eight-week lower body strength training program, integrating resistance and plyometric exercises, significantly improved vertical jump performance among female university netball players at Sabaragamuwa University of Sri Lanka. The intervention group showed a clear and meaningful median improvement compared to the control group, highlighting the effectiveness of structured lower body strength training in enhancing explosive performance capacities essential for netball.

Nevertheless, individual responses varied, with some athletes showing greater gains than others, emphasizing the importance of individualized monitoring when applying group-based training programs. Given the small sample size (n = 14), the short intervention duration, and the lack of control over external factors such as diet, lifestyle, and additional training activities, these results should be interpreted with caution and not overgeneralized to all netball populations.

Future studies with larger and more diverse samples, longer intervention periods, and controlled conditions are recommended to confirm these findings and extend their applicability. Despite these limitations, the outcomes of this case study suggest that structured lower body strength

training can serve as a valuable component of performance enhancement strategies for university-level netball players when implemented with athlete-specific considerations.

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