OPEN ACCESS

Original Article

DOI: 10.55735/eg836g89

HJPRS

The Healer Journal of Physiotherapy and Rehabilitation Sciences

SCAN ME

Journal homepage: www.thehealerjournal.com

Comparative Effects of Ballistic Six and Stretch Shortening Cycle Exercises for Performance Enhancement of Women Cricketers: A Randomized Clinical Trial

Halima Shoukat[1*], Esha Nisar[1], Namira Sardar[1], Muhammad Husnain[1], Laraib Haram[1], Farah Ishaq[2]

[1*]Department of Physical Therapy, Government College University, Faisalabad, Pakistan [2]Department of Health and Physical Education, Government College Women's University, Faisalabad, Pakistan

KEYWORDS

Ballistic Six
Performance enhancement
Stretch shortening cycle
Women cricketers

DECLARATIONS

Conflict of Interest: None

Funding Source: None

CORRESPONDING AUTHOR

Halima Shoukat
Department of Physical Therapy, Government College University, Faisalabad, Pakistan
halimashoukat92@gmail.com

ABSTRACT

Background: Women cricketers need specific training programs to enhance their performance. Ballistic six exercises are a set of high-intensity, explosive movements designed to improve muscle speed, agility, strength and power. The ballistic six and stretch shortening promotes the overall athletic speed, agility, power and strength of the muscles. **Objective:** To compare the effects of ballistic six and stretch-shortening cycle on the performance enhancement of women cricketers. **Methodology:** A randomized clinical trial was conducted to assess the comparative effect of ballistic six and stretch-shortening cycle exercises for performance enhancement of women cricketers. A convenience sampling technique was employed to recruit participants. The study was conducted for 3 months, from March to May 2025. Participants included in this study were female cricketers from the Physical Education Department, Government College University, Faisalabad. Eligible participants were between 18 and 25 years of age, having at least one year of cricket experience. Athletes were required to provide informed consent before participation. Individuals were excluded from the study if they had any history of musculoskeletal injury (female athlete triad), history of neurological conditions, or uncontrolled metabolic disorders such as diabetes mellitus. Continuous variable like age was presented using mean and standard deviation. An independent t-test was used to compare the significant difference between the effect of ballistic six and stretch-shortening cycle exercises for performance enhancement of women cricketers. The study was approved by the Government College University, Faisalabad Committee. Participants were assured of confidentiality and were informed of their right to withdraw at any time. **Results:** The comparison was checked using an independent t-test, which showed ($p=0.82$) for the 20-meter shuttle test, ($p=0.16$) for the agility t-test, ($p=0.26$) for the medicine ball throw test and ($p=0.45$) for the vertical jump test. The $p>0.05$ showed no significant difference in both regimes. **Conclusion:** The ballistic six and the stretch-shortening cycle training programs equally improved important aspects of athletic performance, such as speed, agility, strength and power. These findings emphasize that both methods of training could effectively be integrated into women's cricket performance-based courses.

How to cite the article: Shoukat H, Nisar E, Sardar N, Husnain M, Haram L, Ishaq F. Comparative Effects of Ballistic Six and Stretch Shortening Cycle Exercises for Performance Enhancement of Women Cricketers: A Randomized Clinical Trial. The Healer Journal of Physiotherapy and Rehabilitation Sciences. 2025;5(2): 394-399.

INTRODUCTION

Cricket is admired for its tradition and fierce competitiveness, and it influences how we live and feel. The activity helps your body, mind, and social life all at once. A lot of physical effort is required in cricket, for example, by running, jumping, throwing, and batting. They improve heart health, muscle strength, and how long you can work out. Sports help people become stronger, mentally healthy, and able to connect with others, boosting their overall quality.[1] The fast-paced and tough sport of cricket tests players' core tasks, including batting, bowling, and fielding, which require a lot of precise movement. Good execution of these movements depends on coordination as well as both muscle strength and endurance. Among the key body features for good performance, strong legs are necessary, mainly for sprinting, responding to changes in direction, jumping, and keeping balance while moving. Resistance training is a useful method to strengthen the lower limb, which can boost an athlete's sporting ability.[2]

Doing plyometric exercises helps teach the body to work at its best and fastest within a short time. The best exercises to build these traits are explained below. Jumping onto a box using box jumps increases leg power, allowing you to run farther and faster. By doing this exercise, you are training the muscles that support fast sprinting movements. When bounding, you have to take bigger running steps to cover as much ground as you can while still raising your knees high. It helps with running posture, leg movement and faster steps.[3] Ballistic six exercises involve quick, bouncing movements that extend the body beyond its usual limits to enhance muscle flexibility and prepare athletes for powerful, explosive actions. These exercises are effective in improving both passive and active flexibility, enhancing neuromuscular coordination, and boosting athletic performance in activities that demand speed, agility, strength, and power. Our study includes doing the following exercises: medicine ball throw, medicine ball slam, squat jump, box jump and push-ups.[4]

Stretch shortening-cycle (SSC) activities include a fast chain of muscle activity, rapid muscle stretch (eccentric activity) and then a short pause (amortization) and finally an explosive muscle contraction (concentric). These activities are meant to enhance the explosive strength, the speed and neuromuscular effectiveness.[5] Improving neuromuscular efficiency, explosive power, and reactive strength is what these exercises are often used for in sports training. Also, using SSC methods can save energy spent during high-intensity activities. So, it is essential in sports where athletes must make strong, swift movements all the time. Part of our study includes the following exercises: drop jump, single-leg jump, rope skipping, sprinting interval and Obstacle jump.[6] The sprint test is used to understand the speed and acceleration of an athlete.[7] A t-test to assess the ability of the athlete to change directions quickly.[8] The vertical jump tests are used to determine lower-body explosive strength, representing leg strength and the ability to jump.[9]

The medicine ball throw test targets power and coordination with the upper body, as well as explosive throwing or pushing movements.[10] These tests, along with each other, assist in the overall examination of an athlete as far as speed, agility, strength and power. Engaging in exercises that center on rapid movements, fast footwork, and proper running strategy can enhance gameplay. Training to be quicker, the athlete improves his muscular force and coordination, which enables him to execute his sports gestures with more control and more swiftness. Young or professional athletes always benefit from training speed. After all, they are more competitive and less vulnerable to injuries because they are moving better.[11] The elite seven-a-side players who trained this protocol would work better in the modified agility t-test. The other result was that players could take off more rapidly when the distances travelled could barely achieve 10 meters, largely 10 meters. A positive-based program, such as Speed Card, is the most suitable one to increase directional agility and the general level of control over body movements.[12]

Weight training assists in enhancing performance and reducing the incidence of sports injuries. When athletes enhance muscle strength, power, endurance and coordination, they can perform their movements easily. Muscle strength is part and parcel of preventing most injuries. It balances the muscles, gives protection to joints and enhances the overall body movements, all of which reduces the chances of you incurring sports-related injuries.[13] Power training is particularly significant in training athletes in sports that require them to sprint, jump, throw and frequently change directions with sudden speed. The ultimate advantage of power training is the enhancement of

rapid force creation that is vital in the best achievement in sports like track and field, basketball, volleyball, football and cricket.[14] Providing coaching programs designed for girls and women can boost their confidence, tech skills and make them feel like they belong. Making sure women have equal chances and recognition in cricket helps fight traditional ideas and motivates more people to take part for a longer time. Because of these strategies, cricket is now more open and pleasing to girls both in recreational and advanced settings.[15]

METHODOLOGY

A randomized clinical trial was conducted to assess the comparative effect of ballistic six and stretch-shortening cycle exercises for performance enhancement of women cricketers. The study was carried out at GCWU Faisalabad, Pakistan. The sample size consisted of 36 participants, taken using an apparent article. A convenience sampling technique was employed to recruit participants. The study was conducted for three months, from March to May 2025. Participants included in this study were female cricketers in the Physical Education Department, Government College University, Faisalabad. Eligible participants were between 18 and 25 years of age, having at least one year of cricket experience.

Athletes were required to provide informed consent before participation. Individuals were excluded from the study if they had any history of musculoskeletal injury (female athlete triad), history of neurological conditions or uncontrolled metabolic disorders such as Diabetes Mellitus. Following ethical approval and permission from the GCUF. A formal permission letter was submitted to GCWUF. All eligible athletes were briefed about the study, and informed consent was obtained. The self-made questionnaire was used to assess the athletes whose question relates to their inclusion and exclusion criteria. Data was analyzed using SPSS version 27. Continuous variable like age was presented using mean and standard deviation. An independent t-test was used to compare the significant difference between the effect of ballistic six and stretch-shortening cycle exercises for performance enhancement of women cricketers. The p-value of more than 0.05 was considered non-significant. The study was approved by the Government College University, Faisalabad Committee. Participants were assured of confidentiality and were informed of their right to withdraw at any time. Their responses were anonymized and used solely for research purposes. Written informed consent was obtained from each participant before data collection.

RESULTS

A total of 36 female cricketers participated in this randomized clinical trial in two groups: the ballistic six group A and the stretch-shortening cycle group B (18 in each group). The mean age of participants was between 18–25 years. Both groups showed significant improvement in speed, agility, strength and power. The mean value and standard deviation showed improvement in both groups, ballistic six and stretch shortening cycle, as shown in Table 1 of the paired t-test. The results confirmed that both exercises, ballistic six and stretch-shortening cycle, are equally effective. Table 2 compared the variables of speed, agility, strength and power between the groups using an independent t-test, which shows that there is no significant difference in both regimes, and their p-values are greater than 0.05. 20-meter shuttle run test (p=0.82), agility t-test (p=0.16), medicine ball throw test (p=0.26) and vertical jump test (p=0.45).

Table 1: Within-group analysis (paired t-test)

Variables	Group A (ballistic six)			Group B (stretch shortening cycle)		
	Pre-training Mean±SD	Post-training Mean±SD	p-value	Pre-training Mean±SD	Post-training Mean±SD	p-value
20-meter shuttle run test	6.41±1.02	5.65±0.91	<0.001	6.15±0.66	5.40±0.80	<0.001
Agility t-test	16.83±1.58	15.94±1.57	<0.001	16.12±1.57	15.20±1.58	<0.001
Medicine ball throw test	3.41±0.71	3.87±0.64	<0.001	3.19±0.52	3.65±0.46	<0.001
Vertical jump test	10.29±1.67	13.52±2.11	<0.001	10.14±2.00	13.00±2.05	<0.001

Table 2: Between-groups comparison using an independent t-test

Variables	Groups	Values	Mean±SD	p-value
20-meter sprint test	Group A	Pre-value	6.41±1.02	<0.001
	Group B	Pre-value	6.15±0.66	
	Group A	Post-value	5.65±0.91	<0.001
	Group B	Post-value	5.40±0.80	
Agility t-test	Group A	Pre-value	16.83±1.58	<0.001
	Group B	Pre-value	16.12±1.57	
	Group A	Post-value	15.94±1.57	<0.001
	Group B	Post-value	15.20±1.58	
Medicine ball throw test	Group A	Pre-value	3.41±0.71	<0.001
	Group B	Pre-value	3.19±0.52	
	Group A	Post-value	3.87±0.64	<0.001
	Group B	Post-value	3.65±0.46	
Vertical jump test	Group A	Pre-value	10.29±1.67	<0.001
	Group B	Pre-value	10.14±2.00	
	Group A	Post-value	13.52±2.11	<0.001
	Group B	Post-value	13.00±2.05	

DISCUSSION

This study aimed to determine the comparative effect of ballistic six and stretch-shortening cycle exercise on the performance enhancement of female cricketers. The researchers of the current study found that these exercise regimes enhance speed, agility, strength, power and general athletic performance. SSC exercises focus on slow and controlled stretch work, which works to lengthen muscles and straighten a posture, hence making them perfect for injury prevention and longevity of flexibility.[5] The ballistic six practices, on the other hand, employ more dynamic, bouncing and action to move the body even further than it would do regularly to promote tissue flexibility in the muscles and train the athlete to make explosive movements. These exercises improved performance in related sports involving the ability of speed, agility, strength and power.[16]

The study by Mocanu et al. (2024) supports our research that their intervention group followed a ballistic training program for 8 weeks, and the results showed a statistically significant improvement in upper body explosive strength compared to the control group ($p<0.01$). These findings support the results of our study, which also demonstrated significant improvements in physical performance through both exercise regimes, as seen in the paired t-test table. 1 is $p<0.05$, which shows improvement in both groups.[17] Bettariga et al. (2023) findings reinforce our study that their intervention featured training with rear-foot elevated split squats, single-leg Romanian deadlifts, and ballistic single-leg jumps, unilateral training over their coordination and force production. The findings indicated statistically relevant changes in various force-velocity (F-V) profile parameters, maximal running velocity (V 0), maximal power output (Pmax), and RFmax. The p-value was below 0.05 with an effect size ranging between 049 to 0.84. Those outcomes correspond with the findings of our study since we observed significant improvements ($p<0.05$) in explosive force and physical performance variables in both training programs, as shown in Table 1 of the paired t-test.[18]

Rohit Kumar Thapa and his colleagues in 2020 examined the effect of a combination of ballistic exercises (BE) with slow and fast SSC on sprint and COD ability. The box jump-drop jump combination and walking control were performed by 12 male university basketball players in a randomly divided order, after a standard warm-up was done. Immediately after the warm-up, a first measurement was performed, and a second one

was done 3 minutes into the intervention session. A noticeable increase in agility t-test scores was observed after BDJ compared to the baseline ($p<0.00$, $d=0.98$) and control (interaction effect; $p=0.00$, partial $\eta 2=0.51$). Warming up before using BDJ exercises seems to cause the PAPE effect and boost agility t-test results, as our study also noted improvement in agility, as shown in the paired t-test, as shown in Table 1.[19]

CONCLUSION

This study pointed out that the ballistic six and the stretch-shortening cycle training programs equally improved important aspects of athletic performance, such as speed, agility, strength and power. These findings emphasize the point that both methods of training could effectively be integrated into women's cricket performance-based improvement courses. The identical effectiveness of the two methods provides versatility to the trainers and players in setting up training programs by choice, convenience, or personal demands.

DECLARATIONS

Consent to participate: Written consent had been obtained from patients. All methods were performed following the relevant guidelines and regulations.

Availability of Data and Materials: Data will be made available upon request. The corresponding author will submit all dataset files.

Competing interests: None

Funding: No funding source involved.

Authors' contributions: All authors had read and approved the final manuscript.

CONSORT Guidelines: All methods were performed following the relevant guidelines and regulations.

REFERENCES

1. Kons RL, Orssatto LBR, Ache-Dias J, De Pauw K, Meeusen R, Trajano GS, Dal Pupo J, Detanico D. Effects of Plyometric Training on Physical Performance: An Umbrella Review. Sports Medicine Open 2023; 9(1): 4. https://doi.org/10.1186/s40798-022-00550-8

2. Ali, K., Gupta, S., Hussain, M. E., Alzhrani, M., Manzar, M. D., Khan, M., & Alghadir, A. H. Effect of plyometric versus complex training on core strength, lower limb, and upper limb power in male cricketers: a randomized controlled trial. BMC Sports Science, Medicine & Rehabilitation 2023; 15(1): 160. https://doi.org/10.1186/s13102-023-00771-8

3. Singla D, Hussain ME. Adaptations of the upper body to plyometric training in cricket players of different age groups. Journal of Sport Rehabilitation 2019; 29(6): 697–706. https://doi.org/10.1123/jsr.2018-0469

4. Kumar CKK, Chakrabarty S. A comparative study of static stretching versus ballistic stretching on the flexibility of the hamstring muscles of athletes. British Journal of Sports Medicine 2010; 44(1). https://doi.org/10.1136/bjsm.2010.078725.50.

5. Chauk A, Shah S. Effect of Stretch-shortening Exercise on skill-based physical performance among elite players: A Narrative Review. Bharati Vidyapeeth Medical Journal 2024; 4(3): 38-S10. https://doi.org/10.56136/BVMJ/2024 00355

6. Terbalyan A, Mikołajec K, Krzysztofik M, et al. Effects of overcoming isometric unilateral conditioning activity on subsequent single-leg drop jump in elite and amateur volleyball players: a randomised crossover trial. BMC Sports Science, Medicine and Rehabilitation 2025; 17(1): 30. https://doi.org/10.1186/s13102-025-01083-9

7. Yin X, Zhang F, Sun P, Liu Y, Guo Y. The Multistage 20-Meter Shuttle Run Test Reference Values for Tibetan Children and Adolescents in Tibet, China. International Journal of Environmental Research and Public Health 2022; 19(19): 12703. https://doi.org/10.3390/ijerph191912703

8. Permana DA, Kusnanik NW, Nurhasan N, Setijono H, Arifin MZ, Purwoto SP. Enhancing Strength, Leg Muscle Explosive Power, and Muscle Hypertrophy Using Hurdle-Box Jump Plyometric. Physical Education Theory and Methodology 2022; 22(1): 113-120. https://doi.org/10.17309/tmfv.2022.1.16

9. Oka Y, Taniguchi H, Izumi T, Yura K. Development of a compact jumping lunar rover driven by shape memory alloy actuators. International Conference and Exhibition on New Actuator Systems and Applications 2024; 94–7. https://doi.org/10.1109/SII46433.2020.9025989

10. Marovic I, Janicijevic D, Knežević OM, Garcia-Ramos A, Prebeg G, Mirkov DM. Potential use of the medicine ball throw test to reveal the upper-body maximal capacities to produce force, velocity, and power. Proceedings of the Institution of Mechanical Engineers, Part P: Journal of Sports Engineering and Technology 2022: 239(2):175433712211131.

https://doi.org/10.1177/17543371221113127
11. Sun M, Soh KG, Cao S, Yaacob AB, Ma S, Ding C. Effects of speed, agility, and quickness training on athletic performance: a systematic review and meta-analysis. BMC Sports Science Medicine & Rehabilitation 2025; 17(1): 66. https://doi.org/10.1186/s13102-025-01101-w
12. Chuang C-H, Hung M-H, Chang C-Y, Wang Y-Y, Lin K-C. Effects of Agility Training on Skill-Related Physical Capabilities in Young Volleyball Players. Applied Sciences 2022; 12(4): 1904. https://doi.org/10.3390/app12041904
13. Faigenbaum AD. Strength training for children and adolescents. Clinics in Sports Medicine 2000; 19(4): 593-619. https://doi.org/10.1016/S0278-5919(05)70228-3
14. Lu T, Peng W, Yi M, et al. The Effects of Velocity- Versus Percentage-Based Resistance Training on Lower Limb Explosive Power and Footwork Movement Speed in Elite University Badminton Players. Applied Sciences, 2025; 15(5): 2434. https://doi.org/10.3390/app15052434
15. Fowlie J, Eime R, Griffiths K. Barriers to adolescent female participation in cricket. Annals of Leisure Research 2020; 24(2): 1-19. https://doi.org/10.1080/11745398.2019.1710716
16. Mona E. Effect of ballistic six exercises on certain physical variables and flat serve performance in tennis for female beginners. Ovidius University Annals, Series Physical Education & Sport/Science, Movement & Health 2022; 22(1): 55-60.
17. Mocanu G, Parvu C, Murariu G, Szabo D. Effectiveness of ballistic exercises for increasing upper body explosive power in physical education lessons for university students. Physical Education of Students 2024; 28(3): 175–87. https://doi.org/10.15561/20755279.2024.0306
18. Bettariga F, Maestroni L, Martorelli L, Turner A, Bishop C. The effects of a 6-week unilateral strength and ballistic jump training program on the force-velocity profiles of sprinting. The Journal of Strength & Conditioning Research 2023; 37(7): 1390–6. https://doi.org/10.1519/JSC.0000000000004424
19. Thapa RK, Kumar A, Kumar G, Narvariya P. A combination of ballistic exercises with slow and fast stretch-shortening cycle induces post-activation performance enhancement. Trends in Sport Sciences 2020; 27(4). https://doi.org/10.23829/TSS.2020.27.4-3