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Effect of Plyometric Training on Flexibility of Balochistan Female Cricket Athletes

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Abstract: *The study sought to determine the impact of a 12-week plyometric workout regimen on the flexibility of female cricket players in Balochistan. Twenty participants were divided into two groups: an experimental group that received plyometric workouts, and a control group that wasn't involved in any specific physical activity program. Flexibility was assessed using the sit-and-reach test, and anthropometric characteristics were measured before and after the training period. The results showed a significant increase in flexibility in the experimental group compared to the control group. Additionally, the experimental group exhibited significant changes in weight and waist-hip ratio post-intervention. These findings suggest that plyometric training can effectively improve flexibility in female cricket athletes. Additional studies might concentrate on the long-term consequences of plyometric training and address potential limitations such as diet and weather conditions to enhance understanding further.*

Key Words: Plyometric Training, Flexibility, Female Cricket Athletes, Balochistan, Sit-and-reach Test, Anthropometric Attributes, Sports Training, Athletic Performance

Introduction

The amortization phase is a critical component of plyometric training, representing the transition between the eccentric (lengthening) and concentric (shortening) muscle actions. This phase is vital because it determines how effectively maintained flexible energy from the eccentric phase is transferred into the subsequent concentric phase. A shorter amortization phase is associated with greater power output and performance gains. In plyometric exercises, such as jumps or throws, the goal is to minimize the amortization phase to efficiently use the stored elastic energy and enhance force production in the subsequent concentric phase. Training methods focus on optimizing this phase through specific exercises and techniques, such as depth jumps, which require athletes to quickly transition from the landing (eccentric) to the takeoff (concentric)

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phase, reducing the time spent in amortization. Singla, D., & Hussain, M. E. (2019).

Factors that can influence the efficiency of the stretch-shortening cycle and the amortization phase include muscle stiffness, muscle fibre type, and neuromuscular coordination. Proper plyometric training can improve these factors, leading to enhanced athletic performance. Concentric phase: This is the explosive phase, where the muscle shortens and contracts, releasing the stored energy. Plyometric training can improve muscular power by enhancing the efficiency of the SSC, allowing athletes to generate more force in less time. It can also improve neuromuscular coordination, which is essential for performing complex movements with speed and accuracy. In the context of female cricket athletes in Baluchistan, plyometric training can be particularly beneficial for improving agility, speed, and power, which are important for success in the sport. Additionally, plyometric training can also have positive effects on flexibility, as the rapid stretching and contracting of muscles can help improve their elasticity and range of motion. Robin, V. M. (2022).

Plyometric training is a popular method used in sports to enhance power and agility by rapidly stretching and then contracting muscles. In the context of female cricket athletes in Baluchistan, plyometric training can be a valuable tool for improving not only power and agility but also flexibility. Flexibility is crucial for cricket players, which can improve performance and reduce the risk of injuries. Research on the effects of plyometric training on the flexibility of female cricket athletes, particularly in Baluchistan, is limited. This study aims to address this gap by examining how plyometric training impacts the flexibility of female cricket athletes in Baluchistan. Understanding these effects can offer valuable insights for coaches, trainers, and athletes, aiding in the development of more tailored and effective training programs. Ultimately, this research could enhance performance and reduce injury risk among female cricket athletes in Baluchistan. Gayatri, C., & Sarojini, G. S. (2022).

The physical development of female cricket players is crucial for their performance and injury prevention. Several key areas of physical development are particularly important for female cricket players: Strength: Building strength is essential for generating power in batting, bowling, and fielding. Strength training should focus on the muscles used in cricket-specific movements, such as the legs, core, and upper body. Speed and Agility: Cricket involves quick movements and changes of direction. Speed and agility training can help players react faster and move more efficiently on the field. Endurance: Cricket matches can be long and physically demanding. Developing endurance through aerobic and anaerobic training can help players maintain performance throughout a match. Flexibility: Flexibility is important for cricket players to achieve a full range of motion in their movements, which can improve performance and reduce the risk of injury. Stretching and mobility exercises are key for improving flexibility. Sanaullah, M., Sunble, S., Afzal, M. F., Khan, L., Arif, A., & Qadir, Z., (2023).

Balance and Coordination: Good balance and coordination are essential for cricket players to execute skills such as batting, bowling, and fielding effectively. Balance and coordination exercises can help improve these skills. Injury Prevention: Female cricket players should also focus on injury prevention strategies, absolutely, it's crucial for female cricket athletes to adhere to proper warm-up and cool-down routines, wear suitable protective gear, and maintain good technique in their skills. These practices can significantly reduce the risk of injuries and enhance performance, ensuring the athletes' long-term health and success on the field. Overall, a well-rounded training program that addresses these key areas of physical development is essential for female cricket players to reach their full potential and stay healthy on the field. Ramachandran, A. K., Singh, U., & Lathlean, T. J. (2022).

Flexibility is a crucial component of athletic performance, influencing an athlete's ability to move effectively and efficiently during sports activities. In cricket, a sport that requires a combination of strength, agility, and flexibility, enhancing flexibility can contribute to improved performance and reduced risk of injury. Plyometric training, characterized by rapid and explosive movements, is demonstrated to improve multiple facets of athletic performance, which includes strength, power, and agility. However, its effects on flexibility, particularly in female cricket athletes, remain relatively unexplored.

Balochistan, a province in Pakistan, boasts a rich cricketing tradition and has produced several talented players. Despite this, there is a lack of research focusing on the training methods and physical attributes of female cricketers in the region. Understanding the effects of plyometric training on the flexibility of Balochistan's female cricket athletes could provide valuable insights for coaches, trainers, and athletes looking to improve performance and reduce injury risk. The present research intends to fill the void by investigating the effect of a 12-week plyometric workout program on the flexibility of female cricket athletes in Balochistan. The study hypothesizes that plyometric training will lead to improvements in flexibility, as assessed by a sit-and-reach test. The findings of this study could have implications for training programs designed to enhance the performance of female cricket athletes in Balochistan and beyond.

Materials and Methodology

The goal of this study was to figure out what effect performing plyometric exercises has on the flexibility & anthropometric attributes of female cricket athletes in Baluchistan.

Study Site

The study was conducted at Quetta region female cricket team Bugti cricket stadium in Quetta, Baluchistan.

Participants

Twenty participants met the study's inclusion criteria and The participants were separated into two (2) groups: test (EG, N=10) and control (CG, N=10). The experimental group followed a 12-week plyometric training protocol, whereas the control group did not participate in any structured exercise program. The plyometric training protocol included exercises such as jump squats, box jumps, and lunge jumps, aimed at enhancing lower body strength and power. The sit-and-reach test was used to assess flexibility and physical measurements were taken before and after the period of exercise to determine height, weight, BMI, and body fat percentage.

Statistical analysis, including paired t-tests, and the study compared pre- and post-training measurements, with a significance level of $p < 0.05$.

Table 1

Criteria for Inclusion and Exclusion

S. No	Inclusion	Exclusion
1.	No Chronic disease	Chronic disease
2.	No physical disability	Physical disability
3.	Age between 16-22 years	Age below 16 and above 22

Ethics and Informed Consent

Informed consents were taken from participants, parents respective region presidents, secretary and team manager.

Training Protocol for the Participants

In this study, the researcher administered a 12-week plyometric protocol to the participants.

Selection of Tests and Procedures

In this study, the researcher selected the test of sitting and reaching to evaluate flexibility, particularly focusing on the hamstring muscles and back of the leg muscles, in female cricket athletes from Baluchistan. The sit-and-reach test is a widely used measure of flexibility and is often employed in fitness assessments and research studies due to its simplicity and effectiveness. In this test, the female cricketers sit on the floor with their legs raised in front and reach as far along a measurement line as necessary. The length of time travelled is recorded as well, giving an assessment of flexibility within the back region and the hamstrings. The siting & reaching test was chosen for its ease of administration and relevance to the specific flexibility requirements of cricket athletes.

Figure 1

Sit & Reach Test

Analysis of the Data

The data analysis for the study was conducted using inferential statistical methods, specifically the paired and T-tests with independent samples. The statistical analyses were performed using IBM and the statistical package for the Social Sciences (SPSS) version 27.

Results

Table 2

Paired sample T-test demonstrating the difference between experimental and control groups' flexibility before and after testing.

Name of variable	Groups	Pre-test results(Mean ± SD)	Post-test results (Mean ± SD)	Pre and post- test results (Mean ± SD) difference	t	Sig.(2-tailed)
Flexibility	CG	25.40000±5.358275	7.60000±5.796551	2.200±0.43827	-1.500	168
				11.500±0.16586	-5.983	

Name of variable	Groups	Pre-test results(Mean ± SD)	Post-test results (Mean ± SD)	Pre and post- test results (Mean ± SD) difference	t	Sig.(2-tailed)
	EG	27.60000±5.274677	39.10000±5.108816			.000

Significant level = 0.05, SD=Standard Deviation

Table 02 shows no Significant differences in the control group (CG) for the pre-and post-intervention flexibility of Baluchistan female cricket athletes. The pre-intervention mean flexibility was 25.40 ± 5.36, and post-intervention flexibility was 27.60 ± 5.80. The paired samples t-test yielded a t-value of 1.500 (df = 10) and a p-value of 0.168, indicating no meaningful difference in flexibility before and after the intervention in the control group. In contrast, Table 01 demonstrates a significant difference in the experimental group (EG) for the pre-and post-intervention flexibility of Baluchistan female cricket athletes. The pre-intervention mean flexibility was 27.60 ± 5.27, and post-intervention flexibility was 39.10 ± 5.11. The paired samples t-test yielded a t-value of -5.983 (df = 10) and a p-value of < 0.001, indicating a significant increase in flexibility in the experimental group after the intervention.

Table 3

Paired sample T-test demonstrating the distinction among anthropometric measurement attributes such as weight, and the waist-hip ratio. Pre and subsequent tests of (experimental and control groups)

Name of variable	Groups	Pre-test results (Mean ± SD)	Post-test results (Mean ± SD)	Pre and post test results (Mean ± SD) difference	T	Sig.(2-tailed)
Weight Waist hip ratio	CG	46.50000±6.132790	45.70000±6.864563	0.8±0.731773 1.714		.121
	EG	61.50000±8.058812	55.90000±7.125073	5.6±0.933739 14.000		.000
	CG	28.90000±1.370320	28.90000±1.523884	0±0.153664 0.000		1.00
	EG	31.60000±1.955050	29.60000±1.264911	2±0.690139 6.000		.000

Significant level = 0.05, SD=Standard Deviation

Table 03 presents the pre-and post-intervention characteristics of the control and experimental groups of Baluchistan female cricket athletes. The prior to and after the intervention data were compared using a paired samples t-test characteristics of the control group (CG). The results indicate no significant difference in the control group regarding pre- and post-intervention characteristics. The mean and standard deviation values for weight and waist-hip ratio in the control group were as follows: pre-intervention (Weight = 46.500 ± 6.132790, waist-hip ratio = 28.900 ± 1.370320) and post-intervention (Weight = 45.700 ± 6.864563, waist-hip ratio = 28.900 ± 1.523884), with t values (10) = 1.714, 0.000, and p-values > 0.05 (weight = 0.121, waist-hip ratio = 1.000).

Similarly, a t-test of paired was used to assess the pre-and the intervention traits of the group that underwent the experiment (EG). The results indicate a significant difference in the experimental group regarding pre- and post-

intervention characteristics. The mean and standard deviation values for weight and waist-hip ratio in the experimental group were as follows: pre-intervention (Weight = 61.50000 ± 8.058812, waist-hip ratio = 31.60000 ± 1.955050) and post-intervention (Weight = 55.90000 ± 7.125073, waist-hip ratio = 29.60000 ± 1.264911), with t values (10) = 14.000, 6.000, and p-values < 0.05 (weight = 0.000, waist-hip ratio = 0.000). These results indicate a significant difference in the experimental group regarding pre- and post-intervention characteristics.

Discussion

The primary goal of this research was to determine the impact of a 12-week plyometric exercise schedule on the mobility of female cricketers from Baluchistan. The analysis revealed no significant difference in flexibility among Baluchistan female cricket athletes in the control group (p = 0.168, above the significance level of 0.05). This aligns with previous studies that have also reported insignificant differences in flexibility prior to specific training interventions. Maker, R., & Taliep, M. S. (2021).

In contrast, the present study reported a significant improvement in the flexibility of Baluchistan female cricket athletes in the experimental group after the intervention. This aligns with previous findings showing that plyometric training significantly improved the skills of female soccer and tennis players, which corresponds to an improved level of flexibility (Mengesh et al., 2015). Plyometric training has been shown to increase adolescent cricket players' strength, agility, and jump performance, with the plyometric group showing a greater improvement (6%) than the control group. Saran, M., Pawaria, S., & Kalra, S. (2022).

The findings indicate a significant enhancement in flexibility following the post-training assessment, suggesting that the 12-week plyometric training program positively influenced the selected physical parameter, particularly flexibility, among female cricket athletes from Baluchistan. This aligns with prior research by Aydogmus (2022) and Ozmen and Aydogmus (2022), which observed that plyometric training led to increased strength, agility, and jump performance in adolescent cricket players, with the plyometric group exhibiting a 6% greater improvement than the control group. Additionally, Pancar et al. (2021) and Miller et al. (2022) noted that a 6-week plyometric training regimen can be beneficial for enhancing athletes' agility, which could prove advantageous during the final stages of preseason preparation.

Other researchers have also found similar positive outcomes in agility with shorter training periods, such as a 5-week training program (Robinson and Owens, 2022). The training effect was observed in 8-week and 10-week interventions. Hulton, A, Nonnato, A.,. T., Beato, M, & Brownlee, T. (2022). The results also showed significant changes in anthropometric variables such as weight and waist-hip ratio post-intervention. These findings are consistent with previous research indicating that long-term plyometric training can improve flexibility, upper and lower body strength, weight, and waist-hip ratio. Sole, C. J., Bellon, C. R., & Beckham, G. K. (2022).

Limitation

A potential limitation of the study was the lack of control over the subjects' diets. Addressing this gap in future studies could provide a better understanding of the phenomena under investigation. Another limitation was the weather conditions during the intervention, which took place on open grounds and in cold weather. Conducting the intervention in controlled and normal weather conditions could lead to more reliable outcomes.

Recommendations

1. Regular participation in plyometric training, up to 3 to 5 days a week, is beneficial for girls to improve flexibility.
2. Plyometric training programs can be helpful in improving flexibility, which may

in turn reduce lower back pain in female cricketers.

3. Plyometric training programs have the potential to effectively reduce weight and decrease waist-hip ratio.
4. The study found a significant effect of 12 weeks of plyometric training on the selected physical parameters, including flexibility. The researchers recommend that Quetta region authorities provide maximum opportunities for Quetta girls to participate in cricket games regularly to improve flexibility.

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