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Impact Of Circuit Training And Plyometric Training On Endurance Of Basketball Players From The Jammu Region.

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Abstract

The purpose of this study investigates the impact of Plyometric Training and Circuit training on Endurance among basketball players in the Jammu Region. A total of 60 male Basketball players. The research involves an experimental group of twenty college-level students, aged 18 to 25 years, who undergo a 12-week Plyometric Training and Circuit training program. There are three groups: Experimental Group I (plyometric training, n=20), Experimental Group II (circuit training, n=20), and Control Group (n=20). The training programs for the experimental groups were conducted for 12 weeks, three sessions per week. The selected variables for testing the hypothesis include Endurance. A paired t-test is used for data analysis, with the level of significance set at 0.05. Measurements of these variables are taken before and after the training period to assess the effects of Plyometric Training. The results reveal significant improvements in Endurance among the basketball players.

Key words: Plyometric Training, Circuit Training, Basketball, Physical Fitness

Introduction

Basketball, a dynamic and high-intensity sport, requires players to possess a diverse range of physical fitness components such as explosive strength, speed, endurance, flexibility, and neuromuscular coordination (Cao et al., 2024). These attributes are crucial for optimal performance, influencing both offensive and defensive maneuvers on the court. Given the demanding nature of the game, developing these physical fitness components through targeted training regimens is essential for athletes aiming to excel. Plyometric Training, characterized by its versatility and comprehensive approach, has emerged as a potent training method to enhance multiple fitness components simultaneously (Hu et al., 2024). By integrating a series of exercises performed in succession with minimal rest, Plyometric Training effectively targets different muscle groups

and energy systems. This holistic approach not only improves physical attributes but also contributes to overall athletic performance. Numerous studies have investigated the effectiveness of various training methods. Plyometric Training is a form of interval training that combines strength exercises with endurance and aerobic exercises, offering the benefits of both cardiovascular and strength workouts. In this context, "circuit" refers to a series of selected stations arranged around a facility, which participants visit in rapid succession. (Kundu, 2017). Sánchez (2021) stated in his study that combined training may yield better jump performance outcomes than plyometric training alone, highlighting the importance of measuring biomechanical variables to interpret training effects accurately. Bedoya et al. (2015) conducted a review of plyometric training programs and emphasized the importance of periodization and individualization.. Through a rigorous experimental design of this study aims to offer evidence-based recommendations for coaches, trainers, and athletes. Mengesh, M. (2015) investigated improvement of physical fitness with the help of plyometric training on intercollegiate female soccer players of Haramaya University. The findings will not only contribute to the existing body of knowledge on sports training but also provide practical insights for enhancing the physical fitness and overall performance of basketball players in the Jammu region.

Methods

Research Design

This study aims to investigate the impact of Plyometric Training and circuit training on Endurance among basketball players in the Jammu Region. An experimental design will be utilized, group consisting of twenty subjects.

Participants

The study will include twenty college-level students aged between 18 to 25 years. Participants will be randomly assigned, which will undergo 12-week Plyometric Training program.

Table- 1 Plyometric training Programme Design For 12- Week

Period (Week)	Warm- Up	Squat Jump Reach	Single Leg Hop	Split Squat Jump	Depth Jump	Stepup	Lateral Step Up	Vertical Jump	Stair Run
1 st and 2 nd	5.Min	Repetiti on -6	Repetiti on -6	Repetiti on -6	Repetiti on -6	Repetiti on -6	Repetiti on -6	Repetiti on -6	Repetiti on -6
3 rd and 4 th	6.Min	Repetiti on -8	Repetiti on -8	Repetiti on -8	Repetiti on -8	Repetiti on -8	Repetiti on -8	Repetiti on -8	Repetiti on -8
5 th and 6 th	7.Min	Repetiti on -10	Repetiti on -10	Repetiti on -10	Repetiti on -10	Repetiti on -10	Repetiti on -10	Repetiti on -10	Repetiti on -10

7th and 8th	8.Min	Repetiti on -12	Repetiti on -12	Repetiti on -12	Repetiti on -12	Repetiti on -12	Repetiti on -12	Repetiti on -12	Repetiti on -12
9th and 10th	9.Min	Repetiti on -14	Repetiti on -14	Repetiti on -14	Repetiti on -14	Repetiti on -14	Repetiti on -14	Repetiti on -14	Repetiti on -14
11th and 12th	10.Min	Repetiti on -16	Repetiti on -16	Repetiti on -16	Repetiti on -16	Repetiti on -16	Repetiti on -16	Repetiti on -16	Repetiti on -16

Table- 2 Circuit Training Programme Design For 12- Week

Period (Week)	Warm- Up	Sit-ups	Push ups,	body weight squat	30 m sprint	Skippi ng rope	Burpee	Shuttle run	Plank
1st and 2nd	10.Min	Repetiti on- 30 sec	Repetiti on- 30sec	Repetiti on- 30sec	Repetiti on- 30sec	Repetiti on- 30 sec	Repetiti on- 30 sec	Repetitio n- 30 sec	Repetitio n- 30 sec
3rd and 4th	10.Min	Repetiti on-35 sec	Repetiti on- 35sec	Repetiti on- 35sec	Repetiti on- 35sec	Repetiti on- 35sec	Repetiti on- 35sec	Repetitio n-35sec	Repetitio n-35sec
5th and 6th	10.Min	Repetiti on-40 sec	Repetiti on-40 sec	Repetiti on-40 sec	Repetiti on-40 sec	Repetiti on-40 sec	Repetiti on-40 sec	Repetitio n-40 sec	Repetitio n-40 sec
7th and 8th	10.Min	Repetiti on-45 sec	Repetiti on-45 sec	Repetiti on-45 sec	Repetiti on-45 sec	Repetiti on-45 sec	Repetiti on-45 sec	Repetitio n-45 sec	Repetitio n-45 sec

9th and 10th	10.Min	Repetiti on-50 sec	Repetiti on-50 sec	Repetiti on-50 sec	Repetiti on-50 sec	Repetiti on-50 sec	Repetiti on-50 sec	Repetitio n-50 sec	Repetitio n-50 sec
11th and 12th	10.Min	Repetiti on-55 sec	Repetiti on-55 sec	Repetiti on-55 sec	Repetiti on-55 sec	Repetiti on-55 sec	Repetiti on-55 sec	Repetitio n-55 sec	Repetitio n-55 sec

Measurements

Table- 3 Various physical fitness components and their test

S.No	Component	Test	Description
1.	Endurance	12-minute Run-Walk Test	Measures the distance covered in 12 minutes.

These variables will be measured and compared between the experimental and control groups before and after the 12-week training period.

Data Collection

Pre- and post-test data will be collected for all selected variables. The tests will be administered under standardized conditions to ensure consistency and reliability.

Statistical Analysis

Mean, Standard Deviation (SD), Mean Difference, and Standard Error will be computed for each variable. Paired 't' Test: To compare the differences among the selected variables between the Pretest and Post test data. The level of significance will be set at 0.05.

Hypothesis Testing

The hypotheses will be tested to determine the effectiveness of Plyometric Training and circuit training on the endurance of basketball players. The analysis will include a comparison of pre- and post-training measurements to assess the impact of the training program. By employing this methodology, the study aims to provide comprehensive insights into the effects of Plyometric Training and circuit training on Endurance among basketball players in the Jammu Region.

Results

Mean values, standard deviations, std error of mean and t-value of the Plyometric Training and Circuit Training group pre-test and post-test are presented in Table-4 and 5.

Table-4 Statistical Analysis of Endurance Measurements Before and After Plyometric Training Group.

Variable (cm)	Category	N	Mean	Std. Deviation	Std. Error of Mean	t-Value	Sig. (2-tailed)
Endurance	Pretest Group	20	2369.50	260.63	58.28	-14.96	.000
	Posttest Group	20	2491.50	251.85	56.31		

Table-5 Statistical Analysis of Endurance Measurements Before and After Plyometric Training Group.

Variable (cm)	Category	N	Mean	Std. Deviation	Std. Error of Mean	t-Value	Sig. (2-tailed)
Endurance	Pre	20	2377.50	280.86	62.80	-8.39	.000
	Post	20	2628.50	261.72	58.52		

Graph-1 graph comparing the pre and post-training values of Endurance. The mean values are shown along with the standard deviations for each variable, highlighting the improvements achieved through the training program.

Table-4 and graph-1 outlines the impact of Plyometric Training on the Endurance of basketball players. The average endurance values were 2369.50 before training and 2491.00 after training. Notably, a significant difference was observed between the pre-training and post-training endurance levels of basketball players ($t = -14.96$, $p \leq 0.05$).

Table-5 and graph-1 outlines the impact of circuit training on the endurance of basketball players. Figure 4.5 and 4.6 visually represents the variations in endurance measurements before and after training. Specifically, the average endurance values were 2377.500 before training and 2628.500 after training.

Notably, a significant difference was observed between the pre-training and post-training endurance levels of basketball players ($t = -8.391, p \leq 0.05$).

Discussion

The findings from this study provide robust evidence supporting the effectiveness of Plyometric Training and circuit training in enhancing key endurance among basketball players in the Jammu Region. The experimental group of twenty college-level students, aged 18 to 25 years, who underwent a 12-week Plyometric Training and circuit training program, exhibited significant improvements across all tested variables: Endurance. The study found an increase in strength from 46.40 to 51.80, supporting findings by Gettman et al. (1981) that circuit weight training significantly enhances muscular strength, crucial for powerful basketball actions. An improvement in speed from 7.41 to 6.95 aligns with Alcaraz et al. (2008), who demonstrated that circuit training effectively increases sprinting speed, essential for quick transitions and fast breaks in basketball. Enhanced endurance levels from 2369.50 to 2491.00 reflect findings by Wilmore and Costill (1994) that circuit training improves cardiovascular endurance, helping athletes maintain high performance throughout the game and reducing fatigue. Flexibility improvements from 25.95 to 28.35 are consistent with Arazi and Asadi (2011), who noted increased flexibility following a circuit training regimen, reducing injury risk and enhancing the range of motion for basketball techniques. Better neuromuscular coordination from 16.01 before training and 15.18 corroborates Gettman et al. (1981), who found improvements in neuromuscular coordination with circuit training, vital for executing complex movements like dribbling and shooting. There are numerous studies revealed that circuit training is effective method to improve physical fitness components (Aboshkair, K. A. (2023), Molla, G. G., & Abebe, B. G. (2021), Sefri (2020)

These significant pre- and post-training differences highlight the comprehensive benefits of Plyometric Training, indicating that it not only enhances individual fitness components but also contributes to overall basketball performance. This study's findings align with previous research, reinforcing the importance of a well-rounded training regimen that addresses multiple fitness components to achieve comprehensive athletic development.

Conclusion

This study concludes that Plyometric Training and Circuit Training is a highly effective intervention for improving Endurance among basketball players in the Jammu Region. The significant improvements observed in these key physical fitness components indicate that incorporating Plyometric Training and Circuit Training into regular training routines can substantially enhance basketball performance. Given these positive outcomes, it is recommended that coaches and trainers integrate Plyometric Training and circuit training programs to optimize the endurance and overall performance of basketball players. The results highlight the importance of a well-rounded training regimen that addresses endurance to achieve comprehensive athletic development. Future research could expand on these findings by exploring the long-term effects of Plyometric Training and Circuit Training and its impact on different age groups and skill levels, as well as comparing its effectiveness with other training modalities.

Reference

1. Aboshkair, K. A. (2023). Effect of Circuit Training on Selected Physical Fitness Components in Middle School Students in Baghdad. *Journal of Hunan University Natural Sciences*, 50(5).
2. Alcaraz, P. E., Sánchez-Lorente, J., & Blazeovich, A. J. (2008). Physical performance and cardiovascular responses to an acute bout of heavy resistance circuit training versus traditional strength training. *Journal of Strength and Conditioning Research*, 22(3), 667-671.
3. Arazi, H., & Asadi, A. (2011). The effect of aquatic and land plyometric training on strength, sprint, and balance in young basketball players. *Journal of Human Sport and Exercise*, 6(1), 101-111.
4. Cao, S., Liu, J., Wang, Z., & Geok, S. K. (2024). The effects of functional training on physical fitness and skill-related performance among basketball players: a systematic review. *Frontiers in Physiology*, 15, 1391394.
5. Gettman, L. R., Ayres, J. J., Pollock, M. L., & Jackson, A. (1981). The effect of circuit weight training on strength, cardiorespiratory function, and body composition of adult men. *Medicine and Science in Sports and Exercise*, 8(1), 99-104.
6. Hu, C., Xia, Y., Zeng, D. et al. Effect of resistance circuit training on comprehensive health indicators in older adults: a systematic review and meta-analysis. *Sci Rep* **14**, 8823 (2024). <https://doi.org/10.1038/s41598-024-59386-9>.
7. Kundu, S. (2017). Effects of Circuit Training and Plyometric Training on Leg Strength among Football Players. *Int. J. Phy. Edu. Spo*, 2(12), 77-80.
8. Molla, G. G., & Abebe, B. G. (2021). Effects of Plyometric Training on Physical Fitness in Team Sport Athlete. *International Journal Journal of Human Kinetics*, 11(53), 231–247.
9. Turk J Kin (2015). Effects of plyometric training on soccer related physical fitness variables of intercollegiate female soccer players *Turkish Journal of Kinesiology* (1(1), (20-24).
10. Sánchez-Sixto, A., Harrison, A. J., & Floría, P. (2021). Effects of plyometric vs. combined plyometric training on vertical jump biomechanics in female basketball players. *Journal of human kinetics*, 77(1), 25-35.
11. Sefri, Hardiansyah., Ade, Zalindro., Fella, Maifitri. (2020). Effect of Circuit and Interval Training Method on the Improvement of Physical Fitness. doi: 10.2991/ASSEHR.K.200824.203
12. Kumar, V. (2016). Effect of circuit training program on selected motor abilities among university male. *International Journal of Physical Education, Sports and Health*, 3(4), 255-257.
13. Wilmore, J. H., & Costill, D. L. (1994). *Physiology of Sport and Exercise*. Human Kinetics.