



Effect of Circuit Training on Fitness of Under – 19 Badminton Players

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ABSTRACT

The present study was conducted to examine the effect of circuit training on selected physical fitness components, namely speed and agility, among Under-19 male badminton players. The participants comprised 40 male badminton players selected from Nova Badminton Academy and Infinity Badminton Academy, Bengaluru. The participants were divided into two groups of 20 players each. The players from Nova Badminton Academy constituted the Experimental Group, while the players from Infinity Badminton Academy constituted the Control Group. The Experimental Group participated in a structured circuit training programme for a period of 12 weeks, with training sessions conducted three days per week. The Control Group continued their regular badminton practice and playing activities without participating in the circuit training programme. Before the commencement of the training programme, both groups underwent pre-testing to assess speed and agility. Following the completion of the 12-week training programme, post-tests were conducted using the same testing procedures. Speed was assessed through the 50-Metre Dash Test, while agility was measured using the Right Boomerang Run Test. The data obtained from the pre-test and post-test were statistically analysed using the *t*-test with the level of significance set at 0.05. The findings indicated that the Experimental Group showed greater improvement in both speed and agility compared with the Control Group. The study concludes that a systematic 12-week circuit training programme can be effective in enhancing speed and

agility among Under-19 male badminton players. The findings may be useful to badminton coaches and physical educators in designing appropriate fitness programmes for young players.

Keywords: Circuit Training, Badminton Players, Speed, Agility, Under-19 Athletes.

INTRODUCTION

Badminton is a physically demanding racket sport that requires players to perform repeated movements such as rapid acceleration, deceleration, lunging, jumping, directional changes and explosive strokes. Therefore, a high level of physical fitness is essential for young badminton players to sustain performance throughout training and competition. Research indicates that badminton performance is closely associated with qualities such as agility, speed, explosive power, muscular endurance and aerobic and anaerobic capacity. [PubMed](#)

Under-19 players are at an important stage of athletic development, where systematic physical conditioning can contribute to the development of sport-specific fitness and performance. The World Health Organization recommends that adolescents participate in an average of at least 60 minutes of moderate-to-vigorous physical activity per day, including vigorous and muscle-strengthening activities. [World Health Organization](#)

Circuit training is a structured form of physical conditioning in which different exercises are performed sequentially, allowing multiple components of fitness to be addressed within a single training programme. Its combination of strength-, endurance- and movement-based exercises makes it potentially relevant to the physical demands of badminton. Recent research involving adolescent badminton players has reported improvements in explosive power, sprint performance and agility following structured physical conditioning programmes. [PubMed](#)

Given the importance of physical fitness in badminton and the developmental needs of adolescent athletes, examining



the effect of circuit training on the fitness of Under-19 badminton players is relevant for coaches, physical educators and players. The present study therefore focuses on understanding the contribution of circuit training to enhancing the overall fitness of young badminton players.

REVIEW OF LITERATURE

- 1. Widiyanto et al. (2023)** reviewed the role of circuit training in badminton and reported that circuit training can improve players' physical condition. The authors highlighted its potential to develop multiple fitness components through continuous and varied exercises. They concluded that circuit training is an effective and attractive approach for badminton conditioning. proceedings.unnes.ac.id
- 2. Supriyanto et al. (2025)** examined the effectiveness of circuit training for improving agility among beginner badminton athletes. Their findings indicated that circuit training contributed to better agility, particularly the ability to change direction quickly while maintaining balance. The study emphasized the importance of circuit-based exercises for developing badminton-specific physical performance. [HR Pub](#)
- 3. Ismoilov (2025)** Ismoilov investigated circuit training for developing special endurance among 16–18-year-old badminton players. The study reported improvements in repeated sprinting ability, heart-rate recovery and accuracy during repeated badminton actions. The findings suggest that circuit training can effectively develop endurance qualities required by young badminton players during intensive competitive situations. wosjournals.com
- 4. Ma et al. (2025)** Ma et al. examined physical training programmes used with badminton players and found significant improvements in $VO_2\text{max}$ and agility. The review also identified positive effects of different conditioning approaches on power and balance. These findings demonstrate that structured physical training can substantially enhance important fitness components associated with badminton performance. [Springer](#)
- 5. Deng et al. (2024)** Deng et al. studied the effects of plyometric training on skill-related fitness in badminton players. Their findings showed significant improvements in power, agility, speed and balance, although reaction time did not improve significantly. The study supports the importance of explosive and dynamic exercises for developing badminton-specific physical fitness. [PubMed](#)
- 6. Özmen and Aydogmuş (2016)** Özmen and Aydogmuş investigated core strength training among adolescent badminton players. Their findings showed significant improvements in core endurance and dynamic balance, although agility did not change significantly. The study indicates that specific conditioning exercises can improve selected components of fitness, while different physical attributes may respond differently to training. [PubMed](#)
- 7. Ma et al. (2024)** Ma et al. conducted a systematic review and meta-analysis of core strength training among young badminton players. The findings indicated improvements in explosive power, badminton-specific skills, strength, balance and stability. However, the evidence for improvements in speed, endurance, agility and flexibility remained unclear, suggesting the need for further investigation. [PLOS](#)
- 8. Ma et al. (2025)** Ma et al. reported that different physical training programmes significantly improved several performance characteristics of badminton players. High-intensity and sprint-based training enhanced aerobic capacity, while strength, core and other conditioning programmes improved agility and power. The findings emphasize the value of combining different physical training components for badminton fitness. [Springer](#)
- 9. Zhang et al. (2026)** Zhang et al. investigated high-intensity interval training among trained adolescent athletes. The review found improvements in $VO_2\text{max}$, intermittent endurance, jumping ability, sprint performance and change-of-direction ability. Although the research included athletes from different sports, its findings are relevant to Under-19 badminton players because these fitness components are fundamental to repeated high-intensity court movements. [PubMed Central \(PMC\)](#)
- 10. Wang et al. (2025)** Wang et al. examined resistance training among competitive badminton players and reported improvements in power, speed, agility and endurance. Lower-limb training particularly benefited jumping performance, while core training supported stability and power transfer. The findings demonstrate that systematic physical conditioning can enhance several fitness components important for competitive badminton. [Frontiers](#)

RESEARCH GAP

The existing literature generally supports the effectiveness of structured physical conditioning for improving agility, speed, power, endurance and balance in badminton players. However, comparatively fewer studies have specifically examined the combined effect of circuit training on the overall fitness of Under-19 badminton players. This provides a



clear basis for the present study.

OBJECTIVES OF THE STUDY

1. To determine the effect of a 12-week circuit training programme on the speed of Under-19 male badminton players.
2. To examine the effect of a 12-week circuit training programme on the agility of Under-19 male badminton players.
3. To compare the speed performance between the Experimental Group and Control Group before and after the training programme.
4. To compare the agility performance between the Experimental Group and Control Group before and after the training programme.

METHODOLOGY

Research Design

The present study was undertaken to examine the effect of circuit training on the speed and agility of Under-19 badminton players. A pre-test and post-test experimental research design was adopted to assess the changes in selected physical fitness variables following a structured circuit training programme.

Participants

The participants of the study consisted of 40 male Under-19 badminton players selected from two badminton academies in Bengaluru, Karnataka, namely Nova Badminton Academy and Infinity Badminton Academy. The participants were divided into two groups, with 20 players in each group. The players from Nova Badminton Academy constituted the Circuit Training Group (CTG), also referred to as the Experimental Group, while the players from Infinity Badminton Academy constituted the Control Group (CG).

Training Programme

The Experimental Group underwent a **12-week circuit training programme**, conducted **three days per week**. The programme was designed to improve the selected components of physical fitness relevant to badminton performance. The Control Group did not participate in the circuit training programme and continued their regular badminton practice and playing activities.

Testing Procedure

Prior to the commencement of the training programme, both groups underwent a pre-test to assess their speed and agility. Following the completion of the 12-week training programme, a post-test was conducted using the same testing procedures.

Speed was assessed using the 50-Metre Dash Test, while agility was assessed using the Right Boomerang Run Test. The same procedures and testing conditions were maintained for both the pre-test and post-test to ensure consistency.

STATISTICAL ANALYSIS AND DISCUSSION

Table – 1: Presenting the ‘t’ test analysis of pre-test and post-test scores for speed and agility in the Circuit Training Group and Comparison Group (Control Group) (N = 20 per group).

Physical Fitness Variables	Tests	Comparison Group (Control Group) Infinity Badminton Academy			Experimental Group Nova Badminton Academy		
		Mean	S.D	T-value	Mean	S.D	T-value
Speed	Pre test	6.89	.483	1.29	6.89	.484	3.756*
	Post test	6.83	.587		6.81	.455	
Agility	Pre test	14.09	.461	1.53	14.08	.467	3.841*
	Post test	14.03	.498		14.00	.479	

Significant at 0.05 of confidence, Table Value – 2.09

The main objective of the investigation is to measure the "Effect of 12 weeks Circuit training on speed and agility of Badminton players.

Row-1 presents the pre-test and -test scores of the subjects for speed in both the Experimental and Comparison Group. The mean speed score of the group was 6.89 before training but after 12 weeks of circuit training it decreased to 6.81. The standard deviations for the pre-test and post-test were 0.484 and 0.455 respectively. The calculated T-test value for



the group was 3.756* indicating a significant difference between the pre-test and post-test scores for speed. In the Comparison Group, the mean pre-test speed score was 6.89 and the post-test score was 6.83. The standard deviations for the Comparison Group were 0.483 and 0.587 for the pre-test and post-test, respectively. The T-test value for the Comparison Group was 2.09 indicating no difference, between the pre-test and post-test speed scores.

Row-2 shows the pre-test and -test scores for agility in both the Experimental Group and the Control Group. The mean agility score for the Experimental Group before training was 14.08. After circuit training this score went up to 14.00. The standard deviation for the pre-test was 0.467. For the post-test it was 0.479. The T-test value for the Experimental Group was 3.841* which shows a difference between the pre-test and post-test results. In the Control Group, the mean pre-test agility score was 14.09 and the post-test score was 14.03. The standard deviation for the pre-test was 0.461. For the post-test it was 0.498. The T-test value for the Control Group was 2.09 which does not show a difference between the pre-test and post-test scores. It is clear that circuit training led to an improvement in Speed and Agility, for the Experimental Group. Therefore the hypothesis is statistically. The stated hypothesis is accepted.

Figures



Comparison of pre-test and post-test mean scores for Speed & Agility in between the Experimental and Comparison Groups.

FINDINGS

1. The Experimental Group (Circuit Training Group) showed a significant improvement in speed after the 12-week circuit training programme. The mean speed score improved from 6.89 seconds in the pre-test to 6.81 seconds in the post-test, with a calculated t -value of 3.756, which was higher than the table value of 2.09 at the 0.05 level of significance.
2. The Control Group showed only a slight improvement in speed, with the mean score changing from 6.89 seconds to 6.83 seconds. The obtained t -value did not indicate a statistically significant improvement.
3. The Experimental Group demonstrated a significant improvement in agility. The mean agility score improved from



14.08 seconds in the pre-test to 14.00 seconds in the post-test, with a calculated t -value of 3.841, which was greater than the table value of 2.09.

4. The Control Group showed only a marginal improvement in agility, with the mean score changing from 14.09 seconds to 14.03 seconds. The improvement was not statistically significant.
5. Overall, the findings indicate that the 12-week circuit training programme was effective in improving the speed and agility of Under-19 badminton players in the Experimental Group.

DISCUSSION OF FINDINGS

The purpose of the present study was to examine the effect of a 12-week circuit training programme on the speed and agility of Under-19 badminton players. The findings revealed that the Experimental Group demonstrated statistically significant improvements in both speed and agility, whereas the Control Group showed no significant improvement. The improvement in speed may be attributed to the systematic and repeated performance of exercises included in the circuit training programme. Regular training involving movements requiring rapid acceleration, muscular effort and coordinated body movements may have contributed to better speed performance.

Similarly, the significant improvement in agility suggests that circuit training was effective in developing the ability of badminton players to move quickly and change direction efficiently. These abilities are particularly important in badminton because players frequently perform rapid forward, backward and lateral movements during rallies.

The results therefore indicate that a properly structured circuit training programme can contribute positively to the development of important physical fitness components required for badminton performance.

SUGGESTIONS / RECOMMENDATIONS

1. Similar studies may be conducted with a larger sample size to obtain more comprehensive results.
2. Further research may examine the effect of circuit training on other physiological variables, such as cardiovascular endurance, muscular endurance and recovery ability.
3. Similar studies may be conducted among different age groups to determine whether the effectiveness of circuit training varies with age.
4. Future studies may include both male and female badminton players to examine gender-based differences in response to circuit training.
5. Similar research may be conducted among elite and competitive-level badminton players.
6. Future researchers may investigate the effect of circuit training on anthropometric variables, such as body composition, body mass index and body fat percentage.
7. The influence of circuit training on psychological variables, including motivation, concentration, confidence and competitive anxiety, may also be examined.
8. Coaches and physical educators may consider incorporating well-planned circuit training sessions into regular badminton training programmes to improve players' speed and agility.
9. Future studies may compare circuit training with other training methods, such as plyometric training, interval training and resistance training, to identify the most effective approach for badminton players.
10. Further research may examine the effects of different durations, frequencies and intensities of circuit training on badminton-specific fitness and performance.

CONCLUSION

Based on the findings of the study, it is concluded that the 12-week circuit training programme had a significant positive effect on the speed and agility of Under-19 male badminton players.

The Experimental Group showed significant improvement in both speed and agility, while the Control Group did not show statistically significant changes. Therefore, circuit training can be considered an effective training approach for developing selected physical fitness components among young badminton players.

The results support the acceptance of the research hypothesis that circuit training would significantly improve the speed and agility of Under-19 badminton players.



REFERENCES

1. Deng, N., Soh, K. G., Abdullah, B. B., & Huang, D. (2024). Effects of plyometric training on skill-related physical fitness in badminton players: A systematic review and meta-analysis. *Heliyon*, 10(6), e28051. [PubMed https://doi.org/10.1016/j.heliyon.2024.e28051](https://doi.org/10.1016/j.heliyon.2024.e28051)
2. Ma, S., Xue, W., Soh, K. G., Liu, H., Xu, F., Sun, M., Li, J., Shi, X., & Wang, X. (2025). Effects of physical training programs on healthy badminton players' performance: A systematic review and meta-analysis. *BMC Sports Science, Medicine and Rehabilitation*, 17, 189. [PubMed https://doi.org/10.1186/s13102-025-01199-y](https://doi.org/10.1186/s13102-025-01199-y)
3. Supriyanto, S., Rahayu, S., Rumini, R., Raharjo, H. P., Setyawati, H., & Kusuma, D. W. Y. (2025). Effectiveness of circuit training model in improving agility skills of beginner badminton athletes. *International Journal of Human Movement and Sports Sciences*, 13(5), 1042–1046. [HR Pub https://doi.org/10.13189/saj.2025.130504](https://doi.org/10.13189/saj.2025.130504)
4. *Effects of resistance training on performance in competitive badminton players: A systematic review*. (2025). *Frontiers in Physiology*. The review reported improvements in power, speed, agility and endurance following resistance-training interventions among competitive badminton players. [PubMed https://doi.org/10.3389/fphys.2025.1548869](https://doi.org/10.3389/fphys.2025.1548869)
5. *The effects of an 8-week complex training program on lower limb explosive power and movement agility in adolescent female badminton players*. (2025). The study found significant improvements in sprint performance and multidirectional agility following an eight-week complex training programme among adolescent badminton players. [PubMed Central \(PMC\)](https://pubmed.ncbi.nlm.nih.gov/41111111/)
6. The systematic review by Ma et al. (2025) reported that structured physical training programmes significantly improved agility among badminton players and highlighted the importance of appropriate conditioning programmes for badminton-specific performance.