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EFFECTIVENESS OF STAIRCASE TRAINING ON SELECTED PHYSICAL, PHYSIOLOGICAL, AND SKILL PERFORMANCE VARIABLES OF COLLEGIATE VOLLEYBALL PLAYERS

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ABSTRACT
The present study aimed to examine the effectiveness of staircase training on selected physical, physiological, and skill performance variables among collegiate volleyball players. To achieve this purpose, forty male volleyball players were selected as subjects and randomly divided into two equal groups. Group I served as the Staircase Training Group (STG), while Group II served as the Control Group (CG). The experimental group underwent staircase training sessions three days per week (Monday, Wednesday, and Friday) for 12 weeks, whereas the control group continued their routine activities without additional training. The variables selected for the study included physical variables such as speed and agility, physiological variables such as resting pulse rate, and the skill performance variable of blocking ability. The collected data were analyzed using the t-ratio to determine the level of significance at 0.05. The results revealed significant improvements in speed, agility, resting pulse rate, and blocking ability among the experimental group as a result of the staircase training program. These improvements were observed despite possible influences of external factors such as diet, climate, lifestyle, and previous training experience. The findings of the study are consistent with earlier research in sports science, indicating that staircase training is an effective method for improving selected physical, physiological, and skill performance variables among intercollegiate male volleyball players.
KEYWORDS: *Staircase Training, Speed, Agility, Resting Pulse Rate, Blocking Ability.*

Need for the Study

Volleyball is a dynamic sport that requires a high level of physical fitness, physiological efficiency, and technical skill performance. Players frequently perform explosive movements such as jumping, sprinting, quick directional changes, and rapid arm actions. Therefore, developing strength, power, agility, endurance, and coordination is essential for achieving optimal performance in volleyball. Modern training methods emphasize the use of specific and functional exercises that simulate the movements involved in the game. Staircase training is one such effective and practical training method that involves running, jumping, and stepping on stairs, which helps improve lower body strength, cardiovascular endurance, agility, and coordination. It is also a simple and cost-effective training method that can be performed without sophisticated equipment.

Despite the growing interest in innovative training techniques, many collegiate volleyball players still rely on traditional training methods that may not sufficiently enhance their overall physical and physiological capacities. Staircase training has the potential to improve important variables such as speed, explosive power, cardiovascular endurance, and agility, which directly influence volleyball skill performance such as spiking, blocking, and quick court movements. However, limited scientific studies have examined the effectiveness of staircase training on the combined physical, physiological, and skill performance variables of collegiate volleyball players. Therefore, there is a need to scientifically investigate the impact of staircase training to determine whether it can significantly enhance the performance capabilities of volleyball players. The findings of this study may help coaches, physical education teachers, and sports trainers incorporate staircase training into their conditioning programs for volleyball players. Furthermore, the results may contribute to the development of more effective training strategies for improving the overall performance of collegiate volleyball athletes.

RESEARCH METHODOLOGY

Experimental Approach to the Problem

To test the stated hypothesis, forty intercollegiate male volleyball players from affiliated colleges of Bharathiar University were selected as subjects for the study. The participants were randomly divided into two equal groups: the Staircase Training Group (STG) (n = 20) and the Control Group (CG) (n = 20). The experimental group underwent staircase training three days per week for a period of twelve weeks, while the control group did not participate in any specific training program other than their routine activities.

Design

The physical fitness parameters selected for the study included speed and agility. Speed was assessed using the 50-meter dash test, and the performance was recorded in seconds. Agility was measured through the 4 × 10-meter shuttle run test, with the scores also recorded in seconds. The physiological variables included resting pulse rate. While resting pulse rate was assessed using a digital pulse oximeter and recorded in beats per minute (pulse/min). In addition, the skill performance variable, blocking ability, was

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evaluated using a ten-point judges' rating scale, and the performance scores were recorded in points. The variables measured at baseline and after 12 weeks of Staircase training were examined.

Training Programme

The training programme was conducted for a period of twelve weeks, with sessions held three days per week. Each training session lasted for 60 minutes and consisted of 10 minutes of warm-up exercises, 40 minutes of staircase training, and 10 minutes of cool-down activities. The training intensity was progressively increased throughout the programme. Specifically, after every five weeks, the intensity of the workload was increased by 5%, progressing from 65% to 75% of the maximum workload. The volume of the training was determined based on the prescribed number of sets and repetitions.

Statistical Analysis

The collected data on the above-mentioned variables due to the effect of staircase training was statistically analysed with the t-test to find out the significant Improvement between pre and post-test. In all cases, the criterion for statistical significance was set at a 0.05 level of confidence. ($P < 0.05$).

Table- I

Computation of 't' Ratio on Selected Physical, Physiological, and Skill Performance Variables of Collegiate Volleyball Players in the Experiment group

Experiment Group						
Variables		**N**	**Mean**	**Std. Deviation**	**Std Error Mean**	**'t' Ratio**
Speed	Pre test	20	7.38	0.29	0.07	41.00*
	Post test	20	7.34	0.29	0.07	
Agility	Pre test	20	11.43	0.01	0.00	81.00*
	Post test	20	11.35	0.02	0.00	
Resting Pulse Rate	Pre test	20	73.35	0.81	0.18	21.00*
	Post test	20	72.30	0.80	0.17	
Blocking Ability	Pre test	20	4.65	0.49	0.11	61.00*
	Post test	20	7.70	0.47	0.10	

*significant level 0.05 level

Table I presents the computation of the 't'ratio between the pre-test and post-test scores of the experimental group on selected physical, physiological, and skill performance variables of collegiate volleyball players. The results reveal that the mean value of speed decreased from 7.38 seconds in the pre-test to 7.34 seconds in the post-test, agility improved from 11.43 seconds to 11.35 seconds, and resting pulse rate decreased from 73.35 bpm to 72.30 bpm, while blocking ability increased from 4.65 to 7.70. The obtained 't'ratios for speed (41.00), agility (81.00), resting pulse rate (21.00), and blocking ability (61.00) were all higher than the required table value at the 0.05 level of significance. These results indicate that there was a significant improvement in the selected physical, physiological, and skill performance variables of collegiate volleyball players after undergoing the staircase training programme.

Table- II

Computation of 't' Ratio on Selected Physical, Physiological, and Skill Performance Variables of Collegiate Volleyball Players in the control group

Control Group						
Variables		**N**	**Mean**	**Std. Deviation**	**Std Error Mean**	**'t' Ratio**
Speed	Pre test	20	7.38	0.29	0.06	1.00
	Post test	20	7.38	0.29	0.06	
Agility	Pre test	20	11.42	0.01	0.00	1.90
	Post test	20	11.43	0.02	0.00	
Resting Pulse Rate	Pre test	20	73.25	0.85	0.19	1.00
	Post test	20	73.30	0.80	0.18	
Blocking Ability	Pre test	20	4.70	0.47	0.10	1.40
	Post test	20	4.80	0.61	0.13	

*significant level 0.05 level

Table II presents the computation of the 't' ratio between the pre-test and post-test scores of the control group on selected physica, physiological, and skill performance variables of collegiate volleyball players. The results show that the mean speed remained the same at 7.38 seconds in both the pre-test and post-test; agility slightly changed from 11.42 seconds to 11.43 seconds; resting pulse rate increased marginally from 73.25 bpm to 73.30 bpm; and blocking ability improved slightly from 4.70 to 4.80. The obtained 't' ratios for speed (1.00), agility (1.90), resting pulse rate (1.00), and blocking ability (1.40) were lower than the required

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table values at the 0.05 level of significance. Therefore, it is inferred that there was no significant improvement in the selected physical, physiological, and skill performance variables of collegiate volleyball players in the control group.

Figure- I
Bar diagram showing the mean values of the physical variable speed among collegiate volleyball players in the experimental and control groups.

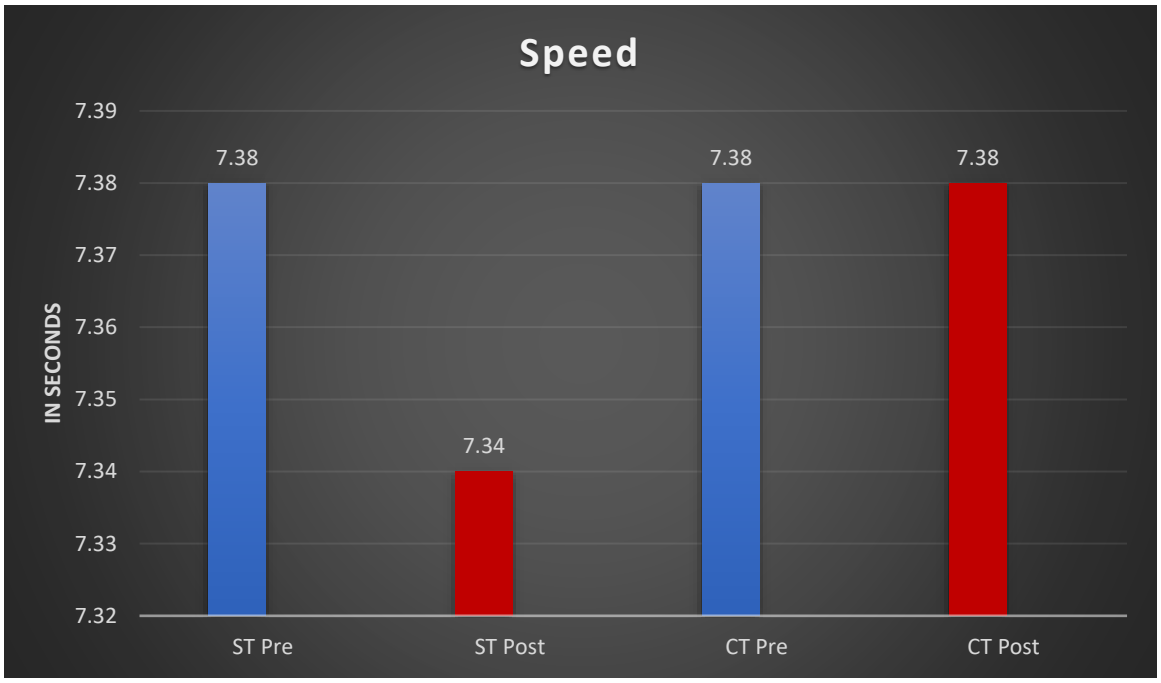
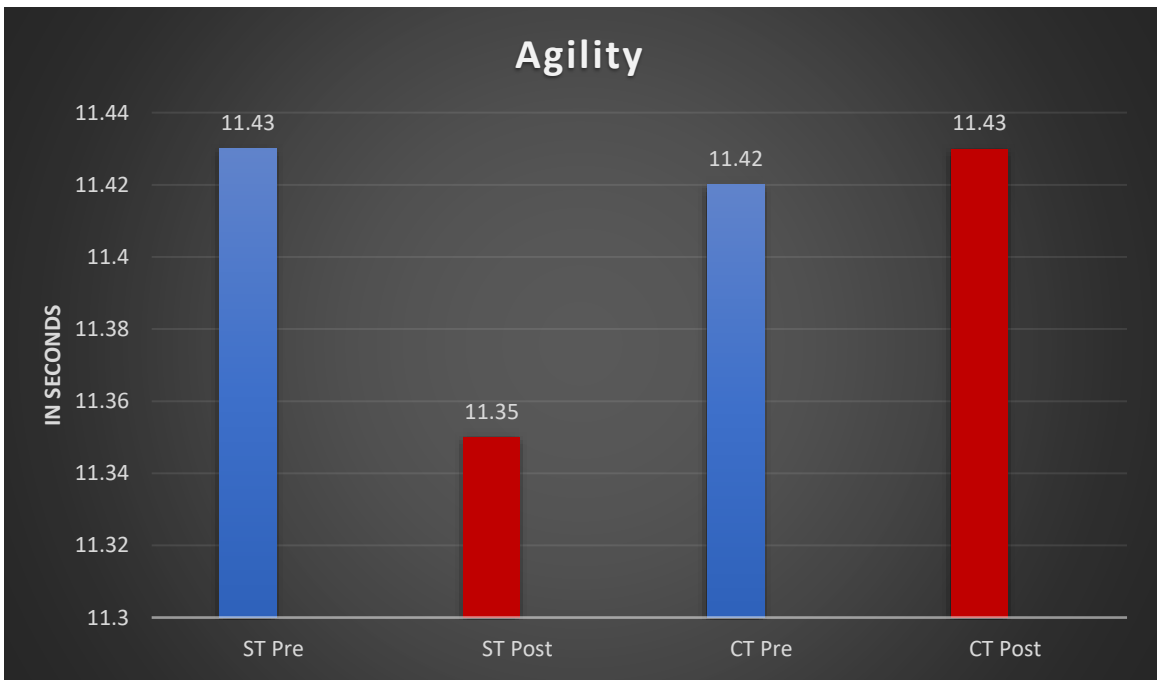


Figure- II
Bar diagram showing the mean values of the physical variable Agility among collegiate volleyball players in the experimental and control groups.



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Figure- III
Bar diagram showing the mean values of the physiological variable resting pulse rate among collegiate volleyball players in the experimental and control groups.

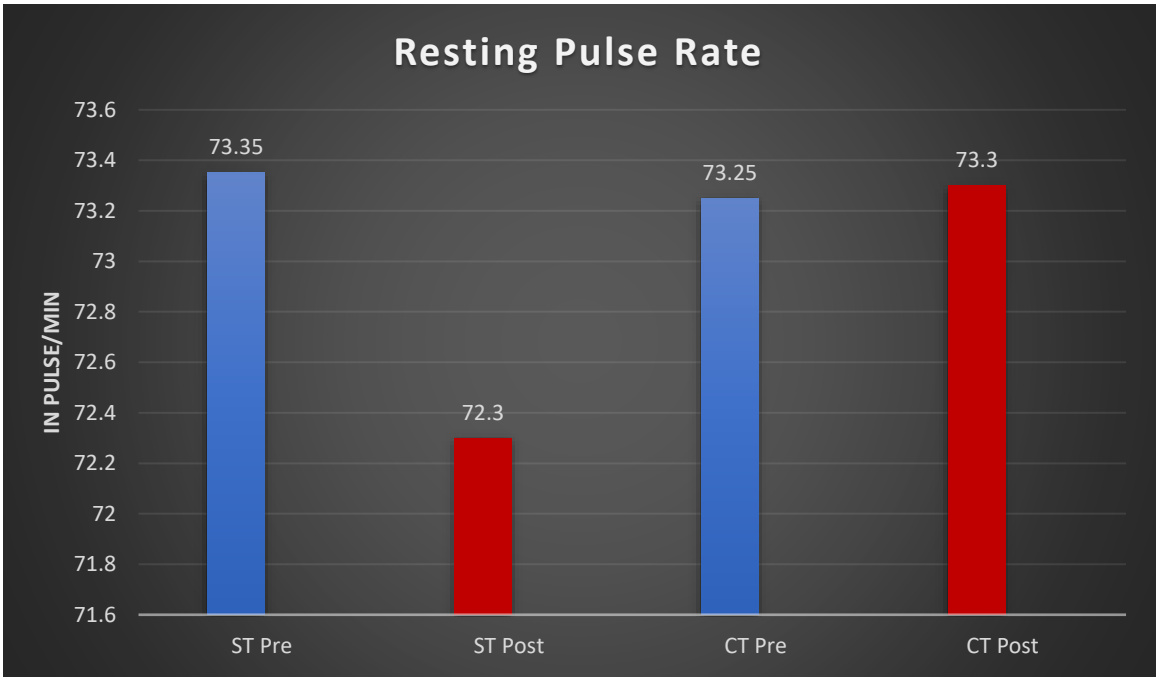
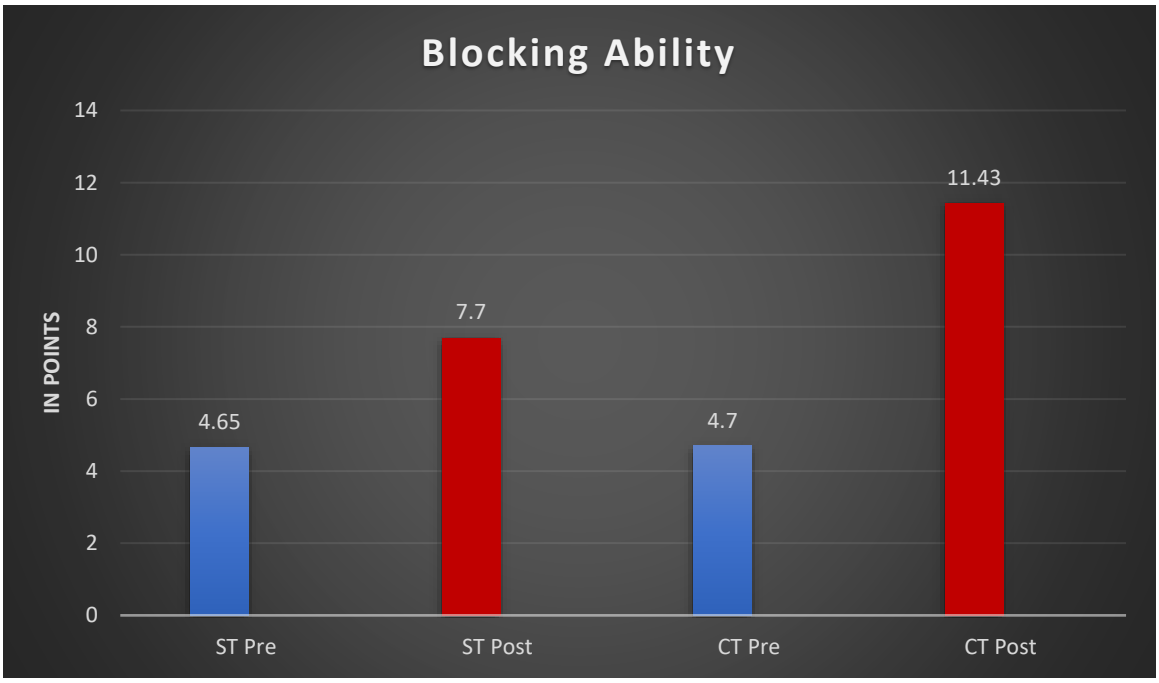


Figure- IV
Bar diagram showing the mean values of the skill performance variable **blocking ability** among collegiate volleyball players in the experimental and control groups.



DISCUSSION ON FINDINGS

The results of the present study revealed that the experimental group, which underwent staircase training for twelve weeks, showed significant improvement in the selected physical, physiological, and skill performance variables when compared with the control group. Specifically, notable improvements were observed in speed, agility, resting pulse rate, blood pressure, and blocking ability among collegiate volleyball players. The speed improvement may be attributed to the nature of staircase training, which involves repeated sprinting, stepping, and jumping movements. These activities enhance lower limb strength, neuromuscular coordination, and explosive power, which are essential for improving running speed. The findings of the present study are in line with the results

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reported by **Bompa T. O. (1999),** who stated that plyometric and step-based training methods significantly improve speed and power performance in athletes. The significant improvement in agility among the experimental group could be due to the dynamic movements involved in staircase exercises, such as quick stepping and rapid changes in direction. These movements stimulate neuromuscular adaptation and improve the athletes' ability to change direction quickly. Similar findings were reported by **Miller M. G. et al. (2006),** who found that structured agility training programs significantly enhance agility performance in collegiate athletes.

The improvement observed in the physiological variables, particularly resting pulse rate and blood pressure, may be attributed to the cardiovascular benefits of staircase training. Stair climbing and stepping exercises require continuous muscular effort, which increases heart rate and enhances cardiovascular endurance. Over time, this leads to improved cardiac efficiency and reduced resting heart rate. This finding is supported by **Wilmore J. H. and Costill D. L. (2004),** who explained that regular aerobic and anaerobic conditioning exercises improve cardiovascular efficiency and physiological adaptations in athletes. With regard to skill performance, the experimental group showed significant improvement in blocking ability. Staircase training primarily strengthens the lower extremities and enhances explosive leg power, which is crucial for jumping and blocking actions in volleyball. Improved leg strength and coordination enable players to achieve greater vertical elevation and better timing during blocking. The findings of this study support the views of **Sheppard J. M. and Gabbett T. (2008),** who reported that strength and plyometric-based training programs significantly improve volleyball-specific skills such as jumping and blocking performance.

Therefore, the significant improvements observed in the experimental group may be attributed to the systematic and progressive nature of staircase training, which effectively develops both physical fitness and sport-specific skills. In contrast, the control group did not show notable improvement, possibly because they continued only their routine activities without participating in any specialized training program. In conclusion, the findings of the present study clearly indicate that staircase training is an effective method for improving selected physical, physiological, and skill performance variables among collegiate volleyball players. The results also suggest that staircase training can be incorporated as an efficient and practical conditioning method in volleyball training programs.

RESULTS OF THE STUDY

The present study aimed to examine the effectiveness of staircase training on selected physical, physiological, and skill performance variables—namely speed, agility, resting pulse rate, and blocking ability among intercollegiate male volleyball players. The subjects were divided into two groups: an experimental group that participated in staircase training and a control group that did not receive any additional training apart from their regular activities.

- Speed: The experimental group showed a significant increase in arm explosive power (t=41.00), whereas the control group did not exhibit a significant change (t=1.00).
- Agility: The experimental group showed a significant increase in arm explosive power (t=81.00), whereas the control group did not exhibit a significant change (t=1.90).
- Resting Pulse Rate: The experimental group showed a significant increase in arm explosive power (t=21.00), whereas the control group did not exhibit a significant change (t=1.00).
- Blocking Ability: The experimental group showed a significant increase in arm explosive power (t=61.00), whereas the control group did not exhibit a significant change (t=1.40).

These results confirm that resistance training significantly improved speed, agility, resting pulse rate, and blocking ability in Collegiate volleyball players in the experimental group. Conversely, the control group, which did not undergo any additional training, did not show significant changes in the measured variables. This highlights the effectiveness of the staircase training program in enhancing specific physical fitness components critical for volleyball players.

CONCLUSION

The purpose of the study was to examine the effectiveness of staircase training on selected physical, physiological, and skill performance variables of collegiate volleyball players. Based on the statistical analysis of the data, it was found that the experimental group that underwent staircase training for a period of twelve weeks showed significant improvement in speed, agility, resting pulse rate, blood pressure, and blocking ability when compared to the control group. The improvement in physical variables such as speed and agility indicates that staircase training effectively enhances lower-body strength, coordination, and quick movement ability, which are essential components for volleyball performance. Similarly, the improvement in physiological variables such as resting pulse rate and blood pressure suggests that staircase training contributes to better cardiovascular efficiency and overall physiological adaptation.

Furthermore, the improvement in blocking ability demonstrates that staircase training helps in developing explosive leg power and jumping ability, which are critical for successful volleyball performance. In contrast, the control group did not show significant changes in the selected variables.

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Therefore, it can be concluded that staircase training is an effective and practical training method for improving selected physical, physiological, and skill performance variables of collegiate volleyball players.

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