

"Role of Resistance and SAQ Training in Improving Lower Limb Strength and Ball Control in Collegiate Football Players"

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Abstract

This study aims to examine the effectiveness of Resistance and SAQ (Speed, Agility, and Quickness) training in enhancing lower limb strength and ball control among collegiate football players. A total of 80 male intercollegiate football players were selected and randomly divided into four groups (n=20 per group): Group I underwent resistance training, Group II received SAQ training, Group III participated in a combined resistance and SAQ training program, and Group IV served as the control group with no specialized intervention. The training was conducted over a 12-week period, with sessions held thrice weekly. Standardized tests were used to measure lower limb strength (such as the vertical jump test and leg press) and ball control performance (including dribbling, juggling, and passing accuracy) before and after the intervention.

The results demonstrated significant improvements in lower limb strength and ball control in all experimental groups compared to the control group. Notably, the group receiving combined resistance and SAQ training showed the greatest gains in both strength and ball control skills, suggesting a synergistic effect of the two modalities. These findings indicate that a structured 12-week program incorporating both resistance and SAQ training can be highly effective in improving key performance variables in football. The study underscores the importance of integrating targeted strength and agility training into regular conditioning programs for collegiate-level football athletes.

Keywords: Resistance Training, SAQ Training, Lower Limb Strength, Ball Control, Collegiate Football Players

Introduction

Football is a high-intensity, intermittent sport that demands a combination of strength, speed, agility, coordination, and technical skills. Among the critical components of football performance, lower limb strength and ball control play pivotal roles in determining an athlete's ability to sprint, jump, change direction, and effectively manage the ball under pressure. In recent years, coaches and sports scientists have emphasized the importance of specific training methods such as Resistance Training and SAQ (Speed, Agility, and Quickness) Training to enhance these physical attributes. Resistance training, which focuses on developing muscular strength and endurance, is widely used to improve the explosive power and stability of lower extremities. On the other hand, SAQ training targets rapid footwork, coordination, and reaction speed—elements essential for technical ball handling and quick transitions in gameplay.

Despite the widespread application of these training methods, limited empirical studies have explored their comparative and combined effectiveness on football-specific skills such as ball control. Ball control includes dribbling, juggling, passing, and receiving, all of which require fine motor coordination, lower limb strength, and quick neuromuscular responses. The integration of both resistance and SAQ training may offer a more holistic approach by addressing both the neuromuscular and skill-related components of performance. However, there is a need to scientifically evaluate the impact of these training interventions, individually and in combination, over a structured period. Understanding which type of training yields optimal improvements can help coaches design more effective training programs tailored to football athletes.

This study aims to fill this gap by investigating the role of Resistance Training, SAQ Training, and their combination in improving lower limb strength and ball control among collegiate football players. A 12-week intervention was implemented with four groups: Resistance Training Group, SAQ Training Group, Combined Training Group, and a Control Group. Each group comprised 20 participants, selected from intercollegiate football teams. Pre- and post-training assessments were conducted using standardized tests to evaluate improvements in lower limb strength and various ball control skills. The outcomes of this study will provide practical insights into evidence-based training strategies and contribute to enhancing the overall athletic development of football players at the collegiate level.

Methodology Participants

The study involved a total of 80 male collegiate football players aged between 18 to 24 years, all of whom had at least two years of regular football training experience. Participants were randomly divided into four groups of 20 members

each: Group I (Resistance Training), Group II (SAQ Training), Group III (Combined Resistance and SAQ Training), and Group IV (Control Group). Prior to the study, all participants were briefed about the research protocol, and written informed consent was obtained. Players with any recent history of musculoskeletal injury or undergoing rehabilitation were excluded from the study.

Research Design

A pre-test and post-test experimental design was adopted for this study. The intervention period lasted for 12 weeks, during which Groups I, II, and III underwent their respective training protocols three days a week on non-consecutive days. The control group (Group IV) continued with their regular football practice without any additional training intervention. All training sessions were supervised by certified strength and conditioning professionals to ensure proper technique and adherence to the protocol.

Training Protocols

Group I performed resistance training exercises focusing on the lower body, including squats, lunges, leg presses, deadlifts, and calf raises. Training intensity progressed gradually, starting at 60% of 1- repetition maximum (1RM) and increasing to 80% over the 12 weeks. Group II engaged in SAQ drills such as ladder drills, cone zig-zag runs, short sprints with direction changes, and quick-feet exercises. Group III received a combination of both protocols—on alternate days, one session of resistance training and one session of SAQ training each week. A standardized warm-up and cool-down was included in every session across all experimental groups.

Assessment Tools

Lower limb strength was assessed using vertical jump tests and a 1RM leg press test. Ball control was evaluated through standardized football-specific drills, including a dribbling test (slalom cone run), juggling test (maximum consecutive juggles), and passing accuracy test (target wall pass). Each test was performed before and after the 12-week intervention period.

Statistical Analysis

The collected data were analyzed using descriptive statistics and inferential statistics. Paired sample t-tests were used to evaluate within-group differences from pre- to post-test, while one-way ANOVA followed by post-hoc Tukey tests were used to compare the mean differences between groups. The level of significance was set at $p < 0.05$.

Results

The results of the 12-week intervention demonstrated significant improvements in lower limb strength among the experimental groups when compared to the control group. All three experimental groups—Resistance Training (Group I), SAQ Training (Group II), and Combined Training (Group III)—showed measurable enhancements in vertical jump height and 1RM leg press performance. Among them, the Combined Training Group showed the most substantial gains, with vertical jump increasing from an average of 42.1 cm to 50.3 cm and leg press strength improving from 195.4 kg to 236.5 kg. The Resistance and SAQ groups also exhibited marked improvements, though to a lesser extent than the combined group. The Control Group (Group IV), which did not undergo any specific training protocol, displayed minimal changes in lower limb strength parameters.

Regarding ball control performance, participants in all experimental groups displayed progress in dribbling, juggling, and passing accuracy, with the Combined Training Group again outperforming the others. This group achieved the greatest improvement in dribbling speed, juggling consistency, and passing accuracy, highlighting the advantage of integrating both strength and agility components. The SAQ Training Group showed better ball control outcomes than the Resistance Training Group, particularly in tasks demanding quick footwork and coordination, such as dribbling and juggling. The Control Group showed negligible improvements, indicating that the observed enhancements in the experimental groups were a direct result of the targeted training protocols.

Table 1: Pre- and Post-Test Scores for Lower Limb Strength (Mean $\pm$ SD)

Group	Vertical Jump (cm) Pre	Vertical Jump (cm) Post	1RM Leg Press (kg) Pre	1RM Leg Press (kg) Post
Group I (Resistance)	43.5 $\pm$ 3.2	48.7 $\pm$ 3.5	190.2 $\pm$ 10.4	225.3 $\pm$ 11.8

Group II (SAQ)	42.8 ± 3.7	47.2 ± 3.6	187.6 ± 12.1	212.4 ± 13.0
Group III (Combined)	42.1 ± 3.4	50.3 ± 3.3	195.4 ± 11.3	236.5 ± 12.7
Group IV (Control)	43.0 ± 3.6	43.8 ± 3.7	191.5 ± 10.2	193.2 ± 10.5

Table 1 displays clear improvements in lower limb strength among all experimental groups after 12 weeks of training. The Combined Group showed the highest increase in both vertical jump and leg press values. The Resistance and SAQ groups also showed considerable gains, affirming the effectiveness of targeted training protocols. The Control Group, which did not undergo any training intervention, showed only marginal improvements. These results confirm that the training interventions were effective in enhancing strength parameters.

Table 2: Pre- and Post-Test Scores for Ball Control Skills (Mean ± SD)

Group	Dribbling Time (sec) Pre	Dribbling Time (sec) Post	Juggling Count Pre	Juggling Count Post	Passing Accuracy Pre	Passing Accuracy Post
Group I (Resistance)	11.2 ± 1.1	9.7 ± 1.0	25.3 ± 4.5	32.8 ± 4.7	6.1 ± 1.0	7.4 ± 1.2
Group II	11.5 ± 1.3	9.3 ± 0.9	26.1 ± 4.2	35.7 ± 5.0	6.3 ± 1.1	7.9 ± 1.3
Group III (Combined)	11.4 ± 1.2	8.5 ± 0.8	25.8 ± 4.6	39.6 ± 5.2	6.0 ± 1.0	8.7 ± 1.1
Group IV (Control)	11.3 ± 1.1	11.1 ± 1.2	25.6 ± 4.4	26.0 ± 4.5	6.2 ± 1.1	6.3 ± 1.2

Table 2 shows that all experimental groups improved in dribbling time, juggling count, and passing accuracy after the 12-week intervention. The Combined Training Group exhibited the most notable improvements across all ball control variables. SAQ Training showed slightly better skill gains than Resistance Training due to its agility emphasis. Minimal change was observed in the Control Group. This reinforces the value of structured training for football skill development.

Discussion

The findings of this study clearly demonstrate that Resistance Training, SAQ Training, and their combination significantly improve lower limb strength and ball control in collegiate football players. The most noteworthy improvements were observed in the Combined Training Group (Group III), suggesting a synergistic effect when both training modalities are integrated into a structured program. This aligns with previous studies indicating that combining strength and agility work can lead to more comprehensive development of physical and technical abilities in team sports athletes.

Resistance Training (Group I) led to notable gains in lower limb strength, as evidenced by improvements in vertical jump height and 1RM leg press performance. This supports the well-established principle that resistance exercises increase muscle hypertrophy, neuromuscular efficiency, and explosive power—all of which are crucial for sprinting, jumping, and stability in football. However, this group showed relatively modest improvements in ball control, indicating that strength alone is not sufficient to significantly impact skills requiring coordination and agility.

The SAQ Training Group (Group II) showed considerable improvements in ball control metrics, particularly in dribbling and juggling performance. These results are consistent with the role of SAQ training in enhancing neuromuscular coordination, foot speed, reaction time, and proprioception. While SAQ training also improved lower limb strength to some extent, its effects were less pronounced than those seen in the resistance group, suggesting it is more effective in improving skill-related aspects of performance.

The Combined Training Group (Group III) produced the most significant improvements in both physical and skill parameters. This supports the idea that a multifaceted training approach can yield superior results by simultaneously targeting muscular strength and functional movement patterns. The enhanced results in both strength and ball control in this group indicate that athletes benefit more when training programs are designed to develop both force production and movement efficiency together.

In contrast, the Control Group (Group IV) showed negligible improvements in both lower limb strength and ball control, reinforcing the importance of targeted and scientifically designed training interventions beyond routine practice. These results emphasize that technical and physical performance in football cannot be optimized through general play alone, and must be supported with structured conditioning programs.

Overall, this study confirms the effectiveness of integrating resistance and SAQ training in improving key performance variables in collegiate football players. These findings have practical implications for coaches and trainers, who are encouraged to design training modules that incorporate both strength and agility components for well-rounded athletic development.

Conclusion

The present study aimed to investigate the role of Resistance Training, SAQ (Speed, Agility, and Quickness) Training, and their combination in enhancing lower limb strength and ball control among collegiate football players over a 12-week period. The results revealed that all three experimental groups showed significant improvements in their respective performance metrics, with the Combined Training Group demonstrating the greatest overall gains. This indicates that an integrated training approach that includes both strength and agility components offers superior benefits compared to isolated training methods.

Resistance training effectively enhanced lower limb strength, which is essential for powerful movements like sprinting and jumping, whereas SAQ training significantly improved football-specific skills such as dribbling, juggling, and passing. The findings strongly support the inclusion of both types of training in the conditioning programs of football players to develop a more complete athletic profile. In contrast, the control group that followed only regular football practice without additional intervention showed minimal improvement, highlighting the necessity for structured and targeted physical conditioning. In conclusion, the integration of resistance and SAQ training into routine practice schedules can significantly improve both the physical and skill performance of collegiate football players. Coaches, trainers, and sports scientists are encouraged to adopt a holistic training methodology to optimize athletic performance and skill execution on the field. Future research may further explore the long-term effects of such combined training programs across different age groups and competitive levels.

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