Current Clinical and Medical Education

Received 14 May 2026 | Accepted 14 Jun 2026 | Published Online 19 Jul 2026

Published By: Vision Publisher

CCME 4 (7), 17-22

ISSN 2942-0792

Evaluating the Effectiveness of a General Physical Fitness Exercise System for Male Soccer Players at Nong Lam University, Ho Chi Minh City

PHAM TRUNG TIEN[1,2], NGUYEN VAN TANG[2], PHAN HOANG VU[1]

[1]Nong Lam University, Ho Chi Minh City, Vietnam

[2]University of Sport Ho Chi Minh City, Vietnam

Abstract:

Objective: Soccer is a high-intensity intermittent sport that requires a comprehensive physical foundation. This study aims to evaluate the effectiveness of a 6-month general physical fitness training program for male student-athletes on the soccer team at Nong Lam University, Ho Chi Minh City.

Methods: A randomized controlled trial was conducted on 20 male students (aged 18–22), randomly divided into a control group (CG, n=10) following a traditional training program, and an experimental group (EG, n=10) applying a specialized system of 25 general physical fitness exercises. Eight physical fitness tests (30m sprint, 150m sprint, 12-minute Cooper test, standing long jump, standing vertical jump, 4x10m shuttle run, 30-second sit-ups, and handgrip strength) were utilized to collect data before and after the intervention.

Results: There was no statistically significant difference in baseline physical fitness between the two groups prior to the experiment ($p > .05$). After 6 months, the EG demonstrated superior and statistically significant improvements compared to the CG in 6 out of 8 parameters: 30m sprint ($t = 3.82$, $p < .05$), Cooper test ($t = 2.58$, $p < .05$), standing vertical jump ($t = 2.71$, $p < .05$), 4x10m shuttle run ($t = 3.37$, $p < .05$), 30-second sit-ups ($t = 6.49$, $p < .05$), and handgrip strength ($t = 2.44$, $p < .05$). The 150m sprint and standing long jump tests did not record any statistically significant differences between the two groups.

Conclusion: The proposed exercise system yielded positive and distinct effects in developing overall motor capacity, providing a practical basis for optimizing collegiate sports training.

Keywords:*Soccer, general physical fitness, students, motor capacity, sports training.*

Corresponding Author: PHAM TRUNG TIEN†, Nong Lam University, Ho Chi Minh City, Vietnam and University of Sport Ho Chi Minh City, Vietnam

Copyright: © 2026 The Authors. Published by Vision Publisher. This is an open access article under the CC BY-NC-ND license (https://creativecommons.org/licenses/by-nc-nd/4.0/).

1. INTRODUCTION

Modern soccer is characterized by intermittent, acyclic movements with continuously varying intensities. According to Stølen et al. (2005), during a standard match, players execute a series of high-speed sprints, sudden changes of direction, jumping duels, and alternating recovery walks. The total average distance covered ranges from 10 to 12 km, of which approximately 1 to 2 km consists of maximal-intensity sprints (Bangsbo, 1994). This paradigm demands that athletes not only possess excellent technical and tactical skills but also a comprehensive physiological foundation, encompassing aerobic endurance, anaerobic capacity, explosive power, and reaction speed (Mujika et al., 2009).

Within both professional and collegiate sports training systems, general physical fitness is universally considered an obligatory foundation before transitioning to sport-specific physical conditioning. The comprehensive development of energy systems, the neuromuscular network, and cardiovascular-respiratory functions through general fitness exercises enables athletes to maintain precise technical execution when fatigue accumulates towards the end of a match (Hoff et al., 2002). According to Faude et al. (2012), decisive situations leading to goals in soccer are frequently associated with straight-line sprints or actions requiring high agility and explosive power. Consequently, building solid general fitness concurrently mitigates the risk of sports-related injuries (Wong et al., 2009).

In Vietnam, collegiate sports in general, and student soccer in particular, are rapidly expanding in scale. However, practical observations at Nong Lam University, Ho Chi Minh City, reveal that the men's soccer team is undergoing a generational transition characterized by an influx of young players. Despite their competitive enthusiasm, these student-athletes often exhibit a noticeable physical decline during direct physical duels or in the final 20 minutes of a half. The absence of a systematic, methodical general physical fitness training program tailored to the limited time availability of university students remains a primary obstacle to improving competitive performance.

Numerous previous studies have indicated that applying combined physical exercises (cyclic and acyclic) exerts positive effects on players' overall motor capacity (Bidaurrazaga-Letona et al., 2015). Nevertheless, standardizing an optimized exercise system specifically for non-professional university students represents a significant literature gap. Stemming from this context, the present study was conducted with the primary objective: To evaluate the effectiveness of a targeted general physical fitness exercise system for male student-athletes on the soccer team at Nong Lam University, Ho Chi Minh City over a 6-month intervention.

2. RESEARCH METHODS

2.1. Subjects and Study Design

The study utilized a Randomized Controlled Trial (RCT) design. The research sample comprised 20 sophomore male students from the soccer team at Nong Lam University, Ho Chi Minh City. The subjects possessed a mean age of 19.5 years, were in normal health, and reported no acute or chronic neuromuscular injuries within the 6 months prior to the study.

The cohort was randomly divided into 2 groups:

Control Group (CG, n=10): Participated in training according to the team's traditional lesson plans (primarily focusing on intra-squad scrimmages and basic tactical drills).

Experimental Group (EG, n=10): Trained under a 6-month intervention program comprising a systematically selected regimen of 25 general physical fitness exercises.

2.2. Exercise Selection and Development Procedure

The intervention exercise system was developed through a rigorous 3-step procedure, anchored in the theoretical foundations of training periodization by Bompa & Buzzichelli (2015):

Synthesis: Preliminarily assembled 201 exercises from specialized sports training literature. These were subsequently screened based on practical facility conditions, retaining 60 potential exercises.

Expert Evaluation: Conducted Delphi-style interviews with domain experts (N=30, including PhDs, Masters, and elite soccer coaches) across two assessment rounds.

Selection: Retained only the 25 exercises that achieved a consensus rate of 80% or higher. The consistency between the two interview rounds was verified using the non-parametric Wilcoxon test ($p > .05$). These exercises were categorized into six physical trait domains: Speed, Strength, Endurance, Flexibility, Coordination, and Agility.

2.3. Intervention Program

The intervention program for the EG lasted for 6 months (September 2025 to February 2026), spanning 24 microcycles. The frequency was set at 3 sessions per week, with a dedicated duration of 30–45 minutes per session

allocated exclusively to physical conditioning. The training load structure strictly adhered to the physiological principles of progressive overload and individualization (Impellizzeri et al., 2008).

2.4. Measurement and Evaluation Tools (Testing Protocols)

Based on expert consensus and standardized physical testing batteries (Reilly et al., 2000), the study utilized the following 8 tests to assess general physical fitness:

30m sprint from a standing start (s): Evaluates movement speed and acceleration capability.

150m sprint from a standing start (s): Evaluates anaerobic endurance capacity.

12-minute Cooper test (m): Evaluates maximal aerobic capacity (VO2max proxy).

Standing long jump (cm): Evaluates horizontal explosive power of the lower extremities.

Standing vertical jump (cm): Evaluates vertical explosive power and stretch-shortening cycle efficiency.

4x10m shuttle run (s): Evaluates agility and multi-directional movement capabilities.

30-second sit-ups (reps): Evaluates the localized muscular endurance of the core stabilizers.

Dominant handgrip strength (kg): Employs a handgrip dynamometer to evaluate the absolute static strength of the upper limb musculature.

2.5. Statistical Analysis Methods

Data processing was executed using SPSS version 20.0 software. Descriptive statistics are presented as Mean ± Standard Deviation (Mean ± SD).

Sample homogeneity was assessed via the Coefficient of Variation (CV%).

Independent t-tests were utilized to evaluate inter-group differences (CG vs. EG) at pre- and post-intervention time points.

Paired t-tests were employed to analyze intra-group longitudinal changes (pre-test vs. post-test).

The growth rate (W%) was calculated using the S. Brody formula. The alpha level for statistical significance was established a priori at $p < .05$.

3. RESULTS

3.1. Evaluation of Group Homogeneity at Baseline

Baseline physical fitness testing was conducted to verify the absence of initial physiological discrepancies between cohorts. The analysis of CV% for all 20 subjects ranged from 1.35% to 8.08% (well below the 10% threshold), indicating high sample homogeneity and adequate representativeness.

Table 1: Comparison of baseline mean performance between the CG and EG

No.	Evaluation Tests	CG (n=10) (M ± SD)	EG (n=10) (M ± SD)	t	p
1	30m sprint (s)	4.38 ± 0.03	4.36 ± 0.08	0.71	> .05
2	150m sprint (s)	19.81 ± 1.35	19.96 ± 1.44	0.24	> .05
3	Cooper test 12 min (m)	2638.70 ± 164.24	2627.70 ± 183.24	0.14	> .05
4	Standing long jump (cm)	247.20 ± 15.16	245.40 ± 16.77	0.25	> .05
5	Standing vertical jump (cm)	50.00 ± 3.89	50.00 ± 4.16	1.73	> .05
6	4x10m shuttle run (s)	10.46 ± 0.31	10.36 ± 0.32	0.67	> .05
7	30s sit-ups (reps)	24.20 ± 1.55	24.50 ± 1.08	0.5	> .05
8	Handgrip strength (kg)	41.50 ± 3.41	41.40 ± 3.47	0.06	> .05

Note: Critical t-value = 2.101 at alpha = .05.

The results in Table 1 demonstrate that the calculated *t*-values across all 8 tests ranged from 0.06 to 1.73. The *p*-values for all parameters were > .05. Consequently, the physiological differences between the two groups prior to the intervention were not statistically significant, effectively ensuring baseline objectivity for the experimental process.

3.2. Evaluation of Intra-group Changes (Pre-test vs. Post-test)

Following the 6-month intervention, the CG recorded marginal changes, reaching statistical significance ($p < .05$) in only 5 out of 8 tests with remarkably low growth rates (W%), ranging from 0.14% to 2.82%. Conversely, the EG demonstrated profound physiological adaptations across most parameters.

Table 2: Performance development of the Experimental Group before and after the 6-month intervention

No.	Evaluation Tests	Pre-test (n=10) (M ± SD)	Post-test (n=10) (M ± SD)	W (%)	t	p
1	30m sprint (s)	4.38 ± 0.03	4.21 ± 0.05	3.89	11.25	< .05
2	150m sprint (s)	19.81 ± 1.35	19.64 ± 1.33	0.86	2.18	> .05
3	Cooper test 12 min (m)	2638.70 ± 164.24	2858.00 ± 208.16	7.98	10.32	< .05
4	Standing long jump (cm)	247.20 ± 15.16	261.50 ± 16.76	5.62	7.63	< .05
5	Standing vertical jump (cm)	50.00 ± 3.89	56.00 ± 4.16	11.32	16.43	< .05
6	4x10m shuttle run (s)	10.46 ± 0.31	9.91 ± 0.20	5.4	14.47	< .05
7	30s sit-ups (reps)	24.20 ± 1.55	28.20 ± 1.03	15.27	9.48	< .05
8	Handgrip strength (kg)	41.50 ± 3.41	45.80 ± 3.43	9.85	20.14	< .05

Note: Critical t-value = 2.262 at alpha = .05.

Table 2 highlights that the 25-exercise system robustly stimulated physiological adaptation processes. Seven out of eight tests exhibited highly distinct improvements ($p < .05$). The most substantial growth rates were observed in the core muscle group (Sit-ups, 15.27%) and vertical explosive power (Vertical jump, 11.32%). However, the 150m sprint test did not register a statistically significant improvement ($p > .05$).

3.3. Comparison of Effectiveness Between CG and EG Post-intervention

The core variable utilized to verify the superiority of the experimental exercise system is the independent comparison of Post-test results between the two groups.

Table 3: Comparison of post-intervention mean performance between CG and EG

No.	Evaluation Tests	CG (n=10) (M ± SD)	EG (n=10) (M ± SD)	t	p
1	30m sprint (s)	4.32 ± 0.08	4.21 ± 0.05	3.82	< .05
2	150m sprint (s)	19.75 ± 1.41	19.64 ± 1.33	0.33	> .05
3	Cooper test 12 min (m)	2631.30 ± 183.94	2858.00 ± 208.16	2.58	< .05
4	Standing long jump (cm)	246.30 ± 15.76	261.50 ± 16.76	2.09	> .05
5	Standing vertical jump (cm)	51.00 ± 4.08	56.00 ± 4.16	2.71	< .05
6	4x10m shuttle run (s)	10.33 ± 0.35	9.91 ± 0.20	3.37	< .05
7	30s sit-ups (reps)	25.20 ± 1.03	28.20 ± 1.03	6.49	< .05
8	Handgrip strength (kg)	42.20 ± 3.16	45.80 ± 3.43	2.44	< .05

Note: Critical t-value = 2.101 at alpha = .05.

The post-intervention divergences were highly evident. Statistical significance ($p < .05$) favoring the experimental group emerged in 6 out of 8 tests. The two parameters that failed to yield statistical differentiation between the cohorts were the 150m sprint and standing long jump ($p > .05$).

4. DISCUSSION

The primary purpose of this study was to evaluate the feasibility and efficacy of a 25-exercise system designed to develop general physical fitness for male collegiate soccer players. The comparative results following the 6-month intervention (Table 3) confirmed the initial research hypothesis: Applying a systematic, strictly periodized training program yields superior physical adaptations compared to traditional training modalities that fail to clearly delineate physical conditioning loads (Bompa & Buzzichelli, 2015).

One of the most prominent findings was the substantial improvement in the 12-minute Cooper test ($t = 2.58$, $p < .05$). Anaerobic and aerobic capacities act as core physiological foundations in soccer due to the spatial demands of the sport (Hoff et al., 2002). Incorporating exercises such as *100-200m interval running*, *Fartlek training*, and *Yo-Yo Intermittent Recovery running simulations* effectively stimulated increases in maximal oxygen uptake (VO2max) and the lactate threshold among the students. While the Yo-Yo test is frequently preferred in elite professional environments for more precise intermittent assessments, the Cooper test demonstrated a reliable linear reflection of general fitness improvements for amateur collegiate athletes, aligning with the physiological frameworks proposed by Impellizzeri et al. (2008).

Regarding explosive power and short-distance acceleration, tests such as the 30m sprint ($t = 3.82$, $p < .05$) and standing vertical jump($t = 2.71$, $p < .05$) exhibited marked enhancements. This outcome is directly attributable to the integration of plyometric exercises (e.g., Depth Jumps, Squat Jumps, Lunge Jumps) within the intervention system. According to Bidaurrazaga-Letona et al. (2015), consistent training of the stretch-shortening cycle (SSC) enhances musculotendinous stiffness and overall neuromotor efficiency. The improved 30m sprint performance perfectly aligns with specific soccer demands, as critical sprints in match play typically occur over distances under 30 meters and are decisive in one-on-one duels (Faude et al., 2012).

Positive adaptations in the 4x10m shuttle run test evidence enhanced agility and rapid direction-change capabilities. Agility depends not merely on skeletal musculature but heavily relies on the central nervous system's capacity to process exceptional balance and proprioceptive information under high velocities (Wong et al., 2009). The combination of *Ladder Drills* and *directional Shuttle Runs* effectively overloaded this neuromuscular component.

Conversely, the study noted that two tests—150m sprint and standing long jump—showed no statistically significant inter-group differences. This phenomenon can be elucidated through the Principle of Specificity. Soccer biomechanics necessitate continuous short bursts (under 30m) rather than prolonged anaerobic speed endurance (characteristic of a 150m track event). Consequently, the training load in the program primarily targeted the ATP-CP energy system for short phases, rather than the glycolytic pathway for mid-distances (Reilly et al., 2000). Similarly, regarding the standing long jump, soccer dynamics require vertical jumps (Z-axis) for heading duels far more frequently than horizontal bounds (Y-axis); hence, the applied plyometric exercises likely stimulated vertical vector adaptations more robustly.

The present study acknowledges certain limitations. The sample size (N=20) was relatively modest, restricted by the fixed roster constraints of a collegiate team. Furthermore, the lack of strict quantification of the students' nutritional and lifestyle regimens over the 6-month period may introduce minor confounding variables. Nonetheless, the recorded empirical data unequivocally demonstrate clear, rule-based physiological developmental trends.

5. CONCLUSION & RECOMMENDATIONS

Based on the experimental analyses, the study draws the following conclusions:

The baseline general physical fitness of the men's soccer team at Nong Lam University, HCMC was at a moderate and uniform level; however, stronger physiological stimuli were required to meet the demands of modern collegiate competition.

The application of a cyclical and progressive system comprising 25 general fitness exercises over 6 months produced statistically significant and superior improvements. The experimental group significantly outperformed the control group in 6 out of 8 assessment tests: 30m sprint, Cooper endurance test, Vertical jump, 4x10m Shuttle run, Sit-ups, and Handgrip strength ($p < .05$).

The proposed program demonstrated high practical applicability, a rigorous scientific structure, and complete suitability for the time constraints inherent to non-professional student-athletes.

Recommendations

Based on the empirical findings, we recommend that the Coaching Staff and the Physical Education Department of the University maintain and replicate this periodized training model for other varsity sports teams. Future training cycles should consider a tighter integration between on-ball and off-ball exercises to ensure student-athletes develop optimal physical conditioning without compromising their specific tactical spatial awareness.

REFERENCES

1. Bangsbo, J. (1994). The physiology of soccer--with special reference to intense intermittent exercise. *Acta Physiologica Scandinavica. Supplementum, 619*, 1-155.
2. Bidaurrazaga-Letona, I., Lekue, J. A., Amado, M., Santos-Concejero, J., & Gil, S. M. (2015). Identifying talented young soccer players: Conditional, anthropometric and physiological characteristics as predictors of performance. *Revista Internacional de Medicina y Ciencias de la Actividad Fisica y del Deporte, 15*(59), 413-430. https://doi.org/10.15366/rimcafd2015.59.002
3. Bompa, T. O., & Buzzichelli, C. (2015). *Periodization Training for Sports* (3rd ed.). Human Kinetics.
4. Faude, O., Koch, T., & Meyer, T. (2012). Straight sprinting is the most frequent action in goal situations in professional football. *Journal of Sports Sciences, 30*(7), 625-631. https://doi.org/10.1080/02640411.2011.646536
5. Hoff, J., Wisløff, U., Engen, L. C., Kemi, C. J., & Helgerud, J. (2002). Soccer specific aerobic endurance training. *British Journal of Sports Medicine, 36*(3), 218-221. https://doi.org/10.1136/bjsm.36.3.218
6. Impellizzeri, F. M., Rampinini, E., Castagna, C., Bishop, D., Ferrari Bravo, D., Tibaudi, A., & Wisloff, U. (2008). Validity of a repeated-sprint test for football. *International Journal of Sports Medicine, 29*(11), 899-905. https://doi.org/10.1055/s-2008-1038491
7. Mujika, I., Santisteban, J., Impellizzeri, F. M., & Castagna, C. (2009). Fitness determinants of success in men's and women's football. *Journal of Sports Sciences, 27*(2), 107-114. https://doi.org/10.1080/02640410802428071
8. Reilly, T., Bangsbo, J., & Franks, A. (2000). Anthropometric and physiological predispositions for elite soccer. *Journal of Sports Sciences, 18*(9), 669-683. https://doi.org/10.1080/02640410050120050
9. Stølen, T., Chamari, K., Castagna, C., & Wisløff, U. (2005). Physiology of soccer: An update. *Sports Medicine, 35*(6), 501-536. https://doi.org/10.2165/00007256-200535060-00004
10. Wong, P. L., Chamari, K., Dellal, A., & Wisløff, U. (2009). Relationship between anthropometric and physiological characteristics in youth soccer players. *The Journal of Strength & Conditioning Research, 23*(4), 1204-1210. https://doi.org/10.1519/JSC.0b013e31819f1e52

Source article: Research on the Selection of General Physical Fitness Exercises for Male Members of the Ho Chi Minh City University of Agriculture and Forestry Football Team. "*Nghiên Cứu Lựa Chọn Một Số Bài Tập Phát Triển Thể Lực Chung Cho Nam Sinh Viên Đội Tuyển Bóng Đá Trường Đại Học Nông Lâm Thành Phố Hồ Chí Minh*"