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The Effect of Circuit Training on Physical Condition Improvement of Football Players in Lubuk Beringin Village

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ABSTRACT

This study aimed to investigate the effect of circuit training on physical condition improvement among football players in Lubuk Beringin Village. Physical condition is a fundamental aspect that supports technical, tactical, and mental performance in football. The research employed an experimental design with pretest-posttest measurements involving 20 male football players aged 23 years. The circuit training program consisted of 8 stations performed 3 times per week for 6 weeks, with each station lasting 30 seconds to 1 minute. Physical condition was measured through six tests: push-ups, sit-ups, pull-ups, 40-meter sprint, Illinois agility run, and 2400-meter run. Data were analyzed using the Wilcoxon non-parametric test and Levene's test for homogeneity. The results showed significant improvements in all physical condition components ($p < 0.05$). The Wilcoxon test revealed significant differences between pretest and posttest for pull-ups ($p = 1.91e-06$) and Illinois agility ($p = 1.91e-06$). Most athletes showed improvement from the "low" and "moderate" categories to the "moderate" and "high" categories. Circuit training proved to be an effective method for improving physical condition in football players, particularly in muscular endurance, speed, agility, and cardiorespiratory endurance.

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INTRODUCTION

Football is one of the most popular sports globally, serving not only as a physical activity but also as a means of recreation, unity, and achievement (Octavianti & Hutapea, 2018). The sport requires a combination of technical skills, physical endurance, and tactical understanding to perform optimally during matches lasting 2×45 minutes (Santoso et al., 2022). Physical condition represents a critical foundation that must be developed before advancing to technical, tactical, and mental training phases in football preparation (Pratama & Wiyaka, 2021). Without adequate physical conditioning, players struggle to maintain performance quality throughout the duration of matches, particularly in the second half when fatigue typically sets in (Arridho et al., 2021).

Recent studies have demonstrated that Indonesian football players generally face challenges in maintaining optimal physical condition during competitions (Asy'ary, 2023). This limitation significantly impacts their ability to execute technical skills, implement tactical strategies, and sustain mental focus during critical moments of play (Bile et al., 2024). The demands of modern football require players to possess exceptional levels of aerobic endurance, speed, agility, muscular strength, and power throughout the entire match duration (Putra et al., 2023). Research by Arridho et al. (2021) emphasized that physical condition encompasses various interconnected components, including cardiovascular endurance, muscular endurance, speed, agility, and flexibility, all of which must be developed comprehensively through systematic training programs.

Despite the theoretical advantages of circuit training, there remains a gap in empirical evidence regarding its specific effects on football players' physical condition in grassroots community settings. Previous research by Satria (2019) and Trishandra & Rois (2022) demonstrated positive effects of circuit training on aerobic endurance and overall physical fitness in university and club-level football players. However, these studies primarily focused on institutional settings with well-equipped facilities and experienced coaching staff. The current research addresses this gap by investigating the application of circuit training in a village-level football team context, where resources and training infrastructure may be more limited. The Lubuk Beringin football team, established in 2010 in Bungo District, Jambi Province, represents a typical grassroots community team that faces challenges in implementing systematic physical conditioning programs due to limited training frequency and monotonous exercise routines.

Therefore, this study aimed to examine the effect of a 6-week circuit training program on physical condition improvement among football players in Lubuk Beringin Village. Specifically, the research investigated changes in muscular endurance (push-ups, sit-ups, pull-ups), speed (40-meter sprint), agility (Illinois agility run), and cardiorespiratory endurance (2400-meter run). The novelty of this research lies in its application of a structured circuit training protocol in a grassroots community football setting, providing practical evidence for coaches and trainers working with limited resources. We hypothesized that circuit training would produce significant improvements across all measured physical condition components, thereby establishing it as an effective and efficient training method for community-level football teams.

METHODS

This study employed a pre-experimental research design with a one-group pretest-posttest approach to examine the effects of circuit training on physical condition among football players. The experimental intervention consisted of a 6-week circuit training program implemented three times per week, with measurements conducted before and after the training period to assess changes in

physical condition components (Trishandra & Rois, 2022). The research population comprised 20 male football players from Lubuk Beringin Village, Bathin III Ulu District, Bungo Regency, Jambi Province, with a mean age of 23 years. Using the total sampling technique as described by Sugiyono (2020), all 20 players who were active members of the team's core squad participated in the study. Participants were required to attend at least 80% of training sessions and complete both pretest and posttest measurements to be included in the final analysis.

The circuit training program was designed based on principles outlined by Permadi et al. (2024) and consisted of 8 exercise stations performed sequentially. Each training session began with a 10-minute dynamic warm-up, followed by 75 minutes of circuit training, and concluded with a 5-minute cool-down period. The 8 stations included: (1) cone jumps, (2) zig-zag running, (3) push-ups, (4) shuttle runs, (5) squat thrusts, (6) sit-ups, (7) T-sprints, and (8) jumping squads. Athletes performed each exercise for 60 seconds with 20-second rest intervals between stations, completing 3-4 circuits per session depending on the training week (Permano et al., 2022). The training intensity and volume were progressively increased throughout the 6 weeks following overload principles.

Physical condition was assessed through six standardized tests measuring different fitness components. Muscular endurance was evaluated using three tests: (1) push-ups measuring upper body endurance with a 1-minute time limit (Setiyawan et al., 2023); (2) sit-ups assessing core muscle endurance performed for 1 minute; and (3) pull-ups testing arm and shoulder strength until failure. Speed was measured using a 40-meter sprint test with a standing start position, recording the best time from two trials with 2-5 minute rest intervals (Sepdanius, 2019).

Raw test scores were converted to T-scores using the formula: $T = 50 + 10(X - M)/SD$, where X represents the raw score, M is the mean, and SD is the standard deviation (Sudijono, 2012). Physical condition categories were established based on three classification levels: High (>M+1SD), Moderate (M-1SD to M+1SD), and Low (<M-1SD). Normality of data distribution was assessed using the Shapiro-Wilk test with a significance level of 0.05. For normally distributed data, paired sample t-tests were conducted, while non-normally distributed data were analyzed using the Wilcoxon signed-rank test for non-parametric comparisons. Homogeneity of variance was examined using Levene's test. All statistical analyses were performed using SPSS software, with statistical significance set at $p < 0.05$.

RESULTS AND DISCUSSION

Descriptive Statistics of Physical Condition Tests

The descriptive statistics for pretest and posttest measurements across all six physical condition tests are presented in Table 1. The data demonstrate substantial improvements in mean scores for all measured components following the 6-week circuit training intervention.

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Table 1.
Descriptive Statistics of Pretest and Posttest Physical Condition Measurements

Test	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD	Change (%)
Push-up (reps)	32.80	1.32	45.40	1.88	38.4%
Sit-up (reps)	34.35	1.76	48.15	2.13	40.1%
Pull-up (reps)	6.75	1.12	10.05	1.47	48.9%
40M Sprint (sec)	7.51	0.13	6.80	0.16	9.5%
Illinois Agility (sec)	17.69	0.25	16.23	0.17	8.3%
2400M Run (min)	14.91	0.21	12.95	0.25	13.1%

Source: Based on research data analysis

The results indicate that muscular endurance tests (push-up, sit-up, pull-up) showed the largest percentage improvements, ranging from 38.4% to 48.9%. These findings align with research by Satria (2019), who reported significant muscular endurance improvements following circuit training interventions. The aerobic endurance test (2400M run) demonstrated a 13.1% improvement in completion time, supporting the effectiveness of circuit training for developing cardiorespiratory fitness as noted by Trishandra & Rois (2022). Speed and agility tests showed moderate improvements of 9.5% and 8.3% respectively, consistent with findings from Permano et al. (2022) regarding circuit training effects on dynamic movement capabilities.

Normality Test Results

Table 2 presents the Shapiro-Wilk normality test results for all pretest and posttest measurements, with significance values indicating whether data followed normal distribution patterns.

Table 2.
Shapiro-Wilk Normality Test Results

Variable	Statistic	df	P-Value	Distribution
Push-Up Pretest	0.909	20	0.061	Normal
Push-Up Posttest	0.922	20	0.110	Normal
Sit-Up Pretest	0.927	20	0.135	Normal
Sit-Up Posttest	0.912	20	0.070	Normal
Pull-Up Pretest	0.896	20	0.034	Non-normal
Pull-Up Posttest	0.951	20	0.389	Normal
40M Sprint Pretest	0.951	20	0.389	Normal
40M Sprint Posttest	0.941	20	0.252	Normal
Illinois Agility Pretest	0.899	20	0.039	Non-normal
Illinois Agility Posttest	0.974	20	0.838	Normal
2400M Run Pretest	0.933	20	0.174	Normal
2400M Run Posttest	0.974	20	0.835	Normal

Source: Based on SPSS analysis

The normality assessment revealed that most variables demonstrated normal distribution ($p > 0.05$), with exceptions for Pull-Up Pretest ($p = 0.034$) and Illinois Agility Pretest ($p = 0.039$). Following the recommendations of Juntara (2019) for analyzing non-normally distributed data, Wilcoxon signed-rank tests were employed for these specific comparisons, while paired t-tests were appropriate for normally distributed variables.

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This mixed approach ensured appropriate statistical treatment for all measured variables according to their distributional characteristics.

Wilcoxon Non-Parametric Test Results

For variables showing non-normal distribution in the pretest phase, Wilcoxon signed-rank tests were conducted to compare pretest and posttest scores, as presented in Table 3.

Table 3.
Wilcoxon Signed-Rank Test Results for Non-Normal Variables

Test	Test Statistic	P-Value	Effect Size
Pull-Up	0.0	1.91e-06*	Large
Illinois Agility	0.0	1.91e-06*	Large

*Significant at $p < 0.05$ Source: Based on statistical analysis

The Wilcoxon test results demonstrated highly significant improvements for both pull-up performance and Illinois agility scores ($p = 1.91e-06$), with test statistics of 0.0 indicating that all participants showed positive changes from pretest to posttest. These findings strongly support the effectiveness of circuit training for developing upper body strength and change-of-direction ability, consistent with research by Harun et al. (2024) who reported similar improvements in plyometric and explosive power following circuit training interventions.

Categorical Distribution of Physical Condition

The distribution of athletes across physical condition categories (Low, Moderate, High) for each test is presented in Table 4, showing the shift in performance levels following the training intervention.

Table 4.
Distribution of Athletes by Physical Condition Category

Test	Category	Pretest (n, %)	Posttest (n, %)
Push-Up	Low	5 (25%)	4 (20%)
	Moderate	14 (70%)	14 (70%)
	High	1 (5%)	2 (10%)
Sit-Up	Low	3 (15%)	2 (10%)
	Moderate	14 (70%)	15 (75%)
	High	3 (15%)	3 (15%)
Pull-Up	Low	2 (10%)	2 (10%)
	Moderate	17 (85%)	15 (75%)
	High	1 (5%)	3 (15%)
40M Sprint	Low	3 (15%)	1 (10%)
	Moderate	16 (80%)	18 (90%)
	High	1 (5%)	1 (5%)
Illinois Agility	Low	3 (15%)	3 (15%)
	Moderate	16 (80%)	15 (70%)
	High	1 (5%)	2 (10%)
2400M Run	Low	3 (15%)	2 (10%)
	Moderate	14 (70%)	14 (70%)
	High	3 (15%)	4 (20%)

Source: Based on T-score categorization

The categorical analysis reveals progressive improvements across most physical condition components, with notable increases in the proportion of athletes achieving "High" category status in pull-ups (from 5% to 15%) and 2400M run performance (from 15% to 20%). The majority of athletes consistently remained in the "Moderate" category across all tests, suggesting that while improvements occurred, further training would be needed to elevate larger proportions of the team to elite physical condition levels (Bile et al., 2024).

Homogeneity Test Results

Levene's test was conducted to assess the homogeneity of variance between pretest and posttest groups, with results presented in Table 5.

Table 5.
Levene's Test for Homogeneity of Variance

Test	F-Statistic	P-Value	Variance
Push-Up	38.38	3.07e-07*	Non-homogeneous
Sit-Up	51.81	1.33e-08*	Non-homogeneous
Pull-Up	60.73	2.14e-09*	Non-homogeneous
40M Sprint	38.37	3.08e-07*	Non-homogeneous
Illinois Agility	32.19	1.60e-06*	Non-homogeneous
2400M Run	23.20	2.35e-05*	Non-homogeneous

*Significant at $p < 0.05$. Source: Based on statistical analysis

The Levene's test results indicated non-homogeneous variance across all physical condition measurements ($p < 0.05$), reflecting the substantial changes in performance variability from pretest to posttest. As noted by Suryadi et al. (2021), such heterogeneity is common in training intervention studies where participants may respond differently to exercise stimuli based on individual characteristics and initial fitness levels. The non-homogeneous variance justified the use of non-parametric statistical approaches for hypothesis testing, ensuring robust analysis despite violations of parametric test assumptions.

Discussion

The significant improvements observed across all physical condition components demonstrate the effectiveness of circuit training as a comprehensive conditioning method for football players. Research by Arridho et al. (2021) emphasizes that football demands multiple physical attributes including aerobic endurance, muscular strength, speed, and agility, all of which were successfully targeted through the implemented circuit training protocol. The muscular endurance improvements (push-ups, sit-ups, pull-ups) align with findings from Satria (2019), who reported that circuit training's combination of resistance exercises with minimal rest intervals effectively stimulates both muscular hypertrophy and endurance adaptations.

The 13.1% improvement in 2400-meter run performance indicates enhanced cardiorespiratory fitness, supporting research by Purnama et al. (2024) suggesting that circuit training protocols incorporating aerobic components can significantly increase VO_2max and endurance capacity. According to Juntara (2019), the metabolic demands of

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circuit training, which combine aerobic and anaerobic energy systems, create physiological adaptations that benefit football-specific fitness requirements. The moderate improvements in speed (9.5%) and agility (8.3%) correspond with findings from Sudirman et al. (2022), who noted that while circuit training effectively develops general physical conditioning, sport-specific speed and agility may require additional specialized training methods. The progressive training structure employed in this study, following principles outlined by Amansyah (2019) ensured systematic overload through gradual increases in exercise intensity, volume, and complexity across the 6-week period. The high adherence rate to the training protocol (all 20 participants completing the program) suggests that circuit training's varied and dynamic nature may help maintain athlete motivation compared to monotonous traditional conditioning methods.

However, several limitations must be acknowledged when interpreting these results. The relatively short 6-week intervention period, while sufficient to demonstrate initial improvements, may not fully reveal long-term training effects or maintenance of gains over an extended competitive season (Trishandra & Rois, 2022). Additionally, the absence of a control group limits the ability to definitively attribute all observed improvements solely to the circuit training intervention, as factors such as regular football practice and natural maturation could contribute to physical development (Santoso et al., 2022). Future research should employ randomized controlled designs with longer intervention periods and larger sample sizes to strengthen causal inferences regarding circuit training effectiveness.

The practical implications of these findings are particularly relevant for grassroots football programs with limited resources. Circuit training requires minimal equipment and can be implemented in basic training facilities, making it accessible for community-level teams like Lubuk Beringin FC. Coaches can utilize the 8-station protocol described in this study as a template, adapting exercises and intensities to match their athletes' capabilities and available resources. The efficiency of circuit training, developing multiple fitness components simultaneously within 75-minute sessions, addresses the time constraints often faced by amateur teams that may only train 2-3 times weekly.

CONCLUSION

This study demonstrated that a 6-week circuit training program consisting of 8 exercise stations performed three times weekly significantly improved all measured components of physical condition among Lubuk Beringin Village football players. Statistical analyses revealed highly significant improvements in muscular endurance (push-ups, sit-ups, pull-ups), speed (40-meter sprint), agility (Illinois agility run), and cardiorespiratory endurance (2400-meter run), with p-values < 0.05 for all comparisons. The Wilcoxon signed-rank test showed particularly strong effects for pull-up performance and agility ($p = 1.91e-06$), while categorical analysis indicated progressive movement from "Low" and "Moderate" to "Moderate" and "High" performance levels across most tests.

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The findings confirm the hypothesis that circuit training effectively enhances physical condition in community-level football players, supporting its adoption as a practical and efficient conditioning method. The circuit training protocol proved especially effective for developing muscular endurance, with improvements ranging from 38.4% to 48.9%, followed by substantial gains in cardiorespiratory endurance (13.1%), speed (9.5%), and agility (8.3%). These results establish circuit training as a viable alternative to traditional conditioning approaches, particularly for teams with limited resources, time constraints, and basic training facilities.

Several recommendations emerge from this research for coaches, athletes, and future investigators. Coaches working with grassroots football teams should consider implementing structured circuit training programs as a foundational element of physical preparation, particularly during pre-season and early-season training phases. The 8-station protocol utilized in this study provides a practical template that can be adapted to various skill levels and available equipment. Athletes should maintain consistent attendance at circuit training sessions, as the progressive overload principle requires regular participation to maximize adaptations. Future research should examine longer intervention periods (12-16 weeks) to assess whether initial improvements plateau or continue progressing with extended training. Additionally, comparative studies employing randomized controlled designs with larger sample sizes would strengthen evidence regarding circuit training's effectiveness relative to other conditioning methods.

The primary limitations of this study include the relatively small sample size (n=20), absence of a control group for comparison, and short intervention duration (6 weeks). The research was conducted with a single community-level team, potentially limiting generalizability to other populations with different training backgrounds, ages, or competitive levels. Future investigations should address these limitations while exploring additional variables such as injury rates, recovery patterns, and sport-specific performance outcomes during competitive matches. Despite these constraints, the current findings provide valuable evidence supporting circuit training implementation in practical football training contexts, particularly for community programs seeking efficient methods to enhance athlete physical conditioning with minimal resources.

REFERENCES

Amansyah, A. (2019). Dasar-Dasar Latihan dalam Kepelatihan Olahraga. Jurnal Prestasi, 3(5), 42–48. https://doi.org/10.24114/jp.v3i5.13448

Arridho, I. Q., Padli, P., Arwandi, J., & Yenes, R. (2021). Kondisi Fisik Pemain Sepak Bola. Jurnal Patriot, 3(4), 340–350. https://doi.org/10.24036/patriot.v3i4.737

Asy'ary, A. (2023). Survei Kondisi Fisik dan Ketrampilan Dasar Bermain Sepak Bola Umur 12-15 Tahun. Jurnal Sosial Teknologi, 3(2), 154–165. https://doi.org/10.36418/jurnalsostech.v3i2.648

Bile, R. L., Tapo, Y. B. O., & Bali, Y. F. (2024). Pengembangan Model Latihan Kondisi Fisik Bagi Wasit Sepak Bola Pemula di STKIP Citra Bakti. Jurnal Pendidikan Olah Raga, 13(2), 304–318. https://doi.org/10.31571/jpo.v13i2.8206

Harun, H., Hadi, R., & Wardiyanto, Y. (2024). Efek Latihan Beban Metode Circuit Training terhadap Peningkatan Ukuran Otot pada Mahasiswa Tidak Terlatih. Jurnal Sains Keolahragaan Dan Kesehatan, 8(2), 121–133. https://doi.org/10.5614/jskk.2023.8.2.3

Juntara, P. E. (2019). Latihan Kekuatan dengan Beban Bebas Metode Circuit Training dan Plyometric. Altius: Jurnal Ilmu Olahraga Dan Kesehatan, 8(2), 15–28. https://doi.org/10.36706/altius.v8i2.8705

Octavianti, R., & Hutapea, B. (2018). Kontribusi Peran Gender dan Konformitas Terhadap Agresivitas Remaja Putri Suporter Sepakbola. Jurnal Muara Ilmu Sosial, Humaniora, Dan Seni, 1(2), 221–230. https://doi.org/10.24912/jmishumsen.v1i2.927

Permadi, A. B., Bayu, W. I., & Yusfi, H. (2024). Pengaruh Circuit Training Terhadap Daya Tahan Kardiovaskular Atlet Sepak Bola. Bravo's: Jurnal Program Studi Pendidikan Jasmani Dan Kesehatan, 12(2), 10–18. https://doi.org/10.32682/bravos.v12i2/44

Permano, M., Zainur, & Vai, A. (2022). Pengaruh Latihan Circuit Training Terhadap Daya Tahan Tim Bola Voli Putra SMAN 1 Luhak Nan Duo. Journal Sport Science Indonesia, 1(2), 68–76. https://doi.org/10.31258/jassi.1.2.68-76

Pratama, S. M., & Wiyaka, I. (2021). Profil Kondisi Fisik, Teknik, dan Psikis Atlet Sepak Takraw. Jurnal Olahraga Dan Kesehatan Indonesia, 1(2), 109–115. https://doi.org/10.55081/joki.v1i2.307

Purnama, E. K. D., Wahyudi, A. T., Parwata, I. M. Y., Sena, I. G. A., & Antariksa, I. M. I. (2024). Latihan Fartlek Meningkatkan Nilai VO2Max Penari Barong: Studi Pre-Eksperimental. Majalah Ilmiah Fisioterapi Indonesia, 12(1), 39–47. https://doi.org/10.24843/MIFI.2024.v12.i01.p07

Putra, S., Emral, E., Arsil, A., & Sin, T. H. (2023). Konsep Model Latihan Fisik pada Sepakbola. Jurnal EDUCATIO: Jurnal Pendidikan Indonesia, 9(2), 974–982. https://doi.org/10.29210/1202323429

Santoso, T., Andibowo, T., Sulistyono, J., Santoso, A. B., & Budiyono, K. (2022). Survei Kemampuan Kondisi Fisik dan Keterampilan Bermain Sepakbola. Jendela Olahraga, 7(2), 193–203. https://doi.org/10.26877/jo.v7i2.11945

Satria, M. H. (2019). Pengaruh Latihan Circuit Training Terhadap Peningkatan Daya Tahan Aerobik Pemain Sepakbola Universitas Bina Darma. Jurnal Ilmiah Bina Edukasi, 11(01), 36–48. https://doi.org/10.33557/jedukasi.v11i01.204

Sepdanius, E. (2019). Tes dan Pengukuran Olahraga. Universitas Negeri Padang Press.

Setiyawan, F. B., Priambadha, A. A., Meifilindati, I., Mintarsih, R. R., Salsabila, A. C., & Darmawan, Z. R. (2023). Pedoman Pelaksanaan Tes Kesamaptaan Jasmani. Kementerian Pemuda dan Olahraga.

Sudijono, A. (2012). Pengantar Statistik Penelitian Pendidikan. Rajawali Pers.

Sudirman, S., Syahruddin, S., & Sahabuddin, S. (2022). Tingkat Keterampilan Gerak Dasar Sepakbola pada Siswa SMA Negeri 2 Majene. Jurnal Olahraga Kebugaran Dan Rehabilitasi (JOKER), 2(1), 43–52. https://doi.org/10.35706/joker.v2i1.6479

Sugiyono. (2020). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Alfabeta.

Suryadi, D., Samodra, Y. T. J., & Purnomo, E. (2021). Efektivitas Latihan Weight Training Terhadap Kebugaran Jasmani. Journal RESPECS, 3(2), 9–19. https://doi.org/10.31949/respecs.v3i2.1029

Trishandra, J., & Rois, M. (2022). Pengaruh Latihan Circuit Training Terhadap Kondisi Fisik Atlet Dalam Olahraga Sepakbola Pada Klub PS Debai Kota Sungai Penuh. Jurnal Muara Olahraga, 4(2), 11–18. https://doi.org/10.52060/jmo.v4i2.816