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Game Changer: The Influence of Circuit Training on Motor Skills among Football Players

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ABSTRACT

Motor skills are essential for football players as they directly impact a player's performance and ability to execute critical movements with precision and speed. Consistent practice and training help develop these skills, which include hand-eye coordination, footwork, and spatial awareness. Examining how circuit training affected particular motor fitness components in male collegiate football players at SRM Institute of Science and Technology in Kattankulathur, Tamil Nadu, India, was the goal of the study. Fifteen male football players, ranging in age from 17 to 23, were chosen at random to participate. The study used a single-group design and included assessments before and after the test. The experimental group underwent circuit training, and initial tests were conducted on all participants to evaluate selected motor fitness parameters. Following a 12-week training period, post-tests were administered, and the results were recorded. The motor fitness variables assessed included speed, endurance, flexibility, and agility. Data from the pre- and post-tests were analyzed using mean, standard deviation, and paired samples t-test, with a confidence level set at 0.05 due to the limited sample size. The findings revealed that circuit training significantly improved motor fitness variables in the male football players at SRM Institute of Science and Technology.

Keywords: *Circuit Training, football players, standard deviation, fitness parameters, footwork.*

1. INTRODUCTION

The most popular sport in the world is football, sometimes referred to as soccer, celebrated for its simplicity, accessibility, and unifying appeal. Played on fields, streets, and beaches across the globe, football involves two eleven-player teams fight to kick an object into the net of the other team in order to score [1, 2]. The sport requires a blend of physical endurance, agility, teamwork, and strategic thinking. Football's universal appeal lies in its low barrier to entry—all that's needed is a ball, a space to play, and a shared passion. Originating in England in the mid-19th century, the game has grown into a global phenomenon with major competitions like the FIFA World Cup and regional leagues such as the English Premier League, La Liga [3], and Serie A [4], which draw massive international audiences. More than just a game, football inspires community and national pride, fostering a passion of the game that unites supporters from various ethnicities and experiences.

FITNESS IN FOOTBALL

Physical fitness is fundamental in football, as the game demands high levels of endurance, speed, strength, and agility. Players cover long distances at varying intensities, often sprinting, changing direction, and making quick decisions under pressure. Cardiovascular endurance is essential for sustaining energy throughout the 90-minute game [5], while muscular strength helps players shield the ball, withstand tackles, and jump for headers. Agility and coordination allow for swift turns, dribbles, and accurate passes, while flexibility reduces the risk of strains and injuries common in such a high-impact sport. Good physical fitness also enhances reaction times, enabling players to respond faster to dynamic situations on the field.

CIRCUIT TRAINING

Circuit exercise is an effective way to meet the diverse fitness demands of football, targeting cardiovascular endurance, strength, agility, and muscular endurance in a single workout. It involves performing a series of exercises at different stations, each focusing on specific muscle groups or skills, with minimal rest in between. This style of training allows football players to build the stamina needed for continuous running, the explosive power required for sprints and jumps, and the strength to handle physical confrontations on the field [6]. A well-designed circuit for football might include stations like sprint drills for speed, plyometric jumps for explosive power, agility ladders to improve quick footwork and coordination, core exercises to stabilize the body, and strength exercises such as squats, lunges, and push-ups for overall muscle endurance. High-intensity intervals mimic the stop-and-go nature of football, training players to perform under fatigue. Circuit training also improves mental toughness, as athletes must push through different exercises without extended breaks, similar to the demands of a game. Regular circuit training prepares players to meet the intense and varied physical demands of football, enhancing overall fitness and reducing injury risk.

2. LITERATURE REVIEW

A combination of high- and low-intensity exercises, such as sprints, hops, and numerous direction changes, define handball as an intermittent sport. To run, jump, and catch the ball before another player can score [7], players must also possess strength and power. Strength training sessions should therefore be a part of the best conditioning regimens. Isokinetics, dynamic constant external resistance training, and isometrics are a few examples. Other choices include contrasting training and intricate training, which combine plyometric workouts with high-load resistance training. The application of moderate loads (4-6 sets of 6-12 repeats with loads between 30 and 50% of 1RM) and high loads (2-4 sets of 6 repeats with loads between 60 and 80% of the 1-repetition maximum (1RM)), both of which are executed at maximum rate.

An organized, research-based strategy is needed to improve student athlete efficiency, and monitoring can reveal this [8]. Enhancing student-athlete success necessitates a methodical, research-based strategy. Circuit training is a technique used in sports that incorporates multiple workout types into a single session to offer a variety of advantages, from increased technical ability to better physical conditioning. Plyometric training, which is crucial for increasing muscle speed and power, is one of the earliest examples of blending that can be done with circuit training techniques. Research has shown that plyometric training, which incorporates explosive movements like box jumps and squat jumps, can greatly enhance athletes' capabilities. This technique can be incorporated into circuit training to add variation and boost the program's efficacy.

The utilization of skill-based training games is a very time-efficient method that incorporates both mobility and context specificity. These are specially created games with altered playing fields and regulations, which are by nature less regimented and played in a more unstructured and arbitrary environment [9]. Because of this, skill-based conditioning competitions are more persistent than the tactical metabolic conditioning format's patterned plays or isolated drills. Most notably in professional rugby league, these techniques are being utilized more and more as part of metabolic conditioning before and during the season. The main components of skill-based condition games—skill and competition—are probably going to encourage athletes to put up more effort and comply more fully, which will ultimately show up as higher training frequency.

Most people agree that executive functioning is a complicated, multidimensional concept with many different elements. Three primaries processes—inhibition, switching, and working memory—have been recognized as potentially significant. The first relates to the capacity to suppress and regulate a dominant response in favor of either no response at all or a different response [10]. The second is the capacity to change one's viewpoint or frame of mind. Lastly, the ability to track and modify mental representations stored in the mind is referred to as updating or working memory. When compared to their peers who had the same IQ, gender, social background, and family background but had less inhibition control as children, they discovered that children who had better inhibition control as adults had greater determination and attention linked to lower impulsivity, as well as a better quality of life marked by better health, assets, and job opportunities, as well as lower crime rates.

3. METHODOLOGY

Football, sometimes known as soccer, is a physically demanding activity that involves quick direction changes, fast acceleration and deceleration, jumping and landing activities, and several instances where players must tackle to win or maintain possession of the ball. These high-intensity scenarios significantly raise the risk of injuries and are particularly pertinent to youngsters, whose personal development and maturation may make them more vulnerable. When compared to other sports, the frequency and severity of injuries sustained by young football players is startling, according to epidemiology research.

According to a recent epidemiological study, injury incidence rates among young children aged 7 to 12 years were 0.61 per 1,000 hours of exposure [11], and the incidence rate increased with age. It should be mentioned that there may be different mobility demands depending on football position, even though few studies have examined position-related changes in injury incidence. No studies have specifically examined this in youth football, though.

Method of Testing

Participants started each test session with a standardized warm-up that included 4–5 minutes of self-paced, low-to-moderate-intensity jogging that included avoiding, forward and reverse motions, and general recruitment (e.g., arm triangles, leg punches). Following this, participants engaged in three sets of dynamic stretching (the straight leg march, the forward lunge alongside opposite arm reach, the forward lunge with an elbow instep, the lateral jump, trunk shifts, and multidirectional skipping) lasting 6–8 minutes each, with a 15-second rest interval in between [12]. Three to five minutes following the normal warm-up, the dependent variables were assessed.

LIMITATIONS

1. The varied characteristics of individuals, influenced by Climatic and genetic variables were recognized as limitations.
2. It was unable to control the variations in internal and external elements that might have inspired or demoralized the individuals during training and assessment.
3. Limits were considered to include uncontrollable variations in weather before and after the testing [13], including humidity, temperature, and other atmospheric factors.
4. Restrictions were also identified for factors like lifestyle, psychological strain, degree of physical effort, and other factors influencing metabolic processes.

4. DEFINITIONS

The scholarship focused on the following aspects in terms of sample and content:

- The participants' ages ranged from 17 to 23, and all were college-level football players.
- A single group design was used, specifically for Circuit Training.
- The study limited its criterion variables to the following selected variables:

Motor Fitness Variable

i. Haste

ii. Endurance

iii. Flexibility

iv. Nimbleness

4. The Duration of the Training was for 12 Weeks

5. The number of sessions per week varied from 5 to 6.

TABLE I: Independent factors and critical variables

CRITERION VARIABLES	INDEPENDENT VARIABLES
• **Speed** • **Endurance** • **Flexibility** • **Agility**	❖ 12 Weeks of Circuit Training

Subject selection:

The objective of this investigation was to determine how circuit training affected football players' measured motor fitness. To fulfill the study's objective, investigator chosen 15 college level men football players at SRM Institute of Science & Technology, Tamilnadu, India's Kattankulathur in the age group of 17-23 years [14], a pre-test and a post-test were part of the single group design. Each group was given their experimental (Circuit diagram Training) assignment. Pre-tests on specific motor variables were administered to each of the 15 participants. Following the twelve-week trial period, post-tests were administered, and the results were documented. Five days a week, Monday through Friday, with the exception of the weekends, from 6.30 to 7.30 a.m., the subjects received their appropriate training.

Program for Training

The circuit training program for football players spans twelve weeks, with sessions lasting 60 minutes each. The schedule

includes three training days per week (Monday, Wednesday, and Friday), with each session consisting of 10 minutes for warm-up, 10 minutes for cool-down, and 40 minutes dedicated to circuit training. The intensity of the workouts increases by 10% every two weeks, starting at 50% and progressing to 60% of the subjects' maximum working capacity [15]. This gradual increase in intensity ensures that each muscle group has adequate recovery time. Rest days are scheduled for Tuesday (TABLE I and TABLE II), Thursday, Saturday, and Sunday

TABLE II: REST DAYS ARE SCHEDULED

Day	Workouts			Circuits	
	Circuit Training	**Duration**	**Rest**	**Numbers**	**Rest**
Monday	Each Station (1-6)	30 Secs	30 Secs	2-3	1 Minute
Wednesday	Each Station (1-6)	30 Secs	30 Secs	2-3	1 Minute
Friday	Each Station (1-6)	30 Secs	30 Secs	2-3	1 Minute

Tools and Techniques

Table III: Displaying the Unit of Measurement, Tests

S. No	Adjustable	Examination	Unit of Quantity
1	Speed	50 Meter Dash	Seconds
2	Endurance	Cooper 12 minutes run test	Distance
3	Flexibility	Sit and Reach	Centimeters
4	Agility	Illinosis Agility Test	Seconds

RESULTS AND DISCUSSIONS

To assess the impact of circuit training on motor fitness among college-level football players, statistical methods were applied to the collected data using the SPSS software. The pretest data was examined, and the adjusted posttest means for the single group were assessed for significance in order to identify any notable changes in the variables brought about by the training in Table III. Measures like Mean [16], SD, and the Paired Samples t-test were used for this. Given the small number of subjects, the confidence level was established suitably.

TABLE IV: Computation of Paired sample t-test on Football Players

Variable	Pre Test		Post Test		Mean Deviation	Sem	t-ratio
	Mean	**SD**	**Mean**	**SD**			
Speed	6.23	0.22	6.09	0.020	0.14	0.03	5.41*
Endurance	2370	62.11	2420	64.92	50.00	8.45	5.92*

Flexibility	0.29	1.64	0.74	0.93	1.04	0.28	3.66*
Agility	19.34	0.86	17.30	0.61	2.04	0.18	11.10*

The t-ratio of the circuit exercise group's pre- and post-test scores on the motor fitness elements of velocity, endurance, flexibility, and quickness is shown in Table IV. The following were the pre-test mean values: agile 19.34, mobility 0.29, endurance 2370, and speed 6.23 in TABLE IV. The typical scores after the exam were agility 17.30, flexibility 0.75, endurance 2420, and speed 6.09. 1.761 was the necessary table value. The circuit conditioning group's t-values were as follows: agility 5, elasticity 3.66, duration 5.92, and fast 5.41.

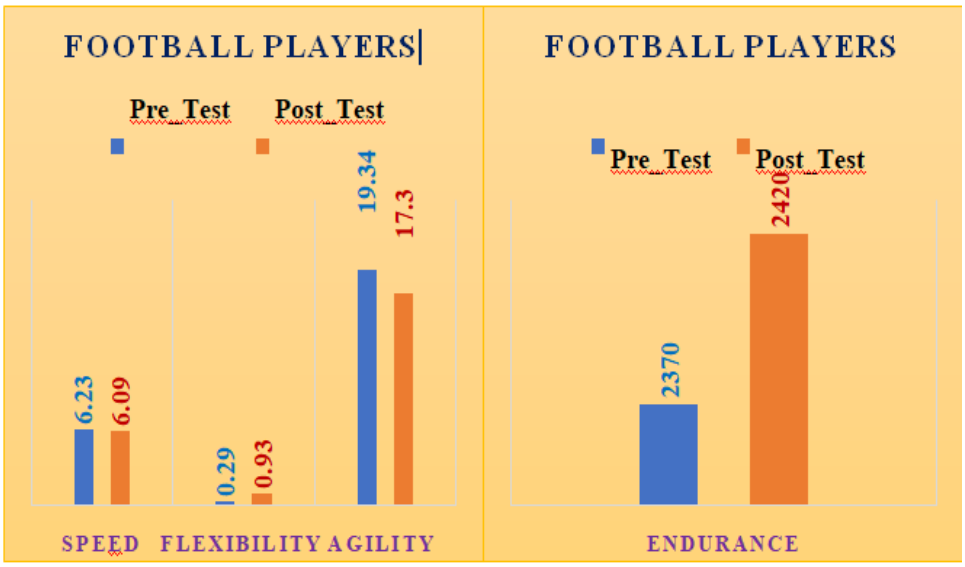

Figure 1: Average values for football players' speed, endurance, flexibility, and quickness

These values exceeded the required table value at a 0.05 level of significance, indicating a statistically significant improvement. This suggests that the twelve weeks of circuit training led to substantial gains in speed, endurance, flexibility, and agility. Therefore, it was concluded that there was a significant difference in these fitness components among college-level football players [17, 18]. A bar diagram (Figure 1) illustrates the mean values for speed, endurance, flexibility, and agility for a clearer understanding of the study's results.

DISCUSSIONS ON THE FINDINGS

Praveen Kumar (2021) aimed to explore the impact of circuit training on specific physical fitness components in college-level football players. The study involved implementing a training program and administering various exercises within the circuit training regimen. The findings highlighted a notable difference in endurance between the experimental and control groups.

5. CONCLUSIONS

According to the results of the present research, male football players at SRM Institute of Science and Technology in Kattankulathur, Tamil Nadu, India, benefit significantly from circuit training in terms of motor fitness variables including speed, agility, endurance, and flexibility.

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