

## **EFFECTS OF INTERVAL TRAINING, CIRCUIT TRAINING AND COMBINED TRAINING ON SELECTED PHYSICAL FITNESS VARIABLES AND PERFORMANCE VARIABLES AMONG WOLAITA SODO UNIVERSITY MALE FOOTBALL PLAYERS**

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### **ABSTRACT**

*The present study was designed to analyze the influence of interval, circuit and combined training on selected skill related physical fitness variables (speed, agility, explosive power, balance, coordination and cardio respiratory endurance) and performance variables (dribbling, kicking and passing) among Wolaita Sodo University male football players. Interval training, circuit training and combined interval and circuit training were selected as independent variables for this study. To achieve the purpose of the study, 60 football players studying in the Wolaita Sodo University were randomly selected as subjects during the academic year 2016-2017. The age of the subjects ranged from 20 to 23 years. The selected subjects were randomly assigned to three experimental groups and one control group of fifteen (n=15) each for experimental group I (Group I), experimental group II (Group II), experimental group III (Group III) and control group (Group IV). Group I underwent interval training, Group II underwent circuit training, Group III underwent combined interval and circuit training for duration of 12 weeks. The control group (Group IV) was asked to refrain from any special training except their regular practice and playing schedule. All the subjects of four groups were tested on selected physical fitness variables performance variables before and after the treatment. The analyses were carried out through various statistical techniques such as the dependent t-test, the analysis of covariance (one-way ANCOVA). Whenever the 'F' ratio for adjusted test was found to be significant, the Scheffe's test was applied as post-hoc test to find out paired mean difference. In all the cases 0.05 level was fixed as significant level. The results were drawn accordingly.*

**KEYWORDS:** Physical Fitness, Training, Football, University Team

## INTRODUCTION

Soccer requires peak physical conditioning of its players to be played at the highest level. The only way to achieve this level of conditioning is training, specifically for soccer and the amount of running done in a match. The benefits of this training vary from better performance on the pitch (soccer field) for longer amounts of time to a decreased chance of injury or cramping before, during and after a match. Also, the better conditioned a player is, the more likely he is to perform with the same amount of skill necessary when passing, dribbling and shooting at the end of the game as the beginning. At any level above a school level, soccer limits the amount of substitutions a team can make. Therefore, any player who tires easily becomes a liability. Two types of running should be done to improve and maintain a player's fitness. The first is "offseason" training. It should be done two weeks after the previous season ends and should finish 10 days before the next season begins. The focus should be on maxing out potential and increasing gains in speed, recovery and endurance. The second type is "in-season" training, which should be done before and after games. It needs to focus on maintaining endurance and muscle recovery. Training should not be done more than 12 to 15 minutes after a game, unless its stretching

and loosening the muscles through light jogging (Scott, 2012).

Soccer is a major sport for young athletes in the United States, and is also rapidly becoming a major sport for males and females for all ages. Because young athletes go through puberty at different times, they vary a great deal among each other in size and maturity. These differences pose a challenge to the athletes and their coaches. The primary characteristics of a young athlete are: motivation; physical fitness (i.e. muscle strength, power, endurance, flexibility, proper body composition, and cardiac respiratory endurance); discipline, coach ability; skills; ability to be a part of a team; ability to think under stress; and good spatial orientation. The practice sessions for soccer should seek to achieve: physical conditioning, repetitive training, and proper intensity of training, flexibility, and awareness that the achievement of proper endurance for the soccer athlete requires 4-6 months of training. Also, the coach should be aware that extreme and severe high intensity and high frequency training causes damage to muscle tissues and is counterproductive to the goals of the athlete. The pre-game meals should primarily be composed of carbohydrates, and balanced meals should be eaten prior to game days. Water consumption (hydration and

rehydration) should be strongly encouraged with water breaks built into the training schedule and water available upon demand (Carroll and Mendoza, 2012)

The most common soccer running exercises address the three major areas of running fitness – speed, endurance and recovery. For speed training, wind sprints with varying distance levels are best. The focus should only be about running as fast as possible for the desired distance. For endurance, there are drills that combine sprinting and running known as interval training. The focus is to maintain a constant speed while running, then in 10 to 15 seconds. intervals, sprinting as fast as possible, then returning to the running speed. For recovery training, players can do sprint circuit training. This involves sprinting a desired distance, from corner flag to corner flag diagonally across the field, then barely jogging from that corner across the goal line to the other corner flag, then sprinting diagonally across the field again. Players should avoid focusing only on one or two types of training. Soccer is a game of constant, but varied movement. It is crucial to train for each type and to train on transitioning from one to another. There is a also concern that players can over-train during a season. The adrenaline used in match competition is almost impossible to re-create in practice. Players are

best advised to err on the side of caution when training in season (Scott, 2012).

### Interval Training

Interval training is a type of physical training that involves bursts of high-intensity work interspersed with periods of low-intensity work. The high-intensity periods are typically at or close to near-maximum exertion, while the recovery periods may involve either complete rest or activity of lower intensity. Interval training provides benefits to any healthy person such as improving fitness, health, speed and stamina; it's a very demanding type of activity and certainly not one you would want to fly into without adequate preparation. Interval training can refer to organization of any cardiovascular workout (e.g. cycling, running, rowing, etc.), and is prominent in many sports' training. It is a technique particularly employed by runners, but athletes from several backgrounds have been known to use this type of training. It is of two types: slow and fast interval training method. High Intensity Interval Training (HIIT) is about mixing high intensity bursts of exercise with moderate intensity recovery periods. It's brutal but has incredible advantages. It's the quickest way to get in fit, lose fat and supercharge for sports performance. It all about increasing one's

anaerobic threshold and this may be more important than your  $VO_2$  max.

## Circuit Training

Circuit training is a form of conditioning combining resistance training and high-intensity aerobics. It is designed to be easy to follow and target strength building as well as muscular endurance. An exercise "circuit" is one completion of all prescribed exercises in the program. When one circuit is complete, one begins the first exercise again for another circuit. Circuit training is an arrangement of exercises that requires the athlete to spend some time completing each exercise before moving on. It is an excellent way to improve mobility and, at the same time, build strength and stamina. Depending on the equipment available, circuits can be developed to improve general fitness or can be highly specialized to meet the specific needs of certain athletes. Circuit training usually consists of 6–10 strength-type exercises that are completed one after the other. Body parts are also alternated so that consecutive exercises don't work the same muscle groups. The strength-type exercises can be interspersed with more aerobic-type activities, or with rest. A simple circuit can be performed up to three times in a training session, depending on time constraints. There are two types of circuits:

fixed resistance circuits and individual resistance circuits.

## Statement of the Problem

The purpose of the present study was to analyze the effects of interval training, circuit training and combined interval and circuit training on selected physical fitness variables, viz. speed, agility, explosive power, balance, co-ordination and cardio-respiratory endurance, and performance variables, viz. kicking, dribbling and passing among Wolaita Sodo University male football players.

## Hypotheses

It has been significantly accepted that any systematic training over a period of time would lead to produce changes on physical fitness and performance qualities. Based on this concept the following research hypotheses were formulated.

1. There would be significant improvement on selected physical fitness and performance variables due to the effect of interval training, circuit training and combined training (interval and circuit) in experimental groups.
2. There would be significant improvement difference on

selected dependent variables among the experimental groups.

### Delimitations

The study was delimited to the following factors.

1. To achieve the purpose of the study, We have to select 60 male football players who were Studying Under Graduation Courses in Wolaita Sodo University. The selected subjects were divided into three experimental groups and one control group with fifteen subjects (n=15) in each group. Experimental Group I (ITG=15) underwent interval training, Group II (CTG=15) underwent circuit training, Group III (COMG=15) underwent combined trainings and Group IV served as control group (CG=15).
2. The following dependent variables were selected for this study. Physical fitness variables namely, speed, agility, explosive power, balance, co-ordination and cardio-respiratory endurance and the performance variables are dribbling, kicking and passing.

3. The duration of the training period was restricted to Sixteen weeks and the number of sessions per week was confined to four.
4. The level of significance fixed at 0.05 level was considered to be appropriate.
5. The data should be collected prior to and immediately after the training period.

### Limitations

The following factors are the limitations of the study since the researcher could not control them.

1. No effort was put in to find out the effect of environmental changes during pre-tests and post-tests and the training period.
2. The subjects need to be motivated verbally; no attempt was made to differentiate their motivation level during testing and training period.
3. Social status, food habits and the way of life style, which could influence on the results, could not be controlled by the researcher personally though orientation was given about these aspects to the subjects.

4. Previous experience in training was not considered.

### Purpose of the Study

A well designed and well supervised interval training, circuit training and combined training (interval and circuit) programmes will be beneficial to the Wolaita Sodo University male football players. The aim of the present study is to contribute to the training methods, which are listed below:

1. The ultimate aim of research in physical education is to help the physical education and sports professionals to train their sports persons based on the new concepts in improving their performances.
2. The study would add knowledge in the area of interval training, circuit training and combined training.
3. The results of the study may provide the standards of the football players in various selected physical fitness and performance parameters.
4. The conclusions of this study will pave a way to train football players with interval training, circuit training and combined training.

5. This study might motivate other professionals and scholars to take up similar studies

### Selection of Subjects

For the present study, we have to select 60 male football players studying in Wolaita Sodo University during the academic year 2016-2017. The age of the subjects ranged between 20 and 23 years. The selected subjects may be divided into three experimental groups and a control group with fifteen subjects ( $n = 15$ ) in each group. Experimental Group I (ITG = 15) underwent interval training, Group II (CTG = 15) underwent circuit training, Group III (COMG=15) underwent combined training (interval training and circuit training) and Group IV served as control group (CG = 15). All subjects are informed about the nature of the study and their consent was obtained to cooperate till the end of the experiment and testing period. Pilot study groups and experimental groups (namely, ITG, CTG and COMG) are trained-up in which three modes of training were given independently with separate subjects in each group. A qualified physician examined the subjects medically and declared them fit for the study.

## Selection of Variables

### Dependent Variables

Variables	
Physical Fitness Variables	Speed
	Agility
	Explosive Power
	Balance
	Co-ordination
	Cardio-respiratory endurance
Performance Variables	Kicking
	Dribbling
	Passing

### Independent Variables

1. Interval training
2. Circuit training
3. Combined interval training and circuit training.

### Selection of Tests

Variables	Test	Unit of Measurement	
Physical Fitness Variables	Speed	50 meters dash	in seconds
	Agility	30 feet shuttle run	in seconds
	Explosive Power	Sargent vertical jump	in centimeters
	Balance	Stroke stand	in seconds
	Co-ordination	Alternate Hand Wall Toss Test	in number of catches in 30 seconds
	Cardio-respiratory endurance	9minutes run/walk	in meters
Performance Variables	Kicking	Mor. Christian Skill Test	in meters
	Dribbling	Punt for distance	in seconds
	Passing	Mor. Christian Skill Test	in points

## Training Programme

During the training period, the experimental groups underwent their respective training programmes four days per week on alternate days for sixteen weeks in addition to their regular physical activities. Experimental Group I (ITG) underwent interval training and Group II (CTG) underwent circuit training and Group III (COMG) underwent combination of interval training and circuit training. Before the commencement of the experimentation and at the middle of the training period (after fifth week), the investigator recorded the target heart rate for interval training, 1RM tests for circuit training and target heart rate and 1RM for combined training subjects. The details are cited in training schedule. The experimental Groups I, II and III performed their training at different velocities. Training volume and intensity should increased progressively on different phases. The training schedule for all the three experimental groups are presented in the table IV, V & VI. Every day the workout lasted for 40 to 50 minutes approximately. Group IV served as the control group. However, they are involved in regular activities as per the daily routine. The subjects underwent their respective training programme under strict supervision of the investigators, and experts in the field of Physical Education. Prior to every training session, subjects

underwent 5 -10 minutes warm-up exercises, which included jogging, stretching and striding. All the subjects involved in the training programmes were questioned about their stature throughout the training period.

## Collection of Data

The data on selected dependent variables should be collected by conducting pre-tests and post-tests, two days before and after the training programme respectively. On the first day speed, agility, balance, co-ordination and explosive power were tested where as cardio-respiratory endurance, kicking, passing and dribbling were tested on the second day.

## Experimental Design

The experimental design used for this study was random group design involving sixty subjects, who were divided at random into four groups of fifteen each. This study consisted of three experimental groups. Group I underwent interval training and Group II underwent circuit training and Group III underwent combined training (interval and circuit), and Group IV acted as control group. All the subjects should be tested prior to and after the experimentation on physical fitness and performance parameters.

## Statistical Techniques Used



The data should collect from the four groups before and after the experimental period were statistically examined for significant improvement by using analysis of covariance. Whenever the 'F' ratio for adjusted post-test was found to be significant, Scheffe's test was used as post-hoc test to determine which of the paired means differed significantly. In all cases the criterion for statistical significance was set at 0.05 level of confidence ( $P < 0.05$ ).

### Analysis and Interpretations of the Data

The analyses should carried out through various statistical techniques such as the dependent 't' test, the analysis of covariance (one-way ANCOVA), and the post-hoc pair wise comparison using the Scheffe's test analysis.

The subjects of four groups should be tested on selected physical fitness variables such as speed, agility, explosive power, balance, coordination and cardio-respiratory endurance and performance variables kicking, dribbling and passing prior to and after the training period.

### Results of the study

The following results should be obtained based upon the hypothesis.

There should be significant difference among the football players of experimental groups

such as interval training, circuit training and combined interval and circuit training groups and control group on physical fitness variables such as speed, agility, explosive power, balance, coordination and cardio respiratory endurance and performance variables such as dribbling, kicking and passing. The result of the present study may be the interval training, circuit training and combined interval and circuit training groups performed better on physical fitness variables such as speed, agility, explosive power, balance, coordination and cardio respiratory endurance and performance variables such as dribbling, kicking and passing than the control group. This might be due to the effect of specified training (interval training, circuit training and combined interval and circuit training) were given to the experimental groups. Further, this study also revealed that the football players of combined interval and circuit training group performed better on physical fitness variables such as speed, agility, explosive power, balance, coordination and cardio respiratory endurance and performance variables such as dribbling, kicking and passing than the football players of interval training, circuit training groups and control group.

When compared interval training group with circuit training group, the football players of circuit training group performed better on

physical fitness variables such as speed, agility, explosive power, balance, and coordination and performance variables such as kicking and passing than that of interval training group, and the football players of interval training group performed better on physical fitness variable cardio respiratory endurance and performance variable dribbling than that of circuit training group.

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