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COMPARATIVE EFFECTS OF THREE TRAINING MODES ON THE PHYSICAL FITNESS ATTRIBUTES OF UNDER 13 MALE SOCCER PLAYERS IN ALUU IKWERRE LGA OF RIVERS STATE

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ABSTRACT

The purpose of this study was to compare the suitability of circuit, continuous and interval training programmes on the physical fitness attributes of U-13 male soccer players. The subjects were U-13 male soccer players who participated in football teams of their junior secondary school teams in Aluu, Ikwerre LGA of Rivers State Nigeria, post 2023/204 academic session. Fifty-four subjects were purposely drawn from 120 U-13 Amateur male soccer players. These Subjects were randomly assigned to three groups: circuit training group (A), continuous training group (B) and Interval training group (C) based on their possession of the actual ability and exponents suitable for the study. The exponents and ability include age, height, weight and participation in school junior team during the 2023/2024 academic session. Three school physical education instructors were adequately trained as assistants for the execution of this experimental work. The study adopted the pre-test randomized group study design. The subjects trained for four weeks using circuit, continuous and interval training regimens. Standardized, modified and physical fitness tests namely: modified Coopers endurance run and modified sit and reach were used for the physical fitness attributes. Two research questions and two hypotheses were formulated based on the effects of the two training programmes on the endurance and flexibility levels of U-13 male soccer players. Mean and Standard Deviation were used to answer research questions while one way Analysis of Variance (ANOVA) was used to determine the level of significance at 0.05. The Least Significant Difference (LSD) post hoc pairwise comparison test was used to determine the direction of the difference for significant gain mean scores of the attributes under study. The results revealed that (1). Physical fitness attributes of U-13 male soccer players differed significantly due to the effect of circuit, continuous and interval training regimens. (2). Continuous and circuit training regimens had better gain mean scores in endurance of U-13 players. (3). Interval and circuit

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.14 (1), January-April, 2025 https://ajemates.org

training regimens had better performance in their flexibility. (4). The study showed that the endurance and flexibility levels of U-13 male soccer players were not significantly affected by the training regimens irrespective of the positions they played. Based on these findings, the researchers recommend among others that soccer coaches should use continuous and circuit training methods for developing endurance, while interval and circuit could be used for other training attributes. It was also suggested that the study should be replicated using females, different sports and environment.

Keywords: Comparative Effects; Three Training Modes; Physical Fitness Attributes; Under 13 Male Soccer Players.

Introduction

Profiles of potential athletes have been receiving a lot of attention by sports scientists who have used them primarily to evaluate, design and modify some training programmes (Blanke, et al, 2021). Zein, et al (2020) earlier stated that profiles have also been widely used to establish levels and develop in understanding of the physical make up of athletes competing in various sports.

Soccer is by far the most popular spectator sport in the world and in many countries, it is the most revenue yielding sport (Jose et al 2015). This popularity has stimulated numerous research efforts aimed at understanding the sport and the factors that promote excellence in it. It is played at amateur and professional levels. The standard of the game has developed tremendously over the years especially in Europe and South America. North America, Asia and Africa have started working hard to improve the standard of the game (Zein et al, 2020). No part of the world is considered as under dogs anymore.

In modern soccer, teams are usually prepared to play what some coaches describe as "total football" consisting of mass attack and mass defense. In this type of soccer game, defenders can turn attackers and attackers can turn defenders when the need arises. This is a far cry from the old system of play in which the eleven (11) players made up of the goalkeeper, two full backs, three half backs and five forward line players had to maintain their positions on the field of play very rigidly. The system has since changed and players not only constitute themselves into different formations on the field but can over-lap and even exchange places on the field of play. Gil, (2007) emphasized that in the 4-2-4 formation for instance, we have the goalkeeper guarding the goal, four players playing the role of defenders, two midfield players and four attackers or strikers. Furthermore, in the 4-3- 3 formation, we have four defenders, three midfielders and three attackers. A team also experiments on other formations such as 4-4-2 and 2-4-4, depending on the objectives of the team for

that match. It is also observed that in modern soccer even though players still specialize as defenders, midfielders, attackers and goalkeepers, every player is expected to know how to play the part of a defender or an attacker as a rule. Ability to play one or more positions is determined by the physical fitness status of an individual.
Furthermore, in modern soccer, all the players with expectation of the goalkeeper can switch positions tactically such that the defenders can occasionally overlap to become midfielders or even attackers (Boyaci & Afryo, 2017).

Based on the foregoing explanations, the study was focused on determining which of three training methods would be suitable for the development of the physical fitness attributes of U-13 male soccer players in Aluu Ikwere LGA of Rivers State based on their playing positions.

Statement of the Problem

Physical fitness and conditioning factors are aspects of the scientific variables being utilized by developed countries to improve the standard of soccer game, this is affirmed by Ajiduah (1992), as he emphasized that the standard of soccer game has developed tremendously over the years, especially in Brazil, Argentina and entire South America due to the application of physical fitness and conditioning variables during the training programme.

Observation showed that in modern soccer, the standard of performance for some Nigerian home-based soccer players appears to be very poor compared to their counterparts in the developed countries of the world. The level of physical fitness of a player makes the difference in his or her ability to sustain performance at high level in a game situation. Vardakis, et al, (2020) stated that enough physical fitness training both aerobic and anaerobic have not been included in the training programme of Nigeria football teams. He further stressed that soccer teams in Nigeria mostly concentrate training efforts on techniques, tactics and co-ordination hoping that physical fitness attributes should be developed as well. This study is designed to fill the gap in knowledge about the effectiveness of different training modes on the physical fitness attributes of amateur soccer players in Aluu, Rivers State of Nigeria.

Purpose of the Study

The main purpose of this study was to determine suitability of circuit, continuous and interval training programmes in the development of physical fitness attributes of U-13 male soccer players based on their playing positions. Specifically, the study aimed at:

1. Determining the effectiveness of circuit, continuous and interval training programmes on the Endurance of U-13 male soccer players.
2. Finding out the effectiveness of circuit, continuous and interval training

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.14 (1), January-April, 2025 https://ajemates.org

programmes on the Flexibility of U-13male soccer players.

Significance of the Study

Specifically, the study would be helpful to sports handlers especially coaches to understand that training for physical fitness is among the key element to excellent performance in soccer. The results of this study could help the coaches in identifying the usefulness of a particular training method in relation to the specific physical fitness attributes. The result of this study could guide coaches in designing or modifying effective training regimen that could help players establish and maintain physical fitness levels required for soccer performance during the preparatory phases. Furthermore, this study could equally help coaches as well as the players to reassess their training techniques and opt for the best. The study could also help to improve the general health of the individual players, as the chances of suffering exhaustion will be limited during the actual play. It will also help in the development of confidence among the sports handlers and the players themselves.

The result of this study can not only help to develop the physical fitness potentials of the players, but also could help in blending such qualities into effective team work and finally help coaches and players maintain high standard of performance in soccer in Nigeria.

Scope of the Study

There are scientific variables for preparation of soccer players such as Psychological, Biomechanical, Nutritional, Sociological, Physical fitness and Conditioning variables. However, the present study is limited to only physical fitness components as one of the scientific variables. The study is focused on the U-13 male soccer players in Aluu Rivers State who participated in school football team during the 2023/2024 academic session.

Research Questions

The following research questions guided the conduct of the study

1. What effectiveness would circuit, continuous and interval training programmes have on the Endurance of U-13 male soccer players?
2. What effectiveness would circuit, continuous and interval training programmes have on the Flexibility of U-13 male soccer players?

Hypotheses

The following null hypotheses were postulated for the study at 0.05 level of significance.

1. There is no significant difference on the effectiveness of and interval circuit, continuous the Endurance of U- 13 male soccer players.
2. There is no significant difference on the effectiveness of circuit, continuous and interval training programmes on the Flexibility of U-13 male soccer players.

Method

Research Design

Experimental research design was used for this study. It was used so as to investigate the

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.14 (1), January-April, 2025 https://ajemates.org

cause-and-effect relationship that existed between the independent and dependent variables for the study. Specifically, laboratory type of experimental research design was adopted for this study. In this design according to Kendall (2003), subjects are studied in a closed setting so that researchers can maintain as much as control as possible over the subjects. It was a pre-test, post-test randomized group study, designed to determine the effectiveness of three training programmes on the physical fitness of U-13 male soccer players based on their playing positions. Three groups of subjects were involved in the study, each group comprised attackers, midfielders, defenders plus goalkeepers. The three groups were exposed to the different experimental treatments. There was no control group.

Area of the Study: The area of the study was Aluu Ikwerre LGA of Rivers State which comprises some. The study specifically centered on the towns within five (5) kilometers radius.

Population of the Study: All the 120 U-13 male soccer players within Aluu community who participated in their school football team in the 2023/24 academic session. Constituted the population for the study. These players were involved in this study because the group constituted a homogenous unit of skillful players fit for grassroots development of dependable soccer players for local and international soccer competition.

Sample and Sampling Technique: Purposive sampling technique was adopted in selecting the subjects for the study. The researcher adopted this technique because it is the most appropriate for the study. In purposive sampling technique, specific elements which satisfy some pre-determined criteria are selected and the criteria used are usually based on the researcher's judgment (Nworgu, 1991). The researcher exercises this judgment in relation to what constituted a representative sample with respect to research purpose. Therefore, purposive sampling technique was adopted in the sense that the subjects possessed the required characteristics suitable for the sample of the study such as age, height, weight (exponents) and participation in school team. Anambra State. Fifty-four (54) out of 120 U-13 male soccer players were sampled by means of this sampling technique.

Instrument for Data Collection: Modified and standardized physical fitness tests were the main instruments used in collecting the data for the study. These comprised:

i. Modified Cooper's Endurance Run
ii. Modified Sit and Reach

In addition, six training exercises suitable for the development of physical fitness attributes each in circuit training, interval training and continuous training were also used as data collecting instruments for the study. Furthermore, standard soccer pitch, stop watches, cones, pen, paper, six standard footballs, tag numbers, graduated ruler, red

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.14 (1), January-April, 2025 https://ajemates.org

and white flags, dumbbells and whistle formed part of the instrument. A data sheet named Physical Fitness Conditioning Assessment Sheet (PFCAS) was developed by the researcher and used in collecting the final data for the physical fitness level of the subjects.

Validation of the Instrument: This study adopted two already standardized physical fitness test items which their validity has been established worldwide as stated by American Association of Health, Physical Education, Recreation and Dance (1988).

Reliability of the Instrument: To ensure the reliability of the modified instruments for the study, test-retest method was applied using the trial run group. The scores were correlated using Pearson product moment correlation coefficient, The scores from the tests yielded reliabilities co-efficient of 0.939, 0.893, 0.993 and 0.986 respectively for modified Coopers endurance run, sit and reach, Illinois agility run and pushups, thus indicating a good degree of reliability. These estimates were considered high enough for adopting the instruments for the study.

Method of Data Collection: The subjects were assembled at the standard football pitch. A pre-test was given to all the subjects in the three groups before the administration of the treatment. The treatment sessions lasted for eight weeks. At the end of the eight weeks of training, post-test was administered using pre-determined criteria.

Assigning the Subjects to Treatment Groups: The researchers assembled the fifty-four (54) subjects and randomly assigned them to the groups using the pre-test scores. In addition, the three groups were assigned to the three training programmes namely circuit training group, interval training group and continuous training group using balloting technique.

Method of Data Analysis: Mean scores and standard deviations were used in answering the research questions. The hypotheses were tested using one way analysis of variance (ANOVA) at 0.05 alpha level. ANOVA was suitable in testing the hypotheses since it serves as a procedure for determining the contingencies of multiple means which involves two independent estimation of the population variance. It is equally used in checking the homogeneity of variance between two samples. Oyeka (1992) emphasized that ANOVA is used for partitioning the total variation of a set of data into several components

Presentation and Analysis of Data

The main purpose of the study was to identify the effectiveness of the training methods on the physical fitness attributes of U-13 male soccer players based on their playing positions, the results of the analysis of data for the study were presented. The results attempted to answer the research questions and tested the hypotheses postulated for the study.

Decision Rule: The null hypothesis (Ho) is rejected if the probability value (p-value) given by the computer is less than the chosen significant level (α), that is 5% or 0.05.

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.14 (1), January-April, 2025 https://ajemates.org

Research Question 1: What effectiveness would circuit, continuous and internal training programmes have on the Endurance of U-13 made soccer players?

The mean and standard deviation data presented on Table 1 below provided answer to the question.

Table 1: Means and Standard Deviations of U-13 Male Soccer Players using Gain in Endurance.

Players position	Circuit Training			Continuous Training			Interval Training			Total		
	X	SD	N	X	SD	N	X	SD	N	X	SD	N
D	234.0000	16.73320	5	238.0000	40.24922	5	210.0000	30.82207	5	227.3333	31.27451	15
A	244.0000	31.30495	5	304.0000	48.27009	5	226.0000	23.02173	5	258.0000	47.83902	15
M	267.0000	35.93976	4	282.5000	64.48514	4	250.0000	90.55385	4	266.6667	62.51117	12
G	232.0000	45.73474	4	302.5000	47.87136	4	190.0000	14.14214	4	241.6667	59.97474	12
Total	243.8889	32.92396	18	280.5556	53.62969	18	218.88330	47.88330	18	247.7778	51.56665	54

Where

D - Defenders
A - Attackers
M - Midfielders
G - Goal Keepers
x - Mean
SD - Standard of Deviation
N - Number of Subjects

The overall result in table 1 indicated that continuous training group had the highest mean gain scores 280.5556 ± 53.62969 followed by circuit training 243.8889+ 32.92396 was internal training group 2 18.8889+ 47.88330.

It means that continuous and circuit training regimens facilitated the endurance of U-13 male soccer players better than the interval training regimen.

Research Question 2: What effectiveness would circuit, continuous and interval training programmes have on the Flexibility of U-13 male soccer players?

The mean and standard deviation data presented on Table 2 answered this research question.

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.14 (1), January-April, 2025 https://ajemates.org

Table 2: Means and Standard Deviations of U-13 Male Soccer Players Flexibility Training

Players position	Circuit Training			Continuous Training			Interval Training			Total		
	X	SD	N	X	SD	N	X	SD	N	X	SD	N
D	2.7000	0.57009	5	1.7800	0.25884	5	2.6600	0.46690	5	2.3800	0.6061	15
A	2.4140	0.43758	5	1.8580	0.3221	5	2.2000	1.12916	5	2.1573	0.71052	15
M	2.2750	0.70415	4	1.6000	0.42426	4	2.6500	0.54467	4	2.1750	0.68639	12
G	2.3000	0.81240	4	1.9750	0.6130	4	2.6500	0.26458	4	2.3083	0.62006	12
Total	**2.4372**	**0.59715**	**18**	**1.8050**	**0.39494**	**18**	**2.5278**	**0.67806**	**18**	**2.2567**	**0.64591**	**54**

From the data in table 2 on the effectiveness of circuit, continuous and interval training programmes on the player's flexibility, the summary revealed that interval training group had highest mean gain scores with standard deviation 2.5278+0.67806. This is followed by circuit training group 2.4372+ 0.59715 and lastly continuous training group 1.8050+ 0.39494. This implies that interval and circuit training regimens improved the flexibility of U-13 male soccer players better than training regimen.

Hypothesis 1 There is no significant difference on the effectiveness of circuit, continuous and interval training programmes on the Endurance of U -13 male soccer players.

To test this hypothesis, an analysis of variance (ANOVA) was done to compare the effectiveness of the three training programmes as it relates to gain in endurance. The results obtained are shown on Table 3.

Table 3: ANOVA Summary Using Gain in Endurance due to Continuous, Circuit and Interval Training Programmes

Source	SS	Df	Ms	F*	P-value	Decision
Type of Training Programme	32409.630	2	17704.815	9.128	0.001*	S
Position of Players	12566.067	3	4188.889	2.160	0.107	NS
Error (within treatment)	8146.000	42	1939.524			

Where

S - Significant

NS - Not Significant

The result from the data in Table 3 indicated that the f calculated is 9.128 for type of training programme and a p- value of 0.001 which is less than 0.05. We therefore reject

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.14 (1), January-April, 2025 https://ajemates.org

the hypothesis on the type of training programme and conclude that there is significant difference in the endurance of U-13 male soccer players. Furthermore, the table showed that there is no significant difference in the endurance of U-13 male soccer players. Furthermore, the table showed that there are no significant differences in the endurance of the players playing positions as the f calculated was 2.160. The p-value 0.107 was greater than the significant level 0.05. In order to determine the direction of significant different in the type of training programme, post hoc pairwise comparisons were conducted with least significant difference (LSD) test. The results of this test are summarized on Table 4 below.

Table 4: LSD Pairwise Comparison of the Circuit, Interval and Continuous Training Programme on Gain in Endurance.

S/N	Training Programmes	X	X Difference	P-value	Decision
1	Circuit	244.510	37.250	0.016*	S
	Continuous	281.750			
2	Interval	219.000	62.750	0.000*	S
	Continuous	281.750			
3	Interval	219.000	25.500	0.092	NS
	Circuit	244.500			

*P < 0.05

The data on table 8 showed that the p-value in the LSD pairwise comparison of circuit and continuous training programmes (0.016) as well as interval and continuous training programmes (0.000) are respectively less than 0.05. The p-value of interval and circuit training programmes (0.092) is greater than 0.05. It is logical to conclude that continuous and circuit training groups had better mean gain scores in endurance than the interval training group.

Hypothesis 2: There is no significant difference on the effectiveness of circuit, continuous and interval training programmes on the Flexibility of U-13 male soccer players. This hypothesis was tested with one way analysis of variance (ANOVA) at 0.05 alpha level. The results obtained are summarized on Table 5 below

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.14 (1), January-April, 2025 https://ajemates.org

Table 5: ANOVA Summary in Flexibility due to the Effectiveness of Circuit, Continuous and Interval Training Programmes

Source	SS	Df	Ms	F*	P-value	Decision
Type of Training Programme	5.569	2	2.785	7.820	0.001*	S
Position of Players	0.488	3	0.163	0.457	0.714	NS
Error (within treatment)	14.956	42	0.356			

*P< 0.05

From the findings on table 5, it can be deduced that the f calculated is 7.820 with p-value of 0.001, which is less than 0.05. It is therefore necessary to reject the null hypothesis on the type of training programme and also conclude that there is significant difference on the flexibility of U-13 male soccer players due to the type of training programmes. Nevertheless, the same table indicated that f calculated for the positions of players is 0.457 with a p-value 0.714 which is greater than the chosen significant level (α) 0.05. This concludes that flexibility quality of U-13 male soccer players is not significantly affected by the three training regimens irrespective of their playing positions. In order to determine the pairs of mean gain in the type of training programmes which were significantly different, post hoc pairwise comparisons were conducted with the least significant difference (LSD) test. The result of this test is shown on Table 10 below.

Table 6: LSD Pairwise Comparison on the Mean Gain Scores of the Effectiveness of Circuit, Continuous and Interval Training on Players Flexibility

S/N	Training Programmes	X	X Difference	P-value	Decision
	Circuit	2.422	0.619	0.004*	S
	Continuous	1.803			
2	Interval	2.540	0.737	0.000*	S
	Continuous	1.803			
3	Interval	2.540	0.118	0.559	NS
	Circuit	2.422			

*P< 0.05

It was observed as shown in Table 6 that the p-values of circuit and continuous training programmes in mean difference (0.004), continuous and interval (0.001) were respectively less than the chosen significant level (α) 0.05, while that of circuit and interval training had the highest effect followed by circuit training and then the

continuous training. Their mean gain score were 2.540, 2.422 and 1.803 respectively.

Summary of Major Findings

The findings of this study are summarized as follows:

1. Physical fitness attributes of U-13 male soccer players differ significantly due to the effectiveness of circuit, continuous and interval training programme.
2. The Endurance level of U-13 male soccer players is not significantly affected by the training regimens irrespective of the positions they play.
3. Continuous and circuit training group had better mean gain scores in Endurance than the interval training group.
4. Interval and circuit training programmes had better effect on the Flexibility of U-13 male soccer players than continuous training regimens.
5. Flexibility quality of U-13 male soccer players is not significantly influenced by circuit, continuous and interval training regimens irrespective of their playing positions.

Discussion, Conclusions and Recommendations

The purpose of the study was to determine the effects of circuit, continuous and interval training programmes in the development of physical fitness attributes of U-13 male soccer players. These physical fitness attributes include Endurance and Flexibility. The findings of the study are discussed in this section. Also highlighted are the conclusion, recommendations, implication of the study, limitation of the study and suggestions for further research.

Discussion

The finding indicated that Continuous and circuit training regimens developed-endurance level of U-13 male soccer players better than the interval training regimen. Branquinho, et al (2020) and Nicholas et al, (2022) emphasized that circuit and continuous training regimens attempt to use economically the time for the exercise to improve cardio respiratory system, muscles ability to use oxygen and thereby facilitate the endurance capacity of players.

Nevertheless, the finding also indicated that the endurance level of U-13 male soccer players is not significantly affected by the training regimen irrespective of the positions they play. This implies that endurance is important for all the soccer playing positions be it defenders, attackers, midfielders and goalkeepers. This is in line with Brown, et al 2007 and Ahmed, (2021) views that it is vital that the whole soccer playing positions have endurance, for it is useless to dominate a match in the beginning because of superior skill only to lose it eventually because the players became exhausted.

AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.14 (1), January-April, 2025 https://ajemates.org

Evidence from the study showed that interval and circuit training groups were found significantly (P<0.05) superior to continuous training group in terms of enhancing U-13 male soccer players flexibility. This could be adduced from the stretching ability inherent in the interval and circuit training methods. Furthermore Agwuebike, (2003) et al and Daneshjoo et al (2013) emphasized that variety of activities included in a circuit training technique provided the opportunity to improve flexibility as well as creating different and specific exercise overloads which simultaneously enhance skill. In addition, Boyaci et al (2017) & Sports Fitness Advisor (2008) emphasized that circuit training forces the key joints involved in moving the body to go through a wider range of motion than they commonly encounter. Therefore, interval and circuit training techniques work well for developing flexibility.

Consequently, the finding also showed that the mean gain scores of the U-13 male soccer players did not differ significantly due to their playing positions. This means that flexibility is the basic physical fitness attributes for all playing positions in soccer. This finding is in line with Vardakis, (2020) assertion that in modern soccer players are usually prepared to play what some coaches described as "total football" consisting of mass attack and mass defence.

Conclusions

Based on the findings of this study, the following conclusions were drawn.

1. Circuit, continuous and interval training programmes were found significant (P<0.05) in terms of Enhancing U-13 male soccer players physical fitness attributes.
2. Continuous and circuit training groups had better mean gain scores in Endurance than the interval training group.
3. The endurance level of U-13 male soccer players is not significantly affected by the training regimes irrespective of the positions they play.
4. Interval and circuit training programmes had better effect on the Flexibility of U-13 male soccer players than continuous training regimens.
5. Flexibility quality of U-13 male soccer players is not significantly influenced by circuit, continuous and interval training regimens irrespective of their playing positions.

Recommendations

Sequel to the result of this finding, the researcher deems it necessary to recommend the following;

Soccer coaches should enforce physical fitness training of players as the basic training programme for soccer players.

Coaches should also use continuous and circuit training regimens for developing

endurance ability while interval and circuit training regimens should be used for flexibility and agility abilities development.
Coaches should try as much as possible to adopt the seven-training guide for building physical fitness suggested by Total Soccer Fitness (2005). This includes aerobic and anaerobic endurance conditioning, programme of different preparation of agility conditioning and flexibility conditioning. Warming up and cooling down, testing soccer fitness and planning soccer conditioning programme.

Well-trained physiologists should be employed to help in planning, monitoring, supervising and evaluating the training categories of soccer players.

Coaches and sports scientists should also plan the training programme based on the specific requirements of the soccer playing positions. On this issue knowledge of the physiological requirements of the playing positions becomes paramount for the coaches.

Coaches should also try as much as possible to follow the basic principles of training such as specificity, overload, intensity, progression and recovery during training periods.
Emphasis should be made by the coaches to know the particular period suitable for physical fitness training, whether during early pre-season, late pre-season, early in-season, late in season or off season.

Sport governing body should establish a policy that should guide the setting of tests for grading of national soccer coaches based on the different level of competition such as 13, U-17 and U-21.
Sport governing body should equally plan to send the national coaches for courses abroad so that they should acquaint themselves with the scientific approaches for training soccer players.

Sports ministries in collaboration with soccer clubs management bodies should make effort to organize seminars/workshops for coaches on the important of building physical fitness attributes of soccer players.

Implication of the Study

The result of this study has some implications for physical education and sports programme. It has provided empirical evidence as to the relative efficacy of the development of soccer players physical fitness attributes using circuit, continuous and interval training regimens. This suggests the need for coaches and sports scientists to adopt the new approach of training soccer players in physical fitness before going into techniques, skills and tactics involved in soccer game. The study has also shown that there is significant improvement in the use of circuit, continuous and interval training regimens in the development of physical fitness attributes of soccer players. Therefore, this called for soccer coaches to start from the grass root to introduce the use of these training programmes so as to build the physical

fitness attributes of soccer players thereby improving the standard of soccer performance in the state and Nigeria in general.

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