IMPACT OF INSTRUCTIONAL INTERVENTION ON THE EXECUTION OF FIELD MODE OF PLYOMETRICS TRAINING AMONG SCHOOL CHILDREN IN IBADAN, OYO STATE, NIGERIA

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Abstract

This paper explore the impact of instructional intervention on the execution of field mode of plyometrics training among amateur athletes in Ibadan, Nigeria. The Single group pre test - post-test research design was used for the study. The purposive sampling technique was used to select sixteen children with mean age of 7.89±3 .3675 ranged between 8-13 years, Height range of 1.12-1. 52 metres with mean of 1.4±.11,and body weight of 21-34 kg, with the mean of 23.4 ±11.4kilograms. The 16 participants were grouped into classes of lower and middle basic primary school as well as their relative genders. The number of successes made in one minute during the execution of plyometrics like slamming, plyometrics push-up, jump into the box and leg bounding were recorded with the best of three trials before and after the instructional intervention . Plyometrics instructional assessment template was used as the instructional guide in the study. The Descriptive statistics of mean and standard deviation for presentation of respective groups achievement was used, while Inferential statistics of Analysis of Covariance was used to test the formulated null-hypothesis at 0.05 level of significance. The result indicates significant differences $F(_{3,12)}=9.743, P<0.05)$ *in the pre and post intervention achievement of school children in the execution of selected field plyometrics protocols. The study concluded that the need for instructional interventions while implementing field plyometrics for children cannot be underestimated. The study recommends involvement of certified experts for effective management of field plyometrics training for children in Nigeria schools.*

Keywords: Instructional therapy, Stepwise instruction, Lower basic, Middle basic intervention achievement

Introduction

One of the concepts that have attracted multivariate styles of definition is Plyometrics. It has been described as jumping exercises that involve a rapid deceleration of body mass followed immediately by rapid acceleration of the body mass in an opposing direction (Faulkner, Claflin & McCully, 1998). These jumping exercises force a rebound action known as the myostatic reflex, elicit the contraction of both the homonymous and synergist muscles while inhibiting antagonist muscles in an effort to produce a fast response to an applied stimulus (Chu, 2004).The myostatic reflex contributes to an increase in muscular force generation due to the effects of voluntary contraction and the involuntary contraction resulting from

the reflex itself. Faigenbaum and Donald (2005); Chu, (2004) and American College of Sports Medicine (2005) stressed that plyometrics combine series of exercise drills that focus on developing athletes' fast twitch muscles and energy systems. In the opinion of Faigenbaum and Donald (2005) plyometrics generally focus on increasing effectiveness power output that can be generated during strenuous activities rather than outright maximum strength. Some drills work directly with strength; balance and toleration of lactic acid build up. All of these elements were considered to be effective prerequisite to enhance improved performing ability to deal with surges, sprints and maintain a low (efficient) body position while the rapid movement is being done. This is possible because it will allows muscles to act like a rubber band, stretching them out, store up energy and releasing them in a more powerful manner than would normally be done in an untrained individual.

Payne, Morrow, Johnson and Dalton, (1997) describe the hop and bounding activities as significant aspect of plyometrics training. The main objective of these hopping and bounding exercises is to convert elastic energy generated by both the force of gravity and body weight during eccentric or lengthening muscle contraction into an opposite force during the concentric or shortening contraction. A lengthening or eccentric contraction followed by a concentric contraction utilizes the elastic energy stored in that muscle during the stretching phase (Payne, Morrow, Johnson and Dalton 1997). When the elastic energy is released, it can make a substantial contribution to the efficiency of the muscle contraction resulting in greater power output. Clarkson, Roll, and Melchionda (1991) explained that the muscle spindles located within the muscles react to sudden stretch by sending signals to the spinal cord, resulting in muscular contraction to resist the sudden stretch. Given the above information, it is understood that plyometrics training has the potential to assist athletes in increasing movement speed and power by developing quicker reaction times. Verkhoshanski (1966) as reported by Bartholomeu (2004) implements his plyometrics protocol through a series of three stages. The first stage consisted of a process required for developing general strength and jumping techniques. He further explained that plyometrics work with increasing resistance, hence, he emphasises the needs for its integration during the second stage to prepare the athletes toward the increment in the muscle loads, than what their bodies would incur. Finally, the third stage involves the athlete's capacity to achieve increment in their reactive ability towards achieving better in the neuromuscular system and function in their body. This could be achieved through the incorporation of more stressful plyometric exercises to facilitate the increase in the muscle's reactive abilities (Verkhoshanski, 1966). Verkhoshanski believed that proper progressive plyometrics training could be extremely beneficial to enhance athletic performance in different sports. Numerous studies have sought to prove or disprove this hypothesis since (Bryscki, 1997; Baechle & Earles, 2000). However, there is increase in numbers of studies that advocated the adoptions of plyometrics training for athletes of varying cadres. For example, American College of Sports Medicine, 2001, the American Academy of Pediatrics,2003, the American Society of Sports Medicine, 2002, and the National Strength and Conditioning Association, 2003 admits that the usage of constructive instruction remained a crucial factors needed to scale down the mode of execution of variety of plyometrics training for beginners (8-12years).

Bartholomeu (2004) further advocates the use of therapeutic instructions to boost the cyclical perfection of beginners on the execution of field plyometrics. This justifying the need to accomplished field drilling with step-wise instruction as a corrective measures during the execution of plyometrics training on the field. The core expectation allured to various organized sporting programme for (talent discovery or hunting) otherwise known as catch them young at the grassroots remained a nightmare. This is can not be disputed because, the gap between advanced and developing countries of the world is widening persistently with the emergent of sophisticated training facilities and equipment in western world. It is not a disputable fact that, excelling in the global Sporting arena remained symbolic ingredient for social ties in the country. However, in a country like Nigeria, where this laudable expectation is being threaten with paucity of scientific training gadgets. ' Get things done with what we have in the absence of what we

lack' should be our watch word. The ovations that is beclouds with a lot of uncertainties due to paucity of reliable training templates was viewed as summontable The author belief that copulation of demonstration with verbal instruction would serve a greatly in achieving the best of performance among the amateur athletes within a short period of time. This study, therefore explore the impact of instructional intervention on the execution of field mode of plyometrics training among amateur athletes in Nigeria.

Statement of the problem

Based on the long time experience of the researcher, Achieving easy adaptation in the execution complex training protocol like field plyometrics remained a nightmare for beginners (Children between 8—12years). However, the need to simplifying the multi –level task that surrounding the execution complex training mode like field plyometrics must not be neglected. Coaching point is widely accepted as medium of communicating therapeutic instructions to the athletes during training. However, its effectiveness in behavioural adaptation of the children when the plyometrics activities are involved found not to be efficient enough. This implies that evidence of improvement observed is relatively low among children between the ages of 8-12years. Meanwhile, active directive instructional strategy was sometimes recommended as a oriented instructional modality for beginners. Its fusion with plyometrics training in Nigeria is relatively new. Hence, this study will explore its effectiveness with field plyometrics for children. In the western and eastern bloc of the world, quite a numbers of options in terms of techniques, methodologies and tactics are available in the performance profile or documented banks of every nations (Faigenbaum & Donald, 2005). Emphasis placed on selected plyometrics (slamming, plyometrics push-up, jump into the box and leg bounding) may yield data that could be useful for comparison with similar age reference groups as well as other available related data . Expectedly, Coaches with catch-them young missions may find the outcome of this study relevant as an alternative field activities for new beginners.

This study explored the use of stepwise instructional intervention to aid the execution of selected plyometrics training protocols for children to determine the extent of their relative achievement before and after the stepwise instructional therapy used will strengthen children seemingly weaken emission. This study, therefore explore the impact of instructional intervention on the execution of field mode of plyometrics training among school children in Ibadan, Oyo state, Nigeria.

Purpose of the study

The use of sequential active directive instructional modality was explored as intervention to strengthen adaptations of school children with the executions of various plyometrics training modalities such as slamming, plyometrics push-up, jump into the box and leg bounding. This approach was paired with coaching instructional strategy. Both of active instructional strategy and coaching instructional strategy are field-based, useful in stepping down field task and verbal expression of the coaches or instructors. However, differed in the sense that coaching instructional strategy offered more general informations to the clients while active directive strategies provides more specific informations for the clients on a specified field task while on the field of play. The pretest was dominated with instructional coaching strategy, while active directive instructional modality was employed as the supplement prior to the post test measurement.

Research questions

1. Will there be any difference in the achievement of school children in the execution of selected plyometrics protocol before and after instructional intervention by the instructor?
2. What is the relative performance of each of the participants in the executions of plyometrics before and after instructional intervention therapy by instructor?

Hypothesis

Ho1. There may not be any significant differences in the pre and post intervention achievement of school children in the execution of selected field plyometrics drillings**.**

Research Methodology

The single pre test –post-test quasi experimental research design was used for the study. Prior to the pre-test measurement, coaching instructional strategies was used, while active directive strategies was used as intervention, prior to the taken of post-test measurement. The population for the study comprised 16 male and female in-school children, who have been actively involved in school sporting activities in Mufutau Lanihun comprehensive primary school Ibadan. Purposive sampling technique was used for the selections of the male and female in-school children with age range 9-13years for respective participants in the lower and upper basic class in primary school. Validity is the degree to which an instrument measure what is supposed to measure. Each of the plyometrics protocols had relative procedures for their executions. Sucesses recorded in the execution of each of the plyometrics training protocols as stated in their relative procedures was admitted as valid performance for each of the participants. While the Reliability on the other hand refers to the ability of the research instrument to yield consistently the same result over a repeated testing period. Relative achievement of individual participants in executing each of the plyometrics (slamming, plyometrics push-up, jump into the box and leg bounding) in accordance with American College of Sports Medicine. ACSM's. (2005) in repeat successions was used. Test-retest was conducted on every plyometrics protocols. Prior to the commencement of the intervention programme, pre-test measurement of the two groups were taken, followed by post-test measurement after the instructional interventions. The difference between the pre-test and post-test among male and female school children were determined weigh the extent of influence of instructional interventions on the execution of selected plyometrics (slamming, plyometrics push-up, jump into the box and leg bounding) .The test retest reliability was used in the study the best of three trials was recorded for individual participant. The descriptive stastistics of mean and standard deviation and Inferential statistics of Analysis of Covariance were used to test the formulated null-hypothesis at 0.05 level of significance. The analysis and interpretation was done with Statistics Package of Social Sciences (SPSS) version 19.

Instrumentation

The equipment used in the study are improvised medicine ball, plyometrics box, stopwatch, measuring tape,field makers and adapted plyometric checklist.

1. The adapted plyometrics checklist was used as the scale of assessment in this study. It was as well used for profiling of participants performance.
2. **Performance rating scale** –perfection of the participants in the execution of each of the listed phase in each of the 4 phases of the five selected plyometrics training rated. Relative achievement of the participants will be based on stepwise executions of each of the plyometrics protocols in repeat successions.
3. **Measuring Tape:**A leather measuring tape calibrated in inches and centimeter, 50 meters long, was used to measure distance for plyometrics rings of the participants.
4. **Bathroom Scale:** The HANA bathroom scale model no BR 9012 with capacity of 120Kilograms

[KG] [made in China] was used to measure immediate body weight of the participants..

5. **Stop Watch:** The hand hart [battery operated brand] stop watch calibrated from 0-30 seconds with minutes hand-reading from 0-15 minutes was used for timing in this study.
6. A modified step box, which is 12 inches [30.5cm] high was used to plyometrics jumps of the participants.
7. **Stadiometer:** The health of meter scale [weight and height] manufactured by Continental Scale Corporation, Bridge View, Illnosis, U.S.A. model 8002 was used to obtain both height and weight of the participants.
8. **Improvised medicine ball:** This is a rubberised bladder like ball with soft leather surface which has twice the weight of normal primary school standard ball. It was used to assess the execution of slamming plyometrics in this study.

Scoring –Numbers of the successes and appropriates repetitions made in the executions of plyometrics protocols (slamming, plyometrics push-up, jump into the box and leg bounding)in one minute was recorded, while the best of 3 trials shall be recorded for every participants.

Research intervention procedure

(Instructional Procedure for the Execution of Selected Plyometrics Protocols)

OBJECTIVES – by the end of this activities, participants should be executes the following selected plyometrics training as slamming, plyometrics push-up, jump into the box, bounding and bounding with the rings.

A. Step-wise instructions on the execution of slamming plyometrics, each participants must,

1. Stand with feet parallel, shoulder-width apart and knees slightly bent.
2. Pull medicine ball back behind head and forcefully throw ball down on the ground as hard as possible.
3. Catch the ball on the bounce from the ground and repeat according to prescribed repetitions.

B. Step-wise instruction on the execution of plyometrics push-up, each participants must,

1. Start by getting into a push-up position.
2. Lower yourself to the ground and then explosively push up so that your hands leave the ground.
3. Catch your fall with your hands and immediately lower yourself into a push-up again and repeat.

C. Step-wise instruction on the execution of Jump to Box plyometrics, each participants must,

1. Stand facing box with feet slightly wider than hip-width apart.
2. Lower body into a semi-squat position and immediately jump up onto box. Do not hold a squat position before jumping up – keep the time between dipping down and jumping up to a minimum.
3. Feet should land softly on box. Step back down (not jump back down) and repeat.

D. Step-wise instruction on the execution of plyometrics Bounding, each participants must,

1. Jog into the start of the drill for forward momentum.
2. After a few feet, forcefully push off with the left foot and bring the leg forward. At same time, drive your right arm forward.
3. Repeat with other leg and arm.
4. This exercise is an exaggerated running motion focusing on foot push-off and air time.

E. Step-wise instruction on the execution of Bounding with the Rings, each participants must,

1. Jog into the start of the drill for forward momentum.
2. After a few feet, forcefully push off with the left foot and bring the right leg forward. At same time, swing left arm forward and land into the first ring, which is 3-4 feet out and to the left, with the right foot.

3. Continue and repeat with other leg and arm into the second ring, which is now 3-4 feet up and to the right.
4. This exercise is an exaggerated running motion focusing on foot push-off and air time.

Analysis of results

R.Q 1: Will there be any difference in the achievement of school children in the execution of selected plyometrics protocol before and after instructional intervention by the instructor?

Table 1 - General Report of participants performance in execution of plyometric in one minute.

selected plyometrics for beginners		pre-intervention achievement on plyometrics	post intervention achievement on plyometrics
Slam plyometrics	Mean	1.0000	3.5385
	N	4	4
	Std. Deviation	.93300	.50839
Plyometrics push-up	Mean	1.0000	1.3103
	N	4	4
	Std. Deviation	.88800	.71231
Bounding	Mean	1.3696	2.2826
	N	4	4
	Std. Deviation	.78802	.45524
Jump into the box	Mean	2.3333	3.0000
	N	4	4
	Std. Deviation	1.26352	.00000
Total	Mean	1.4929	2.5143
	N	16	16
	Std. Deviation	.90161	.89351

As indicated on the above table, it is quite evident that all the participants were able to reciprocate positively to stepwise interventional instruction use to rectified participants inconsistence in the execution of selected plyometrics drilling meant for development of their upper and lower extremities. As indicated on the table tremendous improvement was noticed in the post intervention execution of all the plyometrics trial tested in this study.

R.Q 2: What is the relative performance of each of the participants in the executions of plyometrics before and after instructional intervention therapy by instructor?

Table 2 - General Report of relative perfor mance participants in the execution of plyometric drilling protocols.

Categories of participants		pre-intervention achievement on plyometrics	post intervention achievement on plyometrics
Lower basic male	Mean	1.0000	3.3765
	N	4	4
	Std. Deviation	.80331	.93649
Lower Female	Mean	1.3030	3.9242
	N	4	4
	Std. Deviation	.46669	.56071
Middle basic male	Mean	1.1500	4.2143
	N	4	4
	Std. Deviation	.44096	.41786
Middle basic female	Mean	1.2556	2.0421
	N	4	4
	Std. Deviation	1.26051	.7210
Total	Mean	1.4929	3.5143
	N	16	16
	Std. Deviation	.90161	.89351

As indicated in the above table, the relative performance of the classes of the school children expresses similitude of achievement across the board. As shown in the above table, it is quite evident that all the participants were able to reciprocate positively to stepwise interventional instruction use to rectified participants inconsistence in the execution of selected plyometrics drilling meant for development of their upper and lower extremities. To answer the stated research question above, the instructional intervention contributes positively to the tremendous improvement noticed in the above values.

Tests of Hypothesis:

Ho1: There may not be any significant differences in the pre and post intervention achievement of school children in the execution of selected field plyometrics drillings.

Table 3 - Dependent Variable: post intervention achievement on plyometrics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	67.255[a]	4	22.418	69.743	.000
Intercept	818.811	1	818.811	23.473	.000
Grp categories	37.255	3	22.418	9.743	.000
Error	43.716	12	.321		
Total	996.000	16			
Corrected Total	110.971	15			

a. R Squared = .606 (Adjusted R Squared = .597)

Table 4-scheffe pos hoc pair wise comparison of Post intervention achievement of plyometrics execution of participants.

(I) Categories of participants	(J) Categories of participants	Mean Difference (I-J)	Std. Error	Sig.
Lower basic male	Lower Female	1.75223*	.13855	.000
	Middle basic male	.96218*	.14469	.000
	Middle basic female	.17647	.12883	.600
Lower Female	Lower basic male	-1.75223*	.13855	.000
	Middle basic male	-.79004*	.14567	.000
	Middle basic female	-1.57576*	.12994	.000
Middle basic male	Lower basic male	-.96218*	.14469	.000
	Lower Female	.79004*	.14567	.000
	Middle basic female	-.78571*	.13647	.000
Middle basic female	Lower basic male	-.17647	.12883	.600
	Lower Female	1.57576*	.12994	.000
	Middle basic male	.78571*	.13647	.000

The analysis of covariance in the above table (3) shows that there was significant differences $F_{(3,12)}=9.743, P<0.05$) in the pre and post intervention achievement of school children in the execution of selected field plyometrics drillings. The null hypothesis was therefore rejected. Scheffe post hoc analysis however revealed that the significant differences occurred between male children in lower basic group and their female counterparts (P=0.000), while the other difference existed between the male participants in middle basic group and the entire participants in lower basic primary school (P=0.000).

Discussions of findings

Table 3 shows the significant differences $F(_{3,12})=9.743, P<0.05$) in the pre and post intervention achievement of school children in the execution of selected field plyometrics drillings. However, the male in the lower basic primary school had the mean of 1.0000± 80331and 3.3765±.93649 in its respective pre- and post- intervention measurement. The obtained value as referenced in the group may be compared favourably with their female counterpart in the lower basic group. They obtained the mean score of 1.3030 ±46669, and 3.9242 ± 56071 in their pre and post intervention execution of field plyometrics training protocol. Similarly, the male in the middle basic primary school had the mean of 1.1500±44096 and 4.2143±..41786 in its respective pre- and post- intervention measurement. The obtained value as referenced in the group may not be compared favourably with their female counterpart in the middle basic group. This is because little improvement was observed in their pre intervention mean score of 1.2556 ± 1.2605, while comparing this with post intervention execution achievement mean value of 2.0421 ± .7210 repetitions. Above all it is evident that apart from the fact that plyometrics training is not gender biased as justified in the result of this study. Plyometrics training with contrictive instructional intervention can be executed suceessfully among young athletes without exposing them unto muscular wear and tears. It was enunciated further that plyometrics emphasize the simultaneous application of maximum strength and quickness that can enhance better performance. However, the focus of movement, while executing plyometrics is explosiveness. Hence, it was suggested that repetitive execution of plyometrics training should not be done to the point of fatigue. For example, if the objective is to perform a set of jumps at high intensity, repetitions should not be done past the point of fatigue (Faigenbaum & Donald, 2005). They further asserted that the plyometric training can be used for such purposes; the goal of power drills is not endurance. Faigenbaum & Donald (2005) explained further that explosiveness is greatest when the muscle is warmed and in rest. It was further stressed that giving exercise only to the point where performance declines may hinder improvement. It is better to do an extra set of an exercise than to add repetitions that are not done powerfully. In contrast, school children have ample opportunity to better the performance with varieties of field plyometrics drills include a variety of jumping movements: hops, bounds, single jumps, and leaps or Upper body exercises include medicine ball throws, pendulum throws, and push- ups without sustaining injury. Once the involvement of qualified instructors was not left out. Recent study in local context reported significant effect of plyometrics training on selected physiological variables like forced vital capacity, resting systolic blood pressure, resting diastolic blood pressure, resting heart rates and percent body fat of the school children (Abass and Osho 2009). Conclusively, field plyometrics drills such as leg bounding, jump into box, or Upper body plyometrics push- ups and slamming were confirm to be the best plyometrics training protocols suitable for children without sustaining injury.

Conclusion

Following conclusion was drawn;

There was difference in the achievement of school children in the execution of selected plyometrics protocol before and after instructional intervention by the instructors. As evidence in the pre and post intervention value obtained. The instructional intervention contributes positively to the tremendous improvement noticed in the mean values across the board in this study. Significant differences was noticed in the pre and post intervention achievement of school children in the execution of selected field plyometrics drillings.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. The principle of simplicity should be strictly observed while using field plyometrics training for beginners.

2. Childhood may actually be the ideal time to implement some field- plyometrics training programmes because the neuromuscular system of children is still in formative stage can easily adapt to the training stress. Hence, the Ministry of Education should encourage sports organizations to embark on school-based mobilization exercise (that may yield mass participations of the amateur athletes) with proper and close monitoring of both private and public schools on terminal basis.
3. Workshop, seminar and symposium should be organized for coaches and physical educators to propagate the uniqueness of field plyometrics training techniques, in order to implement their uses for the betterment of the performance of amateur athletes in schools.

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