

THE EFFECT OF USING PLYOMETRIC EXERCISES TO IMPROVE SOME PHYSICAL ABILITIES AND PERFORMANCE IN THE TRIPLE JUMP (HOP, STEP, JUMP)

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Abstract

The research aims to study the effect of Plyometric exercises to improve some specific physical abilities in triple jump, where researchers used the experimental method due to the nature of the research relevance, and the sample was consisted of students from the Institute of Physical Education and Sports at the University of Mostaganem (Algeria). 44 students aged (19 ± 0.55 years) were selected and divided into two equal groups, the first was the control sample which used the traditional style and the second was the experimental one used plyometric exercises during the lesson to know the achievement of the educational goals of the effectiveness of the triple jump, while the tests used were (the broad jump test from the stability, 10 hop walk with the right foot and 10 other ones with the left foot from sprint, sprint 30 m from the moving start, performance in the triple jump). After the treatment of the results by statistical means, and through these results it have been reached several conclusions of them, Plyometric Exercises to develop some Specific Physical Abilities and performance in the triple jump, under discussion significant difference ($*p \leq 0.05$). One of the most recommended by the researcher emphasized the need to use, Plyometric exercises that have been applied in research units within the training curriculum due, with similar studies for the preparation of such exercises and use in the development of the rest of the other games.

Keywords: plyometric, Physical Abilities, performance, triple jump.

1. INTRODUCTION:

The Triple Jump consists of three distinct skills performed at speed in a continuous action as follows: Hop: During the hop the athlete uses the same foot for take-off and landing. Step: Athlete lands on the opposite foot (to that used for the hop). Jump: Athlete performs a jump from the "step" foot by landing in the pit the saying: "same; other; both" can help remember this sequence (Miladinov & Bonov .2004). The triple jump is one of athletic disciplines in which its practitioners must requires a range of physical, psychological, tactical and skills components. The physical aspect is an important and effective element in this event, and this is illustrated by some specialists that physical preparation for the level of jumper is the most important component of an effective and influential general jump distance, and this demonstrates the importance of the physical aspect of the effectiveness of the triple jump before the skills setting, also they indicated the necessary effectiveness of these physical attributes where he focused on the direct influence of muscle strength and its importance and how it relates to the element of speed to generate explosive power and thus improve the level of jump. As the inability to show muscle strength affects the mastery of skills and the development of performance and non-arrival of the athlete to the level he want to access. The use of the training and the variety of plyometric exercises and its effects and the need for practitioners of the discipline of triple jump to physical preparation commensurate with their abilities for the discipline and requirements to take a share deal of work is also associated with levels communicated by the player through the digital achievements that he can record in the triple jump. Where he is known The Plyometrics exercises are training techniques used by athletes in all types of sports to increase strength and explosiveness (Chu, 1998). Plyometric consists of a rapid stretching of a muscle (eccentric action) immediately followed by a concentric or shortening

action of the same muscle and connective tissue. The stored elastic energy within the muscle is used to produce more force than can be provided by a concentric action alone (Marginson et al., 2005). Also some experts indicate that: The importance of plyometric to a strength and conditioning program has previously been established, with positive training adaptations reported for force production (Malisoux, et al., 2006), muscular power (Thomas, et al., 2009), sprint velocity (Kotzamanidis, 2006), and sprint economy (Kerdok, et al., 2002). A review of the published literature produces a common definition of plyometric exercise. (Fatouros, et al., 2000; Moore & Schilling, 2005; Wathen, 1993), report plyometric exercises as those that are characterized by a rapid deceleration of the body followed almost immediately by a rapid acceleration of the body in the opposite direction. It is this eccentric, concentric contraction pattern which is reported to evoke the elastic properties of the muscle fibers and connective tissue in a way that allows the muscle to store more elastic energy during the deceleration phase and release it during the acceleration period. Whereas, Plyometric training specifically fulfills the needs of triple jumpers by developing the ballistic muscular strength these events demand. Care must be taken not to over train and risk injury. Nonetheless, plyometric are effective because they directly address several principles of training for the triple jump and duplicate many of the event's movements (Edward et al., 1995; Stander, 2012). Many researchers also believe that plyometric training or use of plyometric exercise is the most important methods in improving explosive power and distinctive speed force for many sporting activities, which require the integration of the maximum speed with maximum force of the muscle, this method contributes to overcome the problems that correspond to the force development. This is what was said by (Hamdi, 2011; Pertumen et al., 2000), that plyometric training contribute to the improvement, especially in activities that use explosive muscular contractions achievement, and Rahimi and Behpur, (2005), who pointed out that the plyometric training in the short term is effective to the development of muscle strength, improve upgrade and anaerobic capacity. Where in contrast adds that when you connect plyometric training exercises with the adoption of the loads is very effective for players (Ai et al.; 2011). It is understood that the primary objective in physical education and sports sections is upgrading physical for students so that they can practice practical lessons with a good level of fitness, and the research problem due to the follow-up of researchers in the field of teaching students in the athletics disciplines in institutes of physical education and sports, where it was noted weakness among students in the digital delivery, in addition the vulnerability of some specific physical capabilities associated with the triple jump and according to researchers this is due to adoption of lot of teachers of skills side, primarily during the teaching process, and the lack of use of appropriate methods of training concerned with the physical aspect which has a direct impact in performance in the as shows many experts in the field of specialization, as well as studies and previous research, so the researchers felt the use of certain plyometric exercises and find out how effective they are in improving some physical capabilities of digital and achievement in the triple jump at the first-year students of physical education and sports at the University of Mostaganem – Algeria.

Research Aim:

- Prepare Plyometric exercises to develop some Specific Physical Abilities in triple jump of the first year students of L.M.D physical education and sports
- Prepare Plyometric exercises to develop the performance in the in triple jump of the first year students of L.M.D physical education and sports
- To identify the differences between pre and post tests for members of the research group.

Research Hypotheses:

- That the Plyometric exercises have a positive impact in the development of some Specific Physical Abilities in triple jump
- That the Plyometric exercises have a positive impact in the development of performance in the in triple jump
- There are no statistically significant differences between tribal and dimensional tests and for the post-test

2. METHOD:

Research Methodology:

- The researchers used the experimental method for the nature and relevance of the research problem.

Group and the research sample:

group research was selected from the first year students of L.M.D physical education and sports at the Institute of Physical Education and Sports –University of Mostaganem- Algeria for the season 2013-2014, ranging in age from 18 to 20 years old, and totaling 250 students, and 44 students were chosen intentionally and divided into two groups: an experimental group of 22 students and a control group includes 22 students from the first year for the L.M.D.in specialty of athletics.

Specification tests under discussion

- The broad jump test of stability: measuring the explosive force of the muscles of the legs.
- 10 Hop walk for two legs from sprint: measuring the specific speed force.

- Test sprint 30 m from the moving start: measuring the speed
- Testing of sprint the triple jump: measuring the level of achievement in the triple jump.
- **Principal experience:**

After selecting the appropriate plyometric exercise and associated elaborately technical steps in the triple jump, in order to ensure the credibility of the research the researchers followed the simplified method using modern scientific method to learn the steps, where it was given 10 educational and training sessions at the same time, where it was first done tests tribal experimental group , the control sample was train in the traditional manner, and after the end of the programmed application of quotas relating to research and then make a posteriori tests for each of the two samples to determine the collection rate and find out how effective plyometric exercise used.

- Training sessions were conducted in the mornings on Sundays and Wednesdays and was the usual times for the training of research sample and a set of plyometric exercises were prepared with the aim of developing explosive power of the legs with first-year students of physical education and sports using the tools and necessary means.

Where it was proposed 10 training sessions and each session has its own procedural goal and starting from 05/02/2014 until 16/03/2014.

Educational quotas were divided into 3 sections consistent content goes with objectives and they are as follows:

1-The preparatory segment: is the warm-up period or the initialization phase, all terms of the content of one used in the training unit, and range from 20-minute to receive in accordance with the duties and the application of the motor in the main stage.

2 - The main part: the main part of the exercise, which works to achieve the goal of educational goals or quotas, which are given plyometric exercises directly related to the discipline of the technical steps in triple jump a 45-minute contain.

3 - The final part: the final part of the relaxation exercises and calming contain, and duration of 15 minutes.

The first phase included 02 weeks and the duration of use of the proposed exercises about 20 minutes and the intensity of load ranged between 40% to 60% and the number of iterations per exercise was from 06 to 10 with 03 to 04 groups with a rest of an estimated 45 to 60 seconds. The second stage involved a 03 weeks and the duration of use of the proposed training was about 20-30 minute and load intensity ranged between 50% to 70% and the number of iterations per exercise was from 08 to 12 with 04 to 05 groups with a rest of an estimated 60 to 90 seconds. But the control sample was exercising long jump under the supervising professor.

Some plyometric exercises used in practical lessons:

- Jump exercises in place one foot and feet together
- Jump exercises with movement right / left one foot
- Jump exercises from sprint right / left one foot
- Exercises bounce barriers heights Gradient
- Hop exercises of walking, sprint light, sprint average
- Hop and jump exercises together of walking, brisk walking and sprint light
- Hop exercises and jump together with the decline of walking in the sand pit
- Hop exercises and jump together from a brisk walk with landing in the sand pit
- Hop exercises and jump together with the landing of sprint in the sand pit.
- Connectivity sprint exercises between the approximate, hop, and stepping in a hole and then jump to ump.
- Zig Zag jumps or Slalom jumps (two footed) Hops (right leg) ,Hops (left leg) , Bounding/Stepping.

Statistical analysis

To produce an objective judgment on the effect of Plyometric exercises to improve some specific physical abilities in triple jump. We reached the statistical results of our research, which was carried out using SPSS v.20. For data of central tendency and dispersion measures, in physical capacity and athletic performance in the same context, we used also:

Independent-Samples T Test for comparing the average of two case groups (the control sample and experimental sample). (Cortina & Nouri, 2000)

3. RESULTS:

– Display, analyze and discuss the results:

Table 1 Descriptive statistics for control group and experiment group (mean ± SD and Std. Error)

Group Statistics		Pret-test				Post-test		
group		N	Mean	Std. Dev.	Std. Error Mean	Mean	Std. Dev.	Std. Error Mean
The broad jump test of stability	contol group	22	2.19	0.15	0.03	2.28	0.14	0.07
	experimental group	22	2.24	0.13	0.02	2.41*	0.19	0.08
10 Hop walk for right legs	contol group	22	22.87	1.98	0.51	24.2	2.15	0.75
	experimental group	22	22.78	2.11	0.69	25.8*	0.98	0.28
10 Hop walk for left legs	contol group	22	22.78	2.25	0.75	23.8	2.07	0.83
	experimental group	22	22.74	1.98	0.81	25.6*	1.74	0.76
sprint 30 m from the moving start	contol group	22	4.95	0.31	0.09	4.65	0.27	0.085
	experimental group	22	4.86	0.27	0.07	4.34*	0.23	0.063
Performance in the triple jump.	contol group	22	9.20	0.58	0.11	9.71	0.54	0.15
	experimental group	22	9.41	0.51	0.13	10.1*	0.49	0.11

Note: Values are reported as mean ± s.
* indicates significant difference (P < 0.05) from baseline

-Display, analyze and discuss the results of the tests with experimental sample

Table 2. sample comparisons tests between pre-test and post-test in the experimental sample (* p ≤ 0.05)

Statistical measurements	Pre-test		Post-test		T
	Mean	Std. Deviation	Mean	Std. Deviation	
The broad jump test of stability	2.24	0.13	2.41	0.19	4.95*
10 Hop walk for right legs	22.78	2.11	25.8	0.98	3.52*
10 Hop walk for left legs	22.74	1.98	25.6	1.74	5.43*
sprint 30 m from the moving start	4.86	0.27	4.34	0.23	3.99*
Performance in the triple jump.	9.41	0.51	10.1	0.49	5.63*

Statistical signification 0.05 , degree of freedom 21, T Tabulated = 2.08
Note: Values are reported as mean ± s.
*indicates significant difference (P < 0.05) from baseline

We note from the table (01- 02) the results for the experimental sample ,Show a significant difference between the results of the pre and post tests and reached the arithmetic mean of the difference between the results of pre and post- tests, The value (t) calculated (4.95, 3.52, 5.43, 3.99, 5.63) while the value (t) Indexed (2.08) at the level of (0.05) and the degree of freedom (21) Since the value of (T) the

calculated value is greater than tabular indicates that the moral difference between the two tests tribal and posttest and in favor of the post test.

Displays and analyze the results of the tests with the control sample

Table (03) shows the results of the tests in question through tribal and dimensional measurements using T Student

Statistical measurements	Pre-test		Post-test		T
	Mean	Std. Deviation	Mean	Std. Deviation	
The broad jump test of stability	2.19	0.15	2.28	0.14	4.35*
10 Hop walk for right legs	22.87	1.98	24.2	2.15	2.10*
10 Hop walk for left legs	22.78	2.25	23.8	2.07	3.55*
sprint 30 m from the moving start	4.95	0.31	4.65	0.27	5.82*
Performance in the triple jump.	9.20	0.58	9.71	0.54	5.61*
Statistical signification 0.05 , degree of freedom 21, T Tabulated = 2.08					
Note: Values are reported as mean ± s.					
*indicates significant difference (P < 0.05) from baseline					

We note from the table (03) the results for the control sample ,Show a significant difference between the results of the pre and post tests and reached the arithmetic mean of the difference between the results of pre and post- tests, The value (t) calculated (4.35,2.10, 3.55, 5.82, 5.61) while the value (T) Indexed 2.08 at the level of (0.05) and the degree of freedom (21) Since the value of (T) the calculated value is greater than tabular indicates that the moral difference between the two tests tribal and posttest and in favor of the post test.

Comparison of post-test results of research samples:

Table 4. Independent sample t-test comparisons between experimental and control sample (*p≤0.05)

	Levene's Test for Equality of Variances						t-test for Equality of Means					
	research samples											
	Control		Experimental		F	Sig.	T	df	Sig. (2-tailed)	Std. Error Dif.	95% Confidence Interval of the Difference	
	Mean	Std. Dev	Mean	Std. Dev.							Lower	Upper
broad jump test of stability(m)	2.28	0.14	2.41	0.19	0.59	0.07	2.06*	42	0.01	0.18	0.23	0.75
10 Hop walk for right legs(m)	24.21	2.11	25.81	0.98	0.35	0.56	2.57*	42	0.00	0.09	-0.92	0.18
10 Hop walk for left legs(m)	23.88	2.07	25.59	1.74	0.01	0.92	2.36*	42	0.01	3.98	-0.50	0.12
sprint 30 (m) from the moving start(s)	4.65	0.27	4.34	0.23	0.02	0.88	3.27*	42	0.00	0.27	1.11	3.14
performance in the triple jump. (m)	9.71	0.54	10.11	0.51	3.51	0.07	2.20*	42	0.01	0.08	0.23	0.75

Statistical signification 0.05, degree of freedom 42, T Tabulated = 2.02

It is noted through the table (04) that the values of the calculated T, which came between 2,06 smallest value and 3,27 as the largest value is the largest spreadsheet T, which reached 2.02 for the degree of freedom 42 and the significance level 0.05, which confirms the presence of significant moral differences between these averages which are the differences taking place between the averages statistically significant. , and this information is detailed at Figure 1.

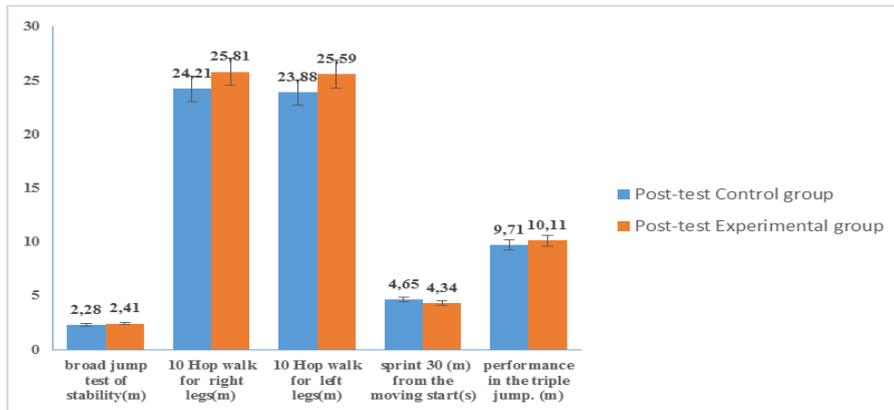


Figure 1. Indicates comparisons between experimental and control sample at Averages Performances In the research variables and athletic performance in triple jump. (*P < 0.05)

1. Discuss the results:

Through the results in tables (02) and (03) which shows the difference between the averages before and after the two samples of research experimental and control in test broad jump of stability, and in test Hop (10 right foot from sprint and 10 left foot from sprint) , in 30 m sprint, which is in favor of post measurements. Which confirmed the effectiveness of the use of plyometric exercise in improving some specific physical capabilities for triple jump discipline in athletics, and the control sample results achieved statistically function, but the differences were for the experimental sample.

Also it shows that the experimental group achieved a better development as a result of attention to improving the ability of jump and Hop by receiving the experimental group special plyometric exercises that help performance and proficiency jump ability and hop.

The researchers explain it to that skill Hop right foot and left foot and then jump lead to access to the target circle also the focus here is to use speed in this skill to be effective performance, giving some educational steps in learning these steps, because the attention to the physical while teaching helps achieve a positive effect in the results, which were divided and the order of steps logically sequential arrangement, make an educated article more interesting for the student, taking into account individual differences among them. This is what the students helped the rapid absorption of the technical steps for effective by linking technical steps in the triple jump by focusing on the recruitment plyometric exercise directly related to the effectiveness. Also refers Through previous studies like (Allen et al.,2011 ; Flora et al.,2015 ; Apostolos et al.,2013 ; Makaruk et al.,2011) .The use of plyometric training contributes to the improvement and upgrading of jump in sports activities that rely on explosive power in the ability of the lower parties.

Through the results of testing performance in the triple jump table (01) and (02) we find that the experimental group achieved better progress through the use of plyometric exercise that contributed to the ability of how to master the hop and jump and stepping in a hole of jump.

The researchers justify the proportion of experimental sample progress on the control sample to improve Hop and jumps kills, which is one of the key components in the discipline of the triple jump, and it was a focus on the special physical abilities under discussion, and improved by employing plyometric exercise. also that the role of the teacher was crystallized in helping students to rely on self-feedback nutrition, and the use of a fixed standard in order to achieve self-perception process. This is consistent with the study (Chimera et al., 2004; Essam 2014 ; Benito et al., 2013; Donley, 1991) .the results showed significant improvements in the performance of athletes who used plyometric exercises.

And that The type of series of performed plyometric exercises with medium strength and represented by a range of different plyometric leaps confirmed the effective impact on the muscular system through the development of the relationship between the maximum power and the explosive power of the lower parts. Thus the development of upgrade capability that improves performance in the in efficiency, and this corresponds to the study of Malisoux (2004) , plyometric training that contributes to the improvement chiefly in activities that

use explosive muscle contractions, and according to (Miller& Hay,1986; Ozbar et al., 2014; Hori, et al.,2008;) . who pointed out that the effective plyometric training in the short term for the development of muscle strength and high upgrade.

Through Table (03) we note that there are significant differences between the post measurements for each of the experimental group and the control group in the level of physical abilities of digital and achievement triple jump discipline pilot for the experimental sample, and this result indicates that plyometric exercise was more effective in improving performance in the applied in the triple jump tests compared to the traditional method, which relies on memorization and performance of the model with the control group.

This confirms that the use of plyometric exercise in line with the characteristics of the game is an important principle for effective educational situation a principle taking account the individual differences among students, and given an additional motivation for learning as a result of the use of devices and tools to assist in education and training. Which led to attract the attention of the learner, to know the material process, and provide opportunities for creativity shown by the student during the course of the lesson. This is in line with the study of (Wong, et al., 2010 ; Damon , et al., 2010 ; Suhail ,2014 ; Koh & Hay ,1990) Showing that: Plyometric exercises increase muscular power and are most effective when designed to complement the specific movements required of the athletic activity.

It is shown by the results of individual differences morale among post measurements between the two sample search tests, as shown in Table No. (03) Presenting the results of the post tests in question (jump of stability, Hop of sprint, it was 30 m, performance in the triple jump).

This actually confirms the effectiveness of using plyometric exercises while teaching with the students led to an improvement in the some physical abilities and performance in the with the experimental research sample (Sam et al.,2013; Labuber, et al.,1993;).

Finally Through the presentation of the previous results found that the curriculum prepared according to scientific controls has resulted in the development of the explosive power of the muscles of the legs as the use of methods of training and different in a scientific as well as the use of different Intensity and rest periods sufficient to restore the healing and the number of its replication fits with the intensity of exercise as well as the use of body weight at elevations varying has led to the development of the explosive power of the muscles of the legs and this, which led to the development aspects of physical, and reflected this development on the technical performance and this was confirmed that the plyometric exercises are aimed at the physical and qualities associated with the type of sports activity development.

4. CONCLUSION

We conclude

- That the Plyometric exercises have a positive impact in the development some Specific Physical Abilities in triple jump
- That the exercises Plyometric a positive impact in the development performance in the in triple jump
- There are no statistically significant differences between tribal and dimensional tests and for the post-test.
- Best improve of the experimental sample-based on plyometric exercises Albulaomitrih lessons in the process compared to the control sample, which rely more on the technical side only in the triple jump.

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