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EFFECT OF USING SOME PLYOMETRIC EXERCISES TO IMPROVE EXPLOSIVE POWER AND DIGITAL ACHIEVEMENT IN THE LONG JUMP

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Abstract:
The research aims to identify the effect of using some plyometric exercises to improve explosive power and digital achievement in the effectiveness of the long jump between pre and post-tests for the sample research. The researchers used an experimental method in conformity with research nature. The sample was formed by students belonging to the sport and physical education institute, University of Mostaganem (Algeria). 44 students were chosen and divided into two equal groups. The broad jump test of stability and digital achievement test were used. After statistical processing of the crude results, researchers found that plyometric exercises used led to the explosive power improvement for legs and so the digital achievement in long jump between pre and post-tests in favor of the post-test, in addition to the superiority of the experimental sample to the controlled one in tests results

Keywords: plyometric exercises, explosive power, digital achievement, long jump

1. Introduction

Athletics games are considered among events that attracted attention in the area of research thing which led to the improvement in various training methods. As consequence there were improvements concerning records in run, jump and throwing competitions at different international levels. This kind of games depend on muscle

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strength at jump and throw competitions. The muscle strength is an important element to achieve any sort of physical performance. Its contribution varies according to the kind of performance and contributes to the appreciation of other physical elements as speed, endurance and agility. For that, it has occupied part in sport training programs and it's considered as an important determinant in achieving sport superiority at most of athletics games events.

The different services of the muscle power in practice that athlete's need, especially at long jump events have a crucial and effective role in results determining, without forgetting the other effectiveness requirements especially when beating the upgrading board after speed acquisition through the approximate sprint.

Also some experts indicates that the importance of plyometric to a strength and conditioning program has previously been established, with positive training adaptations reported for force production (Malisoux,2006,771), muscular power (Thomas,2009,332), running velocity (Kotzamanidis,2006,441).

A review of the published literature produces a common definition of plyometric exercise. Fatouros & al (2000), Moore & al (2005) 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. And Hamdi (2011) mentioned referring to Malisoux (2006) that plyometric training contributes in improving the achievement especially in activities that use explosive muscles contractions (Hamdi, 2011, p01-05). Labuber, Christon, Anne (1993) mentioned that plyometric training contributes to the development of maximum power and legs explosive power during the strength power application.

It's obvious that the main objective in sport and physical educations classes is to upgrade student's physical level so that they can practice practical lessons with good level of physical fitness. The research problem due to researchers field follow-upin the area of teaching students in athletics specialty at the sport and physical education institutes, where students' physical fitness weakness was noticed add to lack of diversification and combination between modern methods by teachers and particularly while developing physical attributes belonging to the effectiveness.

It's, also, noticed students weak performance in the jump as well as slower speed concerning the approximate sprint add to bad standing after beating upgradeboard which require a height speed and strong fast glance while approaching the standing board. Is this what athletes do suffer from in the long jump effectiveness.

This what let us to notice the reasons of digital achievement weakness in long jump for physical and sport education institute students due to the lack of using training methods without looking for means and methods which may fulfill sport superiority. For that, researchers suggested to know the effect of using some special plyometric exercises on legs explosive power to realize the digital achievement in the long jump effectiveness for students sample in the athletics specialty at the Institute of sport and physical education, university of Mostaganem, Algeria. Thus, some questions were asked:

- Does the use of plyometric exercises have an effect in improving legs explosive power in long jump for students practicing athletics?
- Does legs explosive power development contribute in digital achievement in long jump for students practicing athletics?

2. Research Methodology

Researchers used experimental method reliving to the nature and the problematic of the research.

3. Research Society and Sample

Research society was chosen among students of first year LMD belonging to sport and Physical Education institute Mostaganem, academic year 2013/2014, with an age between 18 and 20 years old. Their number was about 240 students.44 students were chosen intentionally who were divided into two groups; experimental group included 22 students and the same number for control group, meaningthe other 22 students. Knowing that, all of them belong to the same level and the same specialty (athletics).

4. Tests Specifications

4.1 The Broad Jump Test of Stability

The aim of the test: explosive power measurement of legs muscles.
Tools used: flat land-band to measure distances.
Descriptionofperformance: install the measurement band on the flat land. The candidate stands after the starting line, his knees bended, his arms put behind then he jumps to as far as possible. The candidate is given two chances. The best result is counted. (See figure 01).

The distance is calculated from the starting line to the nearest foot print from the starting line.

Figure 1: The wide jump test of stability

4.2 Long Jump Test

The aim of the test: measurement of distance achievement for long jump

Tools used: measurement band of distances, long jump track

Performance description: each athlete was selected after controlling the approximate distance to the standing board. Three (03) attempts were given to every athlete recording the highest achievement. The distance was measured to the last trace left by the athlete. (See Figure 2)

Figure 2: The long jump test

4.3 The Main Experience

Training sessions for research sample were held in the morning of each Sunday and Wednesday. Set of plyometric exercises were prepared aiming to develop legs explosive power for first year students of physical and sport education by using the necessary tools and means. Ten (10) training sessions were proposed. Each session had its own procedural aim beginning from Feb. 02^{sd}, 2014 to Mar. 09th, 2014.

The first phase included 02 weeks. The duration used in the proposed training sessions was 16 minutes. The load intensity ranged between 40% and 60%. Each exercise was repeated from 06 to 10 times with 03 to 04 groups with a rest from 45 to 60 second.

The second phase included 03 weeks. The duration used in the proposed training sessions was about 18 minute. The load intensity ranged between 50% and 70%. Each exercise was repeated 08 to 12 times with 04 to 05 groups allowing a rest of 60 to 90

second, where the control sample practiced the long jump activities under the supervision of the teacher.

5. Results

5.1 Viewing, analyzing and discussing the broad jump test

Table 1 shows the comparison between the pre-test and post-test of the results of research sample.

Statistical means / Research Sample	Pre-test		Post test		T Calculated	T Tabulated	Difference significances
	x1	y1	x2	y2			
Control sample	2.17	0.18	2.19	0.19	1.12	2.08	Not Significant
Experimental sample	2.16	0.16	2.34	0.12	6.57*		Significant

Level of significance 0.05 and the degree of freedom (n-1) =21

The results of table 01, after using the significance differences test, shows that the calculated T value for the control sample amounted to 1.12 which is inferior than tabulated T estimated to 2.08 at the degree of freedom 21 and the level of significance 0.05 which means the existence of statistical significance.

Concerning the experimental sample the calculated T value amounted to 6.57 which are superior than the value of tabulated T estimated to 2.08 at the degree of freedom 21 and significant level 0.05 that means the existence of statistical significance which means the existence of significant difference between averages in favor of the post test.

5.2 Viewing, analyzing and discussing the long jump test

Table 2 shows the comparison between the pre-test and post-test of the results of research sample.

Statistical means / Research Sample	Pre-test		Post-test		T Calculated	T Tabulated	Difference significances
	x1	y1	x2	y2			
Control sample	4.56	0.43	4.60	0.40	1.28	2.08	Not Significant
Experimental sample	4.60	0.42	4.85	0.33	7.17*		Significant

Significant level 0.05 and the freedom degree (n-1) =21

Through the statistical results mentioned in table 02, after using the measurement of statistical significance T "student", we notice that the calculated T value for the control sample amounted to 1.28 which is smaller than the tabulated T value estimated to 2.08 at the degree of freedom 21 and significant level 0.05 which means the existence of statistical significance.

As for the experimental sample the value of calculated T amounted to 7.17 which superior than tabulated T amounted to 2.08 at the degree of freedom 21 and significant level 0.05 that means the existence of statistical significance which means also the existence of significant difference between the pre and post calculated average in favor of the post test.

5.3 Comparison of post-test results of research samples:

Table 3 explains the comparison of post-tests results of research samples.

Statistical means / Tests	Control sample		Experimental sample		T Calculated	T Tabulated	Difference significances
	X1	P1	X2	P2			
Board jump of stability	2.19	0.19	2.34	0.12	3.61*	2.04	Significant
Achievement in long jump	4.6	0.40	4.85	0.33	2.55*		Significant

Significant level 0.05 and degree of freedom (2n-2) =42

We do notice through Table 3 that the calculated T value amounted between 2.55 as smallest value and 3.61 as biggest value which is bigger than tabulated T estimated to 2.04 at the degree of freedom 42 and significant level 0.05 which confirms the presence of significant differences between these averages that means the differences have statistical significance.

6. Discussion

Through Table 1 and 2, we notice improvement in legs explosive power for the experimental sample in comparison with the control sample. This due to the use of plyometric exercises aiming to improve and develop legs explosive power by activating voluntary muscles in work. This method leads to produce and output power maximum to fulfill the best result.

The development of explosive power leads to the production of high ability and fast dynamic performance. The use of plyometric exercises to develop legs muscles

explosive power emphasizes to increase the push in advance due to the speed of the working muscles extension resulting from training and adapted to reduce the default time while executing the push in front of which increase the jump distance. Many studies, Labuber and al (1993), Essayed (2012), all these studies mentioned that the use of plyometric training contribute to the improvement the explosive power for low parties after applying the jump test. The results agreed with the results obtained which confirm the effectiveness of the plyometric training method use to improve low parties (legs) explosive power.

Researchers explain the result in Table 2 that plyometric exercises used for experimental sample led to the faster explosive power improvement through central muscle contraction development and develop the relationship between the maximum forces and the explosive power. Researchers found also that the direct relationship between the rises of achievement level in the long jump is linked with the viability of the power characterized by speed and the upgrading capacity or the explosive standing and the possibility of developing them.

The results of Table 3 show also that the experimental sample members had achieved the best results in posttest compared with control sample members. This confirms the improvement of both experimental and controlled sample level with a superiority of experimental sample due to proposed exercises included for the experimental sample in order to develop the explosive power of low parties and thus the ability of upgrading to improve digital achievement in long jump. The series of the performed plyometric exercises ranged in a set of different plyometric leaps confirmed their effective impact on the muscle system through relationship development between the maximum power and the explosive power for low parties.

Therefore, the researchers find that upgrading ability is essential to improve the digital achievement in the long jump. This coincides with Essayed (2012) study which emphasizes on the application of physical exercises in adequate manner (redundancy, density appropriate as well as the intensity). Hamdi (2011) mentioned referring to Malisoux (2006) that plyometric training contributes in the achievement improvement especially in the activities where muscle explosive contractions are used, and Rahimi (2005) who mentioned that the plyometric training in short term has a great effect to power muscle and upgrading development. Add to what Matavulj & Al (2001) said that the plyometric training improved jump results for basketball players for example, and what Kotzamanidis (2006) approved while saying that plyometric training developed the achievement operation in the vertical jump for young people. Researchers believe that upgrading is necessary in long jump effectiveness. This may be seen clear through the students obtained results in long jump which reflect interdependence between upgrading and the Athletic Performance.

7. Conclusion

1. The exercises Plyometric a positive impact in the development explosive power of the legs in triple jump.
2. The exercises Plyometric a positive impact in the development digital achievement in long jump.
3. There are no statistically significant differences between tribal and dimensional tests and for the post-test.
4. Exercises Plyometric used led to the improvement of the explosive power of the legs and Athletic Performance of the long jump

References

1. Baechle, T, Earle, R.(2000). Essentials of Strength Training and Conditioning (3 rded.). Champaign, IL: Human Kinetics.
2. C.Etienne &L.Fabrice.(1999).Les fondamentaux de l'athlétisme. Paris. Ed amphora.
3. Chu, Donald. (1983). Plyometric , The Link between strength andspeed,Rome, p3.
4. Holcomb, W., Lander, J., Rutland, R., & Wilson, G. (1996). The effectiveness of a modified plyometric program on power and the vertical jump. Journal of Strength and Conditioning Research, 10, 89-92.
5. Edward Derse, Jacqueline Hansen, Tim O'Rourke, Skip Stolley (1995). Track and Field Coaching Manuel .LA84 Foundation. All rights reserved. Printed in the USA. ISBN 0-944831-32-XCIP 94-80269.
6. Essam Fathy Ghareb (2014) Effect of Plyometric Training With Different Intensities on Kinematics Variables in Fosbury-Flop High Jump. Ovidius University Annals, Series Physical Education and Sport Science, Movement and Health, Romania, Vol. XIV, ISSUE 2, p 251-256.
7. Fatouros, Ioannis G., Jamurtas, Athnasios Z., Leontsini, D., Taxildaris, Kyriakos, Aggelousis, N., and Buckenmeyer, Philip.(2000) Evaluation of Plyometric Exercise Training, Weight Training, and Their Combination on Vertical Jumping Performance and Leg Strength. Journal of Strength & Conditioning Research, 14(4), 470-476.
8. Hamdi Sofian (2001) Effect of two methods entrainment, plyometric and musculation, on Explosive by players of Soccer Canada, University of Québec à Montréal.p 02.

9. Kotzamanidis, C. (2006). Effect of Plyometric training on running performance and vertical jumping in prepubertal boys. Journal of Strength and Conditioning Research 20, 441- 445

10. Labuber, Christon, Anne(1993). The Effect of plyometric training on selected measures of leg strength and power when compared to weight training. Unpublished MA Dissertation centered Michigan Univ.

11. Makaruk H., SacewiczT. (2011) The Effect of Drop Height and Body Mass on Drop Jump Intensity. Akademicka BialaPodlaska, Poland , Biology of Sport, Vol. 28 No1, p63.

12. Malisoux L, Francaux M, Nielens H, and Theisen D.(2006). Stretch-shortening cycle exercises: An effective training paradigm to enhance power output of human single muscle fibers. J ApplPhysiol 100: 771– 779.

13. Matavulj, D., Kukolj, M., Ugarkovic, J., Tihanyi, J. and Jaric, S.(2001*)*. "Effects of Plyometric training on jumping performance in junior basketball players".Journal of Sports Medicine and Physical Fitness 41,159.

14. Mohamed AbdEl-Mawgoud Essayed (2012).Effect of Plyometric Training on Specific Physical Abilities in Long Jump Athletes. IDOSI Publications .World Journal of Sport Sciences, ISSN 2078-4724, 7 (2): 105-108.

15. Moore, Christopher A., and Schilling, Brian K.(2005). Theory and Application of Augmented Eccentric Loading. National Strength and Conditioning Journal, 27(5), 20-27.

16. Rahimi, R., &Behpur, N. (2005). The effect of plyometric, weight and plyometric-weight training on anaerobic power and muscular strength.FactaUnivPhysEduc Sport, 3(1), 81-91.

17. Thomas K, French D, and Hayes PR (2009). The effect of plyometric training techniques on muscular power and agility in youth soccer players. J Strength Cond Res 23: 332–335.

18. Wathen, Dan. (1993) Literature Review: Explosive, Plyometric Exercises. National Strength and Conditioning Journal, 15(3), 17-19.