

Effect of drop jump protocol on explosive power variables and numerical level of long jump female students

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Introduction.

Plyometric is one of the best training methods that help to develop the athletic performance of sports motor skills, Plyometric training has been extensively correlated with the physical requirements of some sports activities in general and track & field competitions in particular. (33:2)

The results of scientific research showed the ability of this training method to influence the performance correlated with neurological effects such as acceleration, jumping, speed and the ability to change direction.

Track and field competitions are a collection of individual races which includes relay races performed by team members; track and Field competitions are characterized by variety in events such as speed, long distances and throwing competitions also Physical requirements vary according to the requirements of each competition. (10: 8)

The importance of jumping performance for many sports is well documented as well as it is known that drop jump exercises, which involve jumping off the box, landing and powerful jumping, are highly efficient in improving jumping performance.(1748:7)

The long jump is one of the closed chain competitions, which is the result of two velocity vertical and horizontal direction witch the horizontal velocity increase on the long jump. (18)

Long jump is defined as the passage of the body forward by generating a quantity of energy associated with external forces such as reaction time, friction, as well as body weight, which helps to generate a force to increasing speed enables the body to overcome gravity and move in the air for a certain time.

The long jump competition is one of the most famous and oldest field competition The main requirements for excellent performance in long jump are speed, spring or bounce and co-ordination .(704:11)

The four main components of the long jump are the approach run, the last two strides, takeoff, and action in the air and landing. Speed in the run-up, or approach and a high leap off the board are the fundamentals of success. Also because speed is such an important factor of the approach, it is not surprising that many sprinters, notably including Carl Lewis, also compete successfully in the long jump. And to achieve successful in the long jump, it requires having great sprinting speed, and explosive leg power.(18)



Long jump is an exciting event and requires competitors that have speed, explosive leg strength as well as proper coordination of distance, strides and spring action of the body at take- off stage level. (20:15)

The distance a long jumper can jump is influenced by other factors; the speed of the approach run, the conversion of this speed to forward - upward force at the takeoff, the range through which he can apply this forces at an optimum angle and the efficiency with which these factors terminate at the landing in the pit. (381:6)(703:11)

Also studies of **Antonio et, al (2016)(1). cressy et, al (2007)(5). Guillaume et, al(2006)(6)** showed that Out of the options of Body Size and Composition, Muscle Strength, Muscular Endurance, Power, Speed / Quickness, Agility, Flexibility, Balance and Coordination, and Cardiovascular Endurance, the factors which are considered most important are Power and Speed / Quickness for long jump competition.

The drop jump drill aims to develop the explosive power of the lower limb, also drop jump can be performed using different techniques witch improve physical jumping variables, like bounce drop jump and countermovement drop jump, It can also be integrated some exercises for athletics competitions to increase efficiency, which positively affects the level of sports achievement , The idea of this research is to add ABC drills with drop jump protocol to achieve the best benefits of the exercises, which

positively affects the numerical level of the long jump competition for students.

Young et al. (1999) (17) documented significantly higher values of reactive strength after a 6 week training program based on drop jump. Also **Cressey et al. (2007) (3)** demonstrated that lower-body unstable surface training lead to a higher increase in power output for the bouncing drop jump.

Research Aim.

Aim of the research:

- Preparation of a proposed drop jump protocol exercises for long jump female students
- Evaluation of the impact of the drop jump protocol exercises on physical variables for long jump female students.

Research hypotheses:

- 1- There are statistically significant differences between the pre and post measurements of control group on physical variables and record level of long jump for the benefit of the post measurements.
- 2- There are statistically significant differences between the pre and post measurements of experimental group on physical variables and record level of long jump for the benefit of the post measurements.
- 3- There are statistically significant differences between the post measurements of control group and experimental group on physical variables and record level of long jump for the benefit of experimental group.

Research terms:

Drop jump:

- Drop jump exercises, which involve jumping off the box, landing and powerful jumping, are highly efficient in improving jumping performance.

ABC drills:

- The "A" Drills were designed to work the knee lift component.
- The "B" Drills were designed to work on foreleg reach or pawing action.
- The "C" Drills were designed to work on push off and extension. (4:4)

Search procedures:

Research approach:

The experimental approach used two groups control and experimental group with the pre and post measurement standard design.

Research community:

The research community includes female physical education students 1st stage university year 2018/2019.

Research Sample:

The subjects for this experiment from Faculty of Physical Education track & field 1st stage students, (n=25) divided to (10) students for experimental group, (10) students for control group and (5) students for the pilot sample.

Table (1)
Mean \pm SD and skewness for recherché variables (age, height, weight, speed, power, agility, Flexibility, balance & Long jump numerical level)
(N=25)

Variables	measuring unit	Mean	SD	skewness
Age	years	18.20	0.45	2.24
Height	Cm	159.8	2.59	1.23
Weight	kg	58.25	1.95	0.07
30 m speed test	Sec	7.9	0.2	1.33
Starting long jump test	M	1.75	0.25	0.09
Sit and reach test	Cm	29	1.90	1.25
T Drill test	Sec	13.80	2.50	2.36
Leg strength test	kg	31.75	1.75	1.58
Long jump numerical level	M	2.85	0.25	2.10

Table 1 shows: observed in Age, height, weight, speed, power, agility, strength, balance, Long jump numerical level), ranging between (0.07 - 2.44) (± 3) indicating that the sample combined represents a moderate society in these variables.

Material and Methods:

Measurements tools:

- Restameer** /for measuring length (cm).
- Medical balance**/ to measure the weight of the nearest half a kilogram (kg).
- Dynamometer**
- Stopwatch**/ for nearest ($1 / 100^s$).
- Tape measure**/ (cm).
- Cones.**
- boxes**

Research Tests:

1- Physical variables Tests.

- 30 m speed test (speed)
- Starting long jump test. (Power)
- Sit and reach test.(flexibility)
- T Drill test(Agility)
- Leg strength test(strength)

2- Numerical level of long jump competition.

Suggested exercises:

1- Aim of exercises.

Improve physical variables and numerical level of long jump competition for the research sample.

2- Foundations of the development of training:

- Attention to warm up and prepare the body for training.
- Suitable drop jump (ABC) exercises for the research sample.
- Giving consideration of individual differences between students.
- Progressive of exercises from easier to harder and from simple to complex.
- Variety of exercise inside the training units.

3- Exercises protocol :

- Experiment Duration (6) weeks.
- Number of units (12) units (2) units per week.
- The time required to apply the exercises (20) minutes drop jump (ABC) exercise during the unit.
- Training unit time (80-120) minutes divided as follows:
 - Warm up (15m).
 - Specific event workout (60 m) divided into:
 - ☒ Technic to teach and improve the long jump performance.
 - ☒ Drop jump (ABC) exercise for the development of legs movements.
 - The Cool-down (10m).

Research procedure:

Survey Study:

The Survey study includes (5) students from the research community and outside the experimental research sample from 1/10/2018 to 3/10/2018 to achieve the following objectives.

- 1- Identify the suitability of drop jump (ABC) exercise for students.
- 2- Identify the selection of tests in terms of the order and time of application of each test commensurate with the students.

Pre measurement:

The measurements were applied from 5/10/2018 the measurements and tests included the following variables: (Height - Weight - • 30 m speed test (speed), Starting long jump test. (Power), Sit and reach test.(flexibility), T Drill test(Agility), Leg strength test(strength)), long jump test.

Research implementation:

The research experiment was implemented at faculty of physical education for girls, from 6/10/2018 to 20/11/2018 for (6 weeks), (12) units, (2) days per week.

Post measurement:

Post-measurements for all research variables were applied from 22/11/2018.

Statistical analysis

All statistical analyses calculated by the SPSS statistical program. The results reported as means and standard deviations (SD).

- Arithmetic Mean.
- Standard Deviation .
- Skewness.
- Median.
- Paired Samples T-Test
- Percentage of improvement rates.

Results.

Table (2)
Significance of differences between the pre and post measurement of physical variables and numerical level of long jump for control group (N=10)

Variables	measuring unit	Before		After		(T) value	Sig	Rate of change
		mean	SD	mean	SD			
30 m speed test	Sec	7.9	0.2	7.04	0.03	1.05	NS	6.32%
Starting long jump test	M	1.75	0.5	1.85	0.25	1.03	NS	5.71%
Sit and reach test	Cm	29.15	1.90	31.10	0.15	0.85	NS	6.68%
T Drill test	Sec	13.80	2.50	12.60	1.25	1.02	NS	8.69%
Leg strength test	kg	31.75	1.75	35.53	1.50	0.99	NS	11.90%
Long jump numerical level	M	2.75	0.50	2.95	0.15	1.13	NS	7.27%

(T) Value of T is the table at a significant level (0.05) = 1.812

Table (2) shows: non-Significant Difference between the pre and post measurements of control group on (30 m speed test, Starting long jump test, Sit and reach test , T Drill test, Leg strength test, Long jump numerical level) numerical level of long jump. The rate of change was between (6.32% - 11.90%).

Table (3)
Significance of differences between the pre and post measurement of physical variables and numerical level of long jump for experimental group)

(N=10)

Variables	measuring unit	Before		After		(T) value	Sig	Rate of change
		mean	SD	mean	SD			
30 m speed	Sec	7.8	0.5	5.25	0.6	2.66	S	32.69%
Starting long jump test	M	1.85	0.5	2.75	0.25	2.79	S	48.64%
Sit and reach test	Cm	29.50	1.90	35.10	0.15	3.58	S	32.54%
T Drill test	Sec	13.75	2.50	10.60	0.75	2.55	S	22.90%
Leg strength test	kg	31.80	1.75	39.53	0.75	3.05	S	24.30%
Long jump numerical level	M	2.75	0.50	3.25	0.25	1.99	S	18.18%

(T) Value of T is the table at a significant level (0.05) = 1.812

Table (3) shows: Significant Difference between the pre and post measurements of experimental group on (30 m speed test, Starting long jump test, Sit and reach test , T Drill test, Leg strength test, Long jump numerical level). The rate of change was between (18.18% - 48.64%).

Table (4)
Significance of differences between the control and experimental group on physical variables and numerical level of long jump

(N=20)

Variables	measuring unit	control		experimental		(T) value	Sig
		mean	SD	mean	SD		
30 m speed	Sec	7.04	0.03	5.25	0.6	2.85	S
Starting long jump test	M	1.85	0.25	2.75	0.25	3.95	S
Sit and reach test	Cm	31.10	0.15	35.10	0.15	2.75	S
T Drill test	Sec	12.60	1.25	10.60	0.75	3.46	S
Leg strength test	kg	35.53	1.50	39.53	0.75	2.85	S
Long jump numerical level	M	2.95	0.15	3.25	0.25	3.66	S

(T) Value of T is the table at a significant level (0.05) = 1.725

Table (4) shows: Significant Difference between the control and experimental measurements on (30 m speed test, Starting long jump test, Sit and reach test , T Drill test, Leg strength test, Long jump numerical level) for the favor of experimental group.

Discussion: Table (2) shows: non-Significant Difference between the pre and post measurements of control group on (30 m speed test, Starting long jump

test, Sit and reach test , T Drill test, Leg strength test, Long jump numerical level) numerical level of long jump. The rate of change was between (6.32% - 11.90%).

The Researcher attributed these results to Practice the control group to the traditional method of teaching and training for long jump competition. Furthermore the traditional method does not Containing exercises that help to develop the elements of fitness for the long jump competition, but depends on a set of traditional exercises and repeat the performance of the jump only. Therefore, there is a deficiency in the rates of development of specific physical fitness and therefore inadequate in the required level of performance and numerical performance of students.

Table (3) shows: Significant Difference between the pre and post measurements of experimental group on (30 m speed - T Drill test - Standing Stork Test - Leg strength test (Dynamometer) - Bench Press Test - numerical level of javelin throw in favor of the post measurements.

Table (4) shows: Significant Difference between the control and experimental measurements of experimental group on (30 m speed test, Starting long jump test, Sit and reach test , T Drill test, Leg strength test, Long jump numerical level) for the favor of experimental group.

The Researcher attributed these results to drop jump protocol that helps to enhance explosive power of the lower limb which positively effects on specific physical variables and the level of long jump numerical achievement.

Furthermore **Ngetich(1998)(13) & Renwick(2001)(15)** confirmed that long jump is an exciting event and requires a competitor witch have speed, explosive leg strength as well as proper coordination of distance, strides and springing action of the body at take- off stage level.

Also these results also consistent with the findings of **Young et al. (1999) (17)** documented significantly higher values of reactive strength after a (6) week training program based on drop jump. Also **Cressey et al. (2007) (3)** demonstrated that lower-body unstable surface training lead to a higher increase in power output for the bouncing drop jump.

Conclusion:

- 1- There is non-Significant Difference between the pre and post measurements of control group on (30 m speed test, Starting long jump test, Sit and reach test, T Drill test, Leg strength test, Long jump numerical level) numerical level of long jump. The rate of change was between (6.32% - 11.90%).

- 2- There is Significant Difference between the pre and post measurements of experimental group on (30 m speed - T Drill test - Standing Stork Test - Leg strength test (Dynamometer) - Bench Press Test - numerical level of javelin throw in favor of the post measurements.
- 3- There is Significant Difference between the control and experimental measurements of experimental group on (30 m speed test, Starting long jump test, Sit and reach test , T Drill test, Leg strength test, Long jump numerical level) for the favor of experimental group.

Recommendations:

- 1- Using the drop jump (ABC) protocol exercise to improve the numerical level of female students on long jump.
- 2- Conducting such a study on different track and field events.
- 3- Conducting such a study on other kinds of samples.

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