



Science, Movement and Health, Vol. XVII, ISSUE 1, 2017

January 2017, 17 (1): 59-65

Original article

INFLUENCE OF SLING EXERCISES (TRX) ON CERTAIN PHYSICAL VARIABLES AND PERFORMANCE LEVEL OF HIGH JUMP FOR FEMALE COLLEGE STUDENTS

RASHA Mohamed Essam-Eldeen¹

Abstract

Aim. Sling training (TRX) is a revolution in the world of sports training is an advanced form of exercises of the resistance, is aimed at the development of muscular strength in all its forms without the use of weights or other resistance forms, but used only body weight natural when performance. The aim of this study was to investigate that Effect of sling exercises (TRX) on certain physical variables and performance level of high jump for female college students.

Methods. Thirty female students from second grade at the Faculty of Physical Education for girls, Helwan University for the academic year 2014/2015AD, divided into two groups. The experimental group (n = 15) performed sling exercises (TRX) and control group (n = 15) performed traditional exercise.

Subjects were required to read and complete a health questionnaire and informed consent document; there was no history of injuries, diabetes or recent surgery.

Results. Significant Difference between the experimental group and control group in high Jump Test, Sit and Reach Test, Static strength test (BS), Modified Bass Test and Performance level of high jump for posttest to the experimental group. No Significant Difference between two groups in Static strength test (LS).

Conclusion: under the condition of our study, sling exercises (TRX) intervention for eight weeks has a beneficial effect on physical variables and performance level of high jump for female college students.

Key words: Sling exercises (TRX), high jump, Strength. Balance

Introduction

Became athletic achievements and records achieved and shatter before going to the competitions on the athletic fields, according to the findings of the studies and scientific research, and thus became the competitions are in scientific laboratories.

Developed training methods and sports developed tremendously during previous years so that appropriate became the players and became the coach follows all new in the area of training and continuously in order to be able to offer the Best & Brightest in this area and raise the level of performance of the players

Athletics is an exclusive collection of sporting events that involve competitive running, jumping, throwing, and walking. The most common types of athletics competitions are track and field, road running, cross country running, and race walking. The simplicity of the competitions, and the lack of a need for expensive equipment, makes athletics one of the most commonly competed sports in the world. Athletics is mostly an individual sport, with the exception of relay races and competitions, which combine athletes' performances for a team, score, such as cross-country. (Bastawisy, 1997)

The high jump is a track and field event in

which competitors must jump unaided over a horizontal bar placed at measured heights without dislodging it. In its modern most practised format, a bar placed between two standards with a crash mat for landing. In the modern era, athletes run towards the bar and use the Fosbury Flop method of jumping, leaping head first with their back to the bar. Performed since ancient times, competitors have introduced increasingly more effective techniques to arrive at the current form.

The discipline is, alongside the pole vault, one of two vertical clearance events to feature on the Olympic athletics programme. It contested at the World Championships in Athletics and IAAF World Indoor Championships. Moreover, it is a common occurrence at track and field meetings. The high jump was among the first events deemed acceptable for women, been held at the 1928 Olympic Games.

Noteworthy(Zaki, Adel, 1994) all the exciting development of sports levels in the world contemplates those performances aware that sports training great significance in the preparation and formulation of development and humanitarian capacities in various dimensions for the bombing of the maximum which. Can of the capacities and inside the rights from the energies in the direction of the desired goal.

¹ Faculty of Physical Education for Girls, Helwan University, EGYPT

E-mail address: amr297@aswu.edu.eg

Received 06.10.2016 / Accepted 01.11.2016



Sports training and educational process meaningful addressed the scientific planning, preparation of the players of various levels according to their abilities (Blossoms - arising - Advancing) is a prerequisite for the preparation of multi-aspects (physical, skilfully and psychological) to reach the highest possible level. Thus depends not sports training at the level without the other, not limited to the preparation of the higher levels only, each level of final gavel sounded, methods, and sports training process of improving and constant development of the level of the players in the different areas.

This development beneficial to the requirements of the duties of the flag of the sports training especially physical side which is considered one of the most important duties of the sports training, which aims to raise the efficiency of the individual and the development of the potential of functional player and improve the level of physical capacity. In addition, mobility to meet the requirements of the rapid progress in the working methods and the exercise of activities.

One of the most important activities which benefited from the knowledge of general training and physical preparation for game room track and field which is or who became games Olympic sports and basic competitiveness, which occupies a special place among other sports require the capabilities are available only in a few individuals.

It was therefore imperative to find means for the development of the elements of the fitness centre, which will contribute to the improvement of the level of performance. The so-called the sling that called outstanding exercises which allow the player to work against the full weight training.(W D. Dudgeon, et al. 2011)

(Dannelly, et al., 2011) mentioned that sling training (TRX) is one of the latest technologies shown in the sports field aimed to improve the sport performance and to gain a competitive advantage.

(Seiler, et al., 2006) that sling training (TRX) is a revolution in the world of sports training is an advanced form of exercises of the resistance, is aimed at the development of muscular strength in all its forms without the use of weights or other resistance forms, but used only body weight natural when performance.

Sling Training is TRX way interweaving training fitness centre that grows famous during the past few years, which focused on the use of the full weight of the human body to training, rather than the use of devices that are showrooms, fitness centre.

It was the beginning of the commentator training with Randy Hetrick commander in the US Navy and Stanford graduated from the same

disarmament have invention (TRX) to train and prepare the teams in the navy has developed in order to become in its current form in (1990), and then started marketing year. (2005).

As (Dudgeon, et al., 2011) player submitted the former professional in Chile the discovery of the system to adapt to the inhabitants of the Andean logic with nature through the search for the development of their ability to endure this was using the exercises with ropes. In (2008), the team trained Bristol city. They Mark Hammond and Pete Faulkner have put a new training of (TRX), in (2010) , the Zita Alves using officially inside the halls of the fitness centre in North America, in (2012) used by trainers athletes in Dubai to improve fitness level players use modern equipment in Training.

(Amr, 2012) mentioned that the sports training and educational process aimed at reaching the player to the high level of physically, physiology skilfully and psychologically.

Adds (Scott, 2006) that keep training is one of the means for training affecting which aim to give the individual the physical abilities of various mobility so used by most athletes during the period of preparation for various sports activities exercises includes the organization of groups of different muscular using a variety of ballast weights.

Have agreed the views of most training scientists that the physical characteristics of one of the important factors for the success of the performance to reach the highest levels and that the development of these special characteristics are closely linked to the process of development of skills mobility cannot sports individual mastery of the skills of basic mobility. In addition, the type of sporting activity which specializes in case of the lack of physical characteristics necessary for this particular type of sporting activity.

In addition, providing the tools and the assistance of the basic elements of any program of sports training because no could rise to the level of individuals without providing the necessary tools for this success.

Where are the tools and equipment assistance from the necessary requirements in training and frequently presence is of great value in the payment of the players to positive participation in training to disseminate the spirit of enthusiasm and the desire including and adds many elements of suspense and joy.

(Allawi, 2002) noted that the tools and equipment assistance related relevance and effectiveness in the positive impact on training and good out they provoke the activity of Hamas players as well as it is one of the best means diversification.



The commentator training with (TRX) is a set of ropes produce manufactured called outstanding exercises that allows the user to work against the full weight training.

A new way to train fitness centre which She grows famous during the past few years, which focused on the use of the full weight of the human body to training, rather than the use of devices that are showrooms, fitness centre.

In addition, refers (Amr, 2013) the benefits of sling exercises (TRX)

- The work of the development of the motor of the body by using the rate of loading is equal to the size of the whole body.
- Training using body weight.
- You can choose appropriate weight through the angle of the body with the Earth (whenever less than the angle of the body with the earth and the more weight to be loaded on the muscle).
- The ability to ballast to change direction at high speeds.
- Used for building muscles in a strong and burning fat located on the muscles.
- Strengthen chest muscles and legs.
- Increased flexibility and endurance.
- Maintaining Bench Crucifixion of the body.
- The hotel's check the knuckles stability and muscles
- To reduce the chances of infection and muscular.

The researcher observed during her taught the track and field competition especially high jump competition that many female students find it hard to performance of the functional stages in the high jump. thus declining master craftsman and introductions to the contents of the competition from the movements of intricate and complex makes it difficult to understand the female students assiduous government different stages of performance in many cases the fear of injury as a result of the use of the high jump in performance. as well as the note of the researcher of the teaching of the competition in many cases in view of the length of the time period for the duration of the female students to learn the contest. which, made many of the lists and the teaching of that article did not consider to teach mainly within the content of the teaching of the track and field competition, which led to a decline in the local level compared to the global level as a result of the limited number of practices. In addition, through access to available by researcher. previous studies and within the limits of its flag researcher noted the absence of any Arab study on the link between the attachment of the exercises in the sports field in general in the athletics competitions in particular.

The aim of this study was to investigate that Effect of sling exercises (TRX) on certain physical variables and performance level of high jump for female college students.

Methods

Samples

Thirty female students from second grade at the Faculty of Physical Education for girls, Helwan University for the academic year 2014/2015AD, divided into two groups. The experimental group (n = 15) performed sling exercises (TRX) and control group (n = 15) performed traditional exercise.

Subjects were required to read and complete a health questionnaire and informed consent document; there was no history of injuries, diabetes or recent surgery.

Experimental Approach to the Problem

Two groups (experimental and control) performed a pre and post - training designed intervention in which vertical high Jump Test, Sit and Reach Test, Static strength test (LS), Static strength test (BS), Modified Bass Test and Performance level of high jump. The experimental group (EG) (15female students) trained 1 hour per day 3 times a week on sling exercises for eight weeks. The control group (15female students) continued their normal training, while the experimental group completed sling exercises program to see whether this type of training modality would have a positive or negative or no effect on physical variables and performance level of high jump among female colleague students.

Conditions of sample selection :

- The age from 18 years at least and not more than 20 years .
- Participate until the end of the experiment .
- Not have a previous history of patients or their injuries predecessor .
- Student's developments and non-survivors of the restart .

Reasons for selecting community and the research sample:

- Javelin last contest taught in core courses of the second semester of the first year students at the Faculty of Physical Education - Mansoura University.
- Student's research community have no previous experience of competition javelin (beginners).
- Possibility of the availability of stadiums, as well as hardware and tools within the college, and used by researchers to achieve the objectives of the research.

Testing Procedures

Subjects were assessed before and after eight weeks of functional strength training program all measurements were taken one week before and after training at the same time of day. Tests

followed a general warm-up that consisted of running, calisthenics, and stretching.

Modified Bass Test of Dynamic Balance

Indicate with tape, a series of footsteps on the floor. Space them according to your normal walking stride, maybe just a bit more. The object is to stand on the first step on the ball of one foot, the other is held off the ground with bent knee. Hold this static position for 5 seconds. Assuming you are starting on your right foot, hop to the next step, landing on your left foot and hold a new static position on the ball of your foot for 5 seconds. Continue down the line of steps until you are done. It is like the childhood game of hopscotch except you switch feet. It is a combination of static and dynamic balance. Professionals would assign a pass or fail grade based on whether you touched the ground or failed to maintain the static pose, but for our purposes simply keep practicing it and take note of improvement.

Static strength test (LS) (BS)

A Takei leg and back dynamometer was used to measure the static leg strength. The subjects stood on the dynamometer platform and crouched to the desired leg bend position, while strapped around the waist to the dynamometer. At a prescribed time, they exerted a maximum force straight upward by extending their legs. They kept their backs straight, head erect and chest high. Three trials were allowed to the subjects and the best score was taken. Subjects had a rest between the trials (Jensen & Fisher).

Sit and Reach Test

- Equipment: Sit and reach box, marking slider.
- Target Population: Everyone without injury.
- Advantages: Simple to administer.
- Disadvantages: Only measures hamstring flexibility.
- Procedure: Sat down with straight legs and the feet flat against a box with a ruler on top of it the subject reaches forwards with their arms and fingers outstretched and tries to stretch past their toes. The length of the stretch is measured in centimeters at the fingertips. Past the toe, line is a positive reading. Not reaching the toe line is a minus reading.

Vertical High Jump Test

The athlete stands side on to a wall and reaches up with the hand closest to the wall. Keeping the feet flat on the ground, the point of the

Results.

Table 1. Anthropometric Characteristics Training experience of the Groups (Mean \pm SD)

Group	N	Age [years]	Weight [kg]	Height [cm]
Experimental	15	19.12 \pm 0.4	67 \pm 2.9	168 \pm 3.98
Control	15	19.15 \pm 0.6	68 \pm 3.1	167 \pm 4.12

Table 1 shows the age and anthropometric characteristics of the subjects. There were no significant differences were observed in the anthropometric characteristics for the subjects in the different groups.

fingertips is marked or recorded. This called the standing reach height. The athlete then stands away from the wall, and leaps vertically as high as possible using both arms and legs to assist in projecting the body upwards. The jumping technique can or cannot use a countermovement (see vertical jump technique). Attempt to touch the wall at the highest point of the jump. The difference in distance between the standing reach height and the jump height is the score. The best of three attempts is recorded.

The vertical jump test can also be performed using a specialized apparatus called the Vertec. The procedure when using the Vertec is very similar to as described above. Jump height can also be measured using a jump mat, which measures the displacement of the hips. To be accurate, you must ensure the feet land back on the mat with legs nearly fully extended. Vertical jump height can also be measured using a timing mat. The vertical jump test is usually performed with a counter movement, where there is bending of the knees immediately prior to the jump. The test can also be performed as a squat jump, starting from the position of knees being bent. Other test variations are to perform the test with no arm movement (one hand on hip, the other raised above the head) to isolate the leg muscles and reduce the effect of variations in coordination of the arm movements. The test can also be performed off one leg, with a step into the jump, or with a run-up off two feet or one foot, depending on the relevance to the sport involved.

Scoring: The jump height is usually recorded as a distance score. See the vertical jump norm table to rate scores. For more information, see a selection of vertical jump test results. It is also possible to convert jump height into a power or work score.

Statistical analysis

All statistical analyses were calculated by the SPSS statistical package. The results are reported as means and standard deviations (SD). Differences between two groups were reported as mean difference \pm 95% confidence intervals (mean diff \pm 95% CI). Student's t-test for independent samples was used to determine the differences in fitness parameters between the two groups. The $p < 0.05$ was considered as statistically significant.



Table 2. Mean \pm SD and "T" Test between the two Groups (experimental and control) in Dynamic balance, Hand Grip Strength, Static strength test (LS) and Performance level of javelin throw

Variables	Experimental group		Control group		Sign.
	Before	After	Before	After	
Vertical high Jump Test	2.15 \pm 0.23	2.25 \pm 0.31	2.19 \pm 0.21	2.20 \pm 0.29	S
Sit and Reach Test	5.15 \pm 1.43	6.74 \pm 1.68	5.52 \pm 1.52	5.81 \pm 1.71	S
Static strength test (BS)	152.85 \pm 5.84	159.91 \pm 5.67	151.48 \pm 6.54	153.12 \pm 5.53	S
Static strength test (LS)	168.74 \pm 6.63	172.79 \pm 6.42	168.63 \pm 7.16	169.66 \pm 6.37	NS
Modified Bass Test	62.74 \pm 4.48	70.85 \pm 4.76	61.19 \pm 4.92	62.25 \pm 4.55	S
Performance level	19.19 \pm 2.73	23.35 \pm 2.81	19.37 \pm 2.88	21.17 \pm 2.73	S

Table 2 shows that:

1. Significant Difference between the experimental group and control group in Standing Long Jump Test, Sit and Reach Test, Softball throw test Handgrip Strength (lift), Handgrip Strength (right), Static strength test (BS), Modified Bass Test and Performance level of javelin throw for posttest to the experimental group.
2. No Significant Difference between two groups in Static strength test (LS).

Discussion

This study assessed the effects of an eight weeks sling-training program, on the power, high jump performances, Experimental results indicated that all variables significantly increased in the experimental group only after the sling-training program.

Due researchers occurrence of these changes to good sling planning exercise program and rationing training loads in a scientific manner appropriate to the stage of the Sunni and training for research sample. Where the patron researchers training loads graded during the application of the program by training muscle groups different, especially the muscles of the centre, arms and legs and the concentration of the researchers on the muscle groups working during the throw spear, causing it to improve the physical abilities under discussion.

This confirmed by (Seiler, et al., 2006; Stray-Pedersen, et al., 2006) that TRX from using body muscles with every movement and total body exercise a unit of interrelated and complementary. Also helps the commentator TRX on progress easily, hierarchical ways and testing to find the challenge and this is what you need to develop the force safely.

This is consistent with (Essam, 2005) that the physical setting affects the development of physical abilities and motor of muscle strength and endurance, speed, agility, flexibility, and vehicles such as power characteristic speed and carrying power.

It is noteworthy (Abdul Aziz & Nariman, 1996; James, 1999) that the muscle strength necessary for most sports activities, stronger and larger hand him the longest in the case of the convergence of the technical level as well as they

play an important role in the progress of many skills.

This confirms (Hassan, 2002) that muscle strength is that it is based and individual access to the highest levels of the tournament, as they affect a large extent on the development of some physical attributes such as speeding, endurance and agility.

These exercises work on the occurrence of prolongation involuntary muscle material to the joints, which would generate daytime systolic intramuscularly involuntary works to raise the sensory organs other and thus increasing the number of motor units in the working muscles on these joints. Which are necessary to increase muscle strength, as well as to match the Clubbell exercises with movements that performed in competition

This is consistent with the findings of the both of the important (Li & Cao 2010; James, 1999; Amr, 2013; Huang, et al., 2011; Dannelly, et al., 2011) where these researchers found that the exercises has a positive impact on the ability of muscle and performance level of high jump.

In this regard mentions (James, 1999) that Trainees will find that the main reason for use is that the small size and so can be in any portfolio and take with them wherever they go.

- Training can in any place or time.
- No one of the focus on the muscle to be strengthened by himself and his assistant instructors or go halls fitness center.
- Enable trainees from nearly 300 different exercise all over the body.
- Trainees can increase the rates of training and loading with time.
- Useful in improving all elements of the fitness center.



- Using TRX can build muscle force size that can strengthen all the muscles responsible for the stability of the joints and support.
- Moves on the multiple TRX levels and the interlocutor and trends at the side of the vehicle movements, so be modeled on the way in which the moves by the rights in everyday life.
- Work to develop the force, muscular capacity, balance and flexibility, consensus nervous muscular strength and firmness body muscles.
- Use TRX Gives Pleasure and suspense, it is a means to develop functional muscular strength and can used either in the home or in the gym, abroad in the hotel.
- Benefit all communities in both the flexibility or force the players or private individuals.

In addition, reinforces that (Guthrie, et al., 2012) agree that the training programs offered to have a positive impact on the digital level.

In addition, is consistent with the findings of (Seiler et al., 2006) that the proposed training program, which was designed according to the analysis of drill-like locomotors. Performance led to the development of explosive power and level digital.

This is confirmed by (Marwan, 2003) of that training on skill alone is not enough to improve this skill and get fruitful results, as it is next to the development of the skill to be the development of motor skills for the skill itself.

And sees (Amr, 2013) that the relationship between basic skills for any sport and requirements different physical (public, private) is a close relationship must be taken into account when preparing the players, and that there is no separation between the two settings skill and physical. but on the contrary should be the development of the physical elements are consistent with the requirements of skill, it achieves success in the training process and thus raise the level of the players, when the player has the physical attributes a high degree can perform all the skills are good.

This confirmed by (Burns, 2007) that success in any essential skill defensive or offensive needs to develop components of the physical necessary contribute to the dramatic performance is perfect and that all essential skill contributes to their performance according to their nature more than one ingredient workout.

The results of this study are consistent with a study of all (Amr, 2013), (Marwan, 2003)

that the improvement in physical variables contributes to the improved level of performance skills.

Implementation of the traditional methods for training on what we call the equity axis any movement from forward to reverse or push and pull and a seating position, which leads to the revitalization of the Center Muscles. and adopt in everyday life, we move to the left/right, forward, rearward, diagonally and wraps, bending, so use the device TRX allows us training in this way which will help us to avoid many injuries.

Conclusion

Under the condition of our study, sling exercises (TRX) intervention for eight weeks has a beneficial effect on physical variables and performance level of high jump for female college students.

Acknowledgements

For all of our participants from my study I want to say thank you.

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