Design for Scientific RENAISSANCE

ASSR

Effect of Exercises by using Low Hurdles and Rubber Band on the Development of Speed Strength of the Legs and Arms According to some of the Biochinematic Variables Jump on a Jumping Horse

Article Info

Received: March 31, 2014
Accepted: April 24, 2014
Published online: December 01, 2014

Entsar Kadhim, Souad Abdulhssin, Murtadha Ali Lafta

Faculty of Physical Education for girls -University of Baghdad
Faculty of Physical Education for girls -University of Baghdad
Table tennis coach IFK Lund in Sweden
entsarkadhim@hotmail.com
murtadhalafta@hotmail.com

Abstract

The aim of this study was to know the effect of exercises by using low hurdles and rubber band on the development of speed strength of the legs and arms according to some of the biochinematic variables jump on a horse jumping. 20students ofphysical education faculty for girls/ University of Baghdadwereintentional assigned to one group. Researchers used descriptive and experiment design research methods because they are suitable to the nature of the study. Front long jump and medicine ball through tests were used in present study.Participants performed 12 weeks of trainingwith an intensity of 50-100%, 2 times a week, each section included 35 minutes. Data were analyzed by SPSS program and paired sample T-testwas used to compare mean of previous and post of information. In conclusion, our exercises resulted in development of speed strength of the legs and arms, moreover, an improvement of legs and arms led to develop some of biochinematic variables and showed a correlation between speed strength of the legs and arms and some of biochinematic variables.

***Keywords*:** Exercises, low hurdles, rubber band, speed strength, legs and arms.

1. Introduction

Movement analysis in sport field is one of the important sciences which participants with other sciences such as training on improve and develop performance level, it helps to solve problems regarding to performance either learning or training sides where discovers movements and compare them with their parts to know weakness points to pass them and the end will help coaches to prepare clear picture of the movement. However, mechanical analysis is a measurement tool can be using to evaluation training methods used in developing the movement. Moreover, analysis helps coaches to select specific training methods which are suitable to the subject and achieve the aim (Wajeh, 1990).

Biomechanics has a relation to what the person is doing of analysis as through its use can be identified on the level and how to develop it, so give a summary and a simple description about the technical underpinnings of the movement contribute effectively in giving the substrate can be used as a starting point in the analysis process (Murtaza*et al*., 2013). Motor performance of sport skills characterizes bymany difficulties and to work to solve these difficulties, the performance must be underwent to the scientific research of many facets including vital biomechanics which study athletic performance as a complicated dynamic system for the motor actions based on the optimal use of the possibilities and motor abilities of the player in order to resolve a specific duty or access to optimum performance (Rolf, 2014).

The application of the laws and principles of mechanical sportmovements an important part in achieving the best results for motor performances through an analysis of the performance and in which can identify exercises that are similar to the type of skill and then approaching of biomechanical criterions which every athlete seeks to achieve them. Speed strength is one of the basic physical capacities which depend on it many sport activities including gymnastic and consist of two parts strength and speed in which can be improving skillsperformance.

Speed strength is known in the concept of training science the ability of athlete to do the various movements and repeated rapidly withhigh performance strength relatively; either the concept of kinesiology defines as the high ability of the athlete in the implementation duties of required movements (Atheer, 2010). Some of specialists suggest that speed strength is necessary if we are to reach the highest degree of excellence and sporting success, where this type of the strength requires the production of strength and speed in the movements of jump and recoil depending on the kind of sports activity (Gene, 1996).

Speed strength has clear importance in achieving the results of many of the aspects of physical activity, especially the kind with the changing nature of the motor performance, moreover the great role of the nervous system in the creation of the required consensus between nerves and muscles even occur contractions in the moment required and necessary speed of performance (Ahmed & Ali, 1996). However, the researchers believe that the speed strength must be under the visualization and specific technique of that game or sport skill, and must be trained in accordance with those requirements and specificities of those kinetic game or effectiveness.

Given, speed strength plays great importance in gymnastic sport because it determines the level of performance of a lot of movements and skills that will be implemented on gymnastic devices; annexation jump is a skill that requires sufficient amount of strength and speed of the legs as well as arms. The researchers noted a decrease in the level of performance skill of annexation jump on a jumping horse for students of fourth class; they attribute the reason of the weakness in the strength of the legs and arms, in addition to the lack of hiring laws related mechanical document and influencing the jump form in which it serves the goal especially in the stage of advancement. So the researchers prepare exercises by using low hurdles and rubber band on the development of speed strength of the legs and arms inform which serves employ mechanical laws in developing the performance of the jump, as well as to identify the impact of the development of speed strength of the legs and arms on the development of some of the biomechanics variables in jump on a horse.

2. Methodology

2.1 Subject

Researchers used descriptive and experiment design research methods because they are suitable to the nature of the study. 20 students of physical education faculty for girls/ University of Baghdad were intentional assigned to one group. Moreover, 6 students other were participated in pilot study, they were out of main experiment. In addition, researchers have done homogeneous of subject in (age, height, and weight) as well as speed strength of legs and some of biochinematic variations which have agreed by experts as shown in table (1).

Table (1)
Shows homogeneous of the study subject

Variations	Measure Unit	Mean	SD	Medium	Skewness coefficient
Height	Cm	168.12	8.33	164	0.44
Age	Year	22.5	3.51	20	0.43
Weight	Kg	69.2	9.43	66	0.55
Speed strength of legs	Meter	14.34	0.45	15	0.61
Speed strength of arms	Meter	4.53	1.92	4.5	0.39
Approaching angle	Degree	112	5.53	111	0.77
Knee angle through approaching moment	Degree	118	7.32	116.5	0.45
Jumping angle	Degree	66	6.64	65	0.66
Knee angle through jumping moment	Degree	133	8,26	131.5	0.69
Jumping time	Second	0.18	0.66	0.17.5	0.22
Push strength of legs	Kg. M\S	29.75 —	3.81	30	0.18 —
Angle speed of torso	Degree\Se	244	4.68	182	0.38
Flying time	Second	0.01	0.75	0.01	0.35
Push time of arms	Second	0.20	0.22	0.18	0.44
Degree of jumping performance	Degree	3.8	3.79	2.5	0.22

2.2 Measurements and tests

2.2.1 Front long jump test:

- The purpose: To measure speed strength of legs.
- Procedure: The test is conducted on a court its distances (15-20m), player stand on a straight line and he has to be noted that does not touch any part of his body to the ground just his feet and does not go out of determined lines. The player jump to front with his feet to the longer distance through a time of 15 second.
- Scoring: Counted the distance to be as sign of speed strength of legs (Qaise & Bastawecy, 1987).

2.2.2 Medicine ball throwing test:

- The purpose: To measure speed strength of arms.
- Procedure: The test is conducted on a court its distances (5-10m), player sit down on a chair and couch a medicine ball in front of his chest, the torso has to be fastened with the chair by tap around of chest to prevent a movement to the front through push the ball by hands.
- Scoring: Each player tried twice and chose the best one, counted the distance from chair to the last point which ball is arrived to it (Mohamad, 2007).

2.3 Pre-tests:

Pre-tests were conducted on 7-8\10\2013 in gymnastic hall of physical education faculty for girls-Baghdad University at ten an half morning.

2.4 Criterion and design of selected exercises:

The aim of selected exercises is to develop speed strength of legs and arms by using low hurdles and rubber band according to some of biochinematic variations, we placed standards and design for these exercises after conduct speed strength test of legs and arms, then we filmed the performance of jumping and analyze some of biochinematic variations. Researchers prepared set of exercises suitable to the level of subject, participated performed 12 weeks of training with an intensity of 50-100%,2 times a week, each section included 35 minutes. We showed these exercises to set of experts in sport training and biomechanics of gymnastic to know the suitable and validity of these exercises.

2.5 Sample of weekly training unit (main part only):

First week training unit (2\1) time of unit: 35m place: Physical Education Faculty for girls

Main part	Time	Intensity	Exercises	Repeat	Rest	Notes
Hurdles exercises	15 m		1, 4, 5, 2, 3	8, 6, 6, 5, 5	15 S	
			Rest 5 minutes			
Rubber band exercises	15 m	50-60%	1, 6, 3, 7, 5	6, 6, 6, 6, 6	15 S	

2.6 Post-tests:

Post-tests were conducted on 9\1\2014 in gymnastic hall of physical education faculty for girls-Baghdad University at ten an half morning.

2.7 Statistical analysis

Data was analyzed by SPSS program and paired sample T-test was used to compare mean of previous and post of information as well as skewness coefficient and person coefficient.

3. Results and Discussion

Table (2)
Shows value of T-test for speed strength of legs and degree of jumping performance on the horse between pre and post-tests

Variations	Pre-test		Post-tests		T-test
Speed strength of legs	14.34	3.23	17.12	2.87	2.89
Speed strength of arms	4.11	1.92	5.88	2.34	2.64
degree of jumping performance	3.8	3.79	8.9	2.67	4.90

Tabulate T value = 2.11 under freedom degree 19 and significant level 0.05

Table (2) showed that mean of speed strength of legs is (14.34) with standard deviation (3.23), as well as mean of the speed strength of the arms (4.11) and standard deviation (1.92), and the mean for the degree of jump performance (3.8) and standard deviation (3.79) in the pre-tests. While reached the mean in the post tests of strength speed of the legs (17.12) and standard deviation (2.87)but for arms (5.88)with a standard deviation (2.34). However, mean of the jump performance amounted to (8.9) with a standard deviation (2.67). To know significant of means between pre and post-tests we used T-test, when comparing the calculated values with the tabular value under the degree of freedom (19) and the level of significance (0.05), which amounted to (2.11) showed that the value of calculated (T) for each of the variable speed strength of the legs and arms, as well as the degree of performance was greater than the value tabulated (T) and this mean there is a significant difference between pre and post-tests in favor of post-test.

Table (3)
Shows value of T-test of biochinematic variations between pre and post-tests in jumping

Variations	Measure Unit	Pre-test		Post-test		T-test
		Mean	SD	Mean	SD	
Approaching angle	Degree	112	5.53	108	2.11	3.03
Knee angle through approaching moment	Degree	118	7.32	145	7.88	11.20
Jumping angle	Degree	66	6.64	72	3.45	3.59
Knee angle through jumping moment	Degree	133	8,26	145	5.21	5.50
Jumping time	Second	0.18	0.66	0.15	0.99	0.13
Push strength of legs	Kg. M\S	29.75	3.81	33.9	2.65	3.99
Angle speed of torso	Degree\Se	255	4.68	225	9.65	12.5
Flying time	Second	0.01	0.75	0.03	0.25	0.13
Push time of arms	Second	0.20	0.22	0.17	0.51	0.25

Table (3) showed different between means of pre and post-tests in variations of present study and to know significant of means between pre and post-test we used T-test, when comparing the calculated values with the tabular value under the degree of freedom (19) and the level of significance (0.05), which amounted to (2.11) showed that calculated T value for each approaching moment, Jumping angle, Knee angle through jumping moment, Push strength of legs, Angle speed of torso greater than the tabular, this mean there is a significant difference between pre and post-test in favor of post-test in mentioned variations. So this indicates that exercises approved by the researchers was instrumental in the development of variable of speed strength for both legs and arms, as well as biochinematic variables under study which had positive and effective influence in the development of the level of performance of the annexation jump on a horse jumping.

However, some of specialists in the field of biomechanics and training on the importance of speed strength exercise because of its positive and effective impact on the development of a lot of biochinematic variables (Mårten, 2007). Table (3) showed also no significant differences in variables of time such as (Jumping time, Flying time, Push time of arms) when compare value of calculated T with tabulated T value where demonstrated that tabulated value greater than calculated T and this confirm no significant differences between pre and post-tests, so researchers attribute the reason to the fact that the inability of the students on how to employ variable ofgained speed from an approaching runin which fits with phases of implementation jump performance as well as weakness in the kinetic compatibility at the moment of contact with the jumping platform as possible to push player in an attempt to compensate this weakness to work additional movements at the moment of jumping and therefore this will affect the loss in speed and time.

Horizontal speed is one of the important physical abilities of the gymnast, especially in the carpet and floor movements and horse jumping where the results showed in one of the studies with gyro jump on a horse jumpingthat performance which performs in large horizontal fast at the moment of hit jumping platform can achieve short period of time at the stage of jumping as well as the high vertical velocity and these two variables have a positive impact on the degree of final performance evaluation (Bradshaw & Rossignol, 2004). Muslim confirmed that a moment of contact jumping platform the player will interacts with the platform for the purification requirements of linear motion and angular momentum of the flight phase to achieve requirements of the jump from a distance, height, rotations so that the player can landing safely and without additional steps or fall (Muslim, 2008).

Table (4)
Shows correlation between speed strength of legs and arms and degree of performance and variations of present study in jumping

Variations	Speed strength of legs	Speed strength of arms	Degree of performance
Approaching angle	0.45	0.28	0.39
Knee angle through approaching moment	0.56	0.44	0.28
Jumping angle	0.55	0.12	0.68
Knee angle through jumping moment	0.72	0.41	0.57
Jumping time of legs	0.75	0.36	0,41
Push strength of legs	0.81	0.51	0.61
Angle speed of torso	0.42	0.47	0.43
Flying time	0.78	0.31	0.81
Push time of arms	0.46	0.79	0.46
Speed strength of legs	–	0.44	0.79
Speed strength of arms	0.44	–	0.70
Performance degree	0.71	0.73	–

Value of tabulated (R) = 0.47

Table (4) showed correlations between speed strength of legs and arms and degree of jumping performance with some of variations of the study, the highest three values of correlation for speed strength of legs were with push strength amounted to (0.81) and then fly time (0.78) after that jumping time (- 0.75). While the highest three values of correlation for speed strength of arms were withpush time by arms (- 0.79) and then performance degree (0.73). In addition, the same table showed that the highest three values of correlation for jumping performance were with fly time (0.81) and then speed strength of legs (0.79) after that with speed strength of arms (0.70) finally with jumping angle (0.68).

Specialists refer to that whenever the time it takes the foot on the ground in jumpingis few whenever loss of speed will be few as well as push strength is inversely proportional with the time of push. (Sareeh, 1997).Risan and Shalash mentioned that flying height depends on the vertical speed at moment of takeoff which cause a vertically push moving to other parts of the body during the jump. (Risan & Najah, 1992).Specialists also confirmed the need for the full extension of the joints of the body at the moment of jumping in order to raise the center of gravity of the body to the top and achieve greater push strengt (Bradshaw &Rossignol, 2004).

Strength is the index in motor product and has a real link to speed variable and the amount of output, as it is a reflection of kinetic achievementin time extension which depends on correlation withphysiological adaptation. (Suleiman, 1983).Moreover, Risan and Ali (2002) referred that speed strength linked with mystery degree of skill performance, where whatever increasing the degree of skill performance level rose compatibility between fiber and between the muscles and improve the distribution and dynamic performance of the motor; so that the athlete can't achieve a high level of speed strength just in the case of increasing the level of skillperformance.

4. Conclusion

Our exercises resulted in development of speed strength of the legs and arms, moreover, an improvement of legs and arms led to develop some of biochinematic variables and showed a correlation between speed strength of the legs and arms and some of biochinematic variables.

References

Ahmed Khater & Ali Beck (1996).Measurement in the field of sports, the new National Library, Cairo, Egypt, 4:176.

Atheer Mohammed Sabri (2010).The term speed strength, Library Sports Academy, Academy Sports Iraqi site, 67.

Bradshaw E. J. &Rossignol P. L (2004).Anthropometric and biomechanical field measures of floor and vault ability in 8 to 14 year old talent-selected gymnasts,Sports Biomechanics,3:49-52.

Gene Hooks (1996). The essential guide to starching, Grown paper flacks Co, New York,213.

Mårten Fredri ksson (2007). Labration shäfteigener ellaanaerobo tester, Idrottshögskolan, Stockholm, Sweden, 3.

Mohammed Ahmed Abdullah (2007).The Scientific Basis in table tennis and measurement methods, the center states for printing and computer, Egypt, 236.

Murtaza Ali et al., (2013).Table Tennis technically foundations and mechanical training, ATF Dar, Cairo, Egypt, 1:18.

Muslim Badr Awad (2008).Mechanical jump in gymnastics, sports academy library, the site of the sports academy Iraqi.

Qais Naji & Bastawisi Ahmed (1987).Principles of Statistics and tests in the field of sports, Higher Education Press, Baghdad, Iraq, 347.

Risan Kahribt & Ali Turki (2002).Theories of strength training, Baghdad, Iraq, p 55.

Risan Kahribt & Najah Mahdi (1992).Kinetic analysis, Dar al-Hikma Press, the University of Basra, Iraq, 262.

Rolf Wirhed (2014). Biomekanik, SISU idrottsböcker, Idrottenshus, Stockholm, Sweden, 6-10.

Sareeh Abdul-Karim al-Fadhli (1997).Biomechanics analysis for some variables ofjump performance and its effecton the development of achieving, Ph.D. thesis, Faculty of Physical Education, University of Baghdad, Iraq, 91.

Suleiman Ali Hussein (1983).The entrance in sports training, Press Directorate of Mosul University, the University of Mosul, Iraq, 33.

Wagih Mahjoub (1990).Physicist and kinetic analysis of the movements, Higher Education Press, Baghdad, 15-17.