World Journal of Sport Sciences 3 (S): 995-1002, 2010
ISSN 2078-4724

A Recommended Training Program for Developing Cervical Muscles Strength and its Effect on Performance Effectiveness of Defense Against Bridge Block and Waist Turnover

Ehab Fawzy Al-Bedewy and Nabil Hosny Al-Shorbagy

Department of Sports Training, Faculty of Physical Education, Tanta University, Egypt

Abstract: Bridging is one of the basic wrestling skills as it is used in defense or attack. This skill is directly dependant on neck muscles as over-arching helps in better results either in attack or in defense. This research aimed at designing a training device for cervical muscles strength to be used in a training program, identifying the effect of the training program on developing cervical muscles strength and identifying the effect of the training program on developing the technical performance of bridge block and waist turnover. Sample was purposefully chosen from Gharbia Greco-roman Wrestling Team (16 wrestlers) and divided randomly into two groups (8 wrestlers each) to form the experimental and control group. The researchers used the quasi-experimental approach. Results showed statistical significant differences between the control and experimental groups on the post-tests in favor of the experimental group. The recommended program is characterized by calibrating exercises according to the individual differences and abilities of each wrestler. This allowed for adaptation and development of cervical muscles strength. The increase in cervical muscles strength, in turn, led to performing bridges more effectively as support was on the feet from one point and the forehead from the other. This increases the load on cervical muscles. With the increase of cervical muscles strength, there was a correspondent increase in performing bridges. The researchers recommend the use of the recommended training program and the device for developing cervical muscles strength.

Key words: Cervical muscle strength · Waist turnover · Bridge block.

INTRODUCTION

Because of the last amendment of wrestling international regulations, waist turnover has become more important as after 90 seconds of the fight, the referee stops the match and fight is taken to the ground position. The upper wrestler tries to perform the waist turnover for 30 seconds and if he succeeds, the boot is scored for him. This of course depends on his mastery of this skill. Looking at this specific skill, we can recognize the importance of cervical muscles. When performing the waist turnover to get two complete technical points, the offensive wrestler should reach the bridge position, carrying the opponent and supporting himself of the forehead and feet. This indicates the importance of the cervical muscles in performing this skill as should elevate his body on his forehead or else, his shoulders will touch the ma, leading to loose points and effort and in case of instant stillness, the referee may score a takedown on him and so, he loses the whole match. This signifies the importance of cervical muscles in performing the waist turnover correctly.

Bridging is one of basics for preparing wrestlers. The wrestler who cannot perform bridges is very vulnerable for defeat at any moment as this skill is used to keep the defeat area (shoulders) away from the mat. The fulcrum points at this skill are the forehead and both feet soles and if we draw lines connecting these three areas, we will form an isosceles triangle. The wrestler tries to distribute his body weigh, as well as the opponent's pressure, equally on these three points. Considering the nature of Greco-roman wrestling, this pressure is directed to the upper area of the body, towards the head and the offensive wrestler tries to get the opponent out of balance to break the bridge from the head direction. This signifies the importance of cervical muscles to keep the bridge

Corresponding Author: Ehab Fawzy Al-Bedewy, Department of Sports Training, Faculty of Physical Education, Tanta University, Egypt.

position intact and to avoid being defeated by keeping the shoulders away from the mat. Increasing the level of physical fitness is the main goal of all types of wrestlers' preparation for a competition. Therefore, the training contents contributing to the fitness level enhancement are extremely important segments of any training program and a precondition of high performance [1].

One study aimed at examining the maximal isometric strength of cervical extension and flexion in a study titled by "Cervical muscle strength measurements in two groups of elite Greco-roman and free style wrestlers and a group of non-athletic subjects". Results showed that Greco-roman wrestlers appeared to be stronger than the other two groups on all variables. This indicates that neck muscle force measurements may be useful in combat sports like wrestling. Another study noticed that special training methods in wrestling improve the reliability and tolerance of the neck. Neck strength in flexion seems to improve more than in extension as the result of wrestling. Maximal neck strength measurements provide information useful in planning training programs to correct possible muscle deficiency and imbalance. A third study stated that Studies have demonstrated that cervical strength is affected by injury to the neck. Cervical strength measurements are influenced by the protocol used for the measurements. Previous studies have determined the isometric cervical strength only at a few degrees of range of neck motion. Another study aimed at comparing two neck strength training modalities. They demonstrated that the Multi-Cervical Unit MCU was the most effective training modality to increase isometric cervical muscle strength. Thera-Band tubing did,however, produce moderate gains in isometric neck strength. Another study stated that increasing neck muscle strength can play an important role in preventing neck injuries in contact sports. They examined the actual conditions of the isometric cervical extension strength (ICES) and the cross-sectional area (CSA) of neck extensor muscles in male athletes participating in college wrestling and judo. ICES and the CSA in wrestlers were shown to be significantly higher and larger respectively than in the judo athletes, indicating a significant difference between these two sports [2-6].

The researchers think that using innovative training aids and equipments can help developing cervical muscles strength. In addition, experimental studies help developing the technical performance level of wrestling with particular reference to bridge block and waist turnover.

This researches aim at designing a training device for cervical muscles strength to be used in a training program and identifying the effect of the training program on developing cervical muscles strength and technical performance of bridge block and waist turnover.

The Researchers Hypothesized That:

- There are statistical significant differences between the pre- and post- measurements on all the variables under investigation for the control group in favor of the post-measurement.
- There are statistical significant differences between the pre- and post- measurements on all the variables under investigation for the experimental group in favor of the post-measurement.
- There are statistical significant differences between the post- measurements of the two groups on all the variables under investigation in favor of the experimental group.

MATERIALS AND METHODS

Approach: The researchers used the quasi-experimental approach with two-group design (experimental and control) and pre-/post- measurement.

Sample: Sample was purposefully chosen from Gharbia Greco-roman Wrestling Team (16 wrestlers) with means age of 21.3 years. All wrestlers were registered for 2009-2010 season. Sample was divided randomly into two groups (8 wrestlers each) to form the experimental and control group. Sample was free of radical distributions as shown in Table 1.

Tools and Tests: The following tools were used to record the physical variables: A restameter - A medical balance - A dynamometer - A spirometer - A wrestling mat - A stop-watch. The Following Physical Tests Were Used in the Study: Right fest strength - Left fest strength - Back muscles strength - Leg muscles strength - Back cervical muscles strength - Front cervical muscles strength - Right cervical muscles strength - Left cervical muscles strength (Appendix 1)

The following technical tests were used in the study: Number of performed waist turnovers in 30 seconds - Defense against bridge block in 2 minutes (using a form designed by the researchers) (Appendix 1) [7].

Table 1: Sample description (n=16)

		Experimental group		Control group		
Variable	Measurement	Means	SD	Means	SD	(t) Values
Age	Year	21.338	1.4382	21.475	1.4250	0.192
Height	Cm	175.75	3.845	176.50	2.268	0.475
Weight	Kg	77.25	18.336	76.38	17.728	0.097
Training period	Year	9.38	1.506	9.00	1.195	0.552
Pulse	Number	70.00	2.138	69.00	1.852	1.000
Vital capacity	Cm^3	4525.00	113.389	4512.50	118.773	0.215
Right fest strength	Kg	47.63	2.326	47.00	2.138	0.560
Left fest strength	Kg	46.13	2.295	45.38	1.923	0.709
Back muscles strength	Kg	146.25	7.421	146.75	7.166	0.137
Leg muscles strength	Kg	163.13	10.670	163.00	11.364	0.023
Horizontal distance of bridge	Cm	41.50	7.091	40.25	6.319	0.372
Vertical distance of bridge	Cm	45.63	3.378	45.00	2.726	0.407
Back cervical muscle strength	Kg	19.38	1.996	19.25	1.581	0.139
Front cervical muscle strength	Kg	21.13	1.808	20.88	1.808	0.227
Right cervical muscle strength	Kg	15.38	1.061	16.13	0.835	1.572
Left cervical muscle strength	Kg	15.50	1.309	15.50	0.926	0
Number of performed waist						
Turnovers in 30 seconds	Number	0.63	0.518	0.38	0.518	0.966
Number of scored points	Number	0.75	1.035	0.75	1.035	0
Defense against bridge block in 2 minutes	Number	5.63	1.188	5.88	1.458	0.376

$P \leq 0.05$

Appendix 1: Reliability and validity coefficients of the used physical tests

Reliability: To identify the reliability of the used tests, the researchers applied the test/retest procedures on the pilot sample (6 wrestlers), matching the research community and away from the main sample. Correlation coefficients between the first and second applications on $p \leq 0.05$ for the used tests indicated a high degree of reliability.

Validity: To identify the validity of the tests, tests were applied on a practicing group (distinct) (6 wrestlers from Ghazl Al-Mahala wrestling team) and a non-practicing group (non-distinct) (6 beginner wrestlers). Results indicated statistically significant differences on $p \leq 0.05$ between the distinct and non-distinct groups in favor of the distinct group indicating the validity of the tests.

Reliability and Validity Coefficients of Performance Efficiency Form:

Reliability: To identify the reliability of the form, the researchers applied the tests on the pilot sample (6 wrestlers), matching the research community and away from the main sample. Then, they replicated the test after one week on the same sample. There is a significant correlation on $p \leq 0.05$ between the first and second applications of the form indicating a high degree of reliability. Correlation coefficient of the technical performance for fall-on-foot with positive defender in (60sec) was (0.92) while number of scored points was (0.87). Correlation coefficient of the technical performance for fall-on-foot with passive defender in (20sec) was (0.93) while number of scored points was (0.89)

Validity: To identify the validity of the form, tests were applied on a practicing group (distinct) (6 wrestlers from Ghazl Al-Mahala wrestling team) and a non-practicing group (non-distinct) (6 beginner wrestlers).. (t) Test was applied to identify the difference significance between the two groups. There is a significant correlation on $p \leq 0.05$ between the distinct and non-distinct groups in favor of the distinct group indicating the validity of the form. (t) Values of the technical performance for fall-on-foot with positive defender in 60 sec were 10.38, while number of scored points was 14.77. (t) value of the technical performance for fall-on-foot with passive defender in 20 sec was 11.60, while number of scored points was 24.59.

Objectivity: To identify the objectivity of the form, the researchers used two international wrestling referees and recorded the scores of each test alone. Pearson coefficient was used for the referees' scores. Correlation coefficient

between the two scores was (1), indicating a higher degree of correlation. This indicates a higher degree of objectivity of the form measuring the performance efficiency form for bridging.

Scientific Coefficients of Performance Efficiency Form for Bridging:

Reliability: To identify the reliability of the form, the researchers applied the tests on the pilot sample (6 wrestlers), matching the research community and away from the main sample. Then, they replicated the test after one week on the same sample. There is a significant correlation on $p \leq 0.05$ (0.87) between the first and second applications of the form indicating a high degree of reliability.

Validity: To identify the validity of the form, tests were applied on a practicing group (distinct) (6 wrestlers from Tanta University wrestling team) and a non-practicing group (non-distinct) (6 students from faculty of physical education - Tanta University). (t) Test was applied to identify the difference significance between the two groups. There is a significant correlation on $p \leq 0.05$ (t=6.93) between the distinct and non-distinct groups in favor of the distinct group indicating the validity of the form.

Objectivity: To identify the objectivity of the form, the researchers used two international wrestling referees and recorded the scores of each test alone. Pearson coefficient was used for the referees' scores. Correlation coefficient between the two scores was (1), indicating a higher degree of correlation. This indicates a higher degree of objectivity of the form measuring the performance efficiency form for bridging.

The Recommended Device:

Aims:

- To develop the muscular strength of cervical muscles.
- To measure the muscular strength of cervical muscles.

Components: The device height, width and depth are 210cm, 65cm and 90cm respectively. There is an upper pulley, a middle pulley (height 160cm), a lower back pulley fixed to the device base and a lower front pulley fixed to the device base. There is a group of rectangular steel weights fixed by two steel bars passing vertically through the weights. In the middle of the weights, another hole passes another steel bar fixed to the first weight from above. Weights can be increased by putting them through the hole. The bar is attached to a plastic-coated wire from above. The wire passes above an aluminum upper pulley then goes down to pass under the other pulley that moves up and down. The end of the wire is attached to a foam-stuffed helmet with a group of rings all around it to prevent any pain during performance. The seat is 50cm high from the ground with 200cm length. In the middle of the seat, a knuckle elevates the near part and moves the front part backwards to slide on two plastic buckles that move parallel to form a right angle for training in the seated position so that pulling is from the middle pulley. It is extended again to 180 degree angle position for training from lying position and uses the lower pulleys. In this case the wire is attached to another wire to pass under the pulleys and the seat form a U shape to move the head easily during performance. The head guard is attached to metal circles connected to a leather band. It is cushioned with foam to prevent friction on a (V) shape (35cm length) with a fiber brace (20cm length and 1cm width and 25cm from the band's tips). The two upper parts are connected to the head guard and the lower part is connected to weights. This part's position can be changed with two clasps to fix it firmly (Fig. 1a and 1b).

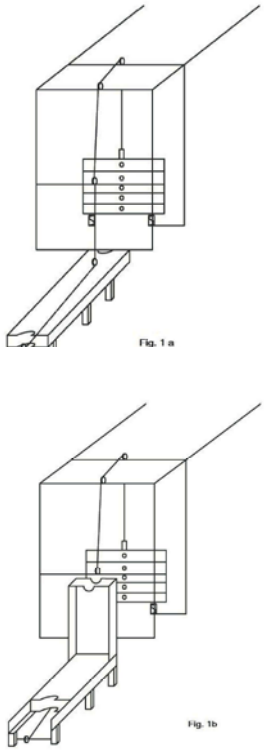

Fig. 1: a, the device in a lying position, b the device in a seated position

Table 2: Reliability coefficient of the recommended device

		First application		Second application		
Variable	Measurement	Means	SD	Means	SD	(t) Values
Back cervical muscle strength	Kg	18.67	1.633	18.83	1.941	0.926
Front cervical muscle strength	Kg	20.67	0.816	20.83	0.753	0.875
Right cervical muscle strength	Kg	15.33	0.816	15.50	1.225	0.913
Left cervical muscle strength	Kg	16.00	0.632	16.17	0.753	0.892

$P \leq 0.05$

Table 3: Validity Coefficient of the recommended device

		Distinct group		Non-Distinct group		
Variable	Measurement	Means	SD	Means	SD	(t) Values
Back cervical muscle strength	Kg	19.00	1.414	7.67	0.516	18.439
Front cervical muscle strength	Kg	20.17	1.169	8.33	0.516	22.680
Right cervical muscle strength	Kg	15.67	0.816	7.00	0.894	17.529
Left cervical muscle strength	Kg	15.50	1.049	7.00	1.265	12.671

$P \leq 0.05$

Mechanics: The wrestler wears the helmet and fastens it firmly then the wire is attached to one of the rings on the helmet. The wrestler moves his head to the desired direction to pull the weight by the wire. Training can be done from seated position or lying position to either sides on a seat attached to the device through a moving pulley. When training from seated position the pulley is fixed on a proper height for each wrestler according to his height. In case of training from a lying position (lying - either sides) the pulley is moved downwards to pass under the seat, where there is another pulley that the wire passes under.

Increasing Resistance: Resistance can be increased by increasing weights (nearly 50 kg of weight pieces) attached to the device. Each piece is 2.5 kg, besides separate weights (50g - 100g - 200g - 400g - 800g - 1600g). These pieces can be added to the device according to each wrestler's demands as each wrestler differs in training from other wrestlers to manage the training loads.

Statistical Treatments: Means - Standard deviation - (t) test.

Reliability and Validity Coefficients of the Recommended Device:

Reliability: To identify the reliability of the recommended device, the researchers applied the tests on the pilot sample (6 wrestlers), matching the research community and away from the main sample. Then, they replicated the test after one week on the same sample as in Table 2.

From Table 2, there is a significant correlation on p = 0.05 between the first and second applications of performance on the recommended device indicating a high degree of reliability.

Validity: To identify the validity of the device, tests were applied on a practicing group (distinct) (6 wrestlers from Tanta University wrestling team) and a non-practicing group (non-distinct) (6 students from faculty of physical education - Tanta university). (t) Test was applied to identify the difference significance between the two groups as in Table 3.

From Table 3, there is a significant correlation on p = 0.05 between the distinct and non-distinct groups in favor of the distinct group indicating the validity of the device.

Pilot Study: The researchers performed the pilot study from 20/6/2009 to 27/6/2009 on a sample of 7 wrestlers from Tanta University wrestling team matching the main sample and outside it.

Pre-Measurements: Pre-measurements were taken in the wrestling hall of Al-Sekka Al-Hadid Sports Club in Tanta for two days from 29/6/2009 to 30/6/2009. Measurements were taken for all sample members for each player individually.

Main Study: After the pilot study and pre-measurements, the researchers started the recommended training program by measuring the maximum weight for each wrestler on the recommended device. The experimental group was trained

as 4 sub-groups as follows: The first group: 45% of 1MRB (15 repetitions) - The second group: 55% of 1MRB (10 repetitions) - The third group: 75% of 1MRB (5 repetitions) - The fourth group: 95% of 1MRB (1repetition) Maximum weight for each wrestler was identified on the recommended device at the end of each week and according to it weights are modified for the next week. The researchers made 9 measurements in the light of adaptation to training principle. Duration of the training program was for 10 weeks from 4 / 7 /2009 to 10 /9 /2009 with 3 training units per week. The program was divided into 30 units (45:70 minutes each) with 15 minutes for training on the recommended device for the experimental group, while controls trained traditionally.

Post-Measurements: At the end of the recommended training program for both groups on, post-measurements were taken for both groups on the cervical muscles strength and the technical performance of waist turnover and bridge block by a group of judges. Post-measurements were taken on two days from 12/9/2009 to 13/9/ 2009. The researchers considered that the same partner of the pre- test should be on the post-test. In addition, rest intervals between tests and order of performing tests is the same for pre- and post- tests.

RESULTS AND DISCUSSION

From Table 4, there are statistical significant differences between the pre- and post- tests of the control group in favor of the post-test. The researchers think that this is due to training and punctuality in an organized traditional training program. This of course led to an enhancement of the physical and technical abilities of wrestlers as they were exposed to a training load for each unit, including over-loads in sometimes. Performing physical and technical exercises and participating in competitive trials with other wrestlers, in addition to performing waist turnover and bridge block repeatedly helped in mastering these skills and enhancing its performance.

From Table 5, there are statistically significant differences between the pre- and post- tests of the control group in favor of the post-test.The experimental group surpassed in the post-test compared to the pre-test on physical tests concerning the cervical muscles strength due to the nature of the recommended program, applied to that group, as this program included several scientific principles of sports training that aim at enhancing cervical muscles strength. The use of the device allowed easy-to-perform resistance training, characterized by calibration of

Table 4: Differences between the pre- and post-measurements for the control group

		Pre-test		Post-test		
Variable	Measurement	Means	SD	Means	SD	(t) Values
Back cervical muscle strength	Kg	19.25	1.581	25.13	1.959	14.758
Front cervical muscle strength	Kg	20.88	1.808	25.88	1.246	9.354
Right cervical muscle strength	Kg	16.13	0.835	19.50	1.195	10.420
Left cervical muscle strength	Kg	15.50	0.926	20.13	0.991	7.400
Number of performed waist						
Turnovers in 30 seconds	Number	0.38	0.518	0.88	0.641	2.646
Number of scored points	Number	0.75	1.035	1.00	1.069	0.424
Defense against bridge block in 2 minutes	Number	5.88	1.458	4.38	1.302	5.612

(t) Value on $p \leq 0.05 = 1.89$

Table 5: Differences between the pre- and post-measurements for the experimental group

		Pre-test		Post-test		
Variable	Measurement	Means	SD	Means	SD	(t) Values
Back cervical muscle strength	Kg	19.38	1.996	38.13	3.441	20.801
Front cervical muscle strength	Kg	21.13	1.808	42.25	4.166	24.143
Right cervical muscle strength	Kg	15.38	1.061	29.50	2.330	19.023
Left cervical muscle strength	Kg	15.50	1.309	28.88	2.475	17.197
Number of performed waist						
Turnovers in 30 seconds	Number	0.63	0.518	2.88	0.641	13.748
Number of scored points	Number	0.75	1.035	5.75	1.282	13.229
Defense against bridge block in 2 minutes	Number	5.63	1.188	0.75	0.707	16.523

(t) value on $p \leq 0.05 = 1.89$

Table 6: Differences between the post-test for the control and experimental group

		Pre-test		Post-test		
Variable	Measurement	Means	SD	Means	SD	(t) Values
Back cervical muscle strength	Kg	38.13	3.441	25.13	1.959	9.286
Front cervical muscle strength	Kg	42.25	4.166	25.88	1.246	10.651
Right cervical muscle strength	Kg	29.50	2.330	19.50	1.195	10.801
Left cervical muscle strength	Kg	28.88	2.475	20.13	0.991	9.283
Number of performed waist						
Turnovers in 30 seconds	Number	2.88	0.641	0.88	0.641	6.242
Number of scored points	Number	5.75	1.282	1.00	1.069	8.050
Defense against bridge block in 2 minutes	Number	0.75	0.707	4.38	1.302	6.918

(t) value on $p \leq 0.05 = 1.76$

training loads, controlling and gradually increasing the intensity as the researchers determined the maximum load for each wrestler individually prior to each week of the program according to individual differences and adaptation to loads principles. This led to increasing cervical muscles strength and reflected positively on performing waist turnover, number of scored points because of elevating the back from the mat and increasing the period of defense against bridge block.

This is in agreement with the results of two previous studies in that using resistance training with weights enhances muscular strength significantly. This is also in agreement with the results of another study in that using weight machines enhances significantly the special strength measurements and the effectiveness of the technical performance level for wrestlers [8-10].

From Table 6, there are statistical significant differences between the control and experimental groups on the post-tests in favor of the experimental group. The excellence of the experimental group over the control in cervical muscles strength tests is due to the recommended program that aimed at enhancing cervical muscles strength using the recommended device, especially that both groups recorded similar results on these tests on the pre-tests. They also went through the same testing procedures, conditions and training except that the experimental group trained with the recommended training program. The program was characterized by easy-to-perform exercises and an increasing safety coefficient leading the wrestlers to perform in all directions and with various degrees of resistance according to the aims of each exercise.

Compared to the traditional program applied to the control group, the recommended program is characterized by calibrating exercises according to the individual differences and abilities of each wrestler. Nine Measurements were taken to identify the wrestler's ability to perform on the device at the end of each training week to determine weights for each wrestler individually in every training unit according to the load direction and preferred intensity through a continuous and gradual increase of the physical load for each wrestler without breaching his ability limits. This allowed for adaptation and development of cervical muscles strength. The increase in cervical muscles strength, in turn, led to performing bridges more effectively as support was on the feet from one point and the forehead from the other. This increases the load on cervical muscles. With the increase of cervical muscles strength, there was a correspondent increase in performing bridges (either waist turnover as elevating shoulders from the mat leads to score more points or the number of scored points). Increasing cervical muscles strength leads to repeating the skill without exhaustion and increased the duration of defense against bridge block. All this is in agreement with the results of another study in that using sports training scientific principles, considering individual differences and adaptation to training load through organizing training programs enhance the physical and technical abilities of the wrestlers due to the program applied to them [11].

Recommendation:

The Researchers Recommend the Following:

- Using the recommended training program with the cervical muscles strength device to improve the technical performance level of waist turnover and defense against bridge block.
- Performing similar studies to invent other devices for developing the technical performance levels of other wrestling skills.

REFERENCES

1. Baiæ, M., H. Sertiæ and W. Starosta, 2007. Differences in physical fitness levels between the classical and the free style wrestlers. Kinesiol., 39: 142-149.
2. Rezasoltani, A., A. Ahmadi, M. Nehzate-Khoshroh, F. Forohideh and J. Ylinen, 2005. Cervical muscle strength measurement in two groups of elite Greco-roman and free style wrestlers and a group of non-athletic subjects. Br. J. Sports Med., 39: 440-443.
3. Ylinen, J., J. M. Julin, A. Rezasoltani, H. Virtapohja, H. Kautiainen, T.Karila and E. Mälkiä, 2003. Effect of Training in Greco-Roman Wrestling on Neck Strength at the Elite Level. The J. Strength and Conditioning Res., 17: 755-759.
4. Suryanarayana, L. and S. Kumar, 2005.Quantification of isometric cervical strength at different ranges of flexion and extension Clinical Biomechanics, 20: 138-144.
5. Burnett, A.F., F.L. Naumann, R.S. Price and R.H. Sanders, 2005. A comparison of training methods to increase neck muscle strength. Work, A Journal of Prevention, Assessment and Rehabilitation, 25: 205-210.
6. Tsuyama, K., Y. Yamamoto, H. Fujimoto, T. Adachi, K. Nakazato and H. Nakajima, 2001. Comparison of the isometric cervical extension strength and a cross-sectional area of neck extensor muscles in college wrestlers and judo athletes. European J. Applied Physiol., 84: 487-491.
7. Al-Shorbagy, N.H., 2000. Effect of a recommended training program using waist turnover device on the technical performance of waist turnover for elite wrestlers. Ph.D. Thesis, Faculty of Physical Education, Tanta University, Egypt, pp: 72. (In Arabic).
8. Mohamed, A.S., 2002. Effect of a weight training program on the effectiveness of the back throw and some physiological variables for beginner wrestlers. M.Sc. Thesis, Faculty of Physical Education for Men, Mansoura University, Egypt, pp: 33. (In Arabic).
9. Kasem, F.F., 2005. The effect of using some resistance training exercises on developing static and dynamic muscle force and the technical performance of snatch in Greco-roman wrestling. Physical Educational J. The Iraqi Academy, 14: 138. (In Arabic).
10. Baiomy, A.A., 2004. Effect of a specific training program for Kumi Kata on the performance effectiveness of Judo performers. M.Sc. Thesis, Faculty of Physical Education, Tanta University, Egypt, pp: 87. (In Arabic).
11. Al-Shorbagy, N.H., 2005. The effect of a recommended training program using bridge device on the technical performance of face-to-face back throw for elite wrestlers. Theories and Application Journal, Faculty of Physical Education for Men, Alexandria University, 25: 470. (In Arabic).