THE EFFECT OF STRENGTH TRAINING OF STATION EXERCISE IN STRENGTH & KINETIC BALANCE ENDURANCE AND THEIR RELATION WITH SHOOTING ACCURACY IN AIR PISTOL SHOOTING

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Abstract

Sport games develop noticeably through achieving world records and achievements in most games which encouraged researchers to focus most of their attention on the most accurate scientific and field details in the field of sport training. In its physical and skill preparation, shooting is one of the games that depend on strength as it plays a role in developing the game's special abilities such as strength endurance and kinetic balance.

Problem of the study lies in that: nature of performance in air shooting (10 m), especially air pistol shooting, is characterized by high accuracy which requires both physical effort and muscular endurance to determine muscular direction correctly and accurately to achieve shooting accuracy. The researcher noticed signs of early tiredness on shooters and their failure in accuracy in last shots which made the researcher conduct a study in this field and try to find suitable solutions that serve the skilled aspect in this game through preparing suitable training methods for this purpose.

The study aims to:

1. Prepare a set of strength exercises by the station training method for air pistol shooters.
2. Identify the effect of strength training with the station method in strength endurance of muscles of arms, shoulders and back muscles on kinetic balance of air pistol shooters.
3. Identify the relation between shooting accuracy and strength endurance (for arms and kinetic balance).

The researcher used the empirical method and selected. The researcher used fixed strength training using the stations method and reached the following conclusions:

1- The researcher concluded that the station training method contributed effectively in developing physical abilities as it is an interesting method and not traditional in shooting exercises.
2- There is a notable development in physical abilities of air pistol shooters (strength endurance of arms, the back and kinetic balance) which shows effectiveness of the prepared exercises and their positive effect.

The researcher recommends making similar researches and studies in other sports with different age categories for males and females and study variables that serve the athletic level.

Key word: Strength Training, Strength, Kinetic, Balance, Endurance, Shooting Accuracy, Pistol Shooting

1. INTRODUCTION & IMPORTANCE OF THE STUDY:

Sport games develop noticeably through achieving world records and achievements in most games which encouraged researchers to focus most of their attention on the most accurate scientific and field details in the field of sport training through the use of scientific means and methods in training to form an activity forming their role prompts in building an athletes who are specialized in a certain competition.

Shooting in general, and air pistol shooting in particular, is among games that developed greatly lately especially in terms of female air pistol shooting. Countries around the world exerted great efforts to get advanced positions which recommend studying and researching in order to reach anything related to this game and produce distinct shooters through physical, skill and functional preparation. Strength is one of the basics of physical training in shooting as it promotes performance as it is the key of achieving and it is closely related to other physical elements such as endurance to produce compound physical characteristics such as endurance which we always seek to develop in shooting. Shooters have to take stationary positions and overcome pistol weight resistance for a relatively long period of time. It is noteworthy that there is a harmony between muscular strength and stationary kinetic balance which is a basic physical element in aerobic sports in addition to its role in adjusting body movements and pistol position in front of the

target, so the researcher sought to develop some special physical abilities such as strength endurance, kinetic balance through preparation of strength training using stations training method as one of the ways which develop physical abilities and identify the correlation between these abilities and shooting accuracy in air pistol shooting.

Problem of the Study:

Performance nature in air shooting (10 m), and especially air pistil shooting, is characterized by high accuracy which requires high physical and skilled abilities. Shooting from a standing position has a great effect on shooting results, whether in preparation or in competition as achievement depends on a long duration (1 hour and 30 minutes). Through her scientific and physical experience in air pistil shooting training, the researcher noted the appearance of early fatigue in all shooting attempts on targets which led to lack the shooter the shooting accuracy. This is clear in last shots as the arm holding the pistol shakes due to irregular training units and training cut off which lead to weak general and private physical preparation as the shooter will not reach comprehensive preparation stage. In addition, the researcher noted shooters' concentration on skilled performance through attempting to repeat the shooting process as it has a competitive interest without focusing on reasons of their failure in the last shots. The researcher found that this was a reason for their weak physical abilities which reflect on skilled performance, so the researcher sought to search for an interesting method that affects developing what needs to be developed such as station training and preparation of strength training using weighing methods in order to develop performance and achievement level for air pistil shooters.

Goals of the Study:

1- Preparing a set of strength exercises using the station training method for air pistil shooters.
2- Identify the effect of strength training with the station method in strength endurance of muscles of arms, shoulders and back muscles on kinetic balance of air pistol shooters.
3- Identify the relation between shooting accuracy and strength endurance (for arms and kinetic balance) and shooting accuracy in air pistol shooting.

2. METHODOLOGY:

The researcher used the empirical method using the design of the two groups, control and empirical groups, as it is proper for the nature and problem of the study.

Sample of the Study:

The sample of the study was selected purposively including 10 female shooters representing the shooting team of the Faculty of Physical Education for Girls for air pistol shooting and the sample was divided into two groups (5 shooters in the empirical groups and other 5 in the control group).

Pre-Tests:

The researcher performed pre-tests on the control group on 30/12/2014 corresponding Tuesday at 10 am in the shooting field of the Faculty of Physical Education for Girls including tests of strength endurance for arms, the trunk, stationary kinetic balance and shooting accuracy tests.

Tests of the Study:

- Romberg tests (balance tests) (Abdelfattah, A. & Hassanien, M. S, 1997, 167).
- Shooting accuracy test (Natek, G., 2004, 64)
- Strength endurance test for arms and shoulders (Jawad, S. A. 2004, 98).
- Hanging test with arms extension (Jawad, S. A. 2004, 99).
- Strength endurance test for back muscles (Natek, G. 2004, 59).

Purpose of the test: measuring strength endurance of the back muscles.

Main & Field Trial:

Training Method:

The researcher prepared strength exercises and applied them on the empirical group to develop some physical abilities represented in strength endurance and kinetic balance as they are among the important physical abilities in air pistol shooting. The training program included: (8) weeks in special preparation stage from the main section (3 training units a week) on Sunday, Tuesday and Thursday. The total was (24) training units. The researcher used stations training forming 6 stations including certain exercises affecting a certain muscle group starting from arms, shoulder, stomach, trunk and then the back. Next, these exercises are distributed on stations. The researcher used some tools accompanying training to achieve goals of the study and reach a successful training result. These exercises were applied with a training stress of 50-60% and the duration of the single training unit was 60 minutes. In her preparing the training method, the researcher considered scientific principles in forming the ripple training load to suit requirements of the study. Training unite were applied on Sunday, 11/01/2014 till Thursday 05/03/2015.

Post-Tests:

The researcher conducted post-tests on the sample of the study on Sunday 08/03/2015 at 10 am.

Analysis and Discussion of Results:

Analysis of Results of Differences between average pre and post measurements in the variables of the study for the control group:

Table (1): significance of differences between average pre and post measurements of the variables of the study for the control group:

Variables	Pre-test		Post-test		T counted value	T schedule value	Significance
	Mean	S.D	Mean	S.D			
Arm strength endurance (extension)	8,00	7,32	12,00	4,36	1,94	2.78	Insignificant
Arm strength endurance (bending)	7,00	2,00	10,00	1,24	2,03		Insignificant
Back strength endurance	11,00	2,31	15,00	2,42	2,31		Insignificant
Kinetic balance	15,60	6,107	17,20	5,89	2,60		Insignificant
Shooting accuracy	19,600	3,714	20,40	3.64	4.32		Significant

Schedule T value under significance level (0.05) and freedom degree (4) = (2.78)

Analysis of Results of Differences between average pre and post measurements in the variables of the study for the empirical group:

Table (2): significance of differences between average pre and post measurements of the variables of the study for the empirical group:

Variables	Pre-test		Post-test		T counted value	T schedule value	Significance
	Mean	S.D	Mean	S.D			
Arm strength endurance (extension)	28,08	7,108	44,76	6,68	5,92	2.78	Significant
Arm strength endurance (bending)	10,60	2,302	25,00	3,78	8,83		Significant
Back strength endurance	30,20	3,11	50,00	7,90	14,142		Significant
Kinetic balance	18,00	2,73	40,44	22,06	2,85		Significant
Shooting accuracy	18,200	5,97	35,00	5,87	8,76		Significant

Schedule T value under significance level (0.05) and freedom degree (4) = (2.78)

Analysis of Results of Differences between results of post measurements of the control and empirical groups for variables of the study:

Table (3): significance of differences between results of post measurements of the control and empirical groups for variables of the study:

Variables	Control group		Empirical group		T counted value	T schedule value	Significance
	Mean	S.D	Mean	S.D			
Arm strength endurance (extension)	12,00	4,36	44,76	6,68	6,73	2.31	Significant
Arm strength endurance (bending)	10,00	1,224	25,00	3,807	9,87		Significant
Back strength endurance	15,00	2,42	50,00	7,90	6,23		Significant
Kinetic balance	17,20	5,89	40,44	22,06	2,43		Significant

Shooting accuracy	20,40	3,64	35,00	5,87	4,23		Significant

Schedule T value under significance level (0.05) and freedom degree (8) = (1.860)

Analysis of Results of Correlation between air pistol shooting accuracy and variables of the study:

Table (4): the correlation coefficient counted and schedule values for the correlation between air pistol shooting accuracy and variables of the study:

Variables / Shooting accuracy	Counted values	Schedule values	Significance
Arm strength endurance (extension) – shooting accuracy	0,959	0,811	Significant
Arm strength endurance (bending) – shooting accuracy	0,911	0,811	Significant
Back strength endurance – shooting accuracy	0,831	0,811	Significant
Kinetic balance – shooting accuracy	0,938	0,811	Significant

Significance at level (0.05) and freedom degree (8) = 0.811

3. Discussion of Results:

It was clear that there are no significant differences for the sake of the control group in physical variables of the study. This is due to non-practicing physical training that develops physical abilities of shooting in general and air pistol shooting in particular especially that the shooting technique depends on the arm holding the pistol without positioning during shooting. This requires a comprehensive physical preparation based on scientific planning of legalized training programs (training load is the base on which training depends through its components in terms or stress, size and comfort) (Oribi, A. O. 1998, 4).

Results also showed significance in skill selection represented in shooting accuracy, but the differences percentage is small and under the hoped level. This was due to the use of skill aspects that are not related to physical preparation although shooting depends generally on strength training. Al Kilany asserts this by saying: “fixed muscular contraction is the production of power or strength in a specific period of time and this makes a change in ht electric effort inside the muscle which means that external muscular contraction is related to its internal form” (Al Kilany et al, 2006, 33).

As for the empirical group and post test for both groups, the researcher found that the reason for significant differences was due to the use of strength training which led to positive changes in physical variables of the study as programmed training according to training units based on scientific principles helped its development which led to enhance skilled performance in air pistol shooting and developing shooting accuracy which is important for each male and female shooter. The researcher asserted that the use of strength training by the station training method with tools gave this positive result of developing variables of the study especially that circular training is an effective mean to raise physical level and affects skill level (Abdallah, D. A. 2000, 32) in addition to simple exercises that were chosen and aim to overcome average strength resistance that can be repeated several times, so they aim to general building of training, improve and develop muscle strength and endurance at the same time. Results of correlation table between shooting accuracy and physical variables showed a significant relation which is a logical result, for the researcher, as air shooting necessitates the use of muscle groups contributing to performance along the training period and all its stages towards target center. The researcher thinks that power surplus of shooters during training is necessary to reach consistent stable balance and avoid muscle cramps due to over-exertion and using additional muscle groups. the increase in the strength of operating body muscles contributes to direct kinetic path in a great accuracy and increases the ability to reach balance and, as a result, performance of different skills in stationary positions. Gonding et al adds: “the best achievement comes through the increase of operation level for muscles that are necessary for operation and performance”.

4. Conclusions:

1. There is a notable development in physical abilities of air pistol shooters (arm and back strength endurance and kinetic balance) which means that the prepared training is effective and has a positive effect.

2. The station training method contributed effectively in developing physical abilities as it is an interesting method and unfamiliar in shooting training.
3. There is a significant correlation between physical variables and shooting accuracy of air pistols.

5. RECOMMENDATIONS:

1- Asserting that the focus of strength training should be directed to develop muscles which contribute to performance.
2- Asserting the use of training methods which serve their purpose.
3- Conducting similar studies using other training methods to enhance physical and skill abilities in shooting.

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Annex (1)
Model of Training (Main Section / Special Preparation)
First Training Unit, Month: First
Goal: developing strength endurance and kinetic balance

Serial	The used exercise	Intensity	Operation time	Frequencies	Groups number	Break among frequencies	Break among groups
1	Standing position by making the player hold a rubber ball in the size of a palm and stress it firmly and consistently with arms exchange.	From 50% to 60%	10 sec	5	2	30 sec	1 min
2	From a standing position by lifting a ½ kg dimple in each arm with extension forward, bending knees and stationary.		10 sec	5	2	40 sec	1 min
3	Laying position and leaning on elbows and raising legs upwards with an angle and stationary.		10 sec	5	2	30 sec	1 min
4	Standing and lifting a dimple (1 kg) with the right and left arms on waist and then raise the right arm sideward and stationary and exchanging arms.		10 sec	5	2	30 sec	1 min
5	Standing position and arms behind holding rubber rope from its ends and extending arms sideward with stationary.		10 sec	5	2	30 sec	1 min
6	Standing position, lifting a medical ball (1 kg), extending arms forward and then positioning on one leg, bending the other leg and positioning on the leaning and stationary leg.		10 sec			30 sec	1 min