

Effect of the functional power exercises by using weights on the center muscles strength and its relationship with the lunge speed and accuracy in fleuret
* **Dr/ Samar Mustafa Hussein**

Introduction :

The researcher and workers in athletic training generally and fencing particularly seek to raise training level of fencers in international and national matches. They depend on scientific and technological methods in process of training to reach the highest athletic levels and get advanced positions/ records in competitions. So, there is need of variety in using new training forms.

The functional power exercises one of the training forms which used recently in athletic field (12:27).

National Academy of Sport Medicine (NASM) defines the functional training as : includes all functional styles of movement (Accelerator, Decelerator, stability) which happen in each joint of the kinetic chain and at all three levels of movement. (15)

Michael Bayle added that the functional power consists of three core elements:

- 1- Core Stability
- 2- Core Strength
- 3- Core Power

Fabiovomana(2004)sees that balance in the muscular work is essential element in functional power exercises, not only balance between strength and flexibility or working muscles and non-working muscles but also player's dependence on one part of body during performance with the ability to move the other parts without falling. this is an important feature in the functional power exercises. where the functional power exercises are mixed of strength and balance in the same time. (6: 43-57)

The encumbered jacket is one of the designed means which used in training by using weights to develop the muscular strength. The encumbered jacket work on achieving development towards the participated skill performance. where the percentage of added weights cope with individuals' weights

to not effect on the form of correct skill performance. (16)

Ramzy Eltanboly (1983)(11) see that load weight ranges between (3% - 9%), while Osama Abdelrahman (1994)(10) see that load weight ranges between (4% to 10%).

Amr Elsokry (2000) see that “improving the athletic performance of the upper limb of body to increase the muscles’ ability , depends on doing the muscular power in the shortest time as possible. Improving the maximum ability of muscles produced by chain of frequent and serious athletic movements between shorten and stretching. (1: 255-239).

The lunge movement in fencing is performed strongly and quickly, however, balance is necessary to make sure of speed and accuracy of movement where imbalance lead to many problems during performance. this can achieved through the center muscles strength (especially, torso and backbone)

so, the researcher realized an importance of using the functional power exercises in training programs. where Scott Gaines (2003) confirmed

that “All training programs should include the functional power exercises as he said : “ if we notice the players during sport competitions, we will find the centre of body weight is non-fixed and irreversibly changing, especially in exercises which need front and back movements such fencing” (13:214)

All these things pushed the researcher to use the functional power exercises in fencing and add body weights according to the relative distribution of body parts on center muscles strength and its relation with lunge speed and accuracy in fencing. this may help achieving the main goal of fencing which represented in using arms and torso to transfer movement from legs to torso then to arms, which make fencing performance (weapon) reach to the legal goal of Competitor to record touch speedily and accurately.

Research Aim

The research aims to know effect of the functional power exercises by using the added weights due to relative distribution of body parts on the center muscles strength and its relationship with speed and accuracy of the lunge in

fencing through recognizing the following:

1- effect of the functional power exercises by using the added weights due to relative distribution of body parts on special physical abilities.

2- effect of the functional power exercises by using the added weights due to relative distribution of body parts on the speed and accuracy of lunge in fencing

Research hypothesis:

1- There are statically significant differences between averages of the measurement (pre and post) of sample under consideration in special physical abilities direction post measurement

2- There are statically significant differences between averages of the measurement (pre and post) of sample under consideration in speed and accuracy of lunge in fencing direction post measurement.

Research terms (the used terms in research):

functional power exercises: It is an integrated and multi_level/planes movements (Anterior, transverse and sagittal) include Accelerator, Decelerator and stability to improve the kinetic ability and Centrifugal/central force (which mean vertebral column, midline and

neuromuscular efficiency) (6:87).

Plan and Procedures of research:

Research method:

The researcher used the experimental method by using the experimental design per set which suitable for the nature and Procedures of research.

Research community:

The research community included University team at faculty of physical education, Assiut university where it reached (22)female students, and (2)female students were excluded due to their absence during the training period. so, the number of sample became(20)female students divided to (12)female students for the main sample and 8 female students for the surveying study.

Research sample:

The research was conducted on sample consists of(12)female students from Assiut University fencing team

Homogeneity of research sample:

The researcher found the homogeneity among people of research community in the following variables:

- 1- physique measurements : total length, weight and age.
- 2- special physical abilities

The research explored opinions of experts and analysed references and studies of fencing to know the abilities of fencing sport. (Attachment 1)

The measurements of homogeneity were conducted by finding skewness coefficients for research community individuals (12 female students) before starting steps of the experiment , to

signify research sample homogeneity in the physical variables, the speed and accuracy of fourth defense then lunge. this may affect on research results. The Procedures of homogeneity were conducted from 14/9/2014 to 24/9/2014. The skewness coefficients were shown in table (1).

Table (1)
The skewness coefficients of the research community in the variables under consideration (N=12)

K. S	Skewness coefficient	Standard deviation	Arithmetic average	Measurement unit	abilities
0.836	0.158	1.15	161.25	Cm	length
1.003	1.96	1.51	64.83	Kg	weight
0.696	0.789	0.560	18.96	Year	age
0.845	0.750	0.489	3.99	Time	kinetic speed
0.890	0.478	0.753	3.250	Second	accuracy
0.726	0.161	0.792	12.91	Once	abdominal muscles strength
0.806	1.14	1.92	151.91	Kg	legs muscles strength
0.892	0.378	1.19	120.83	Kg	back muscles strength
0.926	2.46	0.023	0.969	Time	speed of the anti-encounter lunge reply from the fourth defense
1.11	0.170	0.621	5.250	Degree	accuracy of the anti-encounter lunge reply from the fourth defense

Table (1) shows that the values of skewness coefficients ranged between (-3 /+3) in the research variables which signify that the research community considered homogeneous and equinoctial in the research variables.

Tools of collecting data:

The used tools in research:

- Restameter to measure length
- Medical scale - lunge pillow - stick fixed on basic assigned for performing defense process (local industry)- 2 Fleuret, made in germany, its type is Allstar - encumbered jacket and proposed encumbered belts. attachment 2

- stop watch - Dynamometer- Data collection form

Study variables:

The researcher explored experts opinions and analyzing researches and books of fencing to recognize the physical abilities which related to the research subject and fencing. she concluded the following abilities : (speed - accuracy - abdominal muscles strength - legs muscles strength - back muscles strength) table (2) show the percentage of experts opinions about the selected physical abilities under consideration.

**Table 2
percentage of the experts opinions about the selected physical abilities under consideration.**

the percentage of experts opinions	physical ability
90%	speed
92%	accuracy
100%	Abdominal muscles strength
87%	legs muscles strength
100%	back muscles strength

The physical tests. Attachment (3)

The researcher conducted surveying for tests set which measure the physical abilities. she also explored experts

opinions to conclude the suitable tests for the physical abilities which had been reached.

table (3)
Tests of the research physical abilities

the measurement unit	the test name	the physical ability
second	jogging from moving start 30m	speed
biggest number×10sec	test of speed and accuracy of making touch from diastolic movement	accuracy
once	Sit lie put knees bend test.	abdominal muscles strength
Kg	the muscular strength of legs	legs muscles strength
Kg	strength test of extensor muscles of torso	back muscles strength

The skill tests : attachment (4)

The researcher used test of speed and accuracy of anti-counter lunge reply from the fourth defense in Fleuret(Kuhajda)(5)

The scientific rationing of tests:-

Discrimination credibility:

The researcher used discrimination credibility

through applying test on the distinguished sample consisted of 8 female students out of the main sample and research community, and the non distinguished sample consisted of (8)female students from 1st year who studied fencing.

Table (4)
significance of the differences between skill and physical tests
averages for both two groups distinguished and undistinguished)
(N=8)

significance	T value	undistinguished group		distinguished group		the measurement unit	The tests which measure variables	the abilities
		Y	X	Y	X			
significant	*6.42	0.374	5.33	0.479	3.94	time	jogging from moving start (30)m	Kinetic speed
significant	*3.121	0.640	1.87	0.6408	2.87	biggest number 10sec	test of speed and accuracy of making touch	accuracy
significant	*7.201	0.834	10.87	0.517	13.37	once	sitting from lying	abdominal muscles strength
significant	*6.86	2.434	146.7	1.62	153.87	Kg	Dynamometer	legs muscles strength
significant	*5.319	2.065	117.3	0.916	121.62	Kg	Dynamometer	back muscles strength
significant	*5.47	0.509	1.017	0.016	0.913	Kg	test of lunge speed from 4th defense	speed and accuracy of lunge from 4th defense place
	*7.180	.7071	3.750	0.534	6.00	degree	test of lunge accuracy from 4th defense	

T^{**} tabular value at level 0.05 = 2.365

as shown in table 4, there are statically significant differences between the distinguished and undistinguished group which signify the tests credibility and its ability to differentiate between the different two groups.

Reliability

To make sure of Reliability of the physical abilities tests and

skill performance level, the researcher used (Test-Re-Test) method in the period of 14/9 /2014. then reapplying these tests on the same sample (8 female students) for the second time in the period of 24/9 /2014. there were (10)days between the first and second application. table 5 shows the Reliability of skill and physical tests.

Table (5)
The correlation coefficients between first and second application of skill and physical tests(N=8)

“R” calculated value	the 2nd applying		the 1st applying		measurement unit	The tests	The abilities
	Y	X	Y	X			
*1.00	0.479	3.94	0.477	3.94	time	jogging from start (30)m	Kinetic speed
*0.885	0.640	2.87	0.755	3.00	biggest number × 10sec	test of speed and accuracy of making touch	accuracy
*0.680	0.517	13.37	0.517	13.62	once	sitting from lying	abdominal muscles strength
*0.931	1.64	153.87	1.75	153.75	Kg	Dynamometer	legs muscles strength
*0.659	0.916	121.62	1.12	121.87	Kg	Dynamometer	back muscles strength
*0.959	0.016	0.913	0.014	0.910	kg	test of lunge speed from 4th defense	speed and accuracy of lunge from 4th defense place
*0.691	0.534	6.00	0.707	5.75	degree	test of lunge accuracy from 4th defense	

“R” Tabular value at level 0.05=0.582

Table (5) shows that the correlation coefficients between the first and second application for the skill and physical tests ranged between (0.65- 1.00). this signify that the selected tests have high Reliability coefficients.

determining the time distribution of the proposed exercises:

The researcher reviewed references and studies associated with the research topic to determine time distribution for implementing

the proposed exercises. the researcher reached to following:

- the weeks number = 10 weeks
- number of the training units weekly = 3 units
- time of the daily training unit = 120 min
- The total time for conducting the program = 10 × 3 × 120 =3600 min
- load circle / course = (1:2)

- the program includes the three following stages : attachment (6)

The program includes the three following stages : Attachment (6)

- general preparing stage for three weeks : its time reached 1080 min

- private preparation stage for four weeks: its time reached 1440 min

- preparation stage for competition (competitive preparation) for 3 weeks, its time reached 1080 min.

The total time of the program is distributed on degrees of the different load according to the specific / assigned load course (1:2) as following :

- time of the maximum load reached 720 min. distributed between weeks 5, 8

- Time of the high load reached (1800min) distributed on weeks 1,2,4,7,10.

- Time of the medium load reached (1080 min) distributed on weeks 3,6,9.

based upon what mentioned before, the researcher formed the periodical load cycle, this formation must be (1:2) 2 is high and 1 is low within the periodical load cycle which consisted of 10 weeks. The undulation/waviness keep continuing load and prevent reaching to over load. The researcher also determined the same formation during the daily load cycle inside each training week (1:2)

After determining the total time of program, this time distributed on different parts of preparation where :

- a percentage of the general preparation was 30%.

- a percentage of the private preparation was 40%.

- a percentage of the competitive preparation was 30%.

Table (6)
percentages and distributing the total time of program on the different settings

time	percentages	settings	Total time
1080min	30%	general physical preparation	3600
1440min	40%	private physical preparation	
1080min	30%	competitive preparation	
3600min	100%		total

The pull started with 60% of the pre-measurement because the target is developing muscle capacity, speed and accuracy which increase by 60% to 85%.

- Rest periods start 1 - 3 minutes among groups, where stretching exercises were done as positive rest (Attachment 7)

- necessity of performing repetitions of each exercise as fast as possible

stages of the program implementation:-

- The Foundational period
- The Preparation period
- The Final period

Research steps:

After determining the research sample and community, the researcher did the following through results of the surveying studies:

1- conducting the pre-measurements for sample individuals in following measurements:-

- using rest-meter to measure length with cm
- using medical scale to measure weight by Kg
- measuring the physical abilities of research (speed - accuracy - abdominal muscle strength).
- measuring speed and accuracy of anti-encounter

lunge reply in fourth defense from 1/10/2014 to 2/10/2014

2- conducting the proposed training program on sample under consideration from 5/10/2014 to 11/12/2014.

3- conducting the post measurements in the same order as the pre measurements from 13/12/2014 to 14/12/2014.

4- collecting, classing and scheduling data, then handling them statistically.

Statistical treatments:

Data were treated statistically by the following Statistical coefficients:

- The arithmetic average
- the standard deviation
- the skewness coefficient
- the improvement percentage
- "T" test of differences' significance between two averages

The researcher reached the following results:-

first : showing the results:-

Through the Statistical treatment for research data and in terms of the used measurements, the results were shown as following:

1- results of the functional power affected by using the added weights according to the relative distribution of the body parts on the research variables.

Table (7)
The differences significance of the special physical abilities and speed of lunge accuracy between the pre and post measurements of the experimental group (N=12)

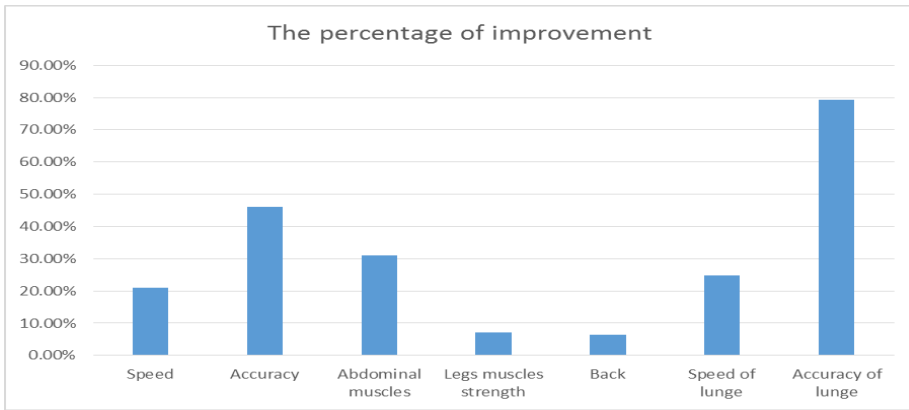
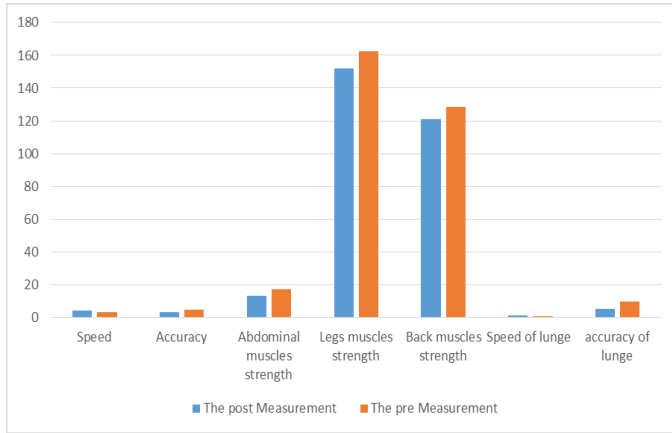
the improvement percentage	the Averages difference	T value	the post measurement		the Pre measurement		the measurement unit	the special physical abilities
			Y	X	Y	X		
20.99%	0.839	5.98	0.370	3.15	0.141	3.99	second	speed
46.15%	1.5	6.514	0.452	4.75	0.753	3.25	biggest number × 10sec	accuracy
30.96%	4.00	11.48	1.16	16.91	0.792	12.91	once	abdominal muscles strength
7.02%	10.66	14.78	1.67	162.58	1.92	151.91	Kg	legs muscles strength
6.48%	7.83	13.94	1.302	128.66	1.19	120.83	Kg	back muscles strength
24.85%	0.240	11.54	0.063	0.72	0.23	0.969	time	speed of lunge from 4th defense place
79.36%	4.16	15.39	0.668	9.41	0.621	5.25	degree	accuracy of lunge from 4th defense place

"T" tabular value at level 0.05 = 2.201

table (7) shows the following:

There are statistically significant differences between the pre and post measurements in the special physical abilities speed and accuracy of lunge in favor of the post measurement.

The differences of the special physical abilities and speed of lunge accuracy between the pre and post measurements of the experimental group



The percentage of improvement the special physical abilities and speed of lunge accuracy between the pre and post measurements of the experimental group **second:** discussing and interpreting the results: In terms of earlier data and earlier statistical treatment, the researcher reached discussing and interpreting the results as following:

discussing and interpreting the results of the functional power exercises' effect by using the added weights according to relative distribution of body parts on physical variables, speed and accuracy of lunge. Table (7) show that the functional power exercises by using the added weights according to the relative distribution of body parts led to improve the centre muscles strength. we also find

improvement with a difference (0.839min) for speed, (1.5) for accuracy, (4) times for abdominal muscles strength, (10.66kg) for legs muscles strength and (7.83kg) for back muscles strength.

also, the speed of anti-counter lunge reply from the 4th defense was improved with difference (0.240) Seconds and the accuracy was improved with difference (4.15) degree.

The researcher attributes this improvement - in the result between the pre and post measurements in favor of the post measurement to the nature of training program and its content of varying exercises.

this improvement also return to the functional power exercises' content of varying exercises which work on strengthen the abdominal and back muscles specially and all body muscles generally with focusing on Torso exercises. the exercises also included some exercises which contribute in developing some elements of the physical fitness such (speed and muscular capacity), they also help strengthen back, abdominal and legs muscles by using Swiss balls.

Dave Schmiz (2003)(4) confirms that focus on the center muscles set is one of the functional power exercises' features, where the strong center muscles link lower limb with upper limb, making them one of the best exercises which used to improve center muscles strength (the middle of the body)

Biran Makenzy indicates to "the Privacy is the golden base for any preparation program, privacy mean that the movements which performed by program be as similar as possible to movements which faced during competitions. (2:10)

the researcher attributes the improvement in speed and accuracy of lunge from the 4th situation to taking the scientific principles in account when developing program that suits the female players level. also, using weights which hanged in arms and legs help developing the physical abilities of fencing to the maximum extent with participation of the largest number of working muscles in skill by aid tools which led to raising the skills level.

this agree with "Naryman Alkhateeb" (1989)(9) and "Hanfy

Mokhtar” (1988)(7) in “The sound planning and choosing the suitable exercises enable the trainer of developing physical elements and at the same time working on player’s perfection of the basic skills .

Michael Boyle (2004)(8) shows that “ the functional programs includes the functional power which use the external resistors at all kinetic levels, also includes the functional ability which represented in movements characterized by producing power and converting it into speed

that agree with what indicated by “Talha Hosam Eldeen et all”(1997)(14) “the weights training was assigned basically to develop the muscular strength. the performance speed and muscular ability can developed through exercises of the added weights.

Conclusions:

In terms of the research aims and its hypotheses, within the research sample and its characteristics, and based upon the statistical treatments and research results, the researcher reached the following conclusions:

1- The proposed functional power exercises contributed positively and effectively in improving the physical abilities under consideration.

2-The prosed functional power exercises contributed positively and effectively in improving speed and accuracy of the anti -encounter lunge reply in fourth defense of Fleuret

3-Using the added weights according to the relative distribution of the body parts led to improving the physical abilities under consideration

Recommendations:

in light of the research aims and results and in terms of the sample, the researcher recommends the following:

1- focus on the functional power exercises when assigning training programs because they have positive effect on physical abilities level and skill performance level.

2-Taking into account the chosing of the functional power exercises in line with the common styles of muscular contractions and the strength kientic track during the skill performance in fencing

3- Designing a test battery to measure the functional power in fencing

References :

1- **Amr Hassan El- soukary (2000):** "A comparison of the effect of phyometric and weight training of the upper extremities on muscular power and the velocity of direct (coup droit) and the riposte sposte simple for beginner fencers" the scientific journal of sport and education, 19th issue, faculty of physical education for girls, Alaxandria university, june

2- **Brian Mackenzie (1999):** Sports cooch –plyometrics" Disclamier, BBC Education Web Guide. (Sport), <http://www.Brianmac.Demen.co.uk/plymo.htm>, uk, 10: 37, 17/03/1999.

3- **Daveschmitz (2003):** Functional Training Pyramids, New Truerhigh School, kinetic wellness. Department, U.S.A.

4- **David cutch (1993):** The Effect of Depth jumps and weight training on leg strength and vertical jump, Research Quarterly for Exercise and sport, Vol. 54, No. 1.

5- **Dhya Z Ebrahim (2007):** "Effects of chronobiological varition on speed and accuracy of repost- lunge from parry-four position in foil and

variables of core body temperature and heart rate behind the Anaerobic threshold" journal of college of Basic Education research seventh volume first edition.

6- **Fabio Comana (2004):** Function training for sports, Human kineties champaign II, Eng land.

7- **Hanfy Mahmoud Mokhtar (1988.):** " the bases of planning athletic training programs" , Dar Zahran for publishing and distribution,

8- **Michael Boyle (2004) :** Functional training for sports fitness, P.o.b 05076, champaignil., 61820- 5076.

9- **Naryman Muhamed Ali Elkhateeb (1989):** "The effect of proposed skill program for developing non aerial .work on performance level and some functional efficiency variables for female gymnasts", unpublished PhD thesis, faculty of physical education for girls, Cairo, Helwan University,

10- **Osama Abdelrahman Ali (1994):** "the influence of using some means of training in developing some kinetic abilities of attack renewing movements for junior fencers", unpublished master thesis, faculty of physical education

for boys, Alexandria University.

11- Ramzy Abd Alkader Altanboly(1983.) : “The effect of using some means of Strength characteristic by speed on performance speed of move forward and lunge for junior fencers” , unpublished master thesis, faculty of physical education, Alexandria,

12- Ron Jones (2003): Functional training #1: Introduction, Reebosantana, Jose corbs univ, USN.

13- Scott Jones (2003): Benefits and Limitations of Functional Exercise, Vertex Fitness, nest A., U.S.A.

14- Talha Hosam Eldeen, Wafaa Salah Eldeen, Mostafa Kamel Hamd, Saeed Abd Alrasheed(1997.) : “The scientific encyclopaedia in the sport training” Merkez Alketab for publishing, Cairo,

15- <http://11Ezine Aricles.Com/715959>.

16- <http://www.spormagazine.CJB.net>, Martinez, B.2001.