Studying the relationship between the Types of muscular strength and digital level for discus throwing competition

* A.P.D / Naglaa Ibrahim Mohamed

Introduction and research problem:

The constant competition to break the numbers and achieve the highest levels of achievement in athletics competitions in general, and discus throwing in particular, is one of the topics that still occupy the minds of all who are interested in learning about the most important factors that need attention and focus to constantly improve the level of achievement for the better.

Hara and Moliv confirm the importance of muscular strength in performing movement skills (13:73) (9:34).

Marios argues that strong persons can attain higher sports levels (11:152).

Mathius agree with Marios that Athletes need muscular strength no matter how different their activities are. (12:12)

Dr. Adel Abdel Baseer (1999) agrees with Hanafy Mokhtar (1988), Mohamed Allawey (1992) and Essam Abd Elkhalek (1981) that muscle power is one of the most important physical and motor abilities that affect performance levels in sports activities, and is one of the distinctive core elements in different forms of physical activity, but their degree of presence varies according to the requirements of each physical performance. Also, it is the base for individuals' reaching the highest levels of sports competition and affect some other physical attributes such as speed, endurance and flexibility.

The discus throwing competition is one that requires muscular strength.

The great development of the sports field and the resulting world records broken by athletes was not incidental but came from the proper application of scientific basics in establishing training

* Assistant professor in Athletic Training and Movement Sciences department, Faculty of Physical Education, Assiut University .

curricula for various sports activities.

Hence " Osman Refaat and Mahmoud Fathy " (1983) indicates the importance of muscular strength in all types of physical performance efficiency, where force occupies a special place for athletics competitors in general, and throwing in particular, but vary in type and intensity depending on the nature of the competition (15: 81).

Westcott (1982) on the need to design training for the sportive activity , according to the model used in the competition and the movement of the hand posture, range of motion, speed, time and adaptation of muscle (18: 14,15)

Talha Husam Eldin (1994) Indicates that the maximum superpower is the ability of neuromuscular system to give the maximum voluntary muscle contraction by overcoming high-intensity resistances (17: 167).

Bastawisi Ahmed and Qassim Hassan (1997) stated that the term explosive power is used by the German and American schools. It is designated by the American School (explosive power) and called (explosive Kraft) by German school (3: 21).

Imad Eddin Abbas (2005) sees that the explosive power is the ability to resist less than the maximum, but in the fastest possible time. (10: 270)

Hussein al-Tai (2010) sees that although the concept of ability is associated with strength, there is a difference between the two. This difference is the basis on which trainers depend on in the development of both the strength and ability; knowing that ability is a form of power on the grounds that the primary form of power is superpower and (characteristic strength fast - force explosiveness) is a composite of two traits: one of which is power. He adds that muscular strength is muscle ability to give greater strength while the ability is natural formula for upright explosive force. (19)

Emad Eldin Abbas 2005 confirm that where shows that the difference between explosive strength and Distinctive strengths fast summed up in the first, the player Making power is less than the maximum in the least

possible time, but the distinctive strength fast is made power less than the maximum power also slower than the maximum fast.

Therefore, the Discus Throwing competition depends on taking muscular strength variables (maximum – explosive - movement) in mind, as Osman Refaat and Mahmoud Fathy (1983) indicate the importance of muscular strength in all types of physical performance efficiency, where force occupies a special place for athletes in general and throwing particular, but vary in type and intensity depending on the nature of the competition (15: 81).

Discus throwing competition is one of the throwing competitions characterized by spontaneity in performance and training, it depends on a lot of physical variables in order to accomplishments focused herein, and continuously in the detection of these variables and studying them theoretically and scientifically to spot weaknesses in performance and power used which play a vital role in accomplishing sportive achievement because they are responsible for motor work in throwing competitions.

So, the general imagination about discus throwing competition and Self-diagnosis for the weakness and strength point wasn't enough without analysis which consider the way for us to reach to know the minute motion path to determine the capabilities of the players and their advantages and, consequently, establishing the appropriate training curriculum and building a scientific and objective measurement. This led the researcher to address strength, in an attempt to determine its relationship with achievement and the percentage of their separate and joint contribution to accomplishing digital achievement in discus throwing for students of the Faculty of Physical Education.

The researcher believes that the study of such problem is a service for the sportive community. Importance and urgency of the study emanate from student progress through guiding trainers to the type of training according to the forms of power requirement for this competition and guiding the students in selecting specialty

through the attempt to identify the percentage contribution of muscular strength (fixed motor- explosive) in the digital level of discus throwing for students of the Faculty of Physical Education.

Research Objectives

1- Identifying the relationship between the types of muscular strength and digital levels of discus throwing competition among students of the Faculty of Physical Education.

2- Identifying the percentage contribution of the types of muscular power and digital level of discus throwing among students of the Faculty of Physical Education.

3- Predicting the digital level of achievement of the discus throwing in terms of the variables of muscular strength among students of the Faculty of Physical Education.

Research hypotheses

1- There is a statistically significant relationship between the types of muscular strength and the digital level of the discus throwing with students of the Faculty of Physical Education.

2- There is a high percentage contribution between the types of muscular strength and the digital level of the discus throwing among students of the Faculty of Physical Education.

3- The types of muscular strength variables are to predict the digital level for discus throwing among the students of the Faculty of Physical Education.

Previous studies:

- Hamed Abd Elnaby Alftlawy (2005)(7) conducted a study titled "The development of relative strength for legs and arms and their impact on the level of achievement of the discus throwing for beginners." The study aimed to identify the effect of relative strength of the arms and the legs in discus level of achievement. The researcher used the experimental method, an0d the research was applied on a sample of (16) students from the Second year, Faculty of Physical Education, University of Baghdad. Students were divided into two groups; one experimental of (6) students, and the other control group (8) students. Research resulted in

that the relative strength exercises have achieved positive return in the development of technical performance level of discus throwing.

- Essam Eldin Mohamed Yousef (2004) (6) conducted a study titled " The impact of training program using bolometric exercises on muscular strength development and digital achievement level for throwing competitors (Shot put, discus, javelin) . The study aimed to identify the impact of bolometric exercises on development of (muscle ability – digital achievement level) for throwing competitors in all competition of (shot put, discus, javelin). The researcher used the Experimental method, and the research was applied on a sample of 15 individual throwing competitors under (18 – 20) from Assuit Area for Athletics. Participants were divided into 3 experimental groups: 5 Shot put, 5 discus throwing, and 5 javelin throwing. Results showed that bolometric exercises positively affect development and progress of muscular strength for throwing competitors in (Shot put, discus, javelin). Bolometric exercises also have a positive impact on the digital level of achievement of competitors in (shot put, disc, javelin) competitions.
- Osman Refat and Mahmoud Fathy (1983) (15) conducted a study titled "The relationship of fixed and mobile power to the speed of the transition and the digital level for athletics competitors). The researchers used Survey method; 22 players Distributed as follows (7 throwing player, 7 jumping players, 8 running players). Search results indicated that factors associated with moving quickly are (weight - relative strength of the legs). Such factors also led to establishing the equation to predict quick moving. The most important factors which affect on digital level is (weight – relative strength of the legs – relative back strength). Researchers reached an equation for predicting digital level using these factors.

Research plan and procedures:

Research Methodology:

Based on the procedures and nature of this research, and to achieve its aims, the researcher used Descriptive method using surveys

Research community

The community of research included on the third year students of specialty Field Training Faculty of Physical Education, Assiut University, research community reached 43 students, three students have been eliminated: one due to injury and two did not complete measurements. Thus, the sample number became (40) student divided into 10 students for the exploring study (survey) and 30 student as a main sample for research.

The research sample

The research was conducted on a sample consisting of (30) students of third year students of specialty training field at the Faculty of Physical Education - Assiut University.

Homogeneity of the sample

The researcher achieved harmony (homogeneity) between research community members in the following variables:

- Physical Building measurements : Total length – weight – age
- Physical variables (Under consideration / study) :
- Fixed power of (grip strength
- strength of the back muscle – leg muscle strength)
- Moving power of (arms strength – legs strength)
- Explosive power of (arms strength – legs strength)
- Digital level.

Homogeneity measurements were conducted by finding skewness coefficients for members of the research community, (30) students, before the start of the experiment steps to indicate the homogeneity of the community members in the variables mentioned previously which may affect the research results. Homogeneity measurements were conducted in the period from 22/3/2014 to 29/3/2014. The twisting coefficients are illustrated in Table (1)

Table (1)

The arithmetic average, standard deviation and the homogeneity of the sample for the variables (age, length, weight) and skill under discussion (studying) (N = 30)

Variables		Measurement unit	Average	Deviation	Mean	skewness coefficient	Kurtosis coefficient
Length		CM	170.17	2.68	170.00	0.39	- 0.66
Weight		KG	76.13	4.59	76.00	- 0.30	- 0.22
Age		Month	244.87	5.20	244.00	0.30	0.17
Fixed power	Fist	KG	33.30	3.00	33.00	0.15	- 0.60
	Back	KG	126.37	5.35	126.00	0.12	- 0.85
	Legs	KG	165.30	6.26	166.00	- 0.18	- 1.09
Moving Power	Chest, arms	KG	59.53	3.74	60.00	- 0.25	- 0.99
	Legs	KG	76.60	4.27	76.00	0.35	- 0.75
Explosive power	Arm(ball push)	Meter	4.69	0.48	4.73	- 0.37	- 1.00
	Legs(Leaping broad)	Meter	2.12	0.18	2.10	- 0.02	- 0.91
Discus throwing		Meter	35.13	0.86	10.90	- 0.36	- 0.98

Significance limit for skewness coefficient = 0.88

Significance limit for Kurtosis coefficient = 1.75

Shown in Table (1) moderation of research sample in the selected measurements, Where convolution coefficients ranged between (- 0.02 : 0.39), as splaying coefficient ranged between (0.17 : - 1.09), They are smaller than significance limits of the coefficient of convolution and splaying, which indicates that the research sample distribute moderate distribution in selected variables.

The study variables:

Physical tests

After reviewing references and previous studies, the researcher explored expert opinions (Attachment 1) to draw the appropriate tests for physical capacities which reached (2). Table 2 shows those tests

Table (2)

Muscular strength tests for research

Muscular strength (power)	Variable	Test name	Measuring unit
Fixed power	Fist power	Dynamometer	KG
	Back muscle power	Dynamometer	KG
	Legs muscle power	Dynamometer	KG
Moving power	Chest, arms muscle power	Test of iron bar pressure by hands in standing position	KG
	Legs muscle power	Tests of full sit and the iron bar on the shoulders	KG
Explosive power	Arms power	Medical ball pushing	Meter
	Legs power	Broad jump from standing position	Meter

Scientific rationing for tests:

Validity (validity of differentiation)

To calculate validity of tests which measure muscular strength variables under consideration, the researcher used validity of differentiation by applying the tests on 10 student in the third year, specialty field training, (the distinctive Group) and 10 student in the second year where the fundamentals of the field are studied. Such fundamentals include the study of discus throwing competition (the non-distinctive group), during the period from 5/4/2014 to 12/4/2014. The value (v) was found to calculate the significance of the differences between both as shown in Table 3.

Table (3)

The arithmetic mean and standard deviation and the value of (T) for muscular strength tests under discussion (Validity of differentiation coefficient) (N = 20)

Muscular power		Physical tests	Measurement unit	Distinctive group		Non-distinctive Group		(T) Value	Significance level
				Average	Deviation	Average	Deviation		
Fixed power	Fist power	Dynamometer	KG	37.20	1.32	30.50	1.58	10.30	significant
	Back muscle power	Dynamometer	KG	133.50	2.72	119.70	2.50	11.82	Significant
	Legs muscle power	Dynamometer	KG	172.30	2.91	156.40	1.58	15.20	Significant
Moving power	Chest, arms muscle power	Test of iron bar pressure by hands in standing position	KG	64.50	1.58	54.20	1.48	15.06	Significant
	Legs muscle power	Tests of full sit with the iron bar on the shoulders	KG	82.80	2.35	72.50	1.72	11.20	Significant
Explosive power	Arms power	Medical ball pushing	Meter	5.25	0.09	4.08	0.18	18.80	Significant
	Legs power	Broad jumping of standing position	Meter	2.32	0.06	1.88	0.05	16.92	Significant

T table value at level 0.05 = 2.10

Table 3 shows that there are statistically significant differences between the two groups (distinctive and non-distinctive) in favor of the distinctive Group which shows the validity of the tests and their ability to differentiate between the two different groups.

Reliability:

The researcher used method of applying test and reapply it (Test – Re-test) she found degrees of sample 10 student in the third year of specialty training field where this degrees consider the first applying during the period from 5/4/2014 to 12/4/2014, then this tests were reapplied for the second time on the same homogeneous sample during the period from 15/4/2014 to 22/4/2014, (10) days difference between the first applying and the second applying. Table (4) shown chosen physical tests stability.

Table (4)

The arithmetic mean, standard deviation and correlation coefficient for muscle power tests under discussion (Reliability coefficient) (N= 10)

Muscular strength		Physical tests	Measurements Unit	First application		Second application		Correlation coefficient
				Average	Deviation	Average	Deviation	
Fixed strength	Fist strength	Dynamometer	KG	31.50	2.80	31.70	2.58	0.84
	Back muscular strength	Dynamometer	KG	129.20	4.69	130.40	4.53	0.93
	Legs muscular strength	Dynamometer	KG	165.80	5.85	165.30	4.83	0.91
Moving strength	Chest, arms muscular strength	Test of iron bar pressure by hands in standing position	KG	58.80	3.55	60.20	4.21	0.88
	Legs muscular strength	Tests of full sit and the iron bar on the shoulders	KG	77.30	2.98	77.10	4.41	0.89
Explosive strength	Arms strength	Medical ball pushing	Meter	4.79	0.39	4.82	0.36	0.97
	Legs strength	Broad jump of stability	Meter	2.03	0.15	2.09	0.11	0.77

R. tabular value at 0.05 = 0.63

Table 4 shows that the correlation coefficient between the first and the second two applications is statistically significant in all used tests under discussion; implying its reliability. The calculated "R" value ranged between (0.77 and 0.97); higher than its tabular value at 0.05

Devices and tools of data collection:

The researcher used the following tools and devices to achieve the research aims :

- Restameter for measuring length and weight (CM, KG).
- Dynamometer.
- Iron bar and a number of iron disks
- Tape Measure
- Disks weighing legal (2 kg) for Boys.
- Medical balls
- Data collection form

Study (survey):

A scoping study has conducted in the period from 5/4/2014 to 8/4/2014 on a sample of 10 student from original community and outside of the research basic sample in order to do the following :

1- checking the validity of tools and devices used in the measurements.

2 - Making sure tools and devices were used appropriately for achieving the research aims.
3- Recognizing the difficulties that one might encounter during application and finding out how to overcome them.
4 - Training support staff on how to implement the research tests.
5. Identifying the time it takes to perform the tests.

Research steps:

After determining research sample and community, the researcher applied the basic experiment in the period from 17/5/2014 to 24/5/2014. Tests were conducted in the following manner:

* Measurement of fixed strength as follows:
- Fist strength (Throwing arm) using dynamometer.
- Back muscular strength using dynamometer.
- Legs muscular strength using dynamometer.

*Moving power measurements as follows:
- Chest and arms strength using (Iron bar).
- Legs muscular strength using (Iron bar).

*Explosive power measurements as follows:
- Throwing arm strength using (Medical ball pushing).
- Legs muscular strength using (wide jumping of standing position).
- Digital level for discus throwing competition according to rules organizing the competition
-Data collection, classification, scheduling, and –then- then statistical processing.

Statistical treatments:

Data was treated by the following statistical treatments:
- Arithmetic average.
- Standard deviation.
- Correlation coefficient.
- Regression Analysis.

- Results and discussion:

Through statistical treatment of the research data, in light of measurements implemented, and to facilitate presentation, results have been displayed according to order of the research aims as follows:

1- Result of identifying the relationship between the types of muscular strength and digital level for discus throwing among students of the Faculty of Physical Education.

Table (5)
Correlation coefficients between

Strength muscle (fixed, moving, explosive) and the discus throwing digital level among student of the faculty of physical education (N=30)

Variables		Measurements unit	Arithmetic average	Standard deviation	"R" value
Fixed strength	Fist	Kg	33.30	3.00	0.66
	Back	Kg	126.37	5.35	0.75
	Legs	Kg	165.30	6.26	0.92
Moving strength	Chest, arms	Kg	59.53	3.74	0.97
	Legs	Kg	76.60	4.27	0.95
Explosives strength	Ball pushing	Meter	4.69	0.48	0.97
	Broad jumping	Meter	2.12	0.18	0.97

Tubular "R" value at level of significance (0.05) = 0.36

Table (5) shows that there are statistically significant correlation coefficients between strength muscle (fixed, Moving, explosive) and the discus throwing digital level among student of the faculty of physical education, where correlation coefficients ranged between (0.66: 0.97).

Also, table (5) shows the presence of a statistically significant positive correlation between strength muscle variables (fixed, moving, explosive) and discus throwing digital level with research sample, where the correlation coefficients between fixed strength tests result and digital level were (0.66, 0.75, 0.92) and the correlation coefficients between moving strength tests and digital level were (0.97, 0.95), while the correlation coefficients between the explosive power tests and digital level were (0.97, 0.97). As shown, the highest value of the correlation was between the arms moving strength and the digital level, reaching (0.97); followed by the correlation coefficient value between legs moving strength and digital level (0.95); then the value correlation coefficients between legs fixed (static) strength and digital level that reached (0.92). The second lowest correlation coefficient value was between back fixed strength and digital level (0.75). Finally, the value of the correlation coefficient between

the fist fixed strength and digital level has reached (0.66).This answers the first hypothesis and achieve the first aim of the research, too. This is consistent with what Ahmed Khater **and Ali Elbik** "2"(1978) and **Hanfy Mokhtar** (1998)"8" referred to, as the maximum strength is required in games whose performance requires overcoming resistance. The maximum strength is required in some skills that require isometric contractions. Both of Essam Abd elkhalek (1981)"5" and Mohamed Hassan Allawy (14) added that the maximum strength is the most important physical attribute required, particularly in competitions of sports activity when linked to a high-speed contraction. And that is what Adel Abd Elbaser (1) confirm it where he referred that the maximum strength consider the base for sportive skills perfection which require overcoming resistors - confined between the intensity of the maximum load and less than the maximum- to perform it .

2- Results of identifying the percentage contribution of the types of muscular strength in the digital level for discus throwing among students of Physical Education Faculty.

3- Results of predicting discus throwing digital level in terms of the types of muscle strength variables among students of the Faculty of Physical Education.

Table (6)

Percentage contribution of fixed strength tests individually and collectively in the discus throwing digital level for the students of the Faculty of Physical Education (N = 30)

Fixed strength tests	Fixed amount	Partial regression coefficient	Standard error	" F" calculated value	"F" tabular value	Percentage Contribution
Fist muscular strength	4.72	0.19	0.04	21.92	4.20	43.91 %
Fist muscular strength	- 2.86	0.07	0.05	19.59	3.35	59.20 %
Back muscular strength		0.03	0.03			

Follow Table (6)

Percentage contribution of fixed strength tests individually and collectively in the discus throwing digital level for the students of the Faculty of Physical Education (N = 30)

Fixed strength tests	Fixed amount	Partial regression coefficient	Standard error	" F" calculated value	"F" tabular value	Percentage Contribution
Fist muscular strength	- 10.6	0.01	0.03	60.17	2.98	81.41 %
Back muscular strength		0.03	0.02			
Legs muscular strength		0.11	0.01			

Table (6) shows that the fixed strength variables may have varying contribution, the result of fist muscle strength tests (fixed) contributed individually by (43.91 %), for this the predictive regression equation in terms of this variable is: y = w +(p)(x)

Y = 4.72 + (0.19) (x1) where x1 refer to the degree of first screened in the test

Back muscle strength tests (fixed) contributed collect ivy with previous test, it increased Contribution rate from (43.91 %) to (59.20 %) with an increase (15.29%) ,Thus, the predictive linear regression equation in terms of these two variables is

Y = w + p1 x1 + p2 x2

Y = - 2.86 + (0.07) (x1) + (0.09) (x2)

X2 refer to the degree of the first screened in second test

The result of legs muscular strength test (fixed) contributed collective with previous two tests it increased contribution rate from (59.20%) to (87.41%) with an increase (28.21%). thus, the predictive linear regression equation in terms of fixed strength muscle under studying is : y = w + p1x1+p2x2+p3x3

Y= 10.6+ (0.01)(x1) + (0.03)(x2) +(0.11)(x3)

X3 refer to first screened result in third test

It turns out that the fixed strength as a contributor variable has made a percentage contribution in the digital level for discus throwing in research sample, reaching the overall percentage of the contribution

of fixed-strength tests percentage (87.41%), which is a high

Table (7)

Percentage Contribution of moving strength tests individually and collectively in the digital level for discus throwing with faculty of physical education student (N=30)

Moving strength test	Fixed amount	Partial regression coefficient	Standard error	"F" calculated value	"f" tabular value	Contribution rate
Chest, arms muscular strength	- 2.20	0.22	0.011	443.21	4.20	94.06%
Chest, arms muscular strength Legs muscular strength	- 2.90	0.16 0.06	0.036 0.031	246.66	3.35	94.81%

Table (7) shows that moving strength variables had varying contribution, the result of chest and arms muscle strength tests (moving) contributed individually by(94.06%). Thus, the predictive regression equation in terms of this variable is: $y = w + p x$

$Y = -2.20 + (0.22)(x1)$, x1 refers to first screened degree in first test.

The result of legs muscle strength test (moving) collectively with previous test, it increased contribution rate from (94.06%) to (94.81%) with an increase (0.75%), and thus the predictive linear regression equation in terms of these two variables is:

$y= w+p1\ x1+ p2x2$

$y= - 2.90 + (0.16)(x1) + (0.06)(x2)$

X2 refer to first screened degree in second test

It turns out that the moving strength as a contributor variable has made a percentage contribution in the digital level for discus throwing in research sample has reached the overall percentage of the contribution of moving-strength tests

(94.81%), which is a high percentage.

Table (8)

Contribution rate of explosive strength tests individually and collectively in the digital level for discus throwing with faculty of physical education student N=30

Explosive strength test	Fixed amount	Partial regression coefficient	Standard error	"F" calculated value	"F" tabular value	Percentage Contribution
Medical ball throwing (3Kg)	2.91	1.73	0.08	532.9	4.20	95.01%
Medical ball throwing (3Kg)	2.15	1.12	0.41	279.49	3.35	95.39%
Fixed broad jumping		1.70	1.13			

The table above shows that the explosive strength variables had varying contributions. The result of medical ball throwing (3Kg) test (explosive) individually by (95.01%), so, the predictive regression equation in terms this variable is : y= w + p1 x1 + p2 x2

Y=2.15 + (1.12)(x1) + (1.70)(x2)

X2 refers to first screened degree in second test.

It turns out that the explosive strength as a contributor variable has made a percentage contribution in the digital level for discus throwing in research sample has reached the overall percentage of the contribution of moving-strength tests (95.39%), which is a high percentage.

From the above, we note that all research variables, consisting of three types of muscular strength, achieved percentage contribution in digital level of discus throwing among the Faculty of Physical Education students (research sample). The researcher noted that the most contributing variable in digital level of discus throwing, out of the three muscular strength variables, is the explosive power with contribution percentage (95.39%); followed

by the moving strength with (94.81%); and finally the fixed strength with percentage (87.41%). The researcher argues that this order is logical as discus throwing depends primarily on the explosive power; the aim of that skill to overcome the resistance of weight as quickly as possible. This is known as explosive power, followed by the moving power which is depended upon mainly in training, and finally the fixed power which consider the foundation of throwing competitions and develop maximum strength. This is what Bastwisy Ahmed stated (1997)(4) " throwing competitions are strength competitions and the physical attributes needed by each competition differ. The most important attributes which must be available in discus throwing players is explosive strength. Players need it to get rid of the resistance, the throwing tool, at full speed. This result agrees with **Reda Abd Elhamed Amer's** (2004) (16) who concluded that there is a difference in contribution percentages of muscular strength forms for each muscles groups of the arms, legs and working trunk during main skills performance in basketball in the performance in these skills. The researcher argues that explosive strength is most important strength component which must be available in discus throwing players to achieve throwing aim; getting rid of tool for the farthest distance and at full speed. Then, there is the moving strength, one of the basic requirements, as performance requires fast motor performance in addition to strength. Fixed strength comes last of these variable as fixed strength is the foundation which performance builds on, and it is the base for the development of other physical variables required and necessary for discus throwing.

Conclusion:

According to research aims, homework, in the sample limits, the methodology used and the results of the statistical analysis of this study, the researcher reached the following conclusions:

1- There is a correlation between the digital level and the three forms of muscular strength(Fixed power - Moving power - Explosive power) .

2- The most important factors contributing in the digital level

for discus throwing were the explosive strength (87.41%), followed by the moving strength (59.20%), and finally the fixed strength (43.91%).

3- The digital level can be predicted in terms of these variables using the predictive equations previously mentioned.

Recommendations:

1- Focusing on the development of the three forms of muscular strength due to their positive contribution to the upgrading of the digital level of discus throwing competition.

2- Developing the forms of muscular strength according to the percentage contribution of each to the digital level.

3- Use of predictive equations reached to predict the digital level in terms of forms of muscle strength in the selection of players.

4- Conducting similar researches on the remaining track and field competitions.

References

1- Adel Abdul Basir: "sports training, integration between theory and practice," the book publishing center, Cairo, 1999

2- Ahmed Mohamed Khater, **Ali Fahmy Elbik :** Measurement in sports field, Dar el maaref, cairo, 1978

3-Bastwisy Ahmed Bastwisy, Kasem Hassan Husien : Iso tronic muscle training in sportive events field, Dar el fekr el araby, cairo,1997

4- Bastwisy Ahmed Bastwisy: Track and field competitions(Technique - Education – Training), Dar Elfekr Elaraby, cairo, 1997

5- Essam Abdel-Khalek: "sports training, theories and applications", 4th Floor, Dar elmaref, Alexandria .1981 .

6- Essam El-Din Mohammad Yousuf: "The impact of a training program using Albleomtrick exercises to develop muscle strength and the achievement digital level for throwing racers (shot put, disc, spear", unpublished PhD, Faculty of Physical Education in Assiut, Assiut University, 2004.

7- Hamed Abdelnby Elftlawy :" "Development of the relative strength of legs, arms and their impact on the achievement level of the discus throwing for beginners", Scientific research publication, physical education magazine, Faculty of Physical Education, Volume 14 , issue II , Baghdad university, 2005

8- Hanfy Mahmoud Mokhtar: " "Based planning of the athletic training program", Dar Zahran, cairo, 1988

9- Harra, D: Training Sport verlage, Berlin , 1971

10- Imad EddinAbbas Abu Zaid : "Planning and scientific foundations to build and prepare the team in team sports, 1st floor, Monshat Elmaref, Alexandria 0.2005 m

11- Maryers , C , R: The official Physical fitness , Hand book, popular library, New york,1996

12- Mathews ,D,K: Measurement in physical Education ,Minneapolis , Minn.Burgess publishing,Co,1990

13- Millev .Di: Biomechanics of sport, Lea and Febigen Nelson,R.C.Philadelphia.1998

14- Mohammad Hassan Allawi: "Training sports science," 9th floor, Dar elmaref , Cairo, 1992

15- Osman Hussein refaat, and Mahmoud Fathy: relationship of fixed and mobile strength with all of the speed of the transition and the digital level racers athletics, research publication, Scientific Conference for Research and Studies of Physical Education, Faculty of Physical Education, Helwan, 1983.

16- Reda Abdel Hamid Amer: "The contribution of muscle strength for each of the arms, legs and torso in the performance of the basic skills in basketball," scientific research publication, Assiut Journal of Science and Arts of Physical Education, 2004

17- Talha Husam al-Din Hussein, "the foundations of motor and functional athletic training," Dar elfekr elaraby, Cairo, 1994.

18- Westcott, L., : strength fitness physiological principles and training techniques , Allyn & Bacon,Inc.Boston ,London 1982 .

The world wide web:

19- http:// www.iraqsport's academy .COM VISITED DATA ,MARCH ., 2010.