

## The Effect of Functional Resistance Drills Using Elastic Band On Some of Physical and Kinematic Variables On Release Phase in Javelin Throw Event.

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### Abstract

*The purpose of this study is to identify the effect of functional resistance drills using elastic band on some of physical and kinematic variables on release phase in javelin throw event. Experimental approach was used with one experimental group sample was intentionally selected from under 20 years javelin thrower at Mansoura Sports Stadium and consisted 6 javelin thrower. the researcher used the experimental method and the research sample was selected from intentional second-year males students of the Faculty of Physical Education - Mansoura University which have level apical featured in the competition javelin and the number (20) students were divided into two equal groups functional resistance drills program applied in special preparation phase for 10 weeks 4 trainings unites a week with repetitions from 8 to 12 in 3 sets to 5. Conclusions functional resistance training drills using elastic band has positive effect on improving the maximum strength , power of two legs and motor balance to the study sample. Functional resistance training using elastic band led to improved height , angle ,speed release and throwing distance of the study sample in the javelin event.*

**Key word:** functional resistance drills - elastic band - kinematic variables - javelin throw release phase ..

### Introduction:

Reaching out to achieve the best digital achievements in javelin throw event, that require access to technical performance as close to optimal by linking the speed of approach and put throwing in order to enable the contestant to give the javelin best speed launch during the release stage, through modern techniques and variety of training methods in addition to the development of assistive equipment's for practical training.

The researcher believe the release phase are the great importance of being a turning point between what it acquired through the contestant approaching the speed of horizontal transfer stage, trying to release of javelin through the stage, according to the kinematic variables the special nature of the movement during this phase.

By the end of steps approaching preparing the contestant is preparing to throwing and release phase and this is Khaled Wahed Ebrahim (2014), quoting Zaki Darwish and Adel Abdalhafez (1994) referred to that after landing his left foot forward, pushing the right earth guy strongly in the direction of throwing and thus pushing the pelvis of spins strongly forward and up the trunk after that the maximum curvature of the back like a character (C), and preceded likely movement of the left arm, which works to lengthen the chest muscles reverse chucking must delay entry aimed at throwing process arm as less muscle (the limbs) strength until the muscles of legs and torso ends to make the maximum her attraction forward. (11)

the arrival of the contestant to put curvature stretched (C) is attached above the grip and make the humerus with forearm angle of (90 degrees) to enact a javelin up toward chucking and that any defect performance of the thrower to this situation will reflect negatively on kinematics affecting distance variables throwing that is Tom (2001) Refers. (18)

Therefore throwing distance affected by kinematics variables on release phase This is what was agreed upon all of Chiu (2009 m) with Murakami, m et al (2006) and represented those variables on the rise above the point of release, the speed of the release, angle release, angle attack tool to Besides wind speed. (1) (15)

While the throwing distance in the javelin rely on the values of kinematic variables release besides affecting it forces during flight, and release angle is the angle between the outcome of the speed of the weight of the javelin and the center line of horizontal passing the weight of the Javelin center path at the moment of its launch and this is referred to all of Viitasalo adds, Mononen and Norvapalo (2003). (13)

So release angle is the important factors that contribute to the length of the flight javelin distance angle in addition to that there is the extent of the amount of release angle depends on the speed of first Instance for the start of the Javelin and strength of the Javelin "throwing force" and the direction of the wind and the optimal angle javelin throw in javelin competition, according to some sport models and rules of javelin throwing is 35 degrees and this is referred to all of Maryniak, Kozdraś and Golińska (2009). (6)

The researcher believes the importance of the relationship between the physical demands and motor duties for this stage because of their importance and impact on the throwing distance, which it help muscle strength of various kinds on the implementation of the duties and motor which in turn affects motor speed development and therefore the foundation to reach the high levels.

Performance analysis and to identify defects or features of the technique used by the athlete is considered one of the factors that can help the coach to designate or identify the type of training needs and commensurate with the athlete to improve his performance and it may be a drawback in lack of physical or described in the player's own performance technique and this was confirmed by Mohamed Brekaa and Kharya Elsokary (2002). (14)

During the past few years has become a functional strength training commonly used in the sports field of in addition to being used under several names, such as integrated training and model training was confirmed by Christine Cunningham, (2000). (2)

During the traditional programs is increased muscle strength for a muscle without training similar movements for the technical performance, while functional drills include several muscle groups and joints for both parties, "top and bottom" as well being used alternative options within training assistance ways to improve the technical performance compared to traditional drills, and it fits with all ages and contribute to the improvement of all physical abilities, where they increase and enhance the muscles strength endurance, motor balance, agility, where lead full motor joints term and This is indicated by Tiana, W., et, al (2010). (17)

And the difference between specific and functional drills Christine Cunningham (2000) refers to be functional training drills performed on the movements of the specific drills is typically the private nature of the performance muscles, plus it is a key part of the functional training basics. (2)

knowing a combination of strength training and balance lead in the same time, it is also an integrated and multi-level movements (front, transverse and sagittal) include acceleration, stability and deceleration, in order to improve motor ability, the central strength (the spine and the middle of the body) and neuromuscular efficiency and this is Fabio Comana (2004)referred. (6)

explaining the importance of functional strength training drills all training programs should include functional strength drills, during they perform the competition; we find that the weight of the body center is a movable and ever-changing, especially in activities that require forward and backward movements and this is Scott Gaines, (2003) referred. (10).

Functional training programs consist of drills Central stability Core stability which movements performed a few repetitions and severity of the medium with the gradual progress in performance in order to achieve stability and self-control neuromuscular, central power Core Strength a related dynamic uses movements external resistors in all kinetic levels and aims to achieve muscle strength and motor integration, the core power movements and are therefore characterized by the production of power and this is Michael, B., (2004) confirmed. (13)

Functional training has the characteristics and attributes of the most important to focus on the muscles of the middle group, multiple levels, multiple joints, control of the anti-balance, one limb, and the parties alternating, integrative movement, specific activity, the quality of speed and this is Dave Schmitz (2003) referred. (3)

the resistance drills using elastic band has a special in many strength training programs stature because of their effective impact on the technical performance and possible performance and integrated in the drills along the extent of the sports movement in order to reform and improve many of the sports movements and this is Wallace, B.J., Et, al (2006) confirmed. (20)

It is already clear the importance of functional resistance training using elastic bands in linking the physical demands and duties kinetic thereby contributing to improving the level of performance compared to traditional drills where the muscle power of various kinds to help implement the duties motor which in turn affects motor speed and employment development to achieve high levels of digital achievement.

And include duties kinetic take the thrower to put the right throwing position before release of the Javelin, which provides access to the largest amount of power and a longer path to the acceleration Javelin and give the angle of the release and the speed of the release " Kinematics" influencing variables in the release phase," and that the acquisition and mastery of performance by release back to its automated stage in performance requires avoiding excessive movements and errors in this important stage.

Through Reference Survey studies and related researches (1) (2) (3) (4) (5) (7) (8)(12 )(13) (15) (19) have been identified the appropriate kinematic measurements kown competition variables throw following javelin, and the survey conducted by the researcher to study the performance by release phase the (5) students of the third year phase - specialty training track and field competitions - Faculty of Physical Education - Mansoura University and they have already learned the competition javelin which have level digital featured in the contest and registered Dakahlia Athletics area through the performance of the best attempts analysis turns out a reduction in the values of

certain variables Kinematics to release ranging height release to have between 182 cm: 194 cm and speed release between 12.5 m / s to 14.6 m / s as it was release 22:26 angle while the value of the ideal release of 35-degree angle, according to the referred Maryniak, J, Kozdraś, E , Golińska,E (2009) study .(12)

So the researcher is trying through this experimental study was to investigate the effect of functional resistance drills using elastic band on some of the physical and Kinematic variables to release stage in the javelin throw event. Research procedures :

Experimental approach was used with one experimental, control group and pre- post measurements in Mansoura University Olympic Village and Mansoura stadium athletic hall, and track and field, pilot studies, pre and post measurements, and main study different rates weight

drills has been conducted during the special preparation period within javelin thrower training program, in the period from September 28 th till December 11th, 2013 .sample was intentionally selected form under (20) years javelin thrower at Mansoura Sports Stadium and consisted (10) thrower.

Kinetic analysis done using PC and video point program where (6) attempts filmed for each javelin thrower, imaging field includes release phase beginning and ending with registration of throwers numbers, according to the order of their performance and identify successful and failed attempts and then selecting best successful attempts for each thrower in research sample and then these attempts used as inputs to the computer software to start the process of kinetic analysis and to define kinematic variables for release phase.

Table (1)

Statistical characterization of study sample in basic and physical variables (under study) n = 20

The variables	Measurement unit	Mean	Median	Std. Deviation	Skewness
Age	to the nearest half-year	19.455	19.500	0.196	-0.083
Height	to the nearest cm	180.700	182.000	4.169	-0.084
Weight	to the nearest kg	72.050	72.000	2.282	0.257
the time of 30-meter sprint from a crouch start test	s	4.018	3.960	0.141	0.783
Measuring extension muscles strength for the back	kg	183.315	184.250	4.207	-0.109
measuring extension muscles strength of the two legs	kg	268.15	267.00	4.591	0.284
Standing broad jump Test	cm	226.35	228.00	5.669	0.056
Standing vertical jump test	cm	38.850	38.000	2.159	0.319
Push shot put by hands in front of the body	m	10.240	10.260	0.138	-1.163
push shot put by hands behind of the body	m	11.282	11.350	0.179	-0.772

Table (1) show the basic and physical variables for study sample are normally distributed

Table (2)

Statistical characterization of study sample in muscle strength of kinematic variables for javelin thrower

Variables	measurement unit	Mean	Median	Standard Deviation	Skewness
High point of release	Cm	187.85	188.00	1.565	-0.457
the speed of the release	m/s	13.775	13.600	0.397	1.152
release angle	Degree	26.805	26.800	0.763	-0.547
throwing distance	M	37.616	37.890	2.435	-3.629

Table (2) show the values of kinematic variables for javelin thrower in release phase for study sample are normally distributed

Table (3)

Valence to experimental and control groups in pre – measurements of the variables under study n 1 = n 2=10

The variables	The unit of measurement	Control group		Experimental group		t
		Mean	Std. Deviation	Mean	Std. Deviation	
Age	to the nearest half-year	19.480	0.210	19.430	0.189	0.560
Height	to the nearest cm	182.00	4.110	179.40	4.006	1.433
Weight	to the nearest kg	71.400	2.221	72.700	2.263	1.296
the time of 30-meter sprint from a crouch start test	S	4.035	0.149	4.001	0.139	0.527
Measuring extension muscles strength for the back	Kg	184.13	5.126	182.50	3.100	0.860
measuring extension muscles strength of the two legs	Kg	268.50	3.408	267.80	5.712	0.333
Standing broad jump Test	Cm	227.10	6.100	225.60	5.420	0.581
Standing vertical jump test	Cm	38.700	2.263	39.000	2.160	0.303
Push shot put by hands in front of the body	M	10.218	0.162	10.262	0.113	0.704
push shot put by hands behind of the body	M	11.284	0.163	11.280	0.203	0.049
High point of release	Cm	187.60	1.265	188.10	1.853	0.705
The speed of the release	m/s	13.610	0.218	13.940	0.474	1.999
Release angle	Degree	26.760	0.849	26.850	0.709	0.257
Throwing distance	M	38.024	0.779	37.207	3.396	0.741

T. tabular value significant at of 0.05 = 2.101

D \*

Table (4)

Statistical characterization of study sample in muscle strength of kinematic variables for javelin thrower

The variables	unit measurement	Control group		Experimental group		t
		Mean	Std. Deviation	Mean	Std. Deviation	
High point of release	Cm	187.60	1.265	188.10	1.853	0.705
The speed of the release	m/s	13.610	0.218	13.940	0.474	1.999
Release angle	Degree	26.760	0.849	26.850	0.709	0.257
Throwing distance	M	38.024	0.779	37.207	3.396	0.741

T. tabular value significant at 0.05 = 2.101

D \*

Shown in table (3) the lack of statistically significant differences between pre - measurements to experimental group and control group in the variables under study which shows the absence of that significance differences between the two groups before the start of the experiment.

#### Main study:

Conducted during special preparation period of training drills resistance using elastic band during the specific preparation from the competition's a training program the

javelin in the period from January 30th, 2014 to April 12th, 2014 for a period of (10) weeks with (4) trainings session a week with repetitions from 8 to 12 in 3 sets to 5 session time (2 hours). Attachment (1)

The calibration of elastic band in plastic private management of public

Labs textile chemistry of the department at the Ministry of Trade and Industry.

Table (5)

Account of the results of the three samples were analyzed for the calibration elastic band

The variables	Red elastic band	Black elastic band	Blue elastic band
Width	2.8cm	2 cm	1.25 cm
Thickness	4.67Mm	4.75 Mm	4.846 Mm
Highest pull load "for 10cm length"	20.546kg	14.595 kg	10.503 kg
Stretch on "highest load length for 10cm"	%434.0	439.0%	420.133%

- Has been set specific dimension for the results of the three-sample analysis for the elastic band by the competent laboratory are as follows:

Post measurements: After completion of main study post-measurements were conducted on April 13th, and 14th, 2014AD.

Statistical coefficients and factors: mean - standard Deviation - median - convolution coefficient - Test (T) - percentage Change.

**Results and discussion:**

First present the results of pre and post measurement to control group in the physical variables under study.

Table (6)

Signify the differences between pre and post measurement of the control group in physical variables under study n = 10

The variables	measurement unit	Pre-Measurement		post Measurement		T value	Change rate
		Mean	Std. Deviation	Mean	Std. Deviation		
the time of 30 meter sprint from a crouch start test	S	4.035	0.149	4.107	0.940	0.235*	1.78%
Measuring extension muscles strength for the back	kg	184	5.126	195.	4.745	10.2	5.96%
measuring extension muscles strength of the two legs	kg	268.50	3.408	286.10	4.606	9.387*	6.55%
Standing broad jump Test	cm	227.10	6.100	238.60	2.413	8.032*	5.06%
Standing vertical jump test	cm	38.700	2.263	42.600	1.350	5.087*	10.08%
Push shot put by hands in front of the body	M	10.218	0.162	11.123	0.139	20.290*	8.86%
push shot put by hands behind of the body	M	11.284	0.163	12.473	0.184	22.212*	10.54%
High point of release	cm	187.60	1.265	195.90	1.853	22.636*	4.42%
the speed of the release	m/s	13.610	0.218	15.850	0.354	20.044*	16.46%
release angle	Degree	26.760	0.849	28.250	0.657	5.001*	5.57%
throwing distance	M	38.024	0.779	39.925	0.747	9.200*	5.00%

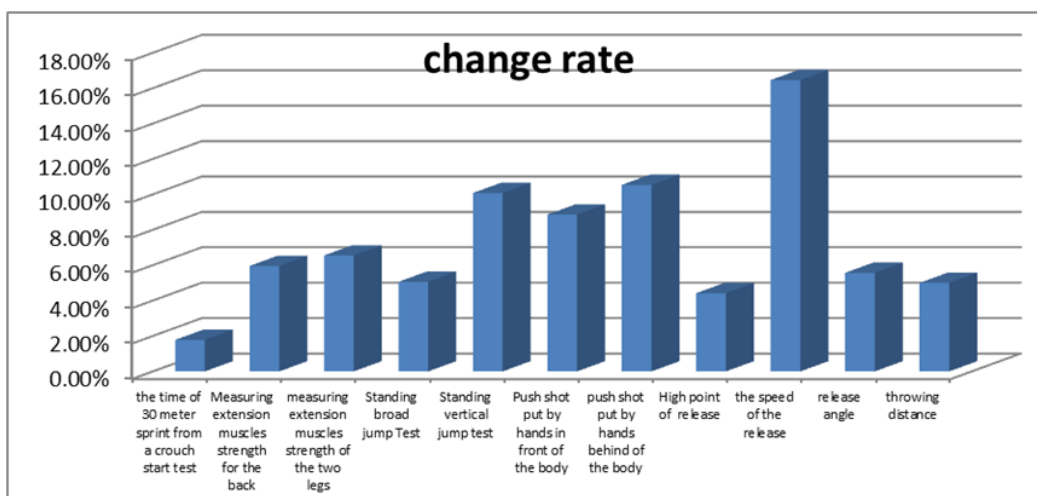
T. tabular significant at 0.05 = 2.101 D\*

Seen from the table (4) lack of statistically significant differences between the pre- and the post measurements of the control group in the variables under study, while there

are no differences between the pre- and post-measurement in variable time 30 m sprint of the crouch start.

Chart (1)

change rate for variables under study for the control group



Second :Present the results of pre- and post-measurements in the variables to experimental group.

Table (7)

Denote the differences between pre and post measurements for experimental group in variables under study n = 10

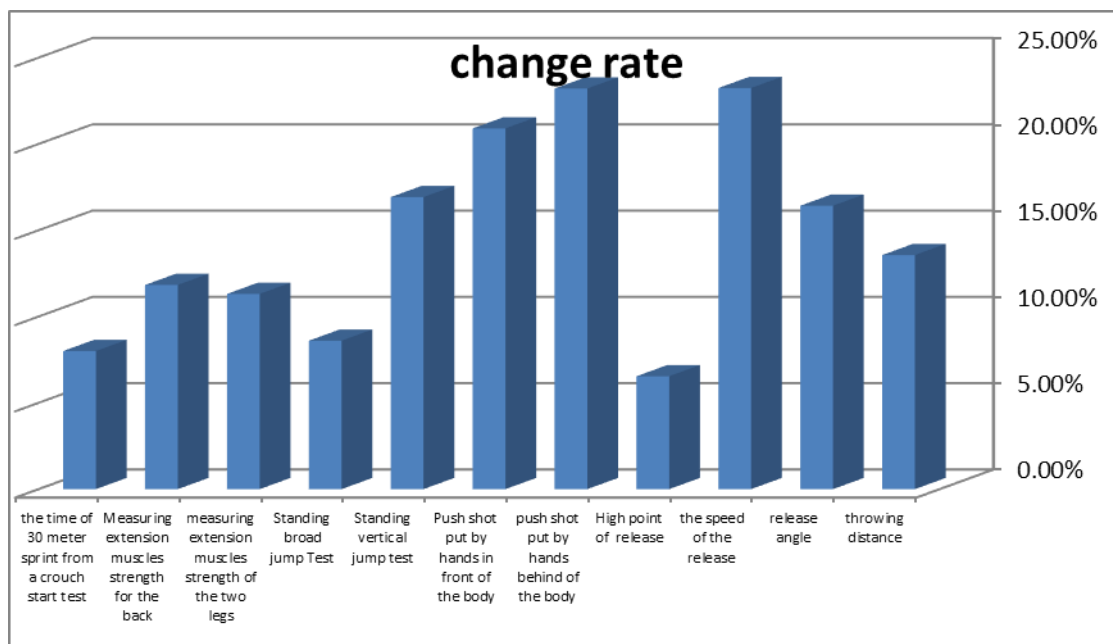
The variables	Measurement unit	Pre-Measurement		post Measurement		t	Change rate
		Mean	Std. Deviation	Mean	Std. Deviation		
the time of 30 meter sprint from a crouch start test	S	4.001	0.139	3.681	0.034	7.307	8.00%
Measuring extension muscles strength for the back	Kg	182.500	3.100	204.090	6.154	9.148	11.83%
measuring extension muscles strength of the two legs	Kg	267.800	5.712	298.100	6.045	11.274	11.31%
Standing broad jump Test	Cm	225.600	5.420	245.000	3.944	7.859	8.60%
Standing vertical jump test	Cm	39.000	2.160	45.600	1.955	7.163	16.92%
Push shot put by hands in front of the body	M	10.262	0.113	12.407	0.486	14.249	20.90%
push shot put by hands behind of the body	m	11.280	0.203	13.898	0.523	14.085	23.21%
High point of release	Cm	188.100	1.853	200.400	3.471	8.554	6.54%
the speed of the release	m/s	13.940	0.474	17.180	0.498	12.693	23.24%
release angle	Degree	26.850	0.709	31.260	0.438	16.578	16.42%
throwing distance	M	37.207	3.396	42.254	0.855	4.073	13.56%

T. tabular value significant at 0.05 = 2.101 D \*

Seen from the table (4) there are significant differences between pre- and post-measurements to experimental group in the variables under study at the significant level.

Chart (2)

change rate for variables under study for the experimental group



Third: the results show the differences between post measurements of the control group and the experimental of the group in the variables under study.

Table (8)

Indication of the differences between the post tests for experimental group and post tests for the control group in variables under study n = 10

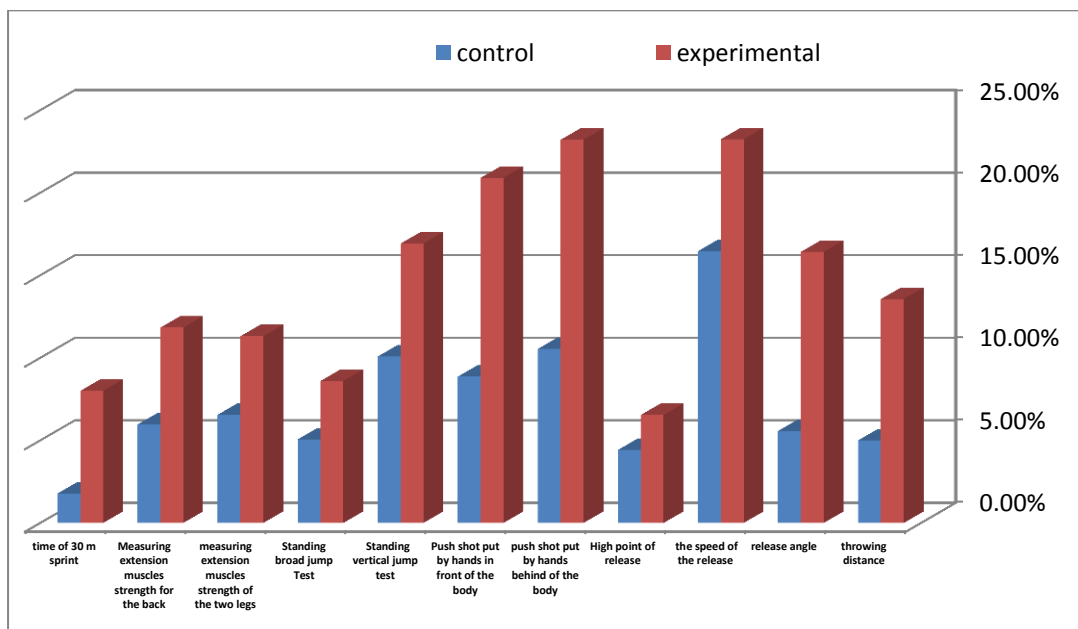
The variables	The unit of measurement	Control group		Experimental group		T value
		Mean	Std. Deviation	Mean	Std. Deviation	
the time of 30 meter sprint from a crouch start test	s	4.107	0.940	3.657	0.023	1.513
Measuring extension muscles strength for the back	kg	195.110	4.745	204.090	6.154	3.654
measuring extension muscles strength of the two legs	kg	286.100	4.606	298.100	6.045	4.993
Standing broad jump Test	cm	238.600	2.413	245.000	3.944	4.377
Standing vertical jump test	cm	42.600	1.350	45.600	1.955	3.993
Push shot put by hands in front of the body	m	11.123	0.139	12.407	0.486	8.030
push shot put by hands behind of the body	m	12.473	0.184	13.898	0.523	8.127
High point of release	cm	195.900	1.853	200.400	3.471	3.617
the speed of the release	m/s	15.850	0.354	17.180	0.498	6.882
release angle	Degree	28.250	0.657	31.260	0.438	12.057
throwing distance	M	39.925	0.747	42.254	0.855	6.484

T. tabular value significant at 0.05 = 2.101 D\*

Seen from the table (8) there are of statistically significant differences between the post measurements to experimental group and post measurements of the control group in favor of the post measurements to experimental group in the variables under study at the significant level of 0.05, where the value of (T) calculated higher than Tabulated value except for a variable time of 30 m sprint from a crouch start test.

Chart3

change rate for variables under study for the post measurements for experimental and control group



**Result discussions:**

Seen from the table (4) and chart (1) the presence of statistically significant differences between pre and post measurements to the control group in the variables under the study in favor of the post tests, unless the time of 30 m

sprint from a crouch start test variable, As the values of confined to Test (T) calculated (0.2350, 22.636), while the value of (T) Tabulated significant at level (0.05) (2.101). As well as confined to the percentage change between (1.78%, 16.46%) had the highest percentage change in the

spread of the release, while the lowest percentage change in the sprint 30 m time of crouch start. The researcher attributed these changes to the Special program control group occurs

Shown in Table 5 and the chart (2) the presence of statistically significant differences between pre- tests and post tests for experimental group in the variables under study in favor of the post tests, As confined to values (T) test calculated (4.073, 14.249), while the value of (T) Tabulated at the moral level (0.05) (2.101). As well as confined to the percentage change between (8.00%, 23.24%) had the highest percentage change in the spread of the release, while the lowest percentage change in the sprint 30 m time of crouch start.

Due researcher these changes occur to functional strength drills program using elastic band in order to muscular strength development by training different muscle groups, especially the center muscles, arms and legs and the researcher concentrated on muscle groups working together with the accuracy choose functional strength drills where it led to improve the power.

It is evident from table 5 and the chart (3) the presence of statistically significant differences between the post tests of the control group and post measurements of experimental group in the variables under study in favor of the post measurements experimental group except for a variable time of 30 m sprint of the crouch start, as confined to values (T) test calculated (1.513, 12.057), while the value of (T) Tabulated at moral level (0.05) (2.101).

It is what consolation researcher of the effect of drills functional resistance using elastic band and that have been applied during Special study sample preparation on the physical variables period under study, and this is consistent with what I said Tiana Weiss et al (2010) that the functional resistance drills is one of the methods in improving fitness muscle in ways better than traditional drills including Provisions of strength training, speed and balance and coordination, as they use alternative options within the training methods compared to traditional drills as they are suitable for all ages, as well as contribute to improving all physical abilities of the athletes, as they increase and enhance the muscles strength endurance and equilibrium and agility during implementation of training programs As they lead to multiple muscles and joints of the body, during the full term of the motor joints. (11)

Due researcher percentage change in kinematic variables phase released especially throwing to the effectiveness of functional strength drills using elastic band per (10) weeks to improving speed and power for the muscles working in throw javelin competition as the duration of drills was appropriate to make working muscles adaptation. As

influenced functional strength drills using elastic band in controlling body positions and acquire of the release and reach out to the mechanism stage as soon as the ideal technical performance during the release stage, which led to obtain the largest amount of power as well as a longer path to the javelin acceleration and improves their maximum spread release.

As well as increase the strength of the muscles of shoulders, chest, back and thrower arm aimed at making a positive impact on the stages of pull and push, thereby increasing the speed release the javelin and throwing distance than a positive impact on the released angle, release height, speed of release and throwing distance.

the functional training programs lead to improved neuromuscular control and integration of motor and enhance the muscle strength and power and agree with what Michel (2004) confirms that (7).

the balance is a key element in functional drills, not only the balance between strength and flexibility, but also between the muscles working and non-working and this important interactive feature in functional drills that is Confirming by Fabio Comana, (2004). (4)

And agrees the results of the current study with as indicated by the results of Khalid Waheed Ibrahim study (2013), where functional strength training drills contributed using elastic band in improving and perfecting performance through motor transport process of the lower limb to the trunk and then to the thrower arm making a positive impact on all of the release angle, the height and speed to release and throwing distance of the study.7))

### **Conclusions:**

Through results presentation and discussion, it was possible to conclude that the Functional resistance training drills using elastic band to improve the maximum strength and power to the study sample and Functional resistance training using elastic band led to improved height and angle release speed and throwing distance of the study sample in the javelin event.

### **Recommendations:**

In light of research conclusion researcher recommends that Functional resistance training drills using elastic band to improve the maximum strength and power to the study sample, Functional resistance training using elastic band led to improved height and angle release speed and throwing distance of the study sample in the javelin event. The use of functional resistance drills using elastic band within training programs for all throwing competitions. variety in the application of functional drills using elastic resistance band muscles party the upper and lower muscles of the center (core muscles) because of its positive effect on the technical performance. The need for strength



measurements muscles party the upper and lower muscles and stability the center (core muscles) and equilibrium and motor kinetic analysis and work to improve them during different training periods.

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