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The effect of using a proposed training device in developing some kinematic variables and achieving discus throwing for the disabled, class (54)

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Abstract
The importance of this study came to shed light on the importance of the proposed device, which includes improving the motor path of the disc in the throwing mode (force mode) and throwing, as well as improving and developing the special strength and development of the muscles working in these two important stages, and helping to develop kinematic variables related to skill performance and correct mechanical conditions. It has to add integration in developing the technical performance of discus throwing and achieving outstanding achievement for this category of disabled people under study category (54). The study aimed to design a proposed device for throwing the disc for the disabled category (54) and to identify the effect of training on this device in developing some kinematics and achievement for throwing the disc for the disabled category (54). The research sample was chosen in the intended way, from the players of the Paralympic Sub-Committee in Diyala in Athletics for the Disabled in the event of throwing the disc, class (54), and their number is (8) players, (2) players were excluded for the purposes of pilot experiments, as the research sample became (8). The research sample constituted (80%) of the original research community, and the research procedures included conducting design and manufacturing procedures for the proposed device, as well as conducting reconnaissance experiments, tribal and dimensional tests, and measuring the kinematic variables, which included (starting angle, direction angle, attack angle, starting speed, point height). Launching, angular and circumferential velocity of the aiming arm, and acceleration obtained). The exercises were applied using the training device for a period of (8) weeks and at a rate of (3) training units per week and The total number of training units was (24) units during the duration of the experiment, as the number of training units reached (24) units, and the time of the total training unit was (90) minutes. The main section, and the researchers concluded that the exercises on the proposed device led to the development of the special force, the kinematic variables under research and achievement for the members of the research sample. Researchers emphasize the use of the (manufactured device) as an aid to develop the special strength of discus

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throwers, especially the disabled class (56), as well as emphasizing explosive and rapid strength training, which is included in the development of achievement, and conducting exercises on the proposed device according to the motor paths of the technical stages of the disc.

Keywords: training device, kinematics, discus throw, disabled, class (54(

Introduction

The use of mechanical devices for kinetic fields, skills and various sports, means the design of devices for simulating movement using physical laws to find solutions and applications with methods of accurate measurements that affect performance directly and is concerned with bringing about development continuously without stopping, and in recent times it has been linked with industrial development in a way Large for the production of devices (training devices) and new and advanced technology means that meet the growing requirements for finding assistance in education and training as well as evaluation of various sports movements, as engineering designs in the sports field during the third millennium in countries such as Federal Germany - soon - reached more than (80)) A device designed for the purposes of sports engineering in various sports fields, especially athletics, including throwing activities (discus, hammer, and weight),The goal of devising technological systems and special devices in discus throwing is to judge the level of performance using the latest measuring devices. In judging the achievement of the goal from the level of performance in which the speed increases from the moment of the double pivot until the stage of disposal of the tool and to treat this problem only mechanical systems were invented using digital technology to evaluate education and training programs and the manufacture of sports equipment to develop special strength, especially in throwing activities, including (throwing) Disc). 1998,89 War War(,Training on these devices brings about the desired developments for the players and ensures access to the required training goals and helps in the development and development of muscular strength and other basic physical characteristics in the least effort and the shortest time. From this point of view, the importance of this study came to shed light on the importance of the proposed device, which includes Improving the motor path of the disc in the phase of throwing (force mode) and throwing, as well as improving and developing the special strength and development of the muscles working in these two important phases, and helping to develop the kinematic variables related to the skill performance and the correct mechanical conditions for them to add integration in the development of the technical performance of discus throw and achieve outstanding achievement For this category of disabled people under study category (54.(

And through the experience of researchers in the field of athletics, especially throwing events, as well as their knowledge of sources, research and scientific studies, I note that there is a low level in the digital level for the achievement of discus throw for the disabled in our dear country compared to the continental and international digital levels, and since the biomechanical variables are among the main determinants of achieving Discus throwing for the disabled, which requires identifying these variables and working on their development and development. Therefore, the researchers turned to study this problem, designing a device that simulates the final throwing position of the discus, which is within the motor path of throwing the disc for this category during the race during the performance of the stages for this activity without prejudice to the required motor paths During the performance, especially for the phases of throwing and throwing, and believing that these procedures would develop the kinematic variables and achieve the players in this game.The study aims to design a proposed device for throwing the disc for the disabled category (54) and to identify

the effect of training on this device in developing some kinematics and achievement of throwing the disc for the disabled category (54),The researchers also assume that the proposed training device has an impact on some kinematic variables and achievement of discus throwing for the disabled for the research sample, and that there are statistically significant differences between the results of the pre and posttests in the kinematic variables and achievement and in the interest of the post tests.

2- Research methodology and field strength:

1.2. Research Methodology: The researchers used the experimental method to suit the nature of the problem by designing one group to suit the nature of the problem to be solved.

2.2.Research sample: The research sample was chosen in the intentional way, from the players of the Paralympic in Diyala in Athletics for the Disabled in the event of throwing the discus category (54) Subcommittee and the number is (8) players, (2) players were excluded for the purposes of pilot experiments, as The research sample became (8) and the research sample constituted (80%) of the original research community.

The researchers found the normal state of the research sample in terms of: length, age, and masses, using the torsion coefficient, as (±3) indicates that there is homogeneity among the sample members as shown in Table (1).

Table (1)

It shows the homogeneity of the sample in terms of age, age, training, mass and lengths.

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.248	1.751	24.500	24.333	raey	egA
.000	2.898	61.000	61.000	gk	ssam ydob
.668	1.169	5,000	5.166	raey	ega gniniart
.879	2.401	65.500	66.166	nosiop	mra gnimia htgnel
.600	2.338	50,000	50.66	nosiop	htgnel bmil reppu

3.2. Equipment and tools used in the research:

The proposed training device, an electronic device for measuring length and mass, (1), a Dell laptop calculator, (1), a CD, (6), a Casio stopwatch, (4), Metric tape measure, number (1), 20 throwing discs of different weights (1 kg, 1.5 kg, 1.750 kg), electronic scale for measuring mass (Ketecto) Japanese-made type, medical balls weighing (3) kg, 3 pieces, iron rod Bar) (20) kg weight, (3) iron discs with weights (1.25 - 2.5 - 5 - 7.5 - 10 15 - 20) kg, bench, especially for the disabled, number (3). Japanese-origin (Exillim) high-speed video camera (1000) r/s with an external storage unit, number (1), special software for kinetic analysis (Kinovia), a ladder of various heights used for video shooting from the top, length 4m, tripod for the camera number 3.

4.2 .The proposed training device (manufacture, description, and method of operation):

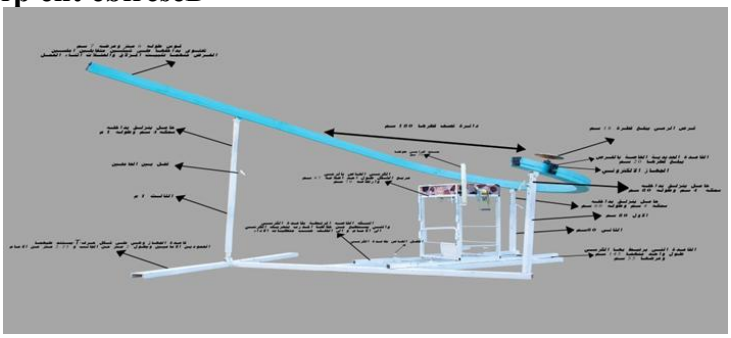
The proposed training device was designed by the researcher Yen and it simulates the last throwing position of the discus, and the goal of the device is to develop the special strength and achievement for the disabled discus throwers category (54). and shooting angle.

As the device was manufactured in the form of an arched metal rail in the form of a semi-circle made of steel (2 mm), radius (180 cm) and length (6 m) containing a cart loaded with different weights and a legal disc that runs smoothly. The same motor path that the tool passes through during the performance of the throwing stage, and the metal rail was fixed on a group of beams that achieve that motor path for us while leaving a straight distance at the end of the path for the purpose of leaving the car in a similar way to the process of leaving the throwing tool, and the researcher took into account that the angle is Throwing is similar to the ideal angle, as the signs were fixed to be the throwing angle (37-40°), which was extracted through a right-angled triangle and a protractor and projecting a vertical line on the ground from the moment of throwing to that angle from the horizontal line parallel to the ground.

The work on this device is done by the athlete sitting in the center of the arc and then holding the handle of the cart and then moving towards the back and then forward and then the throwing process takes place. It is explained in the training units of the program, knowing that the device has the ability to change its position to suit the different physical measurements of samples of different categories, and therefore it is suitable for training in two directions. The ability to load the manufactured cart with iron weights, according to the physical load used and the weight of the resistance.

Figure (1)

ecived desoporp eht ebircseD

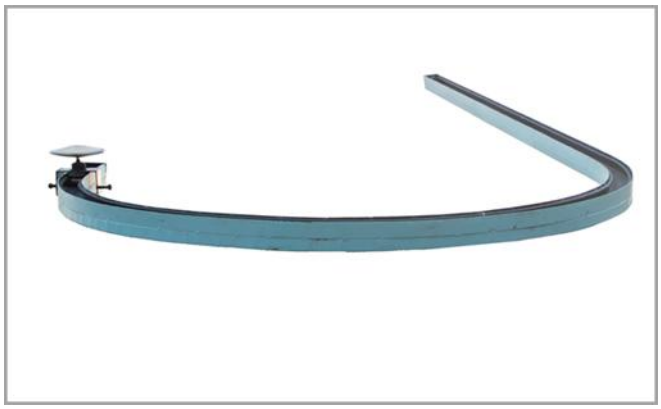


- **2-4-1 Parts of the machine:**

Iron bow: The device consists of a bow made of folded iron, as shown in Figure (2).

Figure (2)

wob nori dedlof eht swohS



: - Three columns fixed in the ground capable of rising and falling according to performance requirements. As shown in Figure (3).

The base of the device: - It consists of galvanized iron (Shelman) in the form of the letter (T) on which the two front columns rest, with a length of (2 m) from the side and (2.25 m) from the front. It has the back column and the chair for sitting, with a length of (145 cm), width (55 cm), iron thickness (10 cm) and height (4.5 cm), as shown in Figure (4).

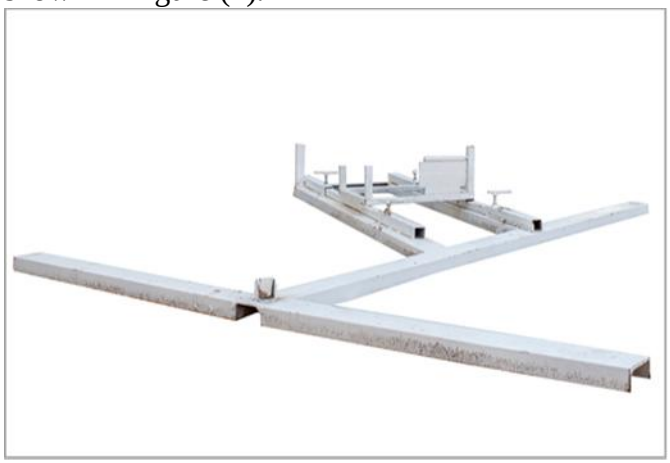


Figure (3) Figure (4)
It shows the device columns Explains the base of the proposed device

The movable base:- It is installed on the iron circle. It contains a handle (legal throwing disc) that is movable according to the length of the player's arm. It also contains a rod for placing weights in length (10 cm) and the height of the machine is (5 cm) and width (7 cm) and a rolling shutter is attached to it on both sides. Its purpose is to install the slides, its own levers, and the weight bearing, which is made of iron, as shown in Figure (5)

Figure (5)

redils eht no esab elbavom eht setartsnomeD

A legal wheelchair for the category of (56) disabled people: - It is square in shape of galvanized iron, its height is (70 cm) according to the legal specifications of the Olympic Committee, and it contains a fixing belt that is linked to its ends by means of (rouges) to enlarge and reduce and contains a front support to install the player's foot During the performance, it is connected from the bottom to the main base and is

designed so that the coach can control it according to the physical measurements of the players.
slide: The slide consists of resistant iron thickness (2 mm) and double bobbin iron pulleys, which are easy to move (2 pieces) fixed by welding from the inside. Figure (6)

Figure (6)
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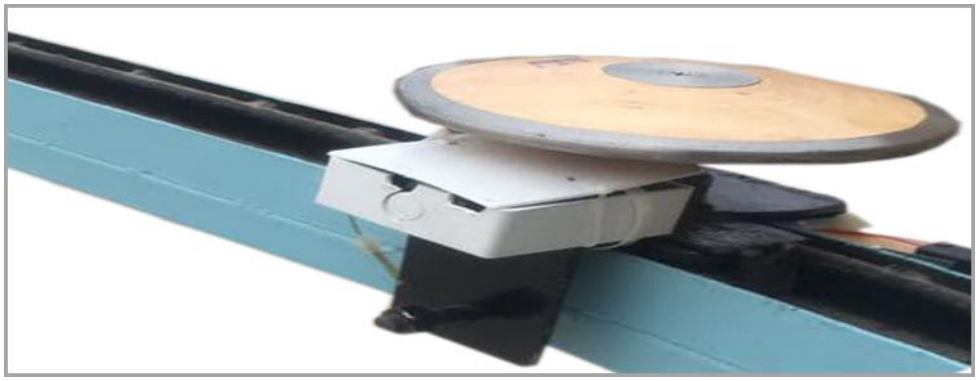
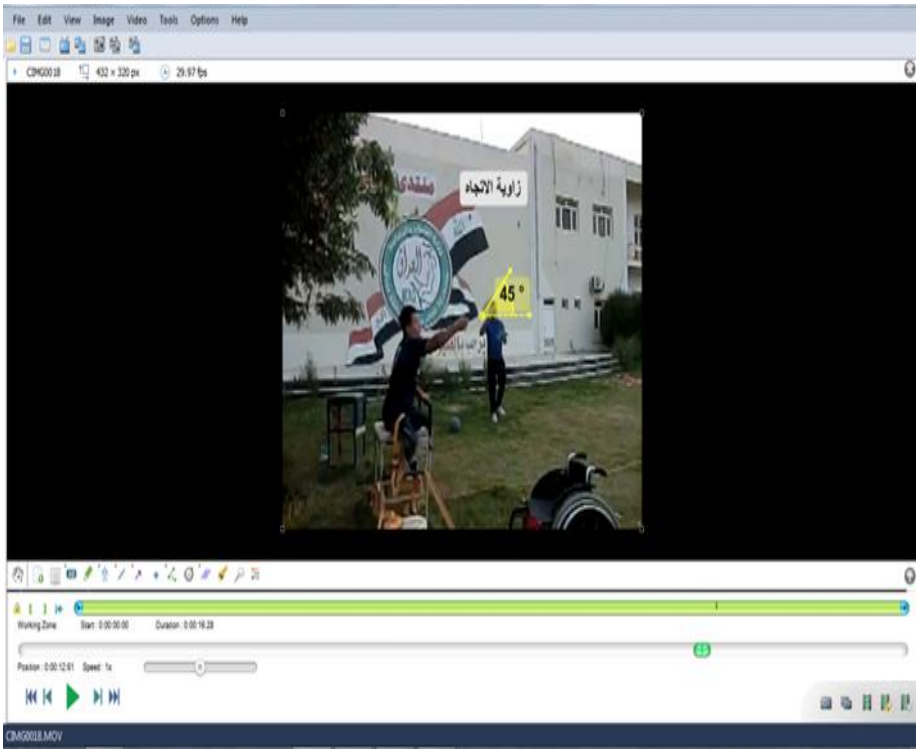


2-5 Kinematic Variables:
The starting angle: The launch angle of the disc was measured by determining the trajectory of the center of the disc's mass point before leaving the thrower's hand and to the moment after its release with the line passing from the disc's center of mass parallel to the ground before leaving the thrower's hand (Najah and Ahmed Thamer: 90:2015)
Figure (7)
elgna gnitrats eht swohS

Direction angle: It is the angle between the longitudinal axis of the shaft during the launch of the disc and the line that passes from the center of gravity of the disc horizontally at the same moment. (Najah and Ahmed Thamer: 90:2015)
Figure (8)
elgna noitcerid swohS



Angle of attack:- It is the angle that results from the product of subtracting the angle of attack from the starting angle, i.e. the difference between the direction angle - the starting angle. (Al-Fadli, Hussein: 203: 2019)

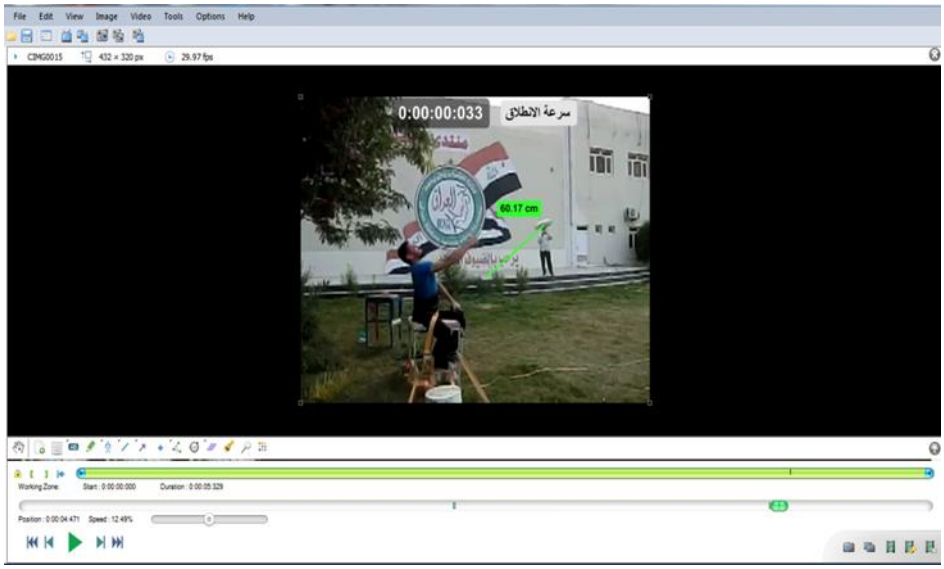
Figure (9)

kcatta fo elgna swohS

Shooting Velocity: is the average velocity calculated by dividing the starting distance computed from the moment the disc is left from the shooter's hand to After starting on the starting time. (Jams G. Hang, 1976,494)

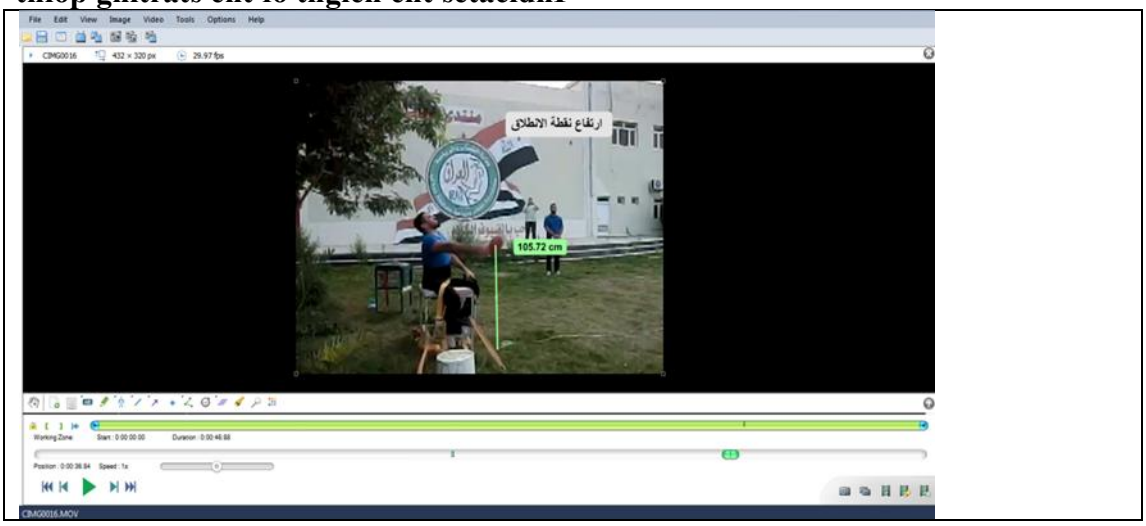
Figure (10)

deeps hcnual swohS

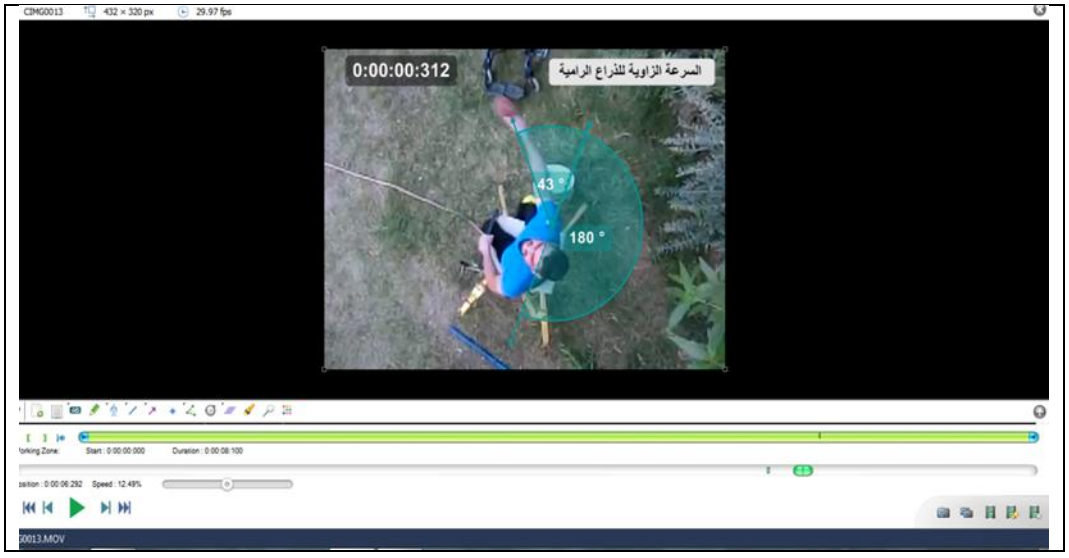


The height of the starting point: It is the vertical distance confined from the center of the disk's center of gravity at the moment the disk is left during the launch, measured to the ground and measured in meters and its parts.

Figure (11)
tniop gnitrats eht fo thgieh eht setacidnI



Angular velocity of the throwing arm at the moment of throwing: It is the angular range that the arm travels from the moment of throwing to the throw in relation to time. (Explicit Abd al-Karim al-Fadhli: 210:40)
Figure (12)
mra gnimia eht fo yticolev ralugna eht swohS



The circumferential velocity of the aiming arm: The linear distance traveled by the aiming arm in the thrust position (force position) to the moment when the disc is fired was measured and this distance is divided by its time (measuring unit m/s) or by law (Circumferential velocity = angular velocity in sector × radius). (Najah and Ahmed Thamer: 90:2015).

The acceleration of the disc: (Bilal Ahmad: 104:2014)

It is the final acceleration that represents the product of the sum of the square root of the vertical and instantaneous acceleration, as follows:

Vertical acceleration = x 2 / min

Instantaneous acceleration = instantaneous velocity/time.

(summary acceleration) 2 = (vertical acceleration) 2 + (tangential acceleration) 2

summation acceleration = x 2 /s + instantaneous velocity / time

:ecniS

htob morf ksid eht fo noitarelecca tsehgih eht stneserper deviecer noitarelecca ehT .snoitarelecca

3-5-4 discus test (achievement): (International Athletics Federation for the Disabled, 2006, 65)

eht fo stcepsa lagel eht gniylppa yb detcudnoc saw tset gniworht-thgiew ehT wal lanoitanretniin athletics for the disabled in calculating the results and approving the validity of the attempt, but each laboratory is given six attempts that are considered the best, in addition to the use of the legal weight for the disabled seated class which is (1) kg.

The objective of the test: to measure the distance (achievement) in the weight throwing competition for the disabled in the seated category.

Tools used: Weight (4) kg, tape measure.

Performance specifications: the legs of the fixed chair are fixed on the inner edge of the throwing bracket

Well, due to the presence of an impulse force similar to the direction of the front push towards the back (i.e. the opposite of the direction of throwing) so that the wheelchair

is at an angle of (45) degrees towards the throwing direction and without using any other means of assistance in the throw.

Registration: The best attempt out of six attempts given to each laboratory is counted.

6. 2. Experimental Experiments:

The researchers conducted the first reconnaissance experiment at exactly three o'clock in the afternoon on Thursday, 5/9/2019, on a sample of (2 players) from the research sample, and it was in the Katoun Sports Forum, and its purpose was to identify the contents of the device, connect the parts with each other and how to work on the device And learn how to measure sensors to measure distance and speed on the device, as well as learn how to determine the angles on the device and how to determine the height of the device and its suitability with the heights of the players and perform some simple exercises on the device, and some notes about the device, including adding some sensors to give Some numerical values in addition to adding a front bracket to the device.

And the researchers conducted the second exploratory experiment on the research sample with the help of the assistant work team, on Thursday 10/9/2019 at exactly three o'clock in the afternoon and it was in the Katoon Sports Forum, and the purpose of it was the following:

Know the method of work, and how to determine the training intensity to implement it on the research sample.

Determine the appropriate time for exercise and rest time.

Knowing the validity of the equipment and tools used in training.

The suitability of the physical exercises used in the training curriculum to the sample level is known.

7.2. Tribal tests:

The researchers conducted the tribal tests, which were over two days, on Saturday and Sunday, corresponding to 12-13/9/2019 at exactly three o'clock in the afternoon, and they were implemented as follows:

The first day: The discus throw test (achievement) in the Katoon Sports Forum, where the test was filmed for the purpose of analysis and biomechanical extraction, as well as measuring the sample's achievement by the long jump. Two cameras were used as follows:

The first camera was placed from the top on the throwing circle, and it was of the type (Sony). At a speed of 210 r/s, the height of the camera from the middle of the throwing circle was 4.85 m, as the camera was fixed to an aluminum pole with a length of 7 m using ropes and transparent adhesive tape.

The second camera was installed, and a second camera was placed on the left side of the shooter (Sony) at a speed of 240 am / s and was 4.90 m away from the center of the throwing circle and from the edge of the circle 3.63 m, and the height of the camera was 1.35 m from the center of the focus of the camera to the ground. These measurements gave The clear picture of the measurements under study, and the variables were extracted by means of the kinetic analysis program (kinovea).

8.2. The exercises used in the research (training with the device):

After informing the researchers of the previous sources and studies, and seeking the opinions of experts and specialists on the development of exercises on the proposed device In order to show its impact on the development of kinematic variables and achievement for young discus throwers, the exercises began on Tuesday 15/9/2019 and were completed on Saturday 7/11/2019 and it was in the Katoon Sports Forum and it was implemented at exactly three o'clock in the afternoon. These exercises were implemented within the main section of the training unit. The training time lasted from (35 to 40 minutes), with three training units per week for eight weeks.

The researcher put some exercises to develop the special strength by using a device manufactured for this purpose, as the training on the device is by taking the throwing position from a sitting position (motor performance similar to the legal performance during the race).

There is a link between the content of general and specific training exercises, technique and psychological preparation and the link between them.

Starting all training units with the general preparation in order to prepare all the muscles of the body, then conducting the special preparation of the muscles participating in performance within the training unit, and ending the training units with calming and relaxing exercises for the muscles.

The exercises were performed using resistances as part of the word training units, which were applied in the part of the main section of the training unit.

The duration of the training modules is (8) weeks, with two intermediate sessions, and (3) training modules in one small session.

The training units were implemented in two medium cycles and by (4) small cycles in each medium cycle, and the movement of the load was rippled in the medium cycles (3:1) and according to the intensity of the extreme work.

The intensity of the training was determined by determining the amount of force via electronic sensors via Bluetooth via a screen, or through the maximum weight.

Each small course consisted of (3) training units per week, meaning that the research sample implemented (24) training units during the duration of the experiment, and the training units were conducted on: Saturday, Monday, and Wednesday.

The repetition training method was used in the exercise application.

9.2. Post tests:

The researchers conducted the tests on Tuesday, 10/11/2019 at exactly three o'clock in the afternoon, and they were in the Katoon Sports Forum, and they were carried out according to the points used in the tribal tests in terms of location, climatic conditions, measurement tools and other application procedures.

10.2. Statistical means: The researchers used the statistical package (SSPS) to process the results.

3. Presentation, analysis and discussion of the results.

3-1 Presenting, analyzing and discussing the results of the tribal and remote tests of the kinematics and achievement variables:

Table (2)
selbairav citamenik eht fo snoitaived dradnats dna snaem citemhtira eht swohs tI tnemeveihca dna.

selbairav citameniK	gniursaem tinu	tseterp		tset tsop	
		s	a	s	a
elgna gnitrats	eergeD	34.66	1.505	38.83	1.602
elgna noitcerid	eergeD	46.833	2.786	41.500	1.516
kcatta fo elgna	eergeD	12.166	3.970	2.666	1.505
deeps hcnual looT	s/m	16,435	.708	18,811	.608
thgieh tniop gnitrats	retem	1.021	.044	1.130	.018
gnimia eht fo yticolev ralugnA mra	ht/d	670.333	51.262	711.833	54.901
eht fo yticolev tneibmA mra gnimia	s/m	5.813	.732	6.394	.845
noitarelecca csiD	m/s2	5.591	.155	6.015	.184
tnemeveihca	retem	20.133	.153	21.116	.491

Table (3)
It shows the arithmetic means, standard deviations, differences for the calculated (t) value and the error rate for the kinematic variables and achievement.

selbairav citameniK	**q q**	**p**	**value (t)**	**ekatsim egatnecrep**	**larom ehT ngis**
elgna gnitrats	4.166	1.329	7.679	.001	larom
elgna noitcerid	5.333	3.011	4.339	007	larom-non
kcatta fo elgna	9.500	3.209	7.251	.001	larom
deeps hcnual looT	2.376	1.041	5.592	.003	larom
thgieh tniop gnitrats	.1083	.049	5.35	.003	larom
eht fo yticolev ralugnA mra gnimia	41.500	7.713	13.178	.000	larom
eht fo yticolev tneibmA mra gnimia	.581	.276	5.150	.004	larom
noitarelecca csiD	.423	.118	8.718	.000	larom
tnemeveihca	-.983	.427	5.63	.002	larom

Table (3) above shows us that the calculated (T) values for the research sample individuals are under a lower error level (0.05) in the kinematic variables. The results show us that there are significant differences in the results of the kinematic variables between the tribal and dimensional tests in favor of the post tests, the researcher attributes this The development in the kinematic variables and this indicates that the special strength development exercises used for the arms and torso on the device manufactured according to the motor paths of the discus skill, which were influential in obtaining this result.

It appears that all the values of the kinematic variables have been developed for the members of the research sample, and this indicates that the special training on the device has affected the development of the kinematic variables, as there has been an evolution in the physical capabilities of the working muscle groups, and this development is linked to the skill performance and its effect was clear in the kinematic variables and that the development of the force of the groups The working

muscle has achieved a development in the kinematic variables related to the same performance, and this was demonstrated through the development of the starting speed of the disc, which is related to all the kinematic variables, such as achieving a high angular velocity of the arms and the rotation of the trunk correctly, and this is inevitably related to the degree of flexibility of the shoulder and this leads to the development of high effort and angular speed, as The centrifugal force keeps the disc on the wider acceleration path.

The researcher attributes the reason for this development in the studied variables to the special exercises that clearly and effectively affected the development of the angular velocity of the arm aiming for the final throwing stage. Moments of grooming and throwing and for the upper body.

The great improvement in the variables of starting and accelerating the result came as a result of the exercises that are carried out through the training device, as the use of several types of force using all possible means was its only goal to develop the mechanical conditions for performance, especially the angle and speed of launch, which inevitably affects the achievement of a good digital level. (1999,46 Bartlett,)

The launch speed is at the forefront of the important mechanical factors indicative of the horizontal distance of the objects ejected at an angle with the horizontal line, whether the projectiles are at a different or similar level. If the launch height and launch angle are equal, then the faster tool will cover a greater horizontal distance, and therefore the shooter must throw the tool as quickly as possible in order to achieve greater than the horizontal distance. Many sources have agreed that increasing the launch speed (1) s Increasing the total distance (4,59) m. (Qasim Hussein: 424:1998)

The researcher also attributes this development to the exercises that she applied to the research sample using the proposed device, which worked to develop the force that affects the angular velocity of the body parts and the starting speed, “since the variable of the instantaneous velocity of the disc from the thrower’s hand is one of the most important kinematic variables affecting the achievement achieved, Because it is equal to the sum of the forces exerted in the different directions of the members participating in the throwing performance, which is the incremental acceleration acquired by the disc, especially the throwing position (the force position), which achieves the investment of all the thrower’s forces in the appropriate direction that ensures the achievement of the greatest starting speed of the disc to obtain the best achievement. ". (Qasim Hassan Hussein (and others): 237:1991)

As the results show through the decrease in the starting angle as well as the angle of attack and the decrease in the direction angle, and these are all good indicators of achieving the ideal angles for the starting spear, and the researcher believes that the angle of attack should be an inverse relationship with the achievement as the direction angle should be less than (10 degrees)) or negative at the moment of launch to obtain the largest possible horizontal distance, when the direction angle is negative, the disc will take a horizontal position at the top of the flight, where the air resistance is reduced to the most extreme and the air itself works to carry the disc farther away If the angle of attack is less than the angle of attack, the angle of attack will be large. (Darwish and Al-Hafed: 1977:46)

As the angle of attack, which is the angle that indicates the achievement of the best position of the disc at the moment of launch, in terms of the starting angle and the direction angle. (KunkerHatmis: 670:1990)

And (Sareeh Al-Fadhli, and Ihab Hassan, 2019) mentions that the relationship between the angles is that the result that is extracted from subtracting the direction angle from the launch produces the angle of attack, which must be between (zero-10) degrees and this leads to that the disc will take a path according to the situation Which it was before starting and to serve the real path, but if the angle of attack is less than zero or more than (10) degrees, the direction of the disk does not represent an ideal performance and does not serve the real path. (Al-Fadli, Hussein: 204: 2019)

The researcher believes that the improvement in the starting angle level, which is a good indicator, because it is close to the level of the good achievements angles in the better numbers.

)James Hee, 57, 2007) mentions the need to increase the angular velocity of the body parts in order to increase the speed of the vector launch of the tool, especially in the activities of projectiles, as he stresses the need for "the athlete to depend on the rotational movement prior to the launch to obtain a high starting speed, based on the relationship between the circumferential velocity and the rotational velocity (peripheral velocity = angular velocity x radius)

And that accelerating the disc is like changing the speed of the disc during the sensitive stages, and this change in speed came from the development of the force exerted by the working muscles, which develop through the use of the resistances of the motor paths of the stages of preparation for throwing and throwing, so the exercises used on the device and the use of kinetic analysis technique led to An additional vision for the research sample members of the need to sense the required force according to the motor path and in a more localized manner in order to serve the achievement of the maximum surrounding speed and angle of the aiming arm and torso according to the starting angle and speed that serves the achievement.

Conclusion

In light of the results obtained by the researchers, the exercises on the proposed device led to the development of the special force, the kinematic variables under research and achievement for the members of the research sample, and the exercises that were applied to the device led to the development of effective variables in achieving good achievement, so there was an evolution in the throwing distance, The researchers recommend emphasizing the use of the (manufactured device) as an aid to develop the special strength of discus throwers, especially the disabled class (56), as well as emphasizing explosive and rapid strength training, which is included in the development of achievement, and conducting exercises on the proposed device according to the motor paths of the technical stages of the disc.

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