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The percentage of the contribution of some physical measurements and kinematic variables with their relationship to the achievement of weightlifting for advanced weightlifters

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Abstract

The effectiveness of weightlifting is one of the difficult arena and field activities in terms of technical performance, as it is used to a lot of physical measurements and kinematic variables that we have to research and continuously to diagnose and develop through field training, and after using the multi-media computer, which relies on video imaging to analyze mechanical variables To appoint the researcher, the coach and the player to control the development of these variables and achieve the best levels of performance and achievement over time. Here the research problem is manifested in Lack of focus on the importance of anthropometric measurements and their relationship to achieving kinematic conditions in order to serve the achievement of pushing the weight. The study aimed to identify the most important physical measurements and their relationship to some kinematic variables of the Iraqi weightlifting players and their achievement, in addition to identifying the relationship between these variables as a whole. The height of the starting point and the time of the entry stage), (the length of the arm and the time of the entry stage), (the length of the leg and the height of the starting point), (the circumference of the hip and the speed of the start). The researcher recommended emphasizing attention to the angles of direction, attack, and departure, because of their great influence in determining the flight path of gravity.

Keywords: Contribution, physical measurements, kinematic variables, weightlifting, weightlifters

Introduction

Biomechanics is interested in analyzing human movements from the point of view of the laws of mechanics and solving kinetic problems for the purpose of developing the art of performance, especially when adopting modern scientific devices and means, which helped to study and analyze movement after developing it and obtaining accurate information for the parts of movement, as well as its correct and accurate judgment on movements and absorbing their subtleties And identifying its errors, and the kinematic variables stand at the forefront of the important factors in achieving this achievement, and the most important factors are the launch speed, the starting angle, the height of the starting point, the rotation times, the angles of the body during the performance, the peripheral speed of the weight, and others, and in order to achieve the mechanical goal in pushing the weight, which is focused on throwing The tool must be launched to the farthest horizontal distance, and the weight must be launched as quickly as possible, with a specific and close to ideal starting angle, and with balanced force components in order to achieve that goal, as “the variable throwing speed constitutes the most important mechanical characteristics in determining the horizontal throwing distance.” In addition, it has become important to select Athletes with suitable bodies as one of the pillars that must be available to take athletes to the highest levels You can be considered a champion from any body that does not meet the specifications of effectiveness. For this, physical measurements have an effective effect in achieving the push - up, where athletes must be selected according to certain physical specifications and for each event, which is an economic process that countries resort to in order to save effort, time and money to achieve the best results, To link the theoretical reference in this field with the field application, and to reveal the importance of these measurements in achieving achievement when applying the specific kinematic conditions of performance.

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Research problems

The physical characteristics and physical measurements of weightlifters play an important and essential role in achieving good results. These studies did not address the relationship between these two important variables, and we mean physical measurements and their relationship to some kinematic variables, especially since these variables give positive indicators of the correctness and mastery of performance and clarify the strengths and weaknesses in it and the appropriateness of these measurements and their relationship to some kinematic variables, so the researcher deliberately studied the effectiveness of pushing the weight and the lack of focus on the importance of anthropometric measurements and their relationship to achieving the kinematic conditions in order to serve the achievement by pushing the weights by the trainers. Even if it was relied upon by them and those who carry out the practical applications of the effectiveness of pushing the weight, it is done through the qualitative side, which gives a judgment that is not based on tangible quantitative facts about the nature of the variables and their values when applying the performance.

That is why this study came to put some scientific solutions by clarifying the importance of the relationship between physical measurements and the required kinematic conditions when performing, which may contribute to the development of achievement for weightlifting players in Iraq.

Research Objectives

1. Determining the most important anthropometric measurements and some priority kinematic variables in relation to the achievement of weight-lifting in Iraq.
2. Identifying the nature of the relationship between the most important physical measurements and some kinematic variables for weightlifters in Iraq.
3. Identifying the nature of the relationship between the most important anthropometric measurements and achievement for weightlifters in Iraq.
4. Identifying the most important anthropometric measurements related to some kinematic variables and achievement for weightlifters in Iraq.
5. To identify the percentages of the contribution of some kinematic variables in the performance of weightlifting players.

Research Hypotheses

In light of the research objectives, the researcher assumes

1. There is a statistically significant correlation between the most important physical measurements and some kinematic variables of weightlifting players.
2. There is a statistically significant correlation between the most important physical measurements and the achievement of weightlifting players.
3. The existence of a correlation between the most important physical measurements and some kinematic variables and the achievement of weightlifting players.
4. There are contribution percentages of some kinematic variables in the performance of weightlifting players.

Research areas

1. Human field: Weightlifting players in the southern region.

2. Time range: from 2/1/2022 to 1/3/2022.
3. Spatial field: Scout camp stadium in Maysan.

Research Methodology

The researcher used the analytical descriptive approach and the study of the correlational relations due to its suitability and the nature of the research problem, as it explains "the reality of accidents and the report of their current facts through analysis and evaluation in order to draw important conclusions to correct this reality, update it, or develop new knowledge about it" (Ahmed, 1989) [2].

Research community

Got up The researcher conducted his research on the original research community of (8) eight athletes, who are the elite who represent the highest level in the country by pushing the weight and whose achievement is limited to between (30-50 m) and counting. The researcher community is homogeneous on the basis that pushing the weight from the movements that are built on fixed laws is a mixture of physical and mechanical laws that the shooter or group of shooters can interact with. Therefore, despite the individual differences in the achievements of the research community and in their physical characteristics, these differences did not affect the Apply fixed laws and do not change the basic kinetic principles.

Research tools and devices used

Research tools mean "the means through which the researcher can collect data, solve his problem, and achieve his research goals". In order for the researcher to be able to complete her experiment, it is necessary to use some tools and devices that help to complete the research and complete it in the best way.

1. Test and measure.
2. Observation.
3. Arabic and foreign references.
4. As for the devices used by the researcher in the implementation of the vocabulary of his research They are:-
5. Panasonic 3500-M video camera with a frequency of 24 images / sec, two
6. Linen tape measure (50 m) long, one number.
7. VHC-RD video cassettes with a time of (2 hours).
8. One American-made electronic medical scale.
9. Men's discus weighing 2 kg, number two.
10. Reflective markers to designate anatomical points.
11. Japanese-made Pentium III electronic computer.
12. A device with a leg to measure chest width and shoulder width.
13. Scale drawing length (1 m).
14. Manual calculator (Casio).
15. Various stationery (pens - ruler - engineering tools - etc...).

Research variables

For the purpose of determining the most important physical measurements and kinematic variables, a special questionnaire form was distributed to a group of specialists in the two subjects (biomechanics, arena and field) to select some of them with the addition of what they deem important in this event. Thus, the following measurements and variables were chosen in light of what was agreed upon and according to the relative importance. Choose the variables

that achieved more than 50%.

Measuring physical variables

Total height: It is the vertical distance from the top of the skull to the ground for the tested individual, provided that he stands vertically. The unit of measurement is the meter and its parts, and it was recorded to the nearest part of a centimeter.

Arm length: It is the distance from the lateral apex of the acromial process of the plate bone to the bottom point of the inferior phalanx of the middle finger. Its unit is the meter and its parts, and it is recorded to the nearest centimeter.

Leg length: The length of the leg is determined by the distance between the middle of the head of the femur to the ground when the laboratory is in a moderately standing position on the feet. The unit of measurement is the meter and its parts, and the recording is done to the nearest part of a centimeter.

Mass: The measurement is done by means of the medical scale, where the tested individual stands on the scale in the middle of his base so that his weight is distributed on the feet. Its unit of measurement is the kilogram, and it is calculated to the nearest part. The laboratory must wear the lightest clothes possible and without shoes. He takes the weight three times and records the average of the three readings.

Shoulder width: It is measured by the bulwark. Where the tips of the legs of the leg are placed on the two lateral summits of the two acromial protrusions of the two plates. These two points can be inferred by placing the fingers at the depth of the two protuberances and walking with them outwards, while the foot is in a horizontal position parallel to the surface of the earth during the measurement. And its unit of measure is the centimeter.

Chest Width: The legs of the man are placed on the transverse extension of the middle thoracic point (on both sides of the rib cage) while moving the legs in all directions until obtaining the largest width of the chest and measured in centimeters as a unit of measurement.

Measurement of kinematic variables

- 1) **Departure angle:** This angle was measured by determining the center of gravity of the disc before its release from the thrower's hand and after its release for a certain distance, by drawing a line between the center of gravity of the disc in both places, and drawing another horizontal line passing through the center of gravity of the disc parallel to the ground before its launch from the shooter's hand. The angle between these two lines through the computer directly (Sahib, 1991).
- 2) **The height of the starting point:** This height was measured by determining the highest point of height from the thrower's hand during the throwing process to the ground, perpendicular to the horizontal line, and the distance is calculated directly by the computer.
- 3) **Launch speed:** This variable is calculated by measuring the distance traveled by the weight from the moment before its launch from the thrower's hand to an acceptable distance following the launch and measuring the time for this distance, then extracting the speed by

measuring the distance it travels over time.

- 4) **The angle of attack (position):** It is the angle confined between the longitudinal axis of the disk before launch and the line passing horizontally from the center of gravity of gravity and parallel to the ground. In the light of these indicators, it was calculated.
- 5) **Entry phase time:** It is the time taken from the moment when the weight reaches the furthest extent during the preliminary swing (backwards) to the moment the player starts before raising his right leg before starting the rotation. It is measured on the basis of the time period deducted from the total throwing movement. And according to the method programmed into the computer.
- 6) **The transition time:** It is the time that begins with raising the right foot to start turning until the moment when the left foot leaves the ground. It is measured in the same way as before.
- 7) **The time of the flight phase:** It is the time that is measured from the moment the left foot leaves the ground until the moment the same right foot touches again after completing the turn, and there is no difference in the measurement of this variable from what we mentioned previously.
- 8) **The time of the throwing stage:** It is the time that is measured after taking the final throwing position until the moment the weight is pushed, and this indicator has a share in the measurement according to the program set up in the computer.

Exploratory experience

An Exploratory Experiment is a preliminary experimental study that is being carried out. The researcher used a small sample before carrying out his research in order to choose the research methods and tools" (The Arabic Language Academy, 1984).

For this purpose, the researcher conducted the preliminary exploratory study on 17/1/2022 on a group of weightlifting practitioners who are outside the research community. The safety of the devices used and the ability of the work team to know, by conducting the application on the nature of the experiment and testing the two video cameras used.

Videotaping

In order to identify the kinematic variables that affect achievement, and in order to obtain a scientific formula for the study of these variables, the researcher used video imaging, as (video imaging) is one of the important means in discovering errors and adjusting the extent of convergence or divergence of the levels of technical performance of athletes, and from it he can. The researcher, by drawing the paths of the points of the body, described the movement and analyzed it to find out the closeness of the levels of a certain group of athletes. The geometric path of the body can also be determined by using the drawing scale. As well as setting the time path by changing the number of images per second (Fouad, 1982).

In order to achieve the above, the research community was photographed with two video cameras of the type (PANASQNNC-3500 TM), each with a frequency speed of (24 images / sec) and using a video cassette type (VHC-RD). My video cameras were set up on a large tripod and it was high. The middle of the lens is (1.20) m from the ground and at a distance of (7.50) m at a point in the middle of the

thrower's movement, one of which is on the opposite side of the throwing arm and the other is behind the thrower and is the same distance away from him.

The researcher used a drawing scale, where every (1) m in nature equals (1,043) cm in the image, and these measurements were used to extract the vertical and horizontal displacements and distances later.

The imaging took place in the stadium of the scout camp in Maysan Governorate, where the researcher put the indicative marks on each of (the joint of the foot, the knee, the hip, the shoulder, the elbow, and the palm) on both sides of the body (left and right) in order to identify the anatomical points when transferring the image and analyzing it after receiving it. lines between tags.

Videography Analysis (Kinematic analysis of movement through a computer)

The kinetic analysis by means of video imaging is an accurate method for studying the kinematic variables in a quantitative study and enables the one who studies the movement to point out the points of weakness and strength in the variables affecting the movement. Dividing the movement to be analyzed into its overlapping sections and determining the nature of each part of the movement in order to apply the appropriate anatomical mechanical foundations and laws for the ideal technique of movement" (Raisan, 1992).

He adds (Qasim Hassan and Iman Shaker - 1998) ^[10]: "The analysis is a key to defining the behavior of human movement or its path, i.e. the process of fragmenting the whole into parts. The nature of those parts and the relationship between them is also studied by knowing the minutes of the movement path and the extent of the relationship between the variables that affect that path." That is, converting the studied phenomena into numbers and degrees" (Qasim, 1998) ^[10]. In order to study and analyze the kinematic research variables were taken The researcher does the following:

First: Converting the photographed material in its raw (electromagnetic) form, which represents the movements of the elite players. Pushing the weight from the video films into light signals received by the computer and stored in file format using the conversion card (MJBG) and then to the laser discs (CD) in order to perform the analysis steps. kinematics of motion.

Second: The steps of the kinematic analysis of motion

included the use of special software, including (Software) [see Appendix (4)].

Whereas, the data entry process concerned with depicting the technical performance mechanism of the throwing movement and in the pictures of the anatomical points of the joints of the shooter's body is fed into these programs in their illustrated format and then converted into files stored in the computer, and from them the analysis process takes place and extraction of measurements and kinematic indicators related to the throw, and among these indicators are the angles of the body And the angles of departure of the tool and its time and speed.

Field Experience

Experience is: "A tight organization of the circumstances and conditions in which we can observe a certain phenomenon in an effort to identify the factors influencing, inducing or causing this phenomenon (Fouad, 1984).

And after reviewing the data extracted from the exploratory experiment, he conducted The researcher conducted a field experiment on 20-21/ 1/20 2 2 at the Scout camp stadium in Maysan, where the filming procedures were approved by the concerned union, and this was done after it had fulfilled The researcher took all the physical measurements concerned with the research, as the community members were subjected to these measurements one day before starting the process of filming the artistic performance of throwing. Regarding the throwing process, each shooter was given six attempts (according to international law) in the event that their number was (8) players or less (Qasim, 1987) ^[11]. After that, the best attempt obtained by each shooter was chosen for analysis, showing the attempts of the members of the research community as it came in the videography, provided that the attempts were made under the supervision of a group of specialists, including the gentlemen of the research supervisors.

Statistical Methods

- 1) arithmetic mean.
- 2) standard deviation.
- 3) Simple link.
- 4) standard error.
- 5) simple regression coefficient:

The relationship between physical measurements and achievement for weightlifters

Table 1: Evaluate the correlations between the anthropometric measurements of the members of the research community and the achievement achieved by throwing weights

Research variables related to achievement	Bloc	total length	arm length	shoulder width;	man's length	chest width;
link value	0.76	0.30	0.15	0.63	0.36	0.88
The moral significance of the link	moral	moral-non	moral-non	moral-non	moral-non	moral

The results presented in Table (1) show that there are three statistically significant correlation values between the achievement achieved on the one hand, and each of the variables of mass, chest width, and hip circumference, and where the correlation values calculated between these variables were higher than their value The (maximum randomness) amounting to (0.632), while the other correlation values between achievement and physical measurements were less than the tabular value, and this means that the integration of physical measurements of

weightlifters is one of the important things that gives an indication of the players' competence and the suitability of their bodies with the nature of this game, where height plays a role The active role in the athlete obtaining the highest height of the starting point, as well as the arm length plays an important role in the athlete obtaining the highest peripheral velocity of the disc, because the peripheral velocity of the disc depends on the angular velocity of the arm as well as the length of the arm.

That is, there is a direct relationship between the arm length of the player and the peripheral speed of the disc. In addition, the length of the leg, especially when it is proportional to the total length of the body, means that the player obtains a suitable height for the center of gravity of the body, which gives a positive condition in the application of the mechanical foundations for the release of weight. In addition to the width of the shoulders and the shoulder girdle, which enhances the transfer of moments occurring in the joints of other parts of the body and their transfer to the throwing arm, as these measurements and their integration enhance the consistency of all movements of the body and its parts in the skill of throwing the weight, and the player tries to benefit from these measurements in the correct numbers for the throwing process and application. The correct mechanical foundations, taking into account the instantaneous positions and speeds that the disk takes at each stage (Al-Moez Li Din Allah, 1998) [4].

The relationship between the kinematic variables and the achievement of weightlifting players:

Table 2: It shows the correlations between kinematic variables and achievement.

T	Variants	Link
1	Angle of attack	0,4 4
2	Starting point height	0,4 8
3	Departure angle	0,8 7
4	Cruising speed	0,8 7
5	Entry time	0,1 4
6	Transition time	0,2 7
7	Flight phase time	0,5 7
8	Throwing time	0,2 8

It is noted from the values of the correlations presented in the table above that there are two statistically significant correlations between each of the variable angle of departure and speed of departure on the one hand, and completion on the other hand, as these values were higher than the (maximum random) value of (0.632) under a degree of freedom (7). The level of significance is (0.05), as follows, as it reached, respectively:

The difference between the completion and the angle of departure, between the achievement with the speed of departure, and the researcher believes that the correct application of the mechanical conditions is one of the basic necessities in obtaining the best achievement, and since each of the speed of departure and the angle of departure are among the factors that control obtaining the best track for the disc, so It has become very necessary to pay attention to these two variables and focus on them during training, as the starting speed is a combination of the horizontal speed and the vertical speed to allow the player to achieve the largest value of the final speed in accordance with obtaining the best starting angle, which achieves his mechanical goal from this performance, which is Obtaining a final result of speed and an appropriate starting angle, which will definitely be less than (45) degrees, meaning that the horizontal vehicle is the one that dominates the vertical vehicle to achieve the best horizontal distance and achieve horizontal flight for weight in the air (Qasim, 1990).

It is noted that the other relationships between other kinematic variables and achievement were weak and do not indicate a strong correlation between them.

Presentation of the results of the contribution percentage of the biomechanical variables under study in the achievement.

Table 3: Shows the percentages of the contribution of kinematic variables and anthropometric measurements in the achievement of the research sample

Variable	Contribution percentage R2_	The shareholding percentage	J standard error
Angle of attack	0.00016	0.06	3.02
Starting point height	0.444	0.07	3.20
Departure angle	0.667	0.07	3.10
Cruising speed	0.821	0.04	3.17
Entry time	0.464	0.32	2.88
Transition time	0.182	0.03	3.15
Flight phase time	0.513	0.05	2.90
Throwing time	0.312	0.1	3.42
Bloc	0.465	0.08	3.64
Total length	0.658	0.06	3.44
Arm length	0.804	0.1	3.11
Man's length	0.427	0.35	2.67
Shoulder width;	0.487	0.1	2.56
Chest width;	0.232	0.08	3.12

From what was stated in the above table, we find that there is a defect, either in the methods of selecting the practicing player to push the weight, or a defect in the training programs and their integration in all respects (physical, physiological, mechanical, psychological) and in a way that is compatible with the development of the aspects comprehensively and completely.

In general, we conclude that each of the studied body measurements plays an important role in the achievement of throwing the weight in one way or another, as is the case with the kinematic variables in terms of their clear contribution to the achievement, and for the purpose of knowing the effect of the body measurements in each of the kinematic variables and the achievement in pushing the weight, i.e. indicate the strength of the relationship between them, In other words, there is a correlation between physical measurements, kinematic variables, and achievement, and that these variables affect each other in proportion to the achievement of appropriate achievement. However, this does not mean that the value of this correlation is high in terms of their influence on others, as more focus should be placed on achieving the ideal value. For all variables, whether physical or kinematic, to serve and achieve the ideal achievement.

Conclusions

1. There is a strong correlation between physical measurements and kinematic variables among members of the research community.
2. There is a correlation between the most important physical measurements and some kinematic variables and the achievement of weightlifting players.
3. There were different percentages of contribution for each of the anthropometric and kinematic variables in the achievement of weight-lifting.

Recommendations

1. Emphasis on correcting the defect and weakness that occurred when performing the throwing process (entering, moving, flying and throwing) due to the

emergence of a non-significant relationship between the time variables of these stages and the launch speed of the tool (weight) by emphasizing the training of this aspect in the training curricula.

2. Emphasis on paying attention to the angles of direction, attack, and departure, because they have a great impact on determining the flight path of gravity.
3. Emphasizing attention to the angles of bending and deviation of the torso and the angles of the knees for the importance of these angles in achieving the final goal.

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