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Relationship of some kinematic variables and ratio her contribution accurately Performance of the barbell track in the snatch

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Abstract

The snatch lift is one of the activities of the sport of weightlifting that requires compatibility between the physical and skillful qualities to complete the lift successfully, as this lift is one of the most difficult Olympic lifts in the sport of weightlifting because they are performed with one pull without stopping from the bottom up, so it requires the weightlifter to exert the maximum possible force continuously from the beginning of the lift to its end in addition to the smoothness and accuracy of performance. From the foregoing, the importance of the research lies in the fact that it is very difficult to accurately judge the quality of performance through abstract and non-technical observation because it is subject to self-evaluation, so researchers and trainers resort to using technical, scientific observation as it is one of the means that helps analyze the kinetic path of the weight and follow the kinetic sequence well and accordingly, It is possible to judge the art of performance objectively and to detect errors that are diagnosed in the kinetic path of the barbell and the body directly. We note that there is a relationship between the kinematic variables and the locomotor pathway as the motor path of the lift is done by using the angles of the muscular work that change from one stage to another during the motor path of the lift. As for the research problem, It was found that there are a group of biomechanical errors committed by some lifters, which greatly affect the art of performance. The high snatch and the lack of economy in the effort exerted negatively affect the achievement, especially since these weightlifters are young. The study aimed to identify the most important kinematic variables in the snatch lift of young weightlifters and Analysis and study some kinematic variables of the snatch lift. The researcher adopted the descriptive method. It is the best method for solving the research problem. Include the research community lifters at the Al-Kout Sports Club for weightlifting. And the number of them (5) lifters As for the conclusions, there are significant differences in the movements of the weight from the vertical and imaginary line.

Keywords: Kinematic, ratio contribution, the barbell track

Introduction

After the scientific development taking place in all fields and the sports field in particular, it became necessary to follow modern scientific methods in proportion to the development taking place in the sports fields to raise the levels of athletic achievement in all sports.

The snatch lift is one of the activities of the sport of weightlifting that requires compatibility between the physical and skilful qualities to complete the lift successfully, as this lift is one of the most difficult Olympic lifts in the sport of weightlifting because they are performed with one pull without stopping from the bottom up, so it requires the weightlifter to exert the maximum possible force continuously from the beginning of the lift to its end in addition to the fluidity and accuracy of performance without any interruption in performance, so it depends mainly Despite its need for high requirements of muscular strength in general and maximum strength in particular. It is not hidden from everyone how important the motor path is for any sporting activity, especially weightlifting, where the motor path of the head of the weight column is one of the most important indicators of judging the technical performance of the lift and through it, errors that accompany the performance can be detected.

From the aforementioned, it is very difficult to accurately judge the quality of performance through abstract and non-technical observation because it is subject to self-evaluation, so researchers and trainers resort to using technical, scientific observation as it is one of the means that helps analyze the kinetic path of the weight and follow the kinetic sequence well, and accordingly, it is possible to judge The art of performing objectively and detecting errors that are directly diagnosed in the kinetic path of the barbell and the body.

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From the aforementioned, the importance of this study is evident in identifying the most important kinematic variables in the snatch raise in young people and setting special instructions on the use and reliance on analysis programs to help develop the art of performance among young people.

Research problem

Through the researcher's review of previous studies and scientific sources, as well as his knowledge of the training units and training curricula used in lifting clubs. Weights and the fact that the researcher is a practitioner of the game, he noticed a relationship between the kinematic variables and the motor path; as the motor path of the lift is done by using the angles of the muscular work that change from one stage to another during the motor path of the lift. It was found that there are a group of biomechanical errors committed by some lifters, which greatly affect the art of performance. The high snatch and the lack of economy in the effort exerted negatively affect the achievement, especially since these weightlifters are young. As the errors of the motor path of the weight and the early bending of the arms during the pull-up and the hunching of the back and others, the researcher has noticed that these errors are transmitted from the lifters's youth to Rubaie n The applicants repeat the same mistake in the art of performance among the applicants, as well as the lack of adoption by the Iraqi trainers in their training curricula of special exercises to correct these mistakes among the youth. This is what prompted the researcher to prepare this study to identify the most important Biokinematic errors in the abduction raise of young Iraqi weightlifters. To correct those mistakes because of the importance of this topic in raising the technical level of the youth weightlifters to achieve advanced positions.

Research aims

The research aims to

1. Determining the most important kinematic variables in the snatch lift of young weightlifters.
2. Analysis and study of some kinematic variables of the snatch lift.

Research hypotheses

1. There is a statistically significant correlation between the kinematic variables and the motor path of the research sample.
2. Improving the motor track of the weight in the snatch raise.

Research areas

1. **Human field:** Lifters of Al-Kout Sports Club for the youth category (18-20 years) for a weight of 77 kg.
2. **Time range:** From 9/21/2022 to 9/28/2022_
3. **Spatial field:** Al-Kout Sports Club hall for weightlifting.

Determine the terms and symbols used in the search

Snatch: The weight bar is placed horizontally in front of the weightlifter's legs, the grip is used from above, and the weight is pulled in one movement from the drum to the full extension of the arms above the head by bending the legs, and during this continuation of lifting, the weight passes in front of the thigh and the pelvis in a continuous movement so that no part of the body touches the drum Only the feet

during the lifting process (Federation 2004) ^[3].

Motor track

It is defined as the schematic figure that represents the shape of the movement on which the selected body points lie, and the length of the path shows us the distance of the movement of the points, and we can determine on this path the length, straightness, and curvature of the direction, and the path is "the connecting line of the movement and the imaginary effect of the movement of the points.

Symbols and study variables in the snatch lift

Heights

- **H:** cm The height of the weight above the drum is measured in centimeters.
- **H₁:** The height of the deepest deviation of the weight towards weightlifters from the (imaginary) line of gravity in the first towing stage.
- **H₂:** The height cut off or tangent to the (imaginary) line of gravity first away from weightlifters.
- **H₃:** Height The deepest outward deflection of the weight away from the weightlifters in the second draw stage.
- **H₄:** The height of the cut or contact of the Earth's gravity line (imaginary) for the second time towards the weightlifters.
- **H₅:** is the highest height the weight reaches.
- **H₆:** Height of the deepest internal deviation of the weight from the (imaginary) line of gravity in the phase of the fall of the weight.
- **H₇:** The distance the weight falls from its highest height to the fixing point.
- **H₈:** Height of the barbell attachment point in the squatting position.

Deviations

- **D:** cm The deviation of the weight from the (imaginary) line of gravity, measured in centimetres.
- **D₁:** The deepest deflection of the weight towards the weightlifters in the first draw stage.
- **D₂:** The deepest outward deflection of the weight away from the weightlifters in the second pull-up stage.
- **D₃:** After the highest point of the weight's height above the Earth's gravity line.
- **D₄:** The deepest internal deviation of the weight towards the weightlifters in the stage of the fall of the weight.
- **D₅:** Deviation of the weight fixing point in the squatting position from the (imaginary) line of gravity.
- **D₆:** Hook arc width = D₂ + D₄.

Materials and Methods

Research methodology and field procedures

The nature of the problem to be studied is what determines the research methodology to be followed, and the methodology is the path that the researcher follows in his study to solve the research problem. (Mahjoub, 1993) ^[6] Therefore, the researcher adopted the descriptive approach, which is the best method for solving the research problem. Included the weightlifting weightlifters of Al-Kout Sports Club. And the number of them (5) weightlifters they were chosen by the intentional method to serve the research, as the sample is considered the part that represents the community of origin or the model on which the researcher

conducts the entirety and focus of his work (Saeed & other, 1986) [7].

Table (1) shows some of the characteristics of the sample, as the researcher made some physical measurements of the members of the research sample in the variables of total height, as well as measuring weight. Sample using the coefficient of variation, and the value of this coefficient was less (30%) than it indicates on sample homogeneity.

Table 1: It represents the sample specification for the variable length and weight

Quarter name	Height	Real Weight
1	171	71 kg
2	175	76 kg
3	173	74 kg
4	176	75 kg
5	172	73 kg
Arithmetic mean	173.40	73.80
standard deviation	2.07	1.92
coefficient of difference	1,193	2.60

Kinematic variables of the snatch lift

Performance variables: It is measured in the same method of performance and all stages of the snatch. All angles were measured at maximum flexion.

- 1. Ankle angle:** At maximum flexion of the ankle: they are the angles confined between the footrest line and the point of the ankle joint to the extension of the line of the leg to the point of the knee joint.
- 2. The angle of the knee:** At the maximum flexion of the knee is the angle confined between the line of the leg from the point of the ankle joint to the point of the knee joint with the line of the thigh (from the point of the hip joint).

Results and Discussions

Presentation, analysis and discussion of results

Table 2: It shows the arithmetic means and standard deviations of the research variables

Stage	Variants	Arithmetic mean	Standard deviation
Extraction stage	Maximum ankle flexion	75	6.30
	Maximum knee flexion	81.80	3.27
	Maximum flexion of the hip	43	2.54
	Maximum shoulder flexion	50	3.1
First draw stage	Maximum ankle flexion	85	1.58
	Maximum knee flexion	126.26	6.64
	Maximum flexion of the hip	82	6.61
	Maximum shoulder flexion	47	1.92
Knee movement phase	Maximum ankle flexion	84.20	3.70
	Maximum knee flexion	130.60	5.94
	Maximum flexion of the hip	106.40	14.99
	Maximum shoulder flexion	38.80	3.19
Second draw stage	Maximum ankle flexion	80.80	3.27
	Maximum knee flexion	112.80	10.66
	Maximum hip flexion	98.60	5.02
	Maximum shoulder flexion	33	2.91

Table 3: A table representing the relationship between the variables and the accuracy of the trajectory of gravity

Variants	Tabular value	Calculated value	Indication
Ankle flexion angle	0.878	0.678	Non-moral
Knee flexion angle	0.878	0.977	Moral
hip flexion angle	0.878	0.698	Non-moral
Shoulder flexion angle	0.878	0.889	Moral

- 3. The angle of the hip at the maximum flexion of the hip:** It is the angle confined between the line of the torso (from the point of the shoulder joint to the point of the hip joint) with the line of the thigh (From the point of the hip joint to the point of the knee joint).
- 4. The angle of the shoulder at the maximum flexion of the shoulder:** It is the angle confined between the humerus line (from the point of the elbow joint to the point of the shoulder joint) with the trunk line (from the point of the shoulder joint to the point of the hip joint).

Exploratory experience

Conducted the exploratory experiment on 9/19/20 2 2 in the Majidiyah Youth Hall for weightlifting on a sample that consisted of (3) lifters s to ascertain the following:

- Know the appropriate height for the camera from the ground and the distance the camera is from the weightlifters.
- Know the appropriate amount of lighting in the hall.
- Know the level of performance of the assistant work team for its required duties.
- Know the time needed to complete the experiment.

The main experience

The researcher experimented on a sample consisting of (5) lifters s weighing (77) kg from the Al-Kut Sports Club on 9/21/2022, where the researcher used (2) cameras, where the natural speed was used (25) images per second, and was placed on a stand A trio with a height of (1.35) m and a horizontal distance of (5.50) m from the weightlifters and on the right side of the weightlifters to fully identify the variables of the weightlifters, either the second camera was placed from the front.

In light of the aforementioned results through tables (2, 3), it is noted that a good significant correlation appears between the angle of the knee and the accuracy of the path of the weight. The bottom and the top, i.e. the knee and hip joint, play a major role for those two joints in moving away from or near the weight column from its path so that the body is in a state of balance and stability on the ground. Here is what is explained by the bending of the joints of the body in a way that increases its stability, as when the joints are almost completely extended, the effect of positive force ends completely. But the connection of the shoulder with the track is strong, but with a random indication due to the lack of sample members in the biomechanical analysis research, which leaves its impact on the weakness of the values of the correlation relationship, and this indicates the importance of the shoulder angle in the stages of the knees and the first pull. In the stage of the second pull, the weightlifters needs to enlarge the angle of the shoulder through the physiological structure of the human body, but here the weightlifters tries to make a tight arc in its back to get rid of the distance of the weight until the weight approaches its path to get rid of the resistance arm, i.e. an increase in the length of the strength arm at the expense of the resistance arm (Al-Hashemi, Mathematical Biomechanics, 1999) [2]. The importance of height of the hip point from the ground, where the weightlifters works to make the centre of gravity of the body pass through the point of the hip for the body's balance and stability, and when the centre of the body's gravity passes through the point of the hip so that the weight of the body is distributed evenly on the feet.

Table 4: Represents the means and standard deviations of the variable weight deviations for the sample of the research (cm)

Variable	Computational circles	Standard deviations
D1	12.50	11.01
D2	3.06	8.99
D3	6.10	9.20
D4	12.20	11.15
D5	12.20	11.85
D6	18.99	15.98

The results of the first deviation towards the weightlifters (D1) appeared. The research sample needs to confirm that the weight is closer to the body than it is at present. Increasing the depth of deviation leads to shortening the resistance arm and its torque, which facilitates the action of the force torque to produce better force.

The results of the deepest external deviation of the weight away from the weightlifter appeared in the second pulling stage, which is a percentage close to the body length of the weightlifter, with confirmation of the preference to reduce this percentage based on the relationship between strength, its arm, and the resistance and its arm.

The deviation of the highest height of the weight appeared from the earth's gravity line (D3), and we note the large difference in the percentage of deviation in the research sample, which indicates the distance of the weight from the body at its highest height, which leads to a weak balance of the weightlifters and the possibility of the weight falling to The straight ahead and the enlargement of the snatch arc, which means an increase in the length and determination of the resistance arm the deepest internal deviation of the weight towards the weightlifters appeared in the stage of

falling (D4), indicating that the research sample used deep curves during the lifting and that the magnitude of this deviation will lead to an increase in the width of the hook arc, which leads to an anxious balance for the lift.

Results of the deviation of the weight fixation point in the squatting position appeared from the earth's gravity line (D5). Straight ahead.

The results of the hook arc display of the research sample (D6) showed that the research sample uses deep curves during the performance, which costs it a great effort to control the weight within the base of support.

Table 5: Represents the means and standard deviations of the variable weight deviations for the sample of the research (cm)

Variable	Computational circles	Standard deviations
H1	83.55	9,478
H2	117.15	10.95
3 H	135.80	8,621
4 H	119.11	13.11
5 H	15.20	11.27
6 H	17.01	4.99

The first deviation towards the weightlifters (H1) appeared. We find that the research group approached a good indicator in favour of the research sample at this stage because it qualifies them to take the correct and appropriate position to achieve better strength.

Earth's gravity line appeared. The first time (H2), it is preferable to increase the value of this height because the increase works to keep the weight close to the body in the first acceleration stage.

The results of the second deviation height of the weight (away from the weightlifters) (H3 lead to a delay in the fall of the weightlifter to a squatting position, which leads to a steady lift Earth's gravity line appeared for the second time (H4). So a negative indicator appeared in the performance of the research sample because it was not invested in n G - D performance.

The results of the highest height reached by the weight (H5) appeared, and this ratio is a negative indicator for the research sample not investing in the art of performance, falling under the weight as quickly as possible, and maintaining the path of the weight close to the body.

The height distance reached the deepest internal deviation of the weight from the line of gravity in the fall phase, indicating that the weightlifter did not invest in the art of performance in a way that allowed him to sit quickly under the weight.

highest height to the point of fixation in the squatting position (H7) appeared as a result of the great height that the weight reaches in (H5), which means that the effort is not economical through performance and the lack of good investment in the mechanical properties of the weightlifters, the lower the height when fixing T was better because the degree of stability of objects depends on the height of their centre of gravity, so their stability is greater when this point is in a lower position than if it was high (Al-Hashemi, Mathematical Biomechanics, University of Mosul, 1999) [2]. The results of the distance of the height of the weight fixation point appeared in the squatting position (H8), which indicates that the research sample did not fully sit under the weight.

Conclusions and recommendation

Conclusions

1. The results of the motor analysis have determined the most important kinematic variables that have a relationship with the motor path.
2. Significant differences in the weight bar heights of the research sample were obtained through kinetic analysis.
3. Significant differences in weight movements for the vertical and imaginary lines.

Recommendations

1. Reliance on kinematic variables through the study of variables in (elevations and deviations).
2. The use of modern methods in video imaging and modern programs specialized in kinetic analysis to obtain accurate results.
3. Reliance on studies and research by clubs and federations because of their relationship to the important scientific information they provide in developing the level of achievement.

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