SOME BIOKINETIC VARIABLES OF THE MOVEMENT OF THE FEET OF THE WEIGHTLIFTER DURING THE DESCENDING PHASE UNDER THE BARBELL IN THE LIFT TO THE CHEST SECTION AND ITS RELATIONSHIP TO ACHIEVEMENT IN THE CLEAN AND JERK LIFT

Maad M Allawi[1]*, Nozad Shafeeq Khalaf[1], Zaki Mirdan Omar[2]

[1]College of Physical education and sport science, Kirkuk University, Iraq; [2]Department of Physical education, Al-Qalam University College, Kirkuk, Iraq

Abstract

The study aimed to identify the relationship between some variables of biokinetic movement of the feet of the weightlifters in the stage of fall (descent) underweight in the section of lift to chest and achievement in Clean and jerk.

The research sample included 7 weightlifters of the Iraqi national team, the advanced category to achieve the technical scientific observation. The researcher used video photography, using two video cameras for a mobile device type 12 I phon promax. The two cameras were placed at a distance of (5) m from the right and left sides of the weightlifter. The height of the focus of the lens was imaging (1) m from ground level and the tools were fixed by the special holder of each machine. The frequency of the two cameras was (120) images /second. After that, the kinetic analysis program Kenovea was used to find the biokinetic variables of the weightlifter. The arithmetic - standard deviation - simple correlation coefficient - Pearson) as statistical analyses were used.

Whenever the weightlifters possess an appropriate amount, not too high, of momentum, kinetic energy, work done, and ability during their forward or backward movement underweight in the fall (jumping) stage in the chest lift section, they have a positive role in achieving the best achievement.

Keywords: Kinetic. Weightlifter. Clean and jerk lift

Introduction, Importance and Problem of the Study

Many sports incidents have witnessed a rapid development in digital levels due to training software based on many sciences, including biomechanics. These incidents include the effectiveness of weightlifting during the study of the mechanical variables of weight or weightlifter or both, and these variables can only be known and measured accurately through Kinetic analysis of lift. Kinetic analysis is an effective tool for investigating facts that help to visualize the movement and know its technical performance to reach the model movement in order to choose special training means and methods to deliver it to the player while avoiding and overcoming motor errors. This analysis helps workers in the sports field to choose good, correct and appropriate movements for players, and also gives them fixed and logical facts to support their decisions(Jassim, 1990).

The use of biomechanical laws and foundations that help to clarify the optimal and best performance of motor skills, as well as to identify the mechanical causes that lead to success and failure in the performance of movement is done through the process of biomechanical analysis of sports events(Majeed & Shalash, 2002).

In weightlifting, kinetic analysis aims to give us a complete picture of the current technical status of the lift and the position or shape that the lift should be in terms of technical performance according to the biomechanical foundations of movement to achieve progress in level and achievement(Nassif & Abdi, 1988).

Through kinetic analysis of the classic lifts of famous quartets, world record holders, world championship and Olympic champions, it became clear that all the curves analyzed for the movement of the weight bar are curved in the form of an arc and not, as weightlifters and trainers thought, a straight line(Al-Tikriti, 1985).

It also helps trainers, all workers and specialists in the field of weightlifting to determine the course of the center of weight or weightlifter or (their composite center of weight) when performing lifts. It also helps to find the value of acceleration and speed horizontal and vertical and other biomechanical variables for weight and weightlift, as well as the optimal utilization of physical ability and physical measurements in the best mechanical form with the ability to compare the art of performance ideal typical of lifting with its current performance(Majeed & Shalash, 1992).

The level of achievement depends on the level of scientific knowledge of the objectives of mechanical analysis as a revealing science of the levels of poor motor performance. Also, the biokinetic variables are considered the driving factor of the bodies when they are in motion or in the event of kinetic connections that require the stillness of the bodies. This is what applies to the sport of weightlifting. The kinetic variables are the basis for changing the state of the bodies, as they move the weight from the state of stability on the ground until the rest of the end of the lift in the squatting position carried on the shoulders in the first section of the netter lift.

The movement of the feet has an important relationship with the technical performance of the weightlifter as this movement is in the second drag stage until the end of the fall stage (descending) under the weight and installation in the squatting position. This movement is either to the side or front or back and has a privacy and evidence. It affects the path of kinetic weight, as it leads to the departure of the weight rod from its path (imaginary line), which leads to a disturbance of balance and according to the amount of this movement(Newton, 2006), and thus will negatively affect the technical performance and thus the achievement as the achievement in the effectiveness of weightlifting depends mainly on the art of performance as well as other physical, physical, psychological and mechanical aspects. If the weightlifter is skillful and has perfect kinetic performance in the performance of the Olympic lifts, no technical errors happen and thus achieve a successful lift and high achievement. Yet, failure of attempts increases with the increase of the technical by the weightlifter, and from these errors, which affect the technical performance of the Olympic lifts, including the first section of the clean and jerk. It is the exaggerated movement of the feet forward or backward, as some studies have proven that the large movement (jumping) back or forward during the performance of the lift has a negative impact on the success of the lift, as the movement must be fast and with a short jump distance (Manea, Saaed, & Hasan, 2022; Sabri & Alawi, 2011). Therefore, the researcher found that this is a problem deserves investigation and scientific proof through technical scientific observation in order to determine the degree of importance of biokinetic variables for the movement of the feet in achievement during the performance of lifting the weight to the chest the clean and jerk.

Objectives of the study

This study aims to:

- Identify the values of some biokinetic variables of the movement of the feet of the weightlifter and achievement during the stage of descent (fall) under the weight in the lift section to the chest in the clean and jerk.
- Show the relationship of some biokinetic variables of the movement of the feet of the weightlifter during the stage of descent (fall) under the weight in the lifting section to the chest and achievement in the clean and jerk.
- The study hypothesis
- There is a statistically significant relationship between some biokinetic variables of the movement of the feet of the lifter during the stage of descent (fall) under the weight in the section of lift to chest and achievement in the clean and jerk.

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*Corresponding Author: Maad M Allawi, College of Physical education and sport science, Kirkuk University, Iraq

Correo-e: Maad.a.bio73@uokirkuk.edu.iq

Fall (descent) Phase under Weight

This stage begins from the position of full extension of the body after the end of the second drag stage until settling in a squatting position and the weight is stable on the chest (Vorobyev, 1975) where the weightlifter slightly flexes the joints of the lower limbs in order to perform the movement of the feet to the sides either forward or backward. The feet leave the drum and the body takes the flight mode and the movement - fall is opposite to the movement of the weight. Then the weight goes upward due to the momentum gained in the second drag stage while the body goes downward. Then, the weight falls from its highest height to the point of fixation in the squatting position and when the entire feet are based on the drum, the front of the feet is slightly pointed outward; the back is slightly concave, and the arms are bent from the elbows, which point forward upwards to quilt the stability of the weight on the chest (Drechsler, 1998).

The experience of the weightlifter and the flexibility of the joints of the body, as well as the strength of the arms and legs has a clear role in the position of the feet on the ground in the fall pivot in the squatting position. Also, most weightlifters put their feet on the ground in a comfortable and suitable position for them (Newton, 2006).

Lifters put their feet backward compared to the starting position (jump back), others put the feet to the sides, and some put one foot in front and the other back, or vice versa (Al-Tikriti, 1985).

In this position, the weightlifter reaches the lowest (deepest) point downward, as the joints of the knees and hips are at their maximum flexion. The chest is raised and protruding forward, and the weightlifter in this position needs balance and stability as the weightlifter tries to maintain the center of weight installed within the base of equilibrium(Christ, Owen, & Hudson, 1995).

Study Methodology

The research sample included 7 weightlifter of the Iraqi team, the advanced category, and table 1 shows some of the sample specifications (Table 1).

- **Means of data collection**

Theresearcher used measurement, technical scientific observation, analysis of the content of studies and research, weightlifting literature, and methods to collect data for the study.

- **Measure the mass and length of the weightlifter**

The mass was measured with a scale measuring to the nearest half a kilogram, and the researcher used a device (Rustamimeter) to measure the length of the quarter.

- **Scientific and technical observation**

To achieve the scientific technical observation,the researcher used video photography, using two video cameras for a mobile device type 12 I phon promax. The two cameras were placed at a distance of (5) m from the right and left sides of the weightlifter and the height of the focus of the lens of the imaging machines was (1) m from ground level. The tools were fixed by the special stand of each machine and the frequency of the two cameras was (120) images /seconds/ after that, the kinetic analysis program Kenovea was used to extract the biocent-key variables of the quadrant.

- **How to perform attempts to lift the nitre (section lift to the chest)**

Three attempts were given to each weightlifter according to international law for weightlifting. The best successful attempt was analyzed, which represents 90-100% of the maximum achievement of the weightlifter of the three attempts, because the weight raised, especially in competitions, ranges between 90-100% of the weightlifter's ability. Also, the weight in these ratios maintains its path parallel to the vertical line approximately, because the difficulty of lifting a weight leads to positional adaptations in the body of the weightlifter to reduce the largest possible links hindering movement, so we see a height. The hips and the extension of the legs begin before the start of the torso movement for the purpose of ridding the weight of the knees located in front of the weight rod and thus the weight takes its usual course (Al-Tikriti, 1985).

Table 1: Some of the sample specifications.

weightlifter	height(cm)	mass(kg)	Age(year)	Relative achievement
1	170	80	22	1.88
2	172	75	23	1.93
3	174	80	21	1.82
4	169	72	21	1.8
5	181	70	22	1.81
6	176	106	24	1.7
7	187	65	23	1.88
Average	175.57	78.29	22.29	1.83
STDEV	6.45	13.35	1.11	0.07

- **Biokinetic variables of the movement of the feet of the weightlifter**

Momentum: It is the product of the mass of an object by its velocity and momentum was calculated using the law (momentum = mass×velocity) (M=m×v) **M**(kg×m/sec) (Omar & Abd-Rahman, 2011).

Linear kinetic energy: It is the product of half the mass multiplied by the square of the velocity and the linear kinetic energy was calculated using the law (**kinetic** energy = 1/2 mass×velocity 2) **E**(kg×m/sec) (E=1/2 m×v ²) (Al-Hashemi, 1999).

Work Done: It is the product of the force of the body multiplied by the distance traveled and the workwas found using the following law (work = force×displacement) (**W** = force×displacement)

Power: It is the quotient of the work done by the time taken and the ability was calculated using the law (power = work / time) (time (**P**=work/ **(**Omar WaabDr. Rahman, 2011, 140-143).

- **Statistical Treatments**

The researcherused the following:

- Arithmetic mean-standard deviation-Simple correlation (Pearson)

- **Presentation and discussion of results**

Table 3 shows the results of the study which revealed an inverse significant correlation between the kinetic variables of the movement of the feet (kinetic energy and work) and achievement in the section of lift to chest in the lift of the clean and jet. The value of (t) calculated (0.8 6-) and (0.8 3-) with a probability of error rate (0. 01) and (0.0 2) which is less than the probability of error rate (0.05). According to the research, the reason is the amount of both kinetic energy and work was not at a high level, which led to a better achievement by the weightlifter because both kinetic energy and the work have done depend on the jumping distance of the weightlifter under the weight. This was few and this is a good indicator that the technical performance of the weightlifter positively affected the achievement(Sabri & Alawi, 2011). The same is the case for the biokinetic variables (kinetic momentum and ability) which have negative correlation between and with the achievement in the lift section to the chest in the clean and jet. Yet, it is not significant as the calculated value of (t) is (-0.60) and (-0.47) and at the probability of the error rate (0) 16 (f) 0. 29) which is higher than the probability of error rate (0.05) and the researcher gives the same reason for this relation (Tables 2 & 3).

Table 2: The variables Kinetics.

variables weightlifter	Momentum (kg×(m/sec)²)	Energy (joule)	Work (joule)	Power (j/sec)	Relative achievement
1	31.22	1.19	2.38	15.87	1.88
2	27.33	2.06	4.13	41.27	1.93
3	95.87	17.65	20.23	31.53	1.82
4	24.28	12.17	2.82	21.69	1.80
5	57.92	8.87	17.75	56.48	1.81
6	75.47	18.96	37.92	51.61	1.70
7	13.59	0.40	0.80	5.69	1.88
Average	46.53	8.76	12.29	32.02	1.83
STDEV	30.51	7.82	13.76	18.84	0.07

Table 3: The Relationship between the variables Kinetics and achievement.

The variables Kinetics		M-weightlifter	E-weightlifter	W-weightlifter	P-weightlifter
Relative achievement	R	-0.60	-0.86	-0.83	-0.47
	Sig	0.16	0.01	0.02	0.29

Conclusions

The researcher found out whenever the weightlifters possessed an appropriate amount of momentum, kinetic energy, work accomplished and ability during the movement forward or backward under the weight in the stage of falling (jumping) in the lift to the chest section, they achieved the best achievement. So, the researcher recommends the need for the movement of the feet of the

weightlifters in the stage of falling under the weight in the lift section to the chest in the clean and jet, whether the movement is forward, backward or sides. Yet, the extent that preserves the balance of the weightlifter and weight, that is, making the center of weight of the compound of the weightlifter and weight located within the base of the fulcrum to ensure the success of the lift and achieve the best. The researcher also recommends conducting similar studies on the kinematic variables of weight in the different lifting stages in the Olympic lifts and a comparative study in the variables of the current study in the stage of the fall of the weightlifter under the weight between the snatch lift and the lift section to the chest in the clean and jet lift. Other studies looking at the biokinetic variables of the rest of the technical stages of the performance of the clean and jet is also important.

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