

## An Analytical Study of Some Biomechanical Variables of the Rising Punch Skill of the National Team Players Weighing 64 Kg

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### Abstract

*The importance of research in the analytical study to find out the values of some variables been the task of punching rising on the (face), which affect in particular mechanics of the technical performance of "technique" to damage of rising in boxing by means of which it is the understanding of how performance and detection of overlapping relations between the movement of the body parts during this performance is determined as the motor actions required to accomplish this performance with the highest efficiency possible, through the investment principles and laws been and after you make the conversion process been my profession punching rising on the (facial). And here it turns out I have a researcher through the analysis of the war that the players do not observe the technique ideal to perform punching and so the player is to guide the punches just without achieving the mechanical mode proper to the body in the lowest speed for you, I'm the player weight (64) do not possess the extent of the movement against the arm strike to the face area, in other words, to the distance traveled by the players 64 was at a slow speed, being the time of punching this large weight according to Newton's third law (action and reaction) Whenever the corners of the body suitable mechanical performance of the motor for you to thrive punching speed after a reaction for every action, the study aimed to identify the value of some variables been the skill damage of rising on the face of national team players with a weight come to, and use int descriptive method of analysis, or a sample search of understanding national team players with a weight come outstanding at the sports which numbered (5) Players used the means and tools and hardware appropriate to achieve the research objectives, as well as the researcher used test the performance of the punch upside the face to face with the rival was applied to a sample of the sea and the use of variables been that govern the nature of the performance of the damage bullish on the face to the players of the national team Posen come on the form of numeric values then the researcher to address value extracted statistically using the statistical bag spss. The fourth chapter included the presentation, analysis and discussion of the results, where they were presented, analyzed and discussed based on scientific sources. The researcher concluded that the variables depend on the player's location, proximity and distance from the opponent, as well as taking the appropriate position in determining the appropriate angle of the variable.*

**Keywords:** Biomechanical Variables, Punch Skill

## DEFINITION OF RESEARCH

### Introduction and Importance of the Research

The Athletic movements performed in accordance with the foundations of mechanical valid to suit the mechanical system for movement of the human body movement is considered more healthy and accuracy because the plugs for the accuracy and correctness of war is the foundations and laws of mechanical and any movement not those foundations and laws that succeeded the success of its coincidence only and does not require that all the time so it was for been important role to achieve these demands as well as this role in the discovery of many important movements and sports building on the foundations of mechanical formed by specialists to get to the best achievements of the economy of the high-energy human that bases apply to many sports activities such as boxing where I'm boxing you think Reaction speed and decision-making and development in fractions of a second so that any increase in the critical path that affects the speed of the damage and technique, and these beats are the upward stroke of his which is considered one of the most strikes the power so what made the injury of accurate, timely, and such a force as a result of the involvement of many variables over a relatively compared with other so the guidance punches to different areas of the body with high accuracy against the closet have a space biomechanic different different type of punching as the God of the rising on the (facial) In turn is affecting the foundations of mechanical skill and its war did not require all the style from the special Technic outcome of his follow-up punch to body weight and accuracy of injury rival in the specified area, the corners of the body perfect in parts of the body, it helps you in the easy guide punches

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to areas of the body and the extents of the war of the occasion and this in turn leads to reduce the time This is a resounding demonstration of the significance of speed for both the football player and the boxer in terms of gaining access to higher momentum for the body. The motor performance did not have a major influence on the amount of movement that the body was able to achieve, which is directly proportional to the amount of force that is applied and inversely related to the length of time that has elapsed. The relevance of the research comes in the fact that it is an analytical study that tries to discover certain values of biomechanical factors of the punching skill (facial). This is the reason why the research is so important. The mechanics of the technical performance "technique" of rising strikes in boxing are particularly affected by certain factors, which have a special influence on the technique. As a result of doing so, it is possible to acquire a knowledge of how to perform and to expose the interrelationships that exist between the movement of body parts during this performance and the motor movements that are required to execute this performance.

### **The Research Problem**

Following the completion of a biomechanics study on the increasing punch skill of the (facial) areas, the researcher discovered via the use of kinetic analysis that the players do not take into account the most effective way to do the punch. The researcher had not yet finished the biomechanical study when they made this insight. Instead, the player's purpose is to direct the punches without acquiring the right mechanical posture of the body at the tempo of the punch that is the slowest. This is the objective of the game. Following the end of the study, the researcher came at this conclusion as a consequence of the results associated with the inquiry. As a result of the fact that the punch time for this weight is very long, the distance that was traveled by the 64 players was accomplished at a rate that was fairly slow. There is a connection between the angles of the body and the mechanics of the kinetic performance of the punches, and according to Newton's third law (action and reaction), the more suited the angles of the body are, the faster the punch will reply after each action. These two laws are related to each other. During the process of directing a punch to an opponent boxer via the biomechanical route and in line with the accuracy zones of the body, this is what we find as a result of our investigation into the boxer. To say it another way, throughout the course of the game, the whole group of sixty-four players walked a considerable distance at a slow pace. Since this is one of the aspects of the scientific vacuum that has not been filled, one of the functions of biomechanics was to improve technique and analysis, to discover the mechanical laws and principles that influence the technical performance of climbing blows, and to identify the factors that influence the technical performance of climbing blows. Biomechanics was able to contribute to the filling of this void. Following this, the researcher arrived at the opinion that it would be advantageous to handle this topic by providing a number of essential elements for the striking places on the face that are employed during rising strikes in boxing. This was the conclusion that the researcher reached as a result of this. Identifying areas of weakness, taking action to eradicate those areas, and improving the aspects of this skill that were already strong were the goals of this endeavor.

### **Research Objective**

**The research aims to identify:**

1-Identify the values of some biomechanical variables for the skill of upward strike in the face area for national team players weighing 64 kg.

### **Research Areas**

**The human sphere:** the players of the national boxing team with a weight of 64 kg for the season 2023-2024.

**Mandatory period:** from 15/8/2023 to 20/3/2024.

**Spatial field:** Boxing Hall (training arena) of the Iraqi Arab Club Baghdad.

## **RESEARCH METHODOLOGY AND FIELD PROCEDURES**

### **Research Approach**

The researcher used the descriptive method in the survey method of comparative postgraduate studies, to suit the nature of the problem to be solved, as it " represents a scientific diagnosis of problems or phenomena to the extent that objective tools are available, and then express this diagnosis with linguistic and mathematical symbols adjusted according to a tight organization.

### **Research Community**

The researcher identified his research community in a deliberate way to achieve the purposes of the study, and (5) players representing the national team in the boxing game for the 2023-2024 season were selected and they represent (100 %) of the research community.

### **Means of Collecting Information**

Observation.

Testing and measurement.

International Information Network (Internet).

Arabic and foreign sources.

Personal interviews with professors specialized in mathematical biomechanics.

### ***Tools and Devices Used***

Including CD No. 4 and DVD No. 8, Imation type.

There are 2 video cameras, one of which is fast (300 images/s), and another is fast (25 images / s) for the purpose of filming the experiment in the field, and all of them are Japanese-made by Casio company.

One laptop computer Number (3) type (Lenovo Ci5) and two (hp Ci7) (American-made).

It is an electronic stopwatch (Casio).

Atextile tape measure to measure distances with a length of (10) meters.

Colored layers, adhesive tape, and phosphorescent markers used to identify body joints.

A boxing ring.

Number of boxing gloves (10).

Number of head protectors (5).

Number of dental protectors (5).

Combat bags to apply skills number (2).

The Fox whistle is number 2.

The American-made electronic medical balance.

Number of power Distribution Units (3).

## **TESTS AND MEASUREMENTS USED IN RESEARCH**

### **Measurement of the Apparent Weight (Mass) of the Body**

The apparent weight of the body was measured by a medical scale type (Ketecto) after its accuracy was confirmed, as the laboratory stands above the scale in a moderate position, upright, barefoot until the indicator is completely stable, and calculates the body mass to the nearest 1/4 kg.

## Measuring Arm Mass Relative to Body Mass

The real trunk mass was measured by multiplying the body mass by the relative weight of the hand (palm, forearm, humerus), which is 43%, and is calculated in kilograms according to the following equation:

$$\text{Arm mass} = \text{body mass} \times 0.6$$

## The Biomechanical Tests and Variables Used in the Research

### Face-to-Face Rising Punch Performance Test with Competitor

**That's the goal of the calendar:** to evaluate the performance of the upward punch to the opponent's face.

**Equipment and tools:** boxing paws number (4) - manual stopwatch-grading form-ring with legal specifications-head protectors-dental protectors

**Performance description:** the exercise is performed by two boxers: each boxer performs the upward punch to the face and for (30) seconds.

**Conditions:** the upward punch to the face is performed according to the following **conditions:** (punch exit – follow it with body weight - accuracy of hitting the target).

**Registration:** (10) scores are calculated for the performance of the upward punch directed to the face, divided as follows:

The exit of the Punch (2) degree.

Follow-up with body weight (4) degrees.

The accuracy of hitting the target (4) degree.

**The final score is (30) degrees,** and each player was given 3 attempts, including 2 minutes of rest, and the best attempt was selected for kinetic analysis.

### Biomechanical Variables

The researcher relied on the most important basic biomechanical variables affecting the performance of the rising blow skill in boxing (for the face) through sources, references and previous studies, in addition to presenting a questionnaire form to survey the opinions of experts and specialists in the field of biomechanics and boxing, in which the biomechanical variables of the rising blow skill were recorded, and after collecting the forms, all the variables were studied as shown in Table (2).

1. The relative angle of the elbow joint at the moment of preparation: it is the angle sandwiched between the elbow line (from the point of the wrist joint to the point of the elbow joint) and the humerus line (from the point of the elbow joint to the point of the shoulder joint) the moment of maximum bending to prepare "backwards" to perform the upward punch (for the face) and is measured by the degree from the inside only because it is a closed angle.
2. the angle relative to the elbow joint is the moment of punching: it is the angle sandwiched between the elbow line (from the point of the wrist joint to the point of the elbow joint) and the humerus line (from the point of the elbow joint to the point of the shoulder joint) the moment of maximum extension of the moment of the upward punch (for the face) and is measured by the degree from the inside only because it is a closed angle.
3. the angle relative to the shoulder joint is the moment of punching: it is the angle sandwiched between the humerus line (from the point of the wrist joint to the point of the elbow joint) and the trunk line (from the point of the shoulder joint to the point of the hip joint) the moment of maximum extension of the moment of the upward punch (for the face) and is measured by the degree from the inside only because it is a closed angle.
4. the angle between the thighs at the moment of punching: it is measured directly and it represents the angle between the lines of the right and left thighs (from the point of the knee joint to the point of the hip joint) meeting the hip at the moment of punching, measured in degree.

5.the angle relative to the knee joint moment of punching: it is the angle sandwiched between the thigh line (from the point of the hip joint to the point of the knee joint) and the leg line and measured (from the point of the knee joint to the point of the ankle joint) and measured by the degree only from the inside because it is a closed angle.

6. the height of the center of mass of the body punching moment: it is the bounded vertical distance between the center of mass of the body and the ground

7. the angular velocity of the striking arm: is the angular change of the arm for the moments of flexion and extension divided by the time of this change, and its unit of measurement is Degree / second

8. peripheral velocity of the striking arm: the ambient velocity of the striking arm was measured after finding its angular velocity by according to the above paragraph (X ZX point ÷57,3) and its unit of measurement M/ s.

9. punching time: it is the time taken by the boxer when performing the punch from the moment of maximum bending of the punching arm to the moment of extension of the punching arm, measured in unit (Tha).

### ***The Main Experience***

The main and final experiment was conducted in (15-16/10/ 2023 in the morning, in the closed hall of the games of the Arab Sports Club (boxing ring), where each player was given three attempts to perform the upward blow skill (face), the best attempt was selected for analysis in terms of (punch exit and follow-up with body weight and accuracy) for each laboratory and then through those attempts extract the values of the biomechanical variables under study.

### **Kinetic Analysis Software**

#### **Kinetic Analysis Software (Kenova-0.9.5)**

The researcher will use the kinesthetic analysis program (Kenova - 0.9.5), which is one of the "uncomplicated kinesthetic analysis programs that can be used in the field of qualitative and quantitative analysis and also in the field of learning", after installing the program, it can be accessed automatically from the list of programs and the program interface appears after clicking on it and there are many options available according to the user's need to extract and analyze the variables required in the research.

## **PRESENTATION, ANALYSIS AND DISCUSSION OF THE RESULTS**

### **Presentation of the Results of the Values of the Biokinematic Variables of the Upward Strike Skill of the Facial Area, Their Analysis and Discussion for the Research Sample**

**Table 4. The description of the values of the arithmetic mean, standard deviations, median, torsion, divergence, the highest and lowest biomechanical value of the skill of upward blow to the facial area of the national team players weighing 64 kg shows.**

#	Measurement	Unit	Mean	SD	Median	Skew	Var	Max	Min
1	Elbow Angle (Prep)	°	60.80	0.83	61.00	0.512	1.376	62	60
2	Elbow Angle (Punch)	°	95.80	0.447	96.00	2.236	0.466	96	95
3	Shoulder Angle	°	76.40	0.894	76	2.236	1.170	78	76
4	Thigh Angle	°	67.20	0.447	67.00	2.236	0.665	68	67
5	Knee Joint Angle	°	158.67	1.032	159	0.665	0.650	160	157
6	Center of Mass Height	m	1.18	0.008	1.185	0.857	0.689	1.19	1.17
7	Angular Velocity (Arm)	°/s	1535.17	36.50	1545.45	1.126	2.377	1565.21	1478.26
8	Circum. Speed (Arm)	m/s	24.05	0.346	24.16	1.571	1.441	24.31	23.47
9	Punch Performance Time	s	0.022	0.000	0.023	2.236	1.960	0.023	0.022

The results presented in Table (4) show that the value of the arithmetic circles, the standard deviation of the values of the biomechanical variables of the upward Strike skill of the facial area for national team players weighing 64 kg. According to the above results the values were catale:

**Elbow angle at the moment of preparation:** The arithmetic mean of the variable of the elbow angle at the moment of preparation when performing the upward strike to the facial region was (60.80) degrees, and the standard deviation was (0.83). The median value of the variable of the elbow angle at the moment of preparation when performing the upward strike to the facial region was (61.00). The value of the skewness coefficient was (0.512), while the coefficient of variation was (1.376). The highest value was (62), and the lowest value was (60).

**Elbow angle at the moment of punching:** The arithmetic mean of the elbow angle variable at the moment of punching when performing an upward strike to the face area was (95.80) degrees, and the standard deviation was (0.447). The median value of the elbow angle variable at the moment of preparation when performing an upward strike to the face area was (96.00). The value of the coefficient of skewness was (2.236), while the coefficient of variation was (0.466). The highest value was (96), and the lowest value was (95).

**Shoulder angle at the moment of punching:** The arithmetic mean of the shoulder angle variable at the moment of punching when performing an upward strike to the face area was (76.400) degrees, and the standard deviation was (0.894), and the median value of the elbow angle variable at the moment of preparation when performing an upward strike to the face area was (76). The value of the coefficient of skewness was (2.236), while the coefficient of variation was (1.170). The highest value was (78), and the lowest value was (76).

**The angle between the thighs at the moment of punching:** The arithmetic mean of the variable of the angle between the thighs at the moment of punching when performing the upward strike to the face area was (67.200) degrees, and the standard deviation was (0.447). The median value of the variable of the elbow angle at the moment of preparation when performing the upward strike to the face area was ( 67.00, the value of the coefficient of skewness (2.236), and the coefficient of variation (0.665), the highest value was (68), and the lowest value was (67).

**The angle of the knee joint at the moment of punching:** The arithmetic mean of the variable of the angle of the knee joint at the moment of punching when performing an upward strike to the face area was (158.666), and the standard deviation was (1.032), and the median value of the variable of the elbow angle at the moment of preparation when performing an upward strike to the face area was (159). The value of the coefficient of skewness was (0.665), while the coefficient of variation was (0.650). The highest value was (160), and the lowest value was (157).

**Height of the body's center of mass at the moment of punching:** The arithmetic mean of the variable of the height of the body's center of mass at the moment of punching when performing an upward strike to the face area was (1.18), and the standard deviation was (0.008). The median value of the elbow angle variable at the moment of preparation when performing an upward strike to the face area was ( 1.185), the value of the coefficient of skewness (0.857), and the coefficient of variation (0.689), the highest value was (1.19), and the lowest value was (1.17).

**Angular velocity of the striking arm:** The arithmetic mean of the angular velocity variable of the striking arm when performing the upward strike to the face area was (1535.17) degrees/second, and the standard deviation was (36.50). The median value of the elbow angle variable at the moment of preparation when performing the upward strike to the facial region was ( 1545.45), the value of the coefficient of skewness (1.126), and the coefficient of variation (2.377), the highest value was (1565.21), and the lowest value was (1478.26).

**Circumferential speed of the striking arm:** The arithmetic mean of the angular velocity variable of the striking arm when performing the upward strike to the face area was (24.05) meters/second, and the standard deviation was (0.346). The median value of the elbow angle variable at the moment of preparation when performing the upward strike to the facial region was ( 24.16), the value of the coefficient of skewness (1.571), and the coefficient of variation (1.441), the highest value was (24.31), and the lowest value was (23.47).

**Punch performance time:** The arithmetic mean of the punch performance time variable when performing an upward strike to the face area was (0.022), and the standard deviation was (0.000). The median value of the elbow angle variable at the moment of preparation when performing an upward strike to the face area was (0.023), and the value of the coefficient of skewness was (2.236), while the coefficient of variation was (1.960). The highest value was (0.023), and the lowest value was (0.022).

## **CONCLUSIONS AND RECOMMENDATIONS**

### **Conclusions**

As a result of the disappearance of the preparatory section in the rising punch due to many considerations, including defense and the speed of the punch, as well as the expectation of movement on the face, the elbow angle at the moment of preparation was relatively close to the elbow angle in the state of preparation.

The opponent's face being on the same imaginary line with the striking player's shoulder forms the angle of the shoulder joint at the moment of punching (95.80).

The need for the hitting player to increase the lifting of the hitting arm in order to hit the face area, which led to a large increase in the shoulder joint at the moment of the sleeve.

Because the upward punch is the process of transferring from the bottom to the top, the striking player needs to be close to the opponent in order for the transfer process to take place in a better and more effective manner.

The player needs to extend the knee joint in order to reach the point of injury to the face

The height of the player's body mass during the upward punch in order to process the kinetic transfer of the force produced in the lower extremities.

The time of the upward punch to the face as a result of the difficulty of performance and the complications resulting from the involvement of large variables and the need of the striking player to agree between these variables.

### **Recommendations**

Ensuring the performance of the upward strike to the face skill according to the stages that this skill passes through and adopting the values of the biomechanical variables of the strike.

The necessity of emphasis by trainers on developing the effectiveness of the biomechanical variables of the upward blow to the face

The researcher recommends that coaches and players possess mechanical information to identify the precise performance of the upward kick to the face used in the research.

The researcher recommends studying the biomechanical variables of the upward blow to the face

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