

A comparative analytical study of the kinematic transmission index values and some bio-kinematical variables for the stage of prompting of the long jump

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ABSTRACT

The importance of research showed in the study of some bio-kinematical variables of the long jump for younger heroes of the country and the comparison between them to reach the best performance through bio-kinematic careful analysis and thus get a clear picture contribute to improve the kinetic level and achievement together, The researchers conducted their experiment on two young country heroes of long jump using a video camera type (Sony(With tripod stand as well as a computer type(DELL) With its accessories as well as the software for imaging and biomechanical analysis, where six attempts were given to each player and the highest-achieving attempts were chosen for the analysis. The researchers reached several conclusions. The second jumper achieved superiority over his first counterpart by the velocity variable of the initial horizontal rise stage, but it moved away from its ideal value. Both jumpers achieved an angular transition to the centre of gravity of the body during the rise stage, which was similar by following the values of the angles of decline and rise, but the first jumper touched at a lower angle and left at a higher angle than the second jumper. The researchers concluded with several recommendations. The need to pay attention to the development of the qualities of speed and strength because of their role in achieving achievement with this effectiveness, the most important of which is the speed of the approach stage. Emphasis on reducing the rise time by achieving ideal angles for landing and rise as well as the amount of flexion of the knee joint during the stage.

Keywords: Bio-kinematic; Long jump; Knee joint; Kinematic transmission.

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INTRODUCTION

The trend to apply the scientific foundations adopted by the sciences of sports education and derived from the scientific and technical development witnessed by the modern world has played a major role in the development of the sports level and achievements, which occurred as a result of scientific efforts and research that concerned the movement carried out by athletes during the performance, which requires knowledge of the foundations of biomechanical events or games by identifying what may happen during the movement as well as what can govern this movement of laws and mechanical principles with direct impact on the causes and outcomes of the movement. Biomechanical science is a physics science that specializes in the study of the effects of forces on objects and movements resulting from these forces and their association with the time factor, so it is one of the sciences that contributed significantly to the scientific progress of sport performance, which in turn led to the advancement of contemporary records.

The games of the arena and field are considered one of the games that contributed scientific progress in the development of its achievements as it represents the maximum performance of athletes and in which all physical and mechanical variables contribute, among which we find the effectiveness of long jump is one of the games with the maximum performance of a specialized character, The nature of this event of a rapid nature multiplies the requirements of the athlete of the physical and technical aspects, especially the aspects of the transport of kinetic momentum compounds during the advancement phase, and therefore the accurate understanding of what are the biomechanical variables and energy pathways of both types that accompanying the implementation of this event is the most important reasons for detecting what are the negative and positive factors affecting the kinetic performance and the level of achievement Verified. From the foregoing shows the importance of research in studying some bio-kinematical variables for the effectiveness of the long jump of young jumpers among the champions of the country and comparing them to reach better performance through accurate biomechanical analysis and thus obtain a clear picture that contributes to improving the kinetic level and achievement together.

Research problem

Through the researcher's follow-up to the recorded numbers of this event, he noted that there is a marked difference between the level of young Iraqi jumpers compared to the Iraqi level of advanced. There is also a lack of research and studies that dealt with the biomechanical aspect of this effectiveness, especially the nature of the factors that affect movement and the extent of good investment of external and internal power and energy pathways and the amount of maintenance during the stage of rising as well as the rest of the conditions surrounding the work and the stability of the kinetic compatibility and understanding of the complex movement of the body at each rising, which appears in the form of a set of biomechanical variables associated with performance, which can be counted on the level of work of this event and compare it with the players themselves to identify weaknesses and strengths to Young jumpers, which the researchers have identified as a problem worth studying, as this research is a service for sports professionals, both coaches and players.

Research objectives

- 1- Identify the values of some bio-kinematical variables for the rising stage to the effectiveness of the long jump in some young heroes of Iraq.
- 2- Identify the values of the kinetic transmission index for the transmission of mechanical energy of both types during the rising stage of the effectiveness of the long jump among some of the young heroes of Iraq.
- 3- Comparison of the variables of the research between members of the sample.

Research hypotheses

There is a discrepancy between the values of bio-kinematical variables among the subjects of the research sample.

Research areas

1-5-1 the human field: Two young jumpers of the heroes of the country.

1-5-2 field of Time: for the period from 3/3/2020 until 5/3/2020.

1-5-3 field of place: the arena and field stadium in the College of Physical Education and Sports Sciences / University of Basra

METHODOLOGY

Research methodology

The researchers used the descriptive method in a manner of comparative studies to suit the nature of the research problem.

Research sample

The sample of the research was selected in the intentional way (intended) as it included two young jumpers of the heroes of the country [1] whose achievement exceeded the distance (6.5) meters, and the researchers counted a homogeneous sample relative to achievement. Despite the individual differences in the completion of the research sample and in their physical qualities, these differences do not affect the application of these fixed laws and do not change the basic principles of movement where one or several athletes can study in accordance with these laws. (6: 37: 1996)

Methods of gathering information

Means of gathering information:

- Observation and experimentation.
- Arab and foreign sources and references.

Devices and tools used in the search

- Video camera type (Sony) with a digital storage capacity (600) GB.
- Tripod.
- Internet.
- Computer (Pentium 4) with accessories.
- Software specialized in analysis.
- Scale (1) m.
- Metal tape measure.
- gypsum.

Exploratory experience

The researchers conducted an exploratory experiment on Tuesday 3/3/2020 with the purpose of identifying the obstacles that may face the progress of the main experiment and identifying the appropriate location and dimensions on the basis of which the camera will be placed in addition to knowing the extent to which the assistant work staff can carry out the duties on their shoulders (2)

Main experience

The researchers conducted the main experiment on Thursday, March 5, 2020, on the field of arena and field in the college of Physical Education and Sports Sciences at The University of Basra and in the presence of both the research sample members and the assistant staff, as three attempts were given for each jumper and the best achievement attempt was analysed.

Videography

The researchers photographed the search sample using a Sony-HDD video camera with a frequency speed (25 images/s) and the camera was mounted on a tripod and the centre of the camera lens was above (24'1 m) and the camera was placed At a distance (60'9 m) from the middle of the advancement panel with a vertical angle with the player this ensures the filming of the last three steps of the approaching run up to the flight stage, as the researchers used a drawing scale (1 m) , figure 1 shows the perspective of the camera.



Figure 1. Perspective of the camera being used.

Analysis the recording video

Researcher Wen analysed the recorded video using laptop type (DELL) and its accessories, after determining the best performance through the best achievement where the researchers used the program (dartfish connect) To analyse the movement performance of players and extract the values of bio-kinematical variables.

Kinematic variables under study

- 1- The speed of the primary horizontal rising stage.
- 2- Landing angle.
- 3- Height (m. W. C) the moment of landing on the plate.
- 4- The angle of the knee joint at its maximum flexion.
- 5- Rising angle.
- 6- Height (m. W. C) the moment of starting off.
- 7- The resulting starting speed.
- 8- Angle of starting off.
- 9- Horizontal speed after getting up.
- 10- Vertical speed after getting up.
- 11- Motor transport indicator. (2: 56: 2004).
- 12- Achievement.



Figure 2. How to measure landing angle.



Figure 3. How to measure the angle of starting off.

Statistical methods

The four statistical operations.

RESULTS AND DISCUSSION

Through the results shown in Table 1 it became clear that there was an advantage for the second jumper in the variable of the velocity of the initial horizontal rising stage, with a difference of (0.35) m / s, and this indicates that the second player had the preference in obtaining a higher achievement, as Muhammad Othman (4:223 :1990) indicated stated that the achievement of the effectiveness of the long jump depends 90% on the approaching speed of the jumper. We also notice in the same table the superiority in the values of the angle of landing on the board and in favour of the second jumper, he closed to the ideal angle for this variable, which (65-70) degrees (4: 258: 1990).

To achieve a large angle of descent has the effect of maintaining the values of the horizontal velocity of approach, by reducing the reaction resulting from the front support of the riser foot, which is usually opposite to the direction of movement. The second player has achieved the best values for height) m. W . C)in the moment of landing on the plate, which came as a result of the big drop angle discussed above . We notice

through the results of Table 1 the superiority of the first jumper in the values of the knee joint angle variable at its maximum flexion in the rising stage, which indicates that the bending of this jumper was not exaggerated as in the case of the second jumper and therefore the moderate bending close to the ideal angle achieved by advanced jumpers, amounting to (145-150) degree (4:223 :1990). It will reduce the deviation of the axis of rotation from the line of action of the force and then increase the magnitudes of the net thrust of the ground during the rising stage.

Table 1. Values of the biomechanical variables under study for the research sample.

T	Variables	1stJumper	2ndJumper
1	Primary horizontal rise velocity (m / s)	4.58	4.93
2	Landing angle (degree)	60.7	63.2
3	Height (m .W .C) the moment of landing on the plate (m)	0.79	0.90
4	The angle of the knee joint at its maximum flexion (degree)	140	123
5	Angle of rising (degree)	74.3	67.2
6	Height (m .W .C) the moment of starting off(m)	1.01	1.09
7	Total cruising speed (m / s)	4.08	4.58
8	Departure angle(degree)	17.3	16.5
9	Horizontal velocity after getting up (m / s)	3.89	4.38
10	Vertical velocity after getting up (m / s)	1.21	1.3
11	Motor transport indicator.	22.76	23.91
12	Achievement (m)	6.55	6.61

We also note from the same table that the achievement of the rising angle of the first jumper is better than that of the second, as the greater the angle of rise, the more this indicates that the rising foot will not remain on the board for a relatively long. The length of the player's stay on the board will cause a loss of horizontal speed that impact on achievement, knowing that the angular transition of both jumpers was converging, the first jumper achieved a lower angle (2.5) degrees than the second jumper, but he achieved an angle of rise higher than the second by (7.1) degrees, which indicates that the difference in the angular transition of The centre of gravity of the body has reached (4.6) degrees only, which is a value with a little effect in speed of the performance of the rising stage.

As for the height of the centre of gravity of the body at the moment of launch, it was clear that the second jumper exceeded the values of this variable, which is the third factor affecting the horizontal distance travelled by the ejected object at an angle with the horizontal line, Talha Hussein Hussam al-Din (8:311: 1993) mentions that in the case of neglecting the impact of air resistance, the jumper will move in all cases with the same compound horizontal of speed during his path, and here the flight time differs for the jumper due to the main difference between the launch and landing level, in all cases the jumper will reach a greater horizontal distance at the second level than in the level First (3: 84 : 2000). We also note from the values of Table 1 that the second jumper has achieved a faster launch speed (result) than his counterpart by (0.5) m / s, which is an effective difference in the value of the achieved achievement, as the speed of the launch is the most important factor affecting the horizontal distance That is crossed by the projected object at an angle with the horizontal line. [4] The first jumper achieved a better starting angle than the second, which was identical to what the Iraqi champions achieve, which is (17) degrees, which is a positive point for him, as the starting angle is the second most important factor in the achievement of the hopper as it is subject to the mechanical laws of ballistics, as we mentioned earlier. The superiority of the second player in the resulting cruising speed variable made him also outperform both the horizontal and vertical speed, which appears to us in Table 1 and that the superiority in the speed compound of horizontal was higher than the difference made by the

speed compound of vertical due to the large starting angle of the first jumper, i.e. Although the first jumper achieved a greater starting angle, the second player had the advantage in the resultant speed and its compound. We also note that there is an superiority of the second jumper over its counterpart in the values of the kinematic transmission index recorded in Table 1 and this indicates that the second jumper was able to keep With the values of the horizontal velocity during the rising stage, with providing a higher starting point for the centre of gravity of the body, so he was able to achieve a better achievement , and this is what Haider Mahdi Abdel Saheb (3 : 84 : 2000) indicated that the higher the values of the kinematic transmission index, the more effective the stage which had a significant impact on increasing the achievement too.

It appears from the results of Table 1 that the best achievement was for the second jumper, and the researchers attribute that to his superiority with two mechanical factors affecting the horizontal distance he achieved, namely the speed of starting off and the height of the starting point, which was confirmed by his recording of the higher value of the kinetic transmission index.

CONCLUSIONS

- 1- The second hopper achieved superiority over its first counterpart by the variable velocity of the initial horizontal rise phase, but it moved away from its ideal value.
- 2- Both jumpers achieved an angular transition to the centre of gravity of the body during the rise stage, which was similar by following the values of the angles of landing and rise, but the first jumper touched at a lower angle and left at a higher angle than the second one.
- 3- The second jumper achieved a higher elevation of the body's centre of gravity at the moments of landing and rising from the board.
- 4- The first jumper achieved an ideal angle of the knee joint at its maximum flexion, which was greater than that of the second jumper.
- 5- The second hopper achieved superiority in the values of the resulting starting speed as well as for its two compounds, both vertical and horizontal, over the counterpart of the first.
- 6- The first hopper achieved a higher starting angle than the second jumper and it matched the ideal angle at the local level.
- 7- The second hopper achieved higher values for both the kinematic transmission index and the achievement than his counterpart, which indicates that he has the highest speed with the ability to maintain it during the starting stage and thus obtain a better achievement.

Recommendations

- 1- The need to pay attention to developing the qualities of speed and strength because of their role in fulfilling achievement with this effectiveness, the most important of which is the speed of the approach stage.
- 2- Emphasis on reducing the rising time by achieving ideal angles for landing and rising as well as the amount of knee joint flexion during the stage.
- 3- Emphasis on achieving an ideal starting angle for jumpers due to their role in fulfilling achievement.
- 4- Taking into account the full tide of man rising to achieve the maximum height of the centre of gravity of the body to the moment of starting.
- 5- The need to maintain the amounts of speed during the stage of starting off that can be followed up by measuring the kinetic transport index for jumpers periodically.
- 6- The use of filming and biomechanical analysis as a method to uncover the hidden aspects related to the performance of players.
- 7- Conducting similar research with other samples and for various activities.

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