THE QUANTITATIVE VALUES OF THE CORRELATIONS IN TERMS OF THE TWO ANALYSES (KINETIC AND KINEMATIC) FOR THE STAGES OF APPROACHING AND GETTING UP AND THEIR RELATIONSHIP TO THE PERFORMANCE LEVEL OF THE STUDENTS' LONG JUMP AND HIGH JUMP ACTIVITIES

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Abstract

The purpose of this paper is to identifying the quantitative values of the correlations in terms of the two analyses (kinetic and kinematic) for the stages of approaching and getting up and their relationship to the performance level of the students' long jump and high jump activities. The researchers used the descriptive approach with correlational relationships to solve the problem under study, and the sample consisted of (40) students from the college of Physical Education and Sports Sciences at the University of Wasit with a rate of (40%) from the total community, and the results were that there is a Level sigificant correlation between the kinetic and kinematic variables of the two stages approaching and getting up and between the level of performance of the long jump and high jump activities for students. The researchers reached the conclusions (that the kinetic and kinematic analysis processes mainly help to identify the variables that are closely related to the performance of the sporting events under study, and that there is a clear similarity in the kinetic paths of both the long jump and high jump activities in terms of biomechanical variables). According to the research results, the two researchers recommend (the need to carry out the mechanical analysis process for sports events (jumping activities) during and after exposure to training doses to know the rates of development and evaluate performance in a scientific and accurate manner, and the need to use mechanical tests resulting from mechanical analysis processes as they deal with the majority of variables associated with the success of technical performance for sporting events.

Keywords: Students, Long jump, High jump

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Introduction

All high-level sports achievements depend on many cognitive aspects that surround specialized sports activity, and these aspects are closely related to the precise details of the movement and the goal required of it in order to reach the highest levels. It is known that the overlap of many variables in the course of sports movements increases their complexity as well as understanding The interpretation of this overlap will reduce the difficulty of performance, and this mainly depends on the use of two basic factors, which are personal experience and objective devices and tools. The use of modern sports techniques in the interpretation of sports movements contributed greatly to solving the difficulties facing those interested in developing the athletic level, especially athletics events, including the long jump and high jump through the two analyzes (kinematic and kinetic).

The function of kinetic analysis is to sort and tabulate the many data with its main elements, then process it logically by balancing with an appropriate criterion to transform from its deaf quantitative formula to another with useful meanings to solve a clear problem (Al-Fadli. 2012).

Kinematic analysis is used to accurately identify the level of performance of sports movements and skills of players, as it provides the opportunity to study the smallest details of sports movements and shows how athletes perform, and through it the values of kinematic and kinetic variables and the relationship between them can be extracted to know the strengths and weaknesses of performance in order to contribute In adjusting performance for the better and also contributes to judging new methods in the technical performance of sporting events (Al-Qatami and Al-Kilani. 2019).

Teachers and coaches face many problems related to reaching the best technical performance for many sporting events, and the use of kinetic analysis works to interpret and fragment the performance and compare it with the ideal performance and correct mistakes and reach high achievement, and it also adds to the coach a successful background that helps him to display the performance of the events in the correct form (Majeed and Shalash. 2002).

The long jump and high jump activities are among the activities that are included in the curriculum of practical lessons in the faculties of physical education and sports sciences. Each of them is divided into many technical stages, the most important of which are the stages of approaching and getting up. Performance, which the teacher or trainer must accurately define in order to be able to teach the performance correctly during the practical lessons and thus be able to evaluate the performance of the students objectively on this basis it is necessary to use biomechanical analysis as an objective tool to judge the adequacy of effective teaching as well as the delivery of vocabulary in a scientific way and shorten the time and effort in the learning process. Here lies the importance of the research with the two analyses (kinetic and kinematic) for the stages of approaching and getting up, and their relationship to evaluating the performance level of the students' long jump and high jump activities.

Research Problem

Through the researchers' review of many previous studies, they noticed that most of the studies are concerned with the development of physical characteristics and motor abilities, and others use different educational methods and methods. Kinematic, kinematics, and dependence on the applied force in some important stages to perform the two activities under discussion.

Through the experience of the two researchers as former players and professors in the College of Physical Education, they noticed that there are many biomechanical variables that overlap with each other when students perform the two activities, specifically during the stages of approaching and getting up, and this difficulty increases for students when the speed of performance increases. It can be objectively inferred through the use of modern technologies (foot scanners, high-speed imaging cameras) to detect the values of the correlations of the variables studied, and thus logical results can be reached to facilitate the learning process and ensure high objectivity in evaluating their level of performance.

Research Objective

- Identify the quantitative values of the kinetic and kinematic variables for the stages of approaching and rising, and the level of performance of the students' long jump and high jump activities.
- Identify the nature of the correlations between the kinematic and kinematic variables of the approaching and rising stages of the students' long jump and high jump activities.
- Identify the nature of the correlations of the kinematic and kinematic variables for the approaching and advancing phases, and the level of performance of the students' long jump and high jump activities.

Research Hypotheses

- There is a statistical correlation between the kinematic and kinematic variables for the stages of approaching and getting up for the students' long jump and high jump activities.
- There is a statistical correlation between the kinematic and kinematic variables with the performance level of the students' long jump and

high jump activities.

Research Fields

- Human field: First-stage students in the College of Physical Education and Sports Sciences at University of Wasit for the academic season 2022-2023.
- Time field: (15/11/2022) to (10/4/2023).
- Spatial field: Playgrounds of the College of Physical Education and Sports Sciences, University of Wasit.

Research Methodology and Field Procedures

Research Methodology

The researchers used the descriptive approach with correlations to solve the problem under study.

Community and Sample Research

The researchers identified their research community, who are the first-stage students in the College of Physical Education and Sports Sciences at University of Wasit for the academic season 2022-2023, who number (100) students. The researchers selected the study sample from this community in a systematic random way, the number of (40) students representing (40%) of the parent community, as shown in the table below (Table 1):

Methods and devices used

- Arab and foreign sources.
- Note.
- Performance evaluation form.
- Motion analysis software (dartfish-kinovea).
- Format factory program.
- Statistical package program spss.
- 100 cm long drawing scale.
- Quick imaging cameras (3).
- A laptop type (HP).
- A foot scan measuring 60 x 40 cm.

Research Variables

Kinetic variables

- The maximum force of the lifting foot when it touches the ground.
- Maximum strength when flexing.
- The maximum force of the moment of thrust.

Kinematic variables

- The angle of the trunk at the moment of contact.
- The knee angle of the ascent foot at full flexion.
- The angular velocity of the free leg while standing up.
- The height of the body's center of gravity at the moment of the push.
- The angle of start.
- The horizontal velocity of the body's center of gravity.

Field Research Procedures

Preparing a technical performance evaluation form for the long jump and high jump effectiveness

For the purpose of evaluating the technical performance of the two activities under study, the researchers prepared an evaluation form (Appendix 1).This form includes dividing the performance into three main sections: the preparatory section represents the approach, the main section represents the rise, and the final section represents the landing stage). It was presented to a group of experts in the field of athletics and motor learning to determine the appropriate degree for each section of the event. After collecting the forms, they were processed statistically to reach the initial version of the evaluation form, and to extract the scientific basis for the evaluation form, the researchers used the following steps:

Validate the technical performance evaluation form

"The research tool is considered validity when it measures what it is supposed to measure, and honesty is one of the important factors that the researcher must make sure of when developing his tests or when deLevel siging his research questionnaire (Ibrahim a. 2000)."

The researchers used virtual validity by presenting the evaluation form to a number of experts and specialists, and after emptying the results of the forms, the validity rate of the form for evaluating the technical performance level of the two activities under study was (92%), and this percentage is acceptable with a high degree of validity.

Stability of the technical performance evaluation form

After confirming the validity of the tool, it is supposed to be stable, and the stability is "if the test was reapplied on the same individuals, it would give the same results or close results"(Ibrahim b. 1999).

The researchers used the method of testing and re-testing in order to obtain the stability of the performance evaluation form. The researchers conducted a performance test on a group of (15) students from within the research community. The technical performance of the two events was filmed and presented to three experts in the specialty to evaluate performance. After 15 days, the test was re-applied under the same conditions, and after emptying the data, the researchers worked to extract the stability of the form using the law of the simple correlation coefficient (Pearson), as the stability coefficient reached (950). This is a high indicator of the stability of the form.

Objectivity of the technical performance evaluation form:

The two researchers extracted the objectivity of the questionnaire using the simple correlation coefficient (Pearson) between the scores of two assessors who evaluated the students' performance at the same time, as the value of the correlation coefficient between their results was (0.90), and this degree is considered a high indicator of the objectivity of the questionnaire.

Exploratory Experience

The two researchers conducted an exploratory experiment on Sunday morning, corresponding to 20/3/2023 at ten o'clock, on a group of (10) students from the first stage in the College of Physical Education and Sports Sciences at Wasit University, and they are among the research community. Its purpose was to identify the appropriate place for the dimensions of the cameras used as well as the correct location for the foot scan.

Main experience

The researchers conducted their main experiment on the research sample over the course of Wednesday and Thursday corresponding to 23-24/3/2023, after the end of the scheduled period of teaching the long jump and high jump activities within the time specified in the annual study plan. The research sample was tested on the first day of the long jump event. On the next day, the research sample was tested for the effectiveness of the high jump, as the researchers gave three attempts and the experts chose the best attempt for analysis. Three cameras were used for the effectiveness of the long jump, a

Table 1: Shows the numbers and specifications of the research community and sample.

No.	division	total number	No. of sample	percentage	Length		coefficient of difference	Wight		coefficient of difference	digital level		coefficient of difference
					Arithmetic mean	Standard deviation		Arithmetic mean	Standard deviation		Arithmetic mean	Standard deviation	
1	B	25	10	10%	170	15.6	9.2%	62	2.8	4.5%	4.90	0.64	%13.06
2	C	23	10	10%	170	13.3	7.8%	62.3	3.7	5.9%	4.95	0.43	%8.69
3	D	27	10	10%	168	4.6	2.7%	61.5	5.2	8.5%	4.92	0.9	%18.29
4	E	25	10	10%	169	5.6	3.3%	62.2	2.8	4.5%	4.91	0.5	%10.18
Total		100	40	40%	Mean=169.25		-	Mean=62		-	Mean=4.9		-

distance of 5.5 meters from the ascent area, at a height of 1.20 cm, and two cameras for the effectiveness of the high jump, a distance of 4.40 from the ascent area and a height of 1.30 with the use of a foot scan on the place of elevation in the two activities, as shown in the following figure (Figure 1).

Statistical methods: The search data was processed through the Statistical Package for the Social Sciences (SPSS).

Results and Discussion

Presentation and analyze the results of the long jump

Presentation and analysis of the results of the arithmetic mean, standard deviations and coefficient of variation for the variables under study in the effectiveness of the long jump: By observing the results of table 2, it is clear that the values of the coefficient of difference showed great homogeneity between all the kinematic variables (The maximum force of the lifting foot the moment it touches the ground , the maximum force of the getting up foot when flexing, the maximum force of the getting up foot at the moment of pushing), while the value of the coefficient of difference in the variables Kinematic showed great homogeneity also, especially in the variables (The angle of the torso at the moment of contact with the horizontal line, the angle of the knee of the ascending foot at full flexion, the angular velocity of the free leg when getting up , the height of the center of gravity of the body at the moment of pushing, the angle of start , the horizontal velocity of the center of gravity of the body) thus, most of the results express the harmony of the kinetic and kinematic variables of the study sample (Table 2).

Presentation of the results of the correlation coefficients between the kinetic and kinematic variables under study for the effectiveness of the long jump

When reviewing the results of table 3, we notice that the values of the correlation coefficients between the kinematic variables and the kinematic variables, as all the values of the correlation coefficients of the kinematic variable (The maximum strength of the ascent foot at the moment of touching the ground) is Level sigificant with the values of the kinetic variables, as the values of the Level sigificance level accompanying it were smaller than the value of the Level sigificance level (0.05), and this indicates that the correlation is Level sigificant and the relationship is real and did not come by chance Except for its association with the variable (knee angle of the ascent foot at full flexion), where the correlation value was not Level significant. We also note that all the values of the correlation coefficients of the kinematic variable (maximum strength of the rise foot when flexed) are Level significant with some values of the kinematic variables, as the values of the Level significance level accompanying them were smaller than the value of the Level significance level (0.05), and this indicates that the correlation is Level significant and the relationship is not real by accident. Except for its association with the variables (knee angle of the ascent foot at maximum flexion, angle of start, horizontal velocity of the body's center of gravity), where the value of the association was not Level significant. We also note that all the values of the correlation coefficients of the kinematic variable (maximum strength of the lifting foot at the moment of pushing) are Level significant with the values of the kinematic variables, as the values of the accompanying Level significance level were smaller than the value of the Level significance level (0.05), and this indicates that the correlation is Level significant and the relationship is real and did not come from by chance. Except for its correlation with the variable (tornk angle and moment of contact), where the correlation value was not Level significant (Table 3).

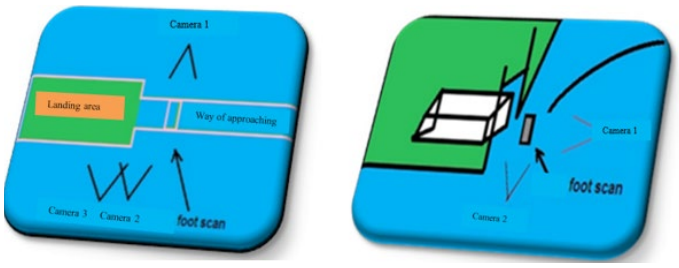

Figure 1: (a) Filming field long jump event, (b) Filming field High jump event.

The majority of sporting events are subject to a set of variables in their performance, and once the movement is performed according to these variables well, it appears well. The researchers believe that performance in the long jump event, for example, consists of a series of movements, and each movement of the body parts has a special importance. If all the movements of the body parts are done in perfect coordination and with accurate timing, then this leads to the appropriate performance of the event.

Presentation of the results of the correlation coefficients between the kinetic variables under study and the performance level of the long jump effectiveness: When reviewing the results of table 4, we find that the values of the correlation coefficient between the variable (the level of long jump effectiveness performance) and the kinematic variables (The maximum force of the lifting foot the moment it touches the ground The maximum force of the lifting foot when flexed, The maximum force of the lifting foot at the moment of thrust) high, and the error level values are less than the Level significance level value (0.05), and this indicates that the correlation is Level significant and the relationship is real and did not come by chance. This is consistent with the natural law of physics that the horizontal jump distance is closely related to the value of the force that creates it, as this activity requires maximum strength and speed during the process of pushing the lift board to obtain a flight height suitable for the center of gravity of the body to achieve the goal of the competition to reach the length of the horizontal distance (Table 4).

Presenting the results of the correlation coefficients between the kinematic variables under study and the performance level of the long jump effectiveness: When reviewing the results of table 5, we find that the values of the correlation coefficient between the variable (performance level of long jump effectiveness) and the kinematic variables (angle of the torso at the moment of touches, angle of the knee of the ascending foot at full flexion, angular velocity of the free leg when getting up , horizontal velocity of the center of gravity of the body) High, and the error level values are less than the Level sigificance level value (0.05), and this indicates that the correlation is Level sigificant and the relationship is real and did not come by chance. Except for the variable (starting angle), the value of the correlation coefficient between it and the performance level of the long jump was weak and had a non-Level sigificant level, since the error level was greater than the Level sigificance level (0.05), which indicates that the relationship is not real. Where these variables are very important in the long jump competition, through which it is possible to predict the level of achievement of the jumper as well as determine the horizontal component, where the performance of the jumper is affected by the angle of the torso at the moment of contact and the angle of the knee of the ascent foot at maximum flexion, as well as the height of the center of gravity of the body at the moment of push and the horizontal speed of the center of gravity The body, which are two of the basic requirements for gaining the appropriate horizontal translational speed for the ascent process (Table 5).

Presentation and analysis of the results of the high jump

Presenting the results, the arithmetic mean, standard deviations and the coefficient of variation for the variables under study in the effectiveness of the high jump: By observing the results of table 6, it is clear that the values of the coefficient of difference showed great homogeneity between all

Table 2: Shows the statistical description of the research variables shows the effectiveness of the long jump.

Variables		Measuring unit	Arithmetic mean	Standard deviation	coefficient of difference
Kinetic	The maximum force of the lifting foot the moment it touches the ground	Newton	1734	23.41	1.35%
	The maximum force of the lift foot when flexed	Newton	1632	25.21	1.54%
	The maximum force of the lifting foot at the moment of thrust	Newton	1934	30.62	1.58%
kinematic	Trunk angle moment of contact with the horizontal line	Degree	84	10.62	12.64%
	Knee angle of the take-off foot at maximum flexion	Degree	145	19.72	13.6 %
	The angular velocity of the free leg when getting up	Degree/ sec	405	15.67	3.87%
	The height of the body's center of gravity at the moment of the push	cm	128	7.92	6.19%
	start angle	Degree	13	1.65	12.69%
	The horizontal velocity of the body's center of gravity	m/sec	6.15	0.37	6.01%
level of performance		Degree	6	0.20	3.33%

Table 3: Shows the correlation coefficients between the kinetic and kinematic variables of the research variables for the effectiveness of the long jump.

Kinetic/ Kinematic			The maximum force of the lifting foot the moment it touches the ground	The maximum force of the lifting foot when flexing	The maximum force of the lifting foot at the moment of thrust
1	The angle of the torso at the moment of touches with the horizontal line	correlation	0.88	0.76	0.12
		Level sig	0.001	0.01	0.26
		type sig	sig	sig	Non sig
2	angle of the knee of the ascending foot at full flexion	correlation	0.18	0.14	0.57-
		Level sig	0.61	0.10	0.030
		type sig	Non sig	Non sig	sig
3	angular velocity of the free leg when getting up	correlation	0.91	0.82	0.90
		Level sig	0.00	0.004	0.002
		type sig	sig	sig	sig
4	height of the center of gravity of the body at the moment of pushing	correlation	0.79	0.60-	0.95
		Level sig	0.01	0.014	0.00
		type sig	sig	sig	sig
5	angle of start	correlation	0.74	0.15	0.85
		Level sig	0.02	0.56	0.002
		type sig	sig	Non sig	sig
6	horizontal velocity of the center of gravity of the body	correlation	0.82	0.17	0.93
		Level sig	0.011	0.61	0.001
		type sig	sig	Non sig	sig

Table 4: Shows the correlation between kinetic variables and the level of performance for the effectiveness of the long jump.

Kinetic variables	level of performance for the effectiveness of the long jump		
	Correlation coefficient value	Level sig	Type sig
The maximum force of the lifting foot the moment it touches the ground	0.88	0.002	sig
The maximum force of the lifting foot when flexed	0.51	0.031	sig
The maximum force of the lifting foot at the moment of thrust	0.89	0.001	sig

Table 5: Shows the relationship between kinematic variables and the level of performance for the effectiveness of the long jump.

kinematic variables	performance for the effectiveness of the long jump		
	Correlation coefficient value	Level sig	Type sig
angle of the torso at the moment of touches	0.62	0.013	sig
angle of the knee of the ascending foot at full flexion	0.85	0.015	sig
angular velocity of the free leg when getting up	0.16	0.101	Non sig
height of the center of gravity of the body at the moment of pushing	0.94	0.00	sig
angle of start	0.10	0.201	Non sig
horizontal velocity of the center of gravity of the body	0.71	0.011	sig

Table 6: Shows the statistical description of the research variables for the effectiveness of the high jump.

Variables		Measuring unit	Arithmetic mean	Standard deviation	coefficient of difference
Kinetic	The maximum force of the lifting foot the moment it touches the ground	Newton	1964	20.51	1.04
	The maximum force of the lift foot when flexed	Newton	1743	19.71	1.13
	the maximum force of the getting up foot at the moment of pushing	Newton	2014	29.27	1.45
kinematic	Trunk angle moment of contact with the horizontal line	Degree	150	10.41	6.94
	Knee angle of the getting up foot at full flexion	Degree	133	4.92	3.70
	The angular velocity of the free leg when getting up	Degree/ sec	322	17.84	5.54
	The height of the body's center of gravity at the moment of the push	cm	134	10.81	8.07
	start angle	Degree	80	9.51	11.88
	The horizontal velocity of the body's center of gravity	m/sec	4.57	0.11	2.40
level of performance		Degree	5.01	0.13	2.59

the kinematic variables (The maximum force of the lifting foot the moment it touches the ground, The maximum force of the lift foot when flexed , the maximum force of the getting up foot at the moment of pushing), while the value of the difference coefficient in The kinematic variables also showed great homogeneity, especially in the variables (The angle of the torso at the moment of contact with the horizontal line, Knee angle of the getting up foot at full flexion , the angular velocity of the free leg when rising, the angle of start, the height of the body's center of gravity at the moment of pushing) Except for the variable (horizontal velocity of the body's center of gravity), it showed weak homogeneity. Thus, most of the results express the harmony of the kinetic and kinematic variables of the study sample (Table 6).

Presenting the results of the correlation coefficients between the kinematic and kinematic variables under study for the effectiveness of the high jump: When reviewing the results of table 7, we notice that the values of the correlation coefficients between the kinematic variables and the kinematic variables, where we note that all the values of the correlation

coefficients of the kinematic variable (The maximum strength of the ascent foot at the moment of touching the ground) is significant with the values of the kinetic variables, as the values of the significance level accompanying it were smaller than the value of the significance level (0.05), and this indicates that the correlation is significant and the relationship is real and did not come by chance. Except for the value of its association with the variable (the angle of the trunk at the moment of contact), where the correlation value was not significant. We also note that all the values of the correlation coefficients of the kinematic variable (maximum strength of the rise foot when flexing) are significant with the values of the kinematic variables, as the values of the significance level accompanying them were smaller than the value of the significance level (0.05), and this indicates that the correlation is significant and the relationship is real and did not come from by chance. Except for its correlation with the variable (knee angle of the rise foot at maximum flexion), where the correlation value was not significant. We also note that all values of the kinematic variable correlation coefficients (Maximum strength of the ascent foot at the moment of pushing) is significant with the values of the kinetic variables, as the values of the level of significance associated with it were smaller than the value of the significance level (0.05), and this indicates that the correlation is significant and the relationship is real and did not come by chance. The researchers believe that the high jump is a complex activity that is affected by several variables during the stages of its performance and has a correlation with each other and according to its motor path, and all of them pave the way for successful performance in the process of ascent, and this was confirmed by (Saleh. 2016) That the high jump differs in the degree of its need for the level of these variables in the approaching stage, according to the requirements of the motor path of performance, which ends with a strong outcome in the ascent stage (Table 7).

Presenting the results of the correlation coefficients between the kinetic variables under study and the performance level of the high jump event: When reviewing the results of table 8, we find that the values of the correlation coefficient between the variable (the level of performance of the high jump effectiveness) and the kinetic variables (The maximum force of the lifting foot the moment it touches the ground, The maximum force of the lifting foot when flexed, The maximum force of the lifting foot at the moment of thrust) are very high and that the values of The error level is less than the value of the significance level (0.05), and this indicates that the correlation is significant and the relationship is real and did not come by chance. In performing the high jump, it requires making every effort and pushing the ground with maximum force and in the shortest possible time in order to obtain a push upward where "The objective of the artistic performance is to enable its users to make the most of their physical capabilities and direct them towards the main goal, which is to achieve a better achievement, through which the forces of the basic parts of the body can be collected and directed towards the goal of movement because the sum of the forces in one direction is equal to the sum of those forces (Bartlett. 2007) (Table 8)."

Presentation of the results of the correlation coefficients between the kinematic variables under study and the performance level of the high jump effectiveness: When reviewing the results of table 9, we find that all the values of the correlation coefficient between the variable (the level of performance of the high jump effectiveness) and the kinematic variables (the angle of the torso at the moment of contact, the angle of the knee of the ascent foot at maximum flexion, the angular velocity of the free leg when rising, the height of the body's center of gravity The pushing moment, the horizontal velocity of the body's center of gravity) is high, and the error level values are less than the significance level value (0.05), and this indicates that the correlation is significant and the relationship is real and did not come by chance (Table 9).

The researchers believe that achieving achievement in the high jump is affected by a set of important kinetic variables to determine the correct path for performance, as determining the important angles on which the success of the jumper's body depends on the effectiveness of the high jump to obtain the vertical vehicle suitable for ascent is the basis for achieving high heights. These variables are the basis for gaining the appropriate vertical speed for the ascent process, and this was confirmed by (Al-Janabi. 2016) that identifying the important angles in the achievement of the high jumpers enables the coaches to focus on the most important variables required in the success of crossing the crossbar and landing properly and thus achieving the required heights.

Conclusions and Recommendations

Conclusions

According to findings of this study, the researchers conclude the following:

- The process of mechanical analysis (kinetic and kinematic) helps mainly to identify the variables that are closely related to the performance of the sports activities under study.
- There is a clear similarity in the motor paths for both the long jump and the high jump in terms of the kinematic and kinematic variables.
- The evaluation of the correct performance of any of the two

Table 7: Shows the correlation coefficients between the kinetic and kinematic variables of the research variables for the effectiveness of the high jump.

Kinetic/ Kinematic			The maximum force of the lifting foot the moment it touches the ground	The maximum force of the lifting foot when flexing	The maximum force of the lifting foot at the moment of thrust
1	The angle of the torso at the moment of touches with the horizontal line	Correlation	0.11	0.61-	0.51
		Level sig	0.12	0.031	0.022
		Type sig	non sig	sig	sig
2	angle of the knee of the ascending foot at full flexion	Correlation	0.85	0.19	0.66
		Level sig	0.002	0.141	0.038
		Type sig	sig	non sig	sig
3	angular velocity of the free leg when getting up	Correlation	0.74	0.74	0.90
		Level sig	0.02	0.02	0.001
		Type sig	sig	sig	sig
4	height of the center of gravity of the body at the moment of pushing	Correlation	0.80	0.90	0.84
		Level sig	0.001	0.000	0.003
		Type sig	sig	sig	sig
5	angle of start	Correlation	0.76	0.55	0.822
		Level sig	0.03	0.029	0.01
		Type sig	sig	sig	sig
6	horizontal velocity of the center of gravity of the body	Correlation	0.77	0.81	0.81
		Level sig	0.002	0.012	0.004
		Type sig	sig	sig	sig

Table 8: Shows the correlation between the kinetic variables and the level of performance for the effectiveness of the high jump.

kinetic variables	High jump performance level		
	Correlation coefficient value	Level sig	Type sig
The maximum force of the lifting foot the moment it touches the ground	0.96	0.000	sig
The maximum force of the lifting foot when flexed	0.76	0.030	sig
The maximum force of the lifting foot at the moment of thrust	0.94	0.001	sig

Table 9: Shows the correlation between the kinematic variables and the level of performance for the effectiveness of the high jump.

No.	kinematic variables	level of performance for the effectiveness of the high jump		
		Correlation coefficient value	Level sig	Type sig
1	The angle of the torso at the moment of touches with the horizontal line	0.14	0.61	sig
2	angle of the knee of the ascending foot at full flexion	0.75	0.031	sig
3	angular velocity of the free leg when getting up	0.89	0.002	sig
4	height of the center of gravity of the body at the moment of pushing	0.95	0.000	sig
5	horizontal velocity of the center of gravity of the body	0.62	0.031	sig

activities must be based on the common basis of biomechanical variables (kinetic and kinematic).

Recommendations

According to the conclusions reached by this study, the researchers recommend the following:

- Need to carry out the mechanical analysis of the sports activities (jumping activities) during and after the training doses to know the rates of development and evaluate the performance in a scientific and accurate manner.
- Use of mechanical tests resulting from mechanical analysis processes, as they deal with the majority of variables associated with the success of the technical performance of sports events.
- Necessity of emphasizing the development of the biomechanical variables related to each activity during the training operations, because of their direct impact on the process of improving the level of technical performance.

References

Akram Hussein Al-Janabi. 2016. Technical and Biomechanical Analysis of the Decathlon Games for Men and Sevens for Women and Training Methods, 1st Edition, Dar Nippur for Printing and Publishing, p. 107,

Haya Muhammad Al-Qatami and Hashim Adnan Al-Kilani. 2019. Analysis of two patterns of the long jump path using the factor results model, published research, Educational Science Studies, Volume 46, Number 1, Jordan, p. 665.

Marwan Abdul Majeed Ibrahim a. 2000 . Foundations of Academic Research for Preparing Theses, 1st edition, Al-Warraq Foundation, Amman, p. 43.

Marwan Abdul Majeed Ibrahim b. 1999 . Scientific Foundations and Statistical Methods for Tests and Measurement in Physical Education, 1st Edition, Dar Al-Fikr for Printing, Amman, p. 70.

Raisan Khraibet Majeed and Najah Mahdi Shalash. 2002. Kinetic Analysis, 1st Edition, International Scientific House for Publishing and Distribution, Amman, p. 121.

Roger Bartlett. 2007 . Introduction to sport biomechanics, 2 ed., London.

Sabah Mahdi Saleh. 2016. Analysis of the horizontal and vertical components and their relationship to the achievement of the high jump event using the scissor method for students of the College of Physical Education and Sports Sciences / University of Al-Qadisiyah, published research, Volume 10, Journal of Sports Education Sciences, Babylon.

Sareeh Abdul-Karim Al-Fadli. 2012. Theoretical and Scientific Foundations of Athletics for the Faculties of Physical Education, Al-Ghadeer for Modern Art Printing, Baghdad, p. 50.

Appendix 1: Shows the Form for evaluating the level of technical performance of the research sample

No.	**student's name**	**Relative weights for evaluating the technical performance stages of the long jump and high jump effectiveness**			
		Approaching stage	Getting up stage	Landing stage	Final evaluation degree
		3	5	2	10
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					