



# Journal of Studies and Researches of Sport Education

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## Specific assessment exercises based on visual sensory modeling and its effect on some biomechanical indicator spiking skill on volleyball

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### Article information

#### Article history:

Received 2/6/2024

Accepted 2/ 7/2024

Available online 15, July,2024

#### Keywords:

biomechanics, exercises, muscular strength, modeling, assessment

### Abstract

The spiking skill is one of the types of volleyball skills the mission and which leads The technical aspect plays an important role and this is what makes the player who studies the details of this skill work to confront incorrect performance by relying on additional visual sensory modeling using modern qualitative analysis techniques in a different way directly to identify some basic faulty biomechanical indicators for the stages of technical performance of the spiking skill and the extent of their need for change according to some exercises which contributes to increasing and supporting the motor path of the skill, which helps learners perform the skill successfully, therefore, the researchers used the experimental method using a one-group experimental design appropriate to the nature of the study, the research sample was chosen by the researchers intentionally. The juniors of the Iraqi national volleyball team, where (7) players were selected who are proficient in the skill of striking. Where the researchers were keen to implement specific evaluative exercises in terms of sensory modeling using different tools with a purpose development Some biomechanical indicators developing the muscular strength of a sample of individuals the study in a period of (8) weeks and included (24) training units, (3) units per week, the conclusions, The most important study was that sorting out the mechanical errors related to performance and witnessing them by each learner instilled in themselves the motivation to reach ideal performance according to the corrective exercises that aimed to develop the absolute strength of each of the muscular moment



## **1– The research Introducing**

### **1–1 Introduction and the importance of research**

The skill of spiking is one of the types of volleyball skills in which the technical aspect plays an important role this makes the one who studies the details of this skill work to confront the wrong performance by relying on additional visual sensory modeling using modern qualitative analysis techniques in a different way directly to identify some basic faulty biomechanical indicators for the stages of technical performance of the crushing hit skill and the extent of their need for change according to some calendar exercises which contributes to increasing and supporting the motor path of the skill, which helps learners perform the skill successfully.(Atimari & Montasar, 2022; Hanna & Altimari, 2023)

So, the design of exercises assessment to correct a specific mechanical error is better if visual means are used that will help learners form the skill in a way that does not Leave room to leak mechanical error after developing the efficiency of muscle torque strength as it is the main factor contributing to modeling and simulation transfer the perfect technique to for educated people, As well as organization of behavior control to getting close to the ideal model as much as possible after completing the repetitions or for each mechanical fault there is a specific one as it is the main guide to the behavior of learners.(Salman, 2023) so, Design exercises a calendar in a purpose manner for Body building and shaping during skill performance according to mechanical feedback given according the needs of every player or learner be in fluent the position the kinetic sinner the specific which was previously mentioned analysts will use their inner vision according to the foundations and indicators biomechanics depend on the distinguished and accurate state of measurement not to mention moving away from the traditional guidance provided by the teacher or trainer with feedback through direct observation, thus making the individual repeat the same mistake several times. (Almahdawi, 2023)

Therefore, one of the priorities of researchers is to gradually correct biomechanical errors and begin to correct the basic common errors related to the technique of motor performance according to corrective exercises. After dividing the spiking skill into small stages for the purpose of evaluating the motor path of the skill, which is considered part of the assessment process.(Oudah et al., 2022)

#### **– Research problem:**

Volleyball has six basic skills, one of them is spiking skill, which is attacking skill, the researchers found some weakness related to biomechanical side.

– **Objectives of the study:**

1–Design the exercises Specific assessment in terms of visual sensory modeling to correct mechanical errors in the volleyball spiking skill among the study sample (14–15 years old).

2– Identifying mechanical errors related to the stages of technical performance of the volleyball smash skill among the study sample (14–15 years old).

1– Knowing the extent of the impact of corrective exercises in terms of visual sensory modeling on the development of some biomechanical variables of the volleyball spiking skill among the study sample (14–15 years old).

**Research hypothesis:**

1– The skill of spiking multiplication is faster correction biomechanical errors by using visual sensory modeling with the assessment exercises.

2– There are statistically significant differences for the post–tests in the visual sensory modeling with the assessment exercises.

**The study procedures**

**The study sample:** Experimental approach using experimental design (One group) appropriate to nature problem of the study, the sample was selected of the juniors of the Iraqi national volleyball team (14–15 years old, the players are homogeneous in terms of height and weight, height (170–175cm) and weight (65–70kg). where (7) players were selected who are proficient in the skill of striking, and after reviewing a group of private sources biomechanics and motor learning for the skill of hitting volleyball and related to the topic for the study, the researchers adopted the mechanism of qualitative analysis and sensory modeling Diagnose and correct biomechanical errors according to the following steps:

•After the learner performs the spiking skill more than once, then the best attempt at this skill is recorded using a Casio camera and other modern technical devices.

•Analysts begin qualitative analysis procedures by giving mechanical feedback and identifying a single player–focused mechanical error.

•Giving the learner the opportunity to see his mistakes after dividing the skill into three sections (the preparatory section, the main section, and the final section).

•Displaying the correct model to the learner through visual means to a creative player (mathematical model). On this basis, the technical performance can be formulated to a high and exemplary level after dividing the skill into its three sections to form the learner’s know-how and mental knowledge to remain as a guide and reference for sensory modeling and external feedback when performing the attempts that follow the exercises. Orthodontic

**Figure No. (1)**

**It explains the basic and sub-skill sections and the specific visual errors of the study sample.**

Skill sections and related errors	Qualitative analysis errors (visual observation)	Shortcomings in biomechanical indicators
Errors related to the preparation phase	<ul style="list-style-type: none"> <li>*There is little flexion in the knee joint.</li> <li>*The torso does not tilt slightly forward.</li> </ul>	<ul style="list-style-type: none"> <li>● Poor performance speed.</li> <li>*Increased motor performance time.</li> </ul>
Errors related to the approach phase	<ul style="list-style-type: none"> <li>*The players did not take a wide and deep step that would help him maintain the value of the horizontal velocity component.</li> </ul>	<ul style="list-style-type: none"> <li>● A rise greater than the required limit in the value of the knee angle at maximum flexion.</li> <li>*Reduced approach speed.</li> </ul>
Errors related to the jump phase	<ul style="list-style-type: none"> <li>● Do not transfer the entire center of gravity of the body onto the combs.</li> <li>*Increase in the resting area of the feet.</li> </ul>	<ul style="list-style-type: none"> <li>● Weak starting speed.</li> <li>*A decrease in the level of instantaneous momentum and the time to reach it.</li> </ul>
Errors related to the multiplication stage	<ul style="list-style-type: none"> <li>● The torso does not arch back as required.</li> <li>*Rotating the torso in the direction of the striking arm is not the desired form</li> </ul>	<ul style="list-style-type: none"> <li>● Decrease in the angular range of the trunk before the moment of hitting the ball.</li> <li>*Decrease in ball launch speed.</li> </ul>
Errors related to the concluding section	<ul style="list-style-type: none"> <li>*Landing on one foot due to imbalance (fall).</li> </ul>	<ul style="list-style-type: none"> <li>*Increasing the force of the collision, causing injury or touching the net.</li> </ul>

Correct the errors shown in Figure No. (1), which were diagnosed through qualitative analysis of motor performance, were among the priorities of the researchers' work, and correcting them is a positive factor in improving the biomechanical indicators of this skill. Where be the beginning of a performance orthodontic exercises to run by jumping and jumping of stability (Stand) to ensure greater forces are exerted against gravity to develop the strength of the muscular moments of the extensor muscles contributing to changing the body's state from stationary to moving with the highest acceleration it is consistent with the nature of the distinguished performance.

The researcher Preparing a special educational curriculum consisting of (24) assessment units to develop muscle torque strength, it continued for (8) weeks, at a rate of three units per week, at a rate of (70) Minutes per educational unit also, specify intensity some corrective exercises for absolute body parts in which errors related to technical performance are made according to the method of resistance used by the learner, as follows:

- Added weights for body parts be according to the block every part of the body which is extracted by (multiplying the body mass x Relative weight for the part) and the intensity of the exercise according to the maximum time achieved.

The Rubber exercises resistance create the maximum frequency relative to a specified time, like jumping through rubber resistance (8 seconds) Repeatedly (90%), If The researchers assume the maximum repetition in this period is 10 repetitions, then 90% = 9 repetitions at the same time., And so on.

**-Present and discuss results the study:**

**Schedule (1)**

**Presenting and discussing the results of differences in the values of some values Indicators the biomechanics to be crushed to measure before and after for the study sample**

No	Biokinematic variables	Measuring unit	One-legged push-up skill test	s	±p	Level of development %
1	The height of center of mass at the moment of approach	meter	before	0.771	0.006	5.185
			after	0.731	0.015	
2	The angle of inclination of the torso at the moment of initiating the approach	degree	before	86.285	0.487	4.801
			after	82.142	0.690	
3	The distance of the last jump	meter	before	0.662	0.030	9.727
			after	0.734	0.032	

4	Approach speed	meters/ second	before	2.138	0.042	18.861
			after	2.635	0.007	
5	The angle of maximum flexion of the knees	degree	before	124.571	1.618	8.307
			after	135.857	0.690	
6	The height of center of mass at the moment of thrust	meter	before	0.800	0.019	5.405
			after	0.845	0.019	
7	Cruising speed	meters/ second	before	2.315	0.037	11.226
			after	2.608	0.053	
8	The angular extent of the torso before the moment the ball is struck	degree	before	165.857	1.069	12.489
			after	145.142	1.345	
9	Final thrust	net	before	648.945	40.351	10.237
			after	722.962	44.279	
10	Access time	second	before	0.199	0.004	4.503
			after	0.190	0.001	

The researchers note from the table (1) There is a rate of development in biomechanical indicators, the researcher attributes this development to the nature of the field study procedures that were organized according to an evaluative educational strategy rapid progress physically and mentally for learners and increase learning the performance motion to improve the skill of overwhelming multiplication by enriching the study sample with cognitive information.(Al-Saeed, 2018) About errors in skill performance and comparing them to ideal performance by tracing the motor path of the crushing hit skill after dividing it into its basic sections (preparatory–Main – Final) based on visual sensory modeling using modern technologies, which in turn increased. Desirea individual sample study in practice corrective doses to correct one error at a time according to detail visual feedback(Kadhim, 2020) individually specified according to the needs of each learner which contributed to revitalization learning process to a member of the group study, and thus obtain on positive results of evolution positive in biomechanical indicators.(Al-Saeed & Pain, 2017)(Hassan & Musharef, 2024)

### schedule (2)

**Differences in means, standard deviations, and Wilcoxon value (z) for biomechanical indicators for skill for an overwhelming hit to measure before and after the study sample.**

No	Biokinematic variables	meas uring unit	SF	±A F	Degree of freedom	Minimu m total of ranks	Z value	Signifi cance level 0.05	The res ult

1	The height of center of mass at the moment of approach	meter	0.040	0.017	7	+0.000	2.387	0.016	positive
2	The angle of inclination of the torso at the moment of initiating the approach	degree	4.142	1.069	7	+0.000	2.388	0.017	positive
3	The distance of the last jump	meter	0.071	0.010	7	-0.000	2.400	0.016	positive
4	Approach speed	m/s	0.497	0.044	7	-0.000	2.383	0.017	positive
5	The angle of maximum flexion of the knees	degree	11.285	1.253	7	-0.000	2.387	0.016	positive
6	The height of center of mass at the moment of thrust	meter	0.045	0.0315	7	-1.000	2.205	0.027	positive
7	Cruising speed	m/s	0.292	0.073	7	-0.000	2.414	0.015	Positive
8	The angular extent of the torso before the moment the ball is struck	Newton	74.016	62.555	7	-1.000	2.197	0.028	positive
9	Final thrust	second	0.009	0.004	7	+0.000	2.213	0.026	positive
10	Access time	degree	20.714	1.976	7	+0.000	2.379	0.017	positive

The researchers note the significant differences that appeared in the biomechanical indicators were for the benefit of the post-tests. The researchers attribute this noticeable improvement in biomechanical indicators the nature of the corrective exercises, which in turn addressed the mechanical errors that are the real reason for the weak motor correlation between the main sections of the crushing skill. The result improving internal strength represented by muscle strength, ligament, and joints by giving separate corrective exercises for each part of the skill to focus on, as well as about its effective role in producing the force necessary for movement and the player's sense of the motor and temporal scope of these parts, not to mention considering the correct timing between the sections of the crushing skill. Which in turn reinforced the effectiveness of learning, accelerating it, and continuous correction of biomechanical errors, as an alignment orthodontic exercises according to the mechanical errors in a gradual manner and according to the skill sections, starting from the



major errors related to the technical performance up to the errors related to the form of the performance, and thus contributed in a way direct in calendar body position at the moment of initiation by getting closer to perform the preliminary stage by reducing height of the body's center of mass, as well as this in turn increases the inclination of the trunk increased the learner's ability to power generation large, aided by weight torque, which contributes to an early and rapid increase in angular velocity move fast and prepare from most important necessities preparing to perform the skill of crushing multiplication from a scientific stand point, so The researchers find the amount of force used to make an object gain a certain speed varies depending on the position of the body before using the force, and this explains to us the importance of preliminary movements in many sporting events.(Al-Saeed et al., 2016)Which was reflected this on the last jump distance where it is associated with an increase horizontal velocity and thus invested through reducing the body's center of gravity the learner thus converts it in the vertical direction at the end of the stage, the result achieved is an increase in the approach speed value it was achieved by combining the above-mentioned mechanical factors, which in turn contributed to reducing the time of motor performance of the spiking skill due to the application of corrective exercises that she achieved her goal of improving performance and overcoming body mass increase your speed and continue until reaching the approaching stage and at perfect angles for the knees(Al-Saeed, 2018; Al-Saeed & Pain, 2017) at the second test which helped the learners to generate a mechanical force greater than the force of the body's weight, which contributed to the ease of transition from the stage of extreme flexion to the initiation of achieve height ideal to the body's center of gravity the moment the payment has been made by sudden extension of both the hip and knee, The learners were able to reach this stage with confidence on the amount of momentum. Muscle strength subject the speed of extension of the joints and the compatibility of the work of these joints which were acquired through corrective exercises that helped them achieve speed perfect starting point and that during guidance outputs indirection vertical without appearing degree. A slope between the line of action of a force and the place of its impact (the body's center of gravity) (Karim, 2010).(Yaseen & Alsaeed, 2022)(Abbas et al., 2023) It helps to use the true path of force through all the joints involved in muscular work and the proper timing of it to determine the correct path for the player's center of gravity. Therefore, the effect of the force push on the body because it is gains speed and in a short time, which leads to an increase in the body's momentum, therefore, it is important during the pushing phase for the player to keep the pushing foot connected to the ground until the foot and knee extension of the pushing leg is complete, and this applies to the law of pushing the relationship between them is direct (push with force) ( $\text{push} = \text{power} \times \text{time}$ ) which is equal



to the change in momentum, and this is what gave the learners the ability and efficiency to control parts of the body after leaving the ground, especially the maximum bend of the torso before the moment of hitting the ball, which came a result due to the nature of the exercises used, which focused on achieving greater flexion at one stage aviation it even serves the skill of crushing multiplication through the value of kinetic transfer and the amount of kinetic energy gained and converted have speed when hitting the ball which It is necessitated by the nature of the involvement of many factors that negatively affect it including positive ones, this is where it stands out the importance of identifying positive factors that help the disease of approaching well and achieving the goal they set a why through effort in a mechanical way, that matches the nature of good performance and limit the impact of negative force as much as possible by changing body positions and following the correct path. For skill as much as possible. (Othman Idham et al., 2023) (Awad et al., 2022)

**Study conclusions:**

1–The gradual correction of mechanical errors specified according to the assessment exercises; the skill of spiking multiplication is faster if it is done as a result of visual sensory modeling.

2–Use visual sensory modeling in every learner's mistakes individually is one of the important methods which contributed to the access for High degree of Mastery in skill performance to be beaten crushing in volleyball.

3– Sorting out the mechanical errors related to performance and seeing them by each learner was the main motivation in achieving ideal performance and seriously applying corrective exercises that aimed to develop the absolute strength of each of the muscular moments.

4– Identifying mechanical errors in terms of qualitative analysis. The effective strategy for correcting mechanical errors was based on specific assessment exercises that had a positive impact in the biomechanical indicators of crushing hitting.

5– Giving assessment exercises in accordance with the principle of skill progression is the main factor in correcting errors related to performance, in addition to the form of performance, and this in turn contributed to obtaining biomechanical indicators that indicate the validity and safety of performance related to the spiking skill.

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