Indian Journal of
Modern Research and Reviews

This Journal is a member of the *'Committee on Publication Ethics'*

Research Paper

The Effect of a Cognitive Program in Motor Learning on The Activity of The Flexor Muscles of The Wrist and The Accuracy of The Smash in Badminton Players

Dr. Jabbar Ali Kadhim[1]*

[1]College of Physical Education and Sports Sciences, Al-Mustaqbal University, Iraq

Corresponding Author: * Dr. Jabbar Ali Kadhim

ABSTRACT	Manuscript Info.
Muscle contraction and movement performance are linked to the motor neuron that sends electrical signals to perform the muscle contraction action, and this type of examination gives us a clear idea of any disorder or dysfunction that may be related to the brain or muscles, and through the above, the importance of the research lies in studying the effect of the cognitive program in motor learning on the activity of the second wrist muscles and the accuracy of the smash hit among the university badminton team players. The researcher used the experimental method with a single-group design with a pre- and post-test, as the research sample included (i) players who were subjected to the tests under study with the specific variables of the activity of the second wrist muscles and the accuracy of the smash hit in badminton. After applying the cognitive program in motor learning, the post-tests were conducted, the data were collected and processed statistically, and the most important conclusions were reached.	✓ **ISSN No:** 2584-184X ✓ **Received:** 19-09-2024 ✓ **Accepted:** 25-10-2024 ✓ **Published:** 29-10-2024 ✓ **MRR:**2(10):2024;48-52 ✓ **©2024, All Rights Reserved.** ✓ **Peer Review Process:** Yes ✓ **Plagiarism Checked:** Yes

1. INTRODUCTION

What distinguishes badminton are the fine motor skills, the development of which requires strength and neuromuscular coordination. Therefore, we find that the development of motor perception has a distinctive character in the development of the skills of this game and its significant development among badminton players. This type of study focuses on the importance of introducing cognitive programs to enhance the process of motor learning and improve performance among players, especially in badminton, specifically the skill of smashing. Motor learning has behavioral and motor properties that appear clearly in the external movement of players, as understanding and perceiving the movement and dealing with it professionally improves performance and gives good results. What was used from the perception of the program in motor learning focuses on the interaction between the body and the mind, which leads

to motor skill integration in addition to improving the appropriate motor response in different movement situations. The main goal of motor learning using perception programs is to achieve effective motor performance and precise control of movement, and from here work is done to employ the outputs of the mind with the outputs of the movement that are translated into the activity of the second muscles of the wrist, as understanding the motor behavior of the hand according to the function of these muscles leads to improving the performance of the crushing strike and increasing its accuracy.[1]

The ability to employ the outputs of the brain to focus performance in perceiving the different positions of the game works to organize the neuromuscular flow and organize the work of the motor units, which results in balanced and coordinated performance with high accuracy in guidance and achieving good results.

To determine the state of the healthy muscle, an electromyography examination is performed, which gives a clear picture of the work of the muscles and the regularity of nerve impulses in performing various motor duties, as the main goal of examining the electrical muscle activity of the second muscles of the hand is to detect the amount of vital activity of the muscles and the absence of a functional defect that hinders performance and to determine the vital knowledge of the neuromotor fluidity.[2]

Muscle contraction and movement performance are linked to the motor neuron that sends electrical signals to perform the action of muscle contraction. This type of examination gives us a clear idea of any disorder or dysfunction that may be related to the brain or muscles. From the above, the importance of the research lies in studying the effect of the cognitive program in motor learning on the activity of the second wrist muscles and the accuracy of the smash hit among the university badminton team players.

1.1 Research Problem:

Through the researcher's field observation, he found that there was a failure among the players of the Al-Mustaqbal University team in badminton, specifically in the accuracy of the smash skill. After research and investigation, the researcher found that there is a part that controls the final stage of performance, which is the second muscles of the hand, due to its important role in directing the force of the shuttlecock strike to its location in the competitor's court. Therefore, the researcher found it necessary to delve into this type of research to find out the truth of the differences between the tests after exposing the sample to the cognitive program in motor learning, as the player's awareness of the freedom of performance from the neurological and muscular point of view achieves accuracy in obtaining a good result.

2. RESEARCH OBJECTIVES

1. Identifying the effect of the cognitive program in motor learning on the muscle activity of the flexor muscles of the wrist in the smash hit in badminton players.

2. Identifying the effect of the cognitive program in motor learning on the accuracy of the smash hit skill in badminton players.

Research hypotheses

There are statistically significant differences between the pre- and post-tests in the variables of electrical muscle activity of the flexor muscles of the wrist and the accuracy of the smash skill among badminton players.

Research field

Human field: Future University badminton team players.
Time field: From 11/11/2023 to 4/3/2024.
Spatial field: The closed sports hall at Al-Mustaqbal University/Faculty of Physical Education and Sports Sciences.

3. RESEARCH METHODOLOGY

The methods that the researcher uses to implement his procedures require a specific method to achieve his goals. This means drawing up a set of steps and procedures that guarantee achieving reliable results that can be relied upon. Therefore, the researcher used the experimental method with a single group with a pre- and post-test.

3-1 Research community and sample

Choosing the appropriate sample for the research is considered one of the important matters for implementing the research and collecting data with high accuracy, as setting the appropriate criteria for choosing the sample makes it more realistic to represent the community in the most accurate way. Therefore, the research sample was chosen from the players of Al-Mustaqbal University badminton team, numbering (6) players, who were chosen from the research community, numbering (8) players, after the sample was homogenized in the variables of height, weight and age, as shown in the table (1).

Table 1. Shows the homogeneity of the research sample

		Age	Height	Weight
N	**Valid**	6	6	6
	Missing	0	0	0
Mean		20.17	174.33	172.67
Median		20	174.5	173.5
Std. Deviation		0.753	3.39	2.66
Skewness		0.313	0.151	0.422
Std. Error of Skewness		0.845	0.85	0.845

3.2 Devices, methods, and tools used in the research

- Badminton rackets.
- Badminton feathers, number (20).
- Legal badminton court.
- Colored tapes.
- A device (EMG) from Mayo trace 400 with two channels.
- Neuromuscular examination sensors.
- Ready laptop.
- Information collection form.

3.3 Tests used in the research:
1. **Test of muscle activity of the flexor muscles of the hand:**[3]
- **The aim of the test:** To measure the muscle activity of the flexor muscles of the hand, which are (Flexor carpi radialis muscle and flexor carpi ulnaris muscle).
- **The tools used:** A device (EMG) from Mayo Trace Company, bipolar, signal sensors and a laptop.
- **Test description:** In the same way as the test of the smash skill with badminton, the electrical activity is measured and the best attempt.
- **Recording method:** The (EMG) device is connected to the laptop, the data is stored, then the signal is purified and the best wave of electrical muscle activity is extracted at the moment the shuttlecock leaves the racket.
- **Units of measurement:** It is the microvolt for the peak indicator, the microvolt second for the area indicator, and the millisecond for the time indicator.

2. **Badminton smash skill accuracy test:**[4]
- **The aim of the test:** To measure the accuracy of the smash skill with badminton.
- **The tools used:** Badminton court, badminton rackets, EMG device, and colored tapes.
- **Test description:** Each player is given 12 attempts and the best 10 attempts are counted, as the player stands in the designated place and works to hit the shuttlecock that reaches him and deliver it to the other side of the court, which is divided into areas from (1-5).
- **Recording method:** The scores are recorded according to the place where the shuttlecock lands on the divided areas and for the best 10 attempts.
- Measurement unit: The score.

3.4 Pre-tests
Pre-tests were conducted on the research sample after all measurement and testing requirements were provided to be suitable for the research sample on 11-13-2023.

3.5 The cognitive program in motor learning
The cognitive program in motor learning was applied to the research sample after conducting the tests and to be a single starting point for the sample members in knowing the level of neuromuscular activity and the accuracy of performance for the skill of the smash hit in badminton. The cognitive program was built on the basis of analyzing the needs of each individual in the research sample and knowing the strengths and weaknesses of each individual in the sample, and in light of that, the characteristics that are developed at the mental neuromuscular level were determined.

The construction of the cognitive program relied on the analytical foundations for developing motor qualities from the neuromuscular side, as the educational doses were determined at three educational doses per week for a period of six weeks during which the functional qualities of the motor units of the second muscles were developed to control the performance hand. By monitoring the researcher's performance of the sample members during the period of applying the cognitive program, the researcher was able to direct the performance paths in a way that achieves accuracy in the performance results.

3.6 Post-tests
The post-tests were administered under the same conditions as the pre-tests, after six weeks.

3.7 Statistical methods
The statistical bag (SPSS) was used to process the data and extract the results.

4. RESULTS AND DISCUSSIONS
4.1 Presentation and analysis of the results of the descriptive analysis of the research variables of the flexor carpi lateralis muscles, performance, and accuracy of the smash in badminton

Table 2: Shows the results of the descriptive analysis of the research variables of the flexor muscles of the wrist, performance and accuracy of the smash in badminton

Muscles and variables			Mean	N	Std. Deviation
Flexor carpi radialis	Amplitude	Pretest	194.67	6	3.012
		Posttest	207.5	6	6.57
	Area	Pretest	24.17	6	1.1691
		Posttest	28.16	6	1.472
	Duration	Pretest	9.67	6	0.516
		Posttest	7.5	6	0.837
Flexor carpi ulnaris muscle	Amplitude	Pretest	182.5	6	1.761
		Posttest	193.33	6	5.241
	Area	Pretest	25.83	6	1.602
		Posttest	31	6	3.163
	Duration	Pretest	11	6	1.265
		Posttest	8	6	1.096
Accuracy		Pretest	26.83	6	1.723
		Posttest	35.5	6	3.02

4-2 Presentation and analysis of the results of the test (t) and the significance of the differences between the pre- and post-tests of the research variables of the lateral wrist flexor muscles and the performance and accuracy of the smash hit in badminton

Table 3: Shows the results of the test (t) and the significance of the differences between the pre-and post-tests
of the research variables of the lateral wrist flexor muscles and the performance and accuracy of the smash hit in badminton

Muscles and variables		Significance of differences			(t) value	df	Sig.	Significant of differences
		Mean	Std. Deviation	Std. Error Mean				
Flexor carpi radialis muscle	pre - Ampitude.post	12.83	6.211	2.54	5.062	5	0.004	Sig.
	pre - Area. post	4	2.191	0.89	4.472	5	0.007	Sig.
	pre - Duration.post	2.167	0.753	0.31	7.050	5	0.001	Sig.
Flexor carpi ulnaris muscle	pre - Ampitude.post	10.83	5.42	2.21	4.897	5	0.004	Sig.
	pre - Area.post	5.167	2.042	0.83	6.2	5	0.002	Sig.
	pre - Duration.post	3	1.898	0.775	3.87	5	0.012	Sig.
pre - Accuracy.post		8.68	2.16	0.882	9.83	5	0.000	Sig.

From the results presented in Table (2 and B3), it is clear that there are positive and significant differences between the pre- and post-tests in favor of the post-tests. This indicates that the cognitive program in motor learning has achieved the goals for which it was set, as improving the activity of the second muscles of the wrist of the performance arm is achieved by enhancing the coordination between the muscles and fine movements. Also, teaching the player to feel the motor performance and perceive motor awareness enhances the ability to increase the player's control of the badminton racket.[5] The cognitive exercises in motor learning used in this study significantly increased muscle strength by increasing their activity and improving the nerve flow of the motor units. It also enhanced their flexibility, which led to increased accuracy in directing the wrist during the implementation of the skill under study.[6] Perception exercises increase concentration and accuracy, which are a basic requirement for the skill of smashing in badminton. [7,8] This is what made the exercises used by the researcher have an effective impact in achieving differences between the results of the pre-and post-tests in favor of the post-tests. Motor guidance is one of the important factors that require development and improvement in each individual in the sample, P [9,10] as it plays an important role in building an advanced educational model that can be used to modify the motor paths of performance. One of the most important things that the cognitive exercise program controls is enhancing self-confidence, as success in achieving accuracy and results enhances the psychological and emotional side of the player, and this was achieved through field observation of the players. [11,12] Through the above, the researcher indicates that motor perception exercises in motor learning are important for all educational levels, whether in the early stages of learning or advanced stages of performance for players.

5. CONCLUSIONS
1- The cognitive program in motor learning enhanced the coordination in the work of motor entities and the ability to direct the movement of the wrist to the performance arm.
2- The results showed clear differences between the test results for variables related to the electrical muscle activity of the flexor muscles of the wrist of the performance arm.
3- The results showed significant differences between the results of the accuracy values in the skill of crushing in badminton.
4- The cognitive program in motor learning worked to increase accuracy by increasing the ability to focus and direct the wrist of the performance arm.

Recommendations
1- The necessity of conducting periodic examinations and tests for players in all games and levels, especially in badminton.
2- The necessity of motor learning programs to include cognitive exercises to enhance motor knowledge of the specialized skill.
3- The necessity of motivating and encouraging players to pay attention to cognitive exercises and to persevere in them to ensure continued accuracy in achieving the best results.

REFERENCES
1. Li F, Li S, Zhang X, Shan G. Biomechanical insights for developing evidence-based training programs: unveiling the kinematic secrets of the overhead forehand smash in badminton through novice-skilled player comparison. *Appl Sci.* 2023;13(22):12488.
2. Eriksen AD, Lorås H, Pedersen AV, Sigmundsson H. Proximal–distal motor control in skilled drummers: the effect on tapping frequency of mechanically constraining joints of the arms in skilled drummers and unskilled controls. *SAGE Open.* 2018;8(3):2158244018791220.
3. Miura A, Kudo K, Ohtsuki T, Kanehisa H, Nakazawa K. Relationship between muscle cocontraction and proficiency in whole-body sensorimotor synchronization: a comparison study of street dancers and nondancers. *Motor Control.* 2013;17(1):18-33.
4. Sparkes V, Smith M. Function of the upper limb. In: *Human Movement: An Introductory Text.* 2010:155.

5. Abdollahipour R, Psotta R, Palomo Nieto M. Motor learning and control. *J Sport Exerc Psychol.* 2014;36:S17-S58.

6. Chia J. Influence of fatigue and acute caffeine supplementation in badminton men's singles [doctoral dissertation]. Loughborough (UK): Loughborough University; 2018.

7. Holland MJ, Sharp LA, Woodcock C, Cumming J, Duda JL. Validity and reliability of the Behavioral Regulation in Sport Questionnaire (BRSQ) with youth athletes. *J Sport Exerc Psychol.* 2010;32:S175-S176.

8. Athab NA. An analytical study of cervical spine pain according to the mechanical indicators of the administrative work staff. *Indian J Public Health.* 2019;10(5):1349.

9. Athab NA, Hussein WR, Ali AAM. A comparative study for movement of sword fencing stabbed according to the technical programming in the game of fencing wheelchairs Class B. *Indian J Public Health.* 2019;10(5):1345.

10. Athab NA, Alsayigh HA. Rehabilitation of the wrist joint injury accordance of kinesiology variables. *J Stud Res Sport Educ.* 2021.

11. Al-Hali MJ, Al-Saffah RH, Athab NA. Studying points of difference in body parts' center of weight and their relation to rhythmic balance of female students. *J Phys Educ.* 2019;31(4).

12. Athab NA. Effect of a rehabilitation program to improve the structural stability of the elbow joint for injured players. *J Stud Res Sport Educ.* 1818;41.