



The effect of special exercises in developing some bio-kinetic abilities and improving the performance of the volley in tennis for players

El efecto de ejercicios especiales en el desarrollo de algunas habilidades biocinéticas y la mejora del rendimiento de la volea en el tenis para los jugadores

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How to cite in APA

Saleem Radhy¹, S., Aboodee Hussein, A., Kadhem fairouz, H. A., Mohammed Karim, G., & Nasser Radhi, M. (2025). The effect of special exercises in developing some bio-kinetic abilities and improving the performance of the volley in tennis for players. *Retos*, 68, 1644-1653. <https://doi.org/10.47197/retos.v68.114658>

Abstract

Objectives: The Objectives of this paper is to preparing special exercises to develop the skill of hitting tennis, and identifying the effect of special exercises on accuracy, agility and the development of the skill of the volley strike tennis.

Research methodology: the researcher used the experimental method (and designed the two equivalent groups), as the experimental method. The sample was selected from third-year students, Section B / University of Kufa / College of Physical Education and Sports Sciences for the academic year (2024-2025), numbering (32), and (20) were selected randomly, and the injured students and the exploratory sample were excluded. The sample was divided into two groups: the control group, numbering (10) and the experimental group, numbering (10) as well.

Result: The superiority of the experimental group in this variable appeared at the expense of the control group, and this superiority is a reflection of the various applications of special exercises that the members of the experimental group were exposed to

Conclusions: The special exercises used in the experiment had a clear effect on the dependent variables (agility, accuracy, and development of the studied tennis skill), there is a significant correlation between the bio-kinetic abilities used under study (accuracy, agility) and the accuracy of performing the tennis volley, and use of special exercises was positively reflected in improving the accuracy and agility of tennis players.

Keywords

Special exercises; bio-kinetic abilities; tennis.

Resumen

Objetivos: El objetivo de este trabajo es preparar ejercicios especiales para desarrollar la habilidad de golpear el tenis e identificar su efecto en la precisión, la agilidad y el desarrollo de la habilidad de volear.

Metodología de la investigación: El investigador utilizó el método experimental (y diseñó dos grupos equivalentes). La muestra se seleccionó aleatoriamente entre estudiantes de tercer año de la Sección B de la Universidad de Kufa, Facultad de Educación Física y Ciencias del Deporte, para el año académico 2024-2025. Los números (32) y (20) se seleccionaron al azar. Se excluyeron los estudiantes lesionados y la muestra exploratoria. La muestra se dividió en dos grupos: el grupo de control (10) y el grupo experimental (10). Resultado: La superioridad del grupo experimental en esta variable apareció a expensas del grupo control, y esta superioridad es un reflejo de las diversas aplicaciones de ejercicios especiales a los que estuvieron expuestos los miembros del grupo experimental.

Conclusiones: Los ejercicios especiales utilizados en el experimento tuvieron un claro efecto sobre las variables dependientes (agilidad, precisión y desarrollo de la habilidad tenística estudiada), existe una correlación significativa entre las habilidades biocinéticas utilizadas en estudio (precisión, agilidad) y la precisión en la ejecución de la volea de tenis, y el uso de ejercicios especiales se reflejó positivamente en la mejora de la precisión y la agilidad de los tenistas.

Palabras clave

Ejercicios especiales; habilidades biocinéticas; tenis.



Introduction

Science served as and continues to serve as the foundation for the quick development of reaching high levels of accomplishments and achievements in a variety of sports, whether team or individual. Because the training process has taken on a shape, structure, and organization that is commensurate with the new level of development in the methods, techniques, and means utilized in the training process, the scientific revolution has had an impact on the field of sports training in recent years. Through the efforts of trainers to select the best and most up-to-date ways that are suitable for the specialized activity, scientific advancement has added several new and current methods that are compatible with the nature and capabilities of the trainee. (Radhi & Obaid, 2020). Given the fundamental importance of these sciences in developing and evaluating training methods, as well as in understanding the responses and adaptations that occur during the practice of sports activity, scientific research has shifted toward studying a variety of sciences, including chemistry, biomechanics, anatomy, and sports physiology, and using them to support the science of sports training in order to raise the level of athletes in all sports. Specialized training is one of the contemporary training approaches that assists the athlete in performing a variety of motions in a way that is indicative of the ability to be improved. To achieve the highest levels of sports proficiency, an athlete must be able to perform a wide variety of sports activities naturally.

These days, tennis is a popular sport. Because of the physical, motor, physiological, and psychological skills it demands, it has evolved through several stages of training methods, just like other sports. Additionally, it speeds up success and reaching the required levels by determining the body's biokinetic capabilities unique to completing a skill, which are variable and controllable through training and exercise. Every sport or game has unique physical and motor capabilities, body measurements, and other features that cause physiological capabilities to adapt. This aligns with what promoted, claiming that skill development is positively impacted by the usage of varied and meaningful games. Thus, the significance of this study resides in comprehending how particular exercises enhance the development of particular biokinetic abilities, which in turn enhances the volley performance of tennis players. Effective implementation of particular exercises results in a major improvement in learners' overall performance, which gives them the opportunity to acquire new knowledge about how to learn skills.

Research problem

Given the variety of kinetic skills involved in tennis, the player must possess both great physical fitness and the accuracy and mastery of the best talent because the game involves every part of the body. As one of the key offensive skills, the volley strike necessitates a great deal of skill in determining the playing positions, particularly close to the net, which calls for kinetic abilities like balance, agility, accuracy, etc. Scientific foundations consider performance and sports training. Additionally, the researcher's observations reveal that the pupils' technique is lacking because she teaches tennis.

Research objectives

Creating specialized drills to improve hitting technique and determining how these drills affect accuracy, agility, and the growth of volley strike tennis skills.

Research hypothesis

The benefit of special exercises is that they can influence some biokinetic powers and improve tennis volley skills. They also have a favorable effect on certain biokinetic abilities.

Method

Research Methodology

One of the most crucial aspects in ensuring the success of the research is selecting the right methodology. The type of problem to be investigated and the objective to be accomplished determine which approach is best. Because the experimental technique is the most truthful way to solve many scientific problems in a theoretical and practical way, the researchers employed it (and created the two equivalent groups). (Alawi & Rateb, 1999).



Community and sample research

The sample was selected from third-year students, Section B / University of Kufa / College of Physical Education and Sports Sciences for the academic year (2024-2025), numbering (32), and (20) were selected randomly, and the injured students and the exploratory sample were excluded. The sample was divided into two groups: the control group, numbering (10) and the experimental group, numbering (10) as well.

Table 1. Shows the research sample

Research community	Research sample	Exploratory sample	Excluded
32	20	10	2

Table 2. Sample homogeneity

Variables	Measuring unit	Mean	Std. Deviations	Skewness	Median
Age	Year	23,4	16,34	-0,091	234,5
Length	Cm	168,21	5,02	-0,47	168
Mass	Kg	66,46	11,24	0,98	62,5

Sample equivalence

In order for the starting point to be the same for both groups (experimental, control) equally in the research variables that will be determined, the equivalence of the two groups in the research variables was carried out based on the statistical function represented by the (t.test) test for independent samples equal in number. After comparing the (sig) value, it was found that it was greater than (0.05), which indicates that there is no significant difference between the control and experimental groups, and Table (3) shows this.

Table 3. Shows the equivalence of the experimental and control groups in the research variables

Variables	Experimental group		Control group		T value calculated	Level Sig	Type Sig
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
Agility	12,630	2,63	12,71	1,76	1.3	0.08	Non sig
Accuracy	6,16	1,47	6,33	1,86	1.5	0.06	Non sig
volley in tennis	34,00	1,29	32,85	1,06	1,80	0,09	Non sig

Research tools, devices and supplies used in the research

1. Computer.
2. Pens. Record, measuring tape, calculator.
3. Tennis court, balls, rackets.
4. Work team.
5. Chalk.

Identifying the bio-kinetic abilities under study and their tests

The researcher prepared a questionnaire regarding the bio-kinetic abilities and the tests relied upon in the research, then presented the questionnaire to a number of experts and specialists, totaling (10) experts, and Table (4) shows that.

Table 4. Shows the relative importance of the physical abilities related to the research according to the opinion of (10) experts

No.	Physical abilities	Relative importance	Nomination
1	Distinctive strength of speed of the Arms	%49	
2	Distinctive strength of speed of the legs	%49	
3	Arms Explosive Strength	% 40	
4	Legs Explosive Strength	% 45	
5	Agility	%65	√
6	Accuracy	%60	√
7	Throwing Arm kinetic Speed	%48	
8	Legs kinetic Speed	%49	

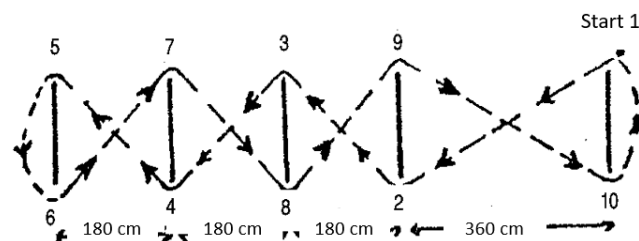
Description of tests for selected bio-kinetic abilities

Agility test

Zigzag running between obstacles (in numbers) (Hassanein, 2003)

- Purpose of the test: To measure agility.
- Tools: Five indicators, stopwatch, recording form.
- Performance specifications: The five indicators are placed on a single line, so that the distance between the first and second barriers is (360) cm and the distance between the other indicators is ((180 cm, and the barriers must be parallel on a single extension line. The tester stands at barrier No. 1, and then runs immediately upon hearing the start signal using the route shown in the numbers until he reaches number (10) as in the figure.
- Recording: The tester records the time he covered during the run from number (1) to number (10).

Figure 1. Shows the zigzag running test between hurdles (in numbers)



Accuracy test (Abdul Jabber & Bastawisi, 1987)

- Test name: Overlapping rectangles shooting test (purpose of the test is to measure the accuracy of the working arm)
- Tools: (5) tennis balls, a wall with a flat surface in front of it, adhesive tape
- Performance method: The tested player stands behind the line at a distance of (5) meters from the wall on which overlapping rectangles are drawn, the dimensions of which are shown in Figure (2), then shoots the five balls (in a row) at the rectangles, trying to hit the small rectangle. The tested has the right to use either hand in shooting.
- Recording:
 - If the ball hits the small rectangle inside or on the lines, the tested person is given three points.
 - If the ball hits the middle rectangle inside or on the lines, the tested person is given two points.
 - If the ball hits the large rectangle inside or on the lines, the tested person is given three points.
 - If the ball comes outside the three rectangles, the tested person is given zero points.

Tennis volley test (Kharbit, 1989)

- Test name: Forehand volley from the service line
- Test objective: Measure the forehand volley from the service line
- Equipment used: A legal tennis court, the service area and the backcourt are divided into two equal areas and can be called the DCBA areas as shown in the test diagram.
- Tennis racket - Tennis balls in good condition.
- Test instructions:
 - The tester stands on the service line and at the intersection (T) and is not allowed to possess it, and the teacher stands on the opposite court directly behind the net

- The scorer stands on the opposite court and in the backcourt to calculate the scores for the correct balls.
- The tester is given 10 attempts for the forehand volley and 10 attempts for the backhand volley
- Performance method: The teacher throws the ball and in a volley manner, that the tester plays it with a forehand volley to the opposite court, trying to drop it at the end of the court.

Figure 2. Shows the tennis volley test

		D	C	B	A
× laboratory		× teacher		× Registrar	

- Recording:
 - Scores are calculated for each correct answer as follows:
 - 4 points for a ball dropped in zone A.
 - 3 points for a ball dropped in zone B.
 - 2 points for a ball dropped in zone C.
 - 1 point for a ball dropped in zone D.
 - 0 points for balls that do not cross the net or fall outside the individual court.
 - A ball dropped on the line is counted for the zone with the most points.
 - The tester's score is the sum of the points he scores from the ten attempts.

Exploratory experiment

The researcher conducted the exploratory experiment on a sample of (3) players from the same research community on Sunday 15/7/2024; This was to know the following points:

1. Verify all devices and tools.
2. Identify the test time.
3. Know the ease and difficulty of the test.
4. Validity of the forms.

Scientific foundations of tests

Validity

Validity of a test means: (that the test measures what it was designed to measure, i.e. a valid test is a test that measures the function it claims to measure) (Alawi & Radwan, 2000). In order to obtain the validity of the nominated tests, the researcher presented a questionnaire form to a group of experts and specialists, who are the same ones to whom the physical abilities nomination form was presented.

Stability

Validity of a test means (the extent of accuracy, agreement, or consistency with which the test of the phenomenon for which it was designed is measured) (Al-Nabhan, 2004); To calculate the stability of the tests adopted in the research, the tests were applied to the individuals of the exploratory research sample, and under the same conditions, and then reapplied a week later to the same sample, and under the

same conditions, and then processed statistically using the simple correlation coefficient (Pearson), as the higher the degree of correlation, the more stable the test is.

Objectivity

By objectivity we mean (the lack of difference between the evaluators in judging something) (Bahi , 1999), and the objectivity of the tests was found in the exploratory experiment by recording the results by two arbitrators who arbitrate the results, after which the correlation coefficient was extracted between the recording of the two arbitrators using the simple correlation coefficient law (Pearson), which represents the degree of objectivity of the tests, and Table (6) shows the scientific foundations of the tests.

Table 5. Shows the coefficient of stability and objectivity of the tests.

No.	Tests	Unit of measurement	Stability	objectivity
1	Medicine Ball Throw Test (2 kg) from Sitting	meter	0.92	1
2	Long Jump from Standing	meter	0.95	1
3	Eight Passes of the Throwing Arm Test	second	0.96	1
4	White Test for Accuracy of serve	degree	0.91	1

Pre-test

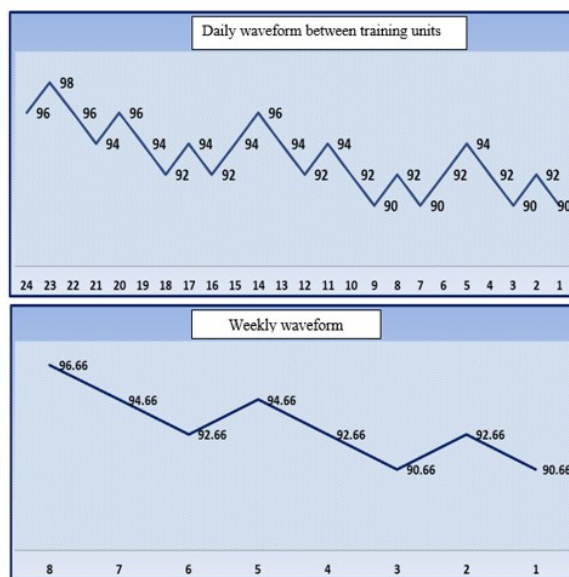
The researcher conducted the pre-tests on the research sample on Sunday, corresponding to 15/8/2024 at exactly nine o'clock in the morning on the tennis court in the College of Physical Education and Sports Sciences / University of Kufa and under the supervision of the researcher.

Preparing special exercises

- The purpose of the specific exercises is to improve volleyball performance, agility, and accuracy. While the control group continued on their usual curriculum, the experimental group's curriculum was supplemented with the provided additional exercises by the researcher. Over the course of eight weeks, there were three training units per week. There were twenty-four units with unique exercises, and each training unit's special exercises lasted twenty to twenty-five minutes (main section only).
- The following are the specifics of the specialized exercises:
 1. There are twenty-four training units for specialized exercises.
 2. Over the course of eight weeks, the specific workouts consist of three weekly training units.
 3. Each training unit's specialized workouts lasted 20 to 25 minutes (major segment alone).
 4. Sunday, Tuesday, and Thursday are the days of the week that are designated for training.
 5. The purpose of certain exercises is to enhance volley performance and build bio-motor skills.
 6. Take into account how different muscle units exchange work.
 7. During daily and weekly sessions, specific exercise combinations are planned using (2-1).
 8. Time and repetition were used to gauge the intensity.
 9. The other exercise intensities were calculated by extracting the maximal intensity (100%) for each activity.
 10. When introducing specific activities, the researchers employed a (1:2) oscillation between daily and weekly training sessions.



Figure 3. Show the waveform used in daily and weekly training units



Post-tests

The post-test was conducted for the research sample (experimental and control) on Sunday 15/1/2025 in the tennis court - College of Physical Education and Sports Sciences / University of Kufa after completing the application of special exercises, which took (12) weeks. The researcher was keen to provide the conditions of the pre-test and the procedures followed for the technical performance of the volley in tennis skill, and the bio-kinetic capabilities

Statistical methods

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

Results

Presentation and analysis of the results of the bio-kinetic variables and the development of the performance of the volley strike in the pre-test and post-test for the two research groups

Table 6. Shows the results of the comparison between the pre-test and post-test for the experimental group.

Variables	Unit of measure	Pre-test		Post-test		T value calculated	Level Sig
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
Agility	Second	16	1.05	12.9	0.73	7.61	0.000
Accuracy	Degree	94.3	4,96	145,8	2,78	28,60	0.000
volley in tennis	Degree	99.9	8,11	155.9	3.47	20.05	0.000

At a significance level of (0.05)

Table 7. Shows the results of the comparison between the pre- and post-tests of the control group

Variables	Unit of measure	Pre-test		Post-test		T value calculated	Level Sig
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
Agility	Second	16	1.15	14.60	0.97	2.94	0.009
Accuracy	Degree	88,70	7.21	96,30	7,54	2,30	0.003
volley in tennis	Degree	96.80	7.94	104.60	5.08	2.61	0.01

At a significance level of (0.05)

Because the significance value Sig is less than the significance level of 0.05, the results in Table (7) demonstrated that the calculated (T) value for all variables under study is significant. This means that the difference between the pre-test and post-test for all variables is significant, and the experimental group benefited from the post-test. Because the significance value Sig is less than the significance level of 0.05, the calculated (T) value for the control group was shown to be significant. This means that the difference between the pre-test and post-test for all variables is significant, favoring the post-test. The results are shown in Table (19).

Presentation and the results volley in the game of tennis in the post-test for the two research groups

Table 8. Shows the results of the comparison between the experimental and control groups in the post-test in the studied variables.

Variables	Unit of measure	Experimental group		Control group		T value calculated	Level Sig
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
Agility	Second	12.9	0.73	14.60	0.97	3.79	0.04
Accuracy	Degree	145,8	2,78	96,30	7,54	19,32	0.000
volley in tennis	Degree	155.9	3.47	104.60	5.08	35.67	0.000

At a significance level of (0.05)

When comparing the experimental group and the control group in the post-test, the results displayed in Table (8) included the arithmetic mean, standard deviation, calculated value, and significance Sig for all studied variables. The calculated T value for all studied variables is significant because the significance Sig value is less than the significance level of (0.05), indicating that there is a significant difference between the experimental and control research groups, favoring the experimental group.

Discussion

Table (7) showed us the existence of a statistical difference when comparing the pre- and post-test for the agility variable, in favor of the experimental group. This difference came, according to the researcher's opinion, to the special exercises prepared for the members of the experimental group, and the traditional exercises for the members of the control group, which was reflected in the players' ability to perform the special exercises, which helped them, develop agility that subsequently affects the performance of the volley in tennis strike. The researcher believes that training with special exercises that included the use of appropriate training loads in addition to the gradual increase in the training load, taking into account the rest period between repetitions and rest between groups, had an effective impact on the training process, which led to the adaptation of the working muscle group (since The use of well-designed and implemented programs in a way that leads to the development of physical performance (Muhammad ,2002) ; therefore, the reason for the development that occurred is due to the effectiveness of the special exercises used in the training exercises for this group.

The trainers' traditional exercises, which included numerous application items for the training curriculum they prepared to train the players to develop their performance level, are what caused the control group's improvement in the above variable of agility. They also focused on agility exercises that affected the players' performance of the volley, which is a fundamental aspect of modern play to reach the best levels, because exercise performance is characterized by quick and innovative reactions, which are among the most important means of influencing the development of all the variables specific to the type of activity practiced.

The researcher attributes these differences to the improvement included in the special exercises and the use of traditional exercises for the members of the control group, as the members of the research sample were unable to achieve better results in the pre-test. The results of comparisons between the pre- and post-tests using the t-test for correlated samples show a statistical difference in favor of the post-tests.

The superiority of the experimental group in this variable appeared at the expense of the control group, and this superiority is a reflection of the various applications of special exercises that the members of

the experimental group were exposed to; because the basis of exercises is to develop or improve accuracy, exercises that improve accuracy have conditions, including preparing athletes physically well; to accept exercises that develop and improve accuracy (Timothy et al., 2009). And find that the exercises prepared by the researcher focused on agility, because the player needs to move from one place to another within the playing area, and that agility depends mainly on leg exercises. Because tennis players rely heavily on their agility to execute skills, the researcher incorporated some arm exercises.

In this instance, both affirm that the majority of strength-building techniques only result from specialized training that relies on contraction exercises by lengthening and shortening the muscles, whether for the knees or thighs, as it gives a clear difference in the level of muscle strength.

The difference in this variable came as a result of the applications of special exercises; for a period of three months, and among those exercises was focused on the throwing arm (racket holder), (and speed has forms including transitional, kinetic and reaction) (Al-Lami, 2004), as we find that the exercises prepared by the researcher focused on agility; because the player needs to move from one place to another within the playing area and that agility depends mainly on leg exercises, and the researcher put a share of arm exercises, because the tennis player relies to a large extent on agility in performing skills.

The researcher put a set of tests for the results of the performance of the studied skill; To examine the development of performance for these skills, the test was (the volley test) as we find that the researcher relied on the development of direct performance on analyzing the performance results of the studied skill, which showed a difference in favor of the members of the experimental group, and relied on the development of indirect performance by studying the performance result in accuracy and strength. According to all the measurements and tests studied, the researcher has a complete picture of the development of performance for this skill by applying special exercises. We find that the improvement was clear in the accuracy of the volley according to dividing the background area of the field into areas, each of which has a number of points, which showed superiority among the members of the experimental group; because training on special physical fitness has a certain effect on the level of performance. (Regular training results in an increase in the individual's ability as a result of performing exercises for several weeks or months by adapting the body's systems to the optimal performance of these exercises) (Edington & wand Edgerton, 1976).

Conclusions

- The special exercises used in the experiment had a clear effect on the dependent variables (agility, accuracy, and development of the studied tennis skill).
- There is a significant correlation between the bio-kinetic abilities used under study (accuracy, agility) and the accuracy of performing the tennis volley.
- The use of special exercises was positively reflected in improving the accuracy and agility of tennis players.
- The use of special exercises gave more specificity to the exercises according to the objectives of the studied skill.
- The physical tests and measurement of the volley skill used in the research contributed to accurately determining the results.

Recommendation

- Trainers are requested to pay attention to training on exercises that include agility and accuracy for tennis players, which have a great impact on the player's performance level; because it is related to the actual strength targeted in performing the skill, which differs from one player to another.
- Working on upgrading and developing training curricula and introducing modern training techniques in order to raise the physical level of players..



- Training other bio-kinetic abilities in tennis.
- Conducting similar research and studies on the rest of the other tennis skills such as: (smashing strokes, or overhead), or on other racket games (squash, badminton) based on the results of this study.

Acknowledgements

None.

Financing

None.

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