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THE RELATIONSHIP BETWEEN BLOOD FLOW IN THE CAROTID ARTERY AND SOME MENTAL PROCESSES AND THE ACCURACY OF SKILL PERFORMANCE WITH A TENNIS BALL

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Abstract
The research aims to relate the blood flowing in the carotid artery to some mental processes and the accuracy of skill performance with a tennis ball. The experimental method was used and the research community was represented by the (10) players of the Tennis Association in Maysan. The researchers used pre- and post-tests and measurements, which are in line with the research requirements.The results of the study indicated the following: The effect of blood flowing in the carotid artery on some mental processes and the accuracy of skill performance among tennis players in an effective manner among individuals in the experimental group. The most important conclusions were that there is a correlation between the diameter of the carotid artery and the amount of blood flowing in it with some mental processes and accuracy of skill performance with the tennis ball. The researchers recommended the need to conduct studies on other activities because this method has positive results in creating physiological adaptations and improving performance.

Keywords: Blood measurements, carotid artery diameter, accuracy of skill performance.

Introduction

Achieving achievements requires raising the level of physical, skill, tactical, and psychological performance, all of which require the preparation of curricula that are appropriate to the age stage and the type of features and characteristics of the game. This requires making exceptional efforts to solve all the issues that stand in the way of advancing the level, most of which require brain functions that are depleted during mental processes that are the basis for implementing offensive and defensive duties and skills. Despite the differences in brain functions and sections, They all participate in parallel to adapt to the surrounding environment, including external load and competition, which is reflected in the

accuracy of the players' skill performance. Hence the importance of research and the need for it to explain the reason for the increase in blood flow in the carotid arteries and the extent of its relationship to brain functions and its impact on the accuracy of performance among tennis players for the sample under study.

Especially when comparing this to rest, after physical effort, and its relationship to brain functions and aiming accuracy The fact that the responses to physical effort are more evident among the eyes and gives an indication of the changes that occur as a result of practicing sports activity.

Through the experience of researchers in the field of playing tennis, they noticed a failure in the accuracy of skill performance with the tennis ball. Weakness in the use of modern technologies to guide the training process and achieve its goals, and the extent of the interrelation between brain functions and mental processes such as attention, concentration, and accuracy of skill performance with a tennis ball, which requires taking into account the preparation of exercises that increase the development of mental processes, which can be confirmed through carotid blood flow. Hence, the problem can be identified with the following question. Question: Is it increased blood? The joint in the spinal artery is related to some mental processes, accuracy, and skill performance with the tennis ball.

The objective of the study

1- Identify the diameter of the carotid artery and the amount of blood flowing from it to the head.

2- Identifying the correlation coefficient between the diameter of the carotid artery and the amount of blood flowing through it with some mental operations and the accuracy of skill performance with the tennis ball (before effort).

Research areas: Research areas included:

Human field: Maysan Oil Club players included (10) players representing Maysan Oil Club in ground tennis, applicants category.

Spatial area: The tennis court at the Maysan Oil Club and the Turkish Hospital for Cardiac Diseases

Temporal scope: the period from 10/10/2023 to 12/10/2024

Methods and structure of the study

Epermental approach to the problem

The researcher used the experimental method because it suits the nature of the research, as the experimental method is "one of the most sufficient means of achieving knowledge when it can be used to solve problems" (Deobold van Dalen, 1984).

Participants

The choice of the sample is always linked to its representation of the original community and the possibility of generalizing its results to the community from which it was chosen. The sample "is the model on which the researcher conducts the entirety and focus of his work, or

it is part of the research community in which the researcher and analysis are included, with the aim of generalizing the results obtained to the community from which the sample was drawn (Ahmed Al-Khatib, 2003). Therefore, the research population represents tennis club players in the Maysan Tennis Federation, and the research population to be studied was chosen intentionally from the original research population and using the method of two equal groups, namely the control and experimental group. The researcher identified the research population as the players of the Maysan Tennis Federation, the applicant category. The population was determined in a deliberate manner, and the research population reached (13) players, and (10) players were selected randomly, representing a percentage of (90%) of the original population. The researcher excluded (3) players for conducting reconnaissance experiments. The researcher divided the two samples into two groups, experimental and control. Note that the researcher confirmed the names of the players through the records of the Tennis Federation in Maysan

After obtaining the approval of the Maysan Tennis Federation administration and the coach, the researcher obtained the approval of the players and volunteered them to perform the training program, which is (competition exercises), prepared by the researcher, and to perform the pre- and post-tests.

The researcher carried out homogeneity among the members of the research sample in terms of (age, height, weight, training age, heart rate), as shown in Table (1):

Table (1) It shows the arithmetic means, standard deviations, median, and skewness coefficient for individuals in the research sample

Torsion coefficient	The mediator	Std	Mean	Unit of measurement	variables
0.348	32.00	1.663	32.10	The year	the age
0.000	177.50	1.958	177.50	cm	height
0.288	21.50	2.055	22.00	The year	Training age
0.000	77.50	1.958	77.00	kilogram	the weight
0.095	66.50	1.350	66.40	Blow/minute	Heart rate

Through Table (1), it was shown that the values of the skewness coefficient were limited to (±3), which indicates the homogeneity of the research sample in the aforementioned variables.

The researcher conducted the process of equivalence between the control and experimental research groups in (serve, forehand, backhand) basic skills with the tennis ball, as shown in Table (2):

Table (2) The arithmetic means, standard deviations, calculated (t) value, and significance level show the skill performance of some basic skills with the tennis ball for the two research groups:

Level of significance	sig	Calculated t value	Std	Mean	Group	Testing
In moral	0.000	49.178	1.673	40.60	empiricism	Transmission
			5.128	32.40	The female officer	
In moral	0.000	25.889	4.970	31.80	empiricism	Forehand
			3.286	42.60	The female officer	
In moral	0.000	23.620	2.074	30.40	empiricism	Backhand
			2.588	28.80	The female officer	

• Significant at the significance level > (0.05).

Through Table (2), it was shown that the calculated (t) values ranged between (49.178) and (23.620), the level of significance (sig), all of which are less than 5%, which indicates that there are no significant differences between the two research groups, and this indicates the equality of the two groups in the tests.

Procedure

Tests and measurements used:

Testing the accuracy of transmission skill:

1- Test title: Testing the skill of serving in tennis (Dhafer Hashim Al-Kazemi, 2000).

The aim of the test: to measure the accuracy of the serve in tennis.

Measuring the accuracy of the serve in tennis

A rope with a diameter of 1.4 inches is fixed at both ends to the two posts of the net at the top, so that the distance between it and the net is (4) feet and the distance between it and the ground is (7) feet. After the preparation period, the tester stands behind the base line designated for performing the serve for individual play, then gives five trial attempts, and after their implementation, each player is allocated ten service attempts, at which point the ball must fall within the boundaries of the serving area and in specific calendar degrees of (1-6) degrees, as in the numbers (1-2-3-4-5-6), which represent values that indicate the serving area.

- The number (1) refers to a rectangle (15 x 13.5) feet.
- The number (2) refers to a rectangle (6 x 10.6) feet

The numbers (3-4-5-6) refer to rectangles, the dimensions of each one of which are (5.1 x 3) feet. The same numbers (1-2-3-4-5-6) indicate the grades assigned to each of the areas on which the ball falls, provided that it passes between the net and the rope.

Balls that touch the rope or the net are not counted as an attempt and must be repeated again

The ball that passes over the top of the rope is counted as an attempt and a score of zero is awarded, even if it falls on any correct location. The score is calculated in the correct area on which the ball lands. Players' scores are the sum of points obtained from the ten attempts.

Front and rear ground strike test:

Test title: Front and back ground kicks (Dhafer Hashim Al-Kazemi, 2000)

Name of the test: - Measuring the accuracy of the forehand and backhand groundstrokes - This test is conducted on a court A tennis system with rackets, (30) tennis balls, a registration form, and a fixed rope, as in Figure (16), explaining the laboratory parking areas, how to conduct the test, and the evaluation marks. (1) A rope is fixed on two poles in the two pillars of the network, parallel to it, at a height of (7) feet from the ground and (4) feet from the network, as shown in Figure (17). Three parallel lines are drawn between the transmission line and the base line so that the distance between the lines is (4.5) feet. The player stands at the center mark, which is located in the middle of the base line, and is given five trial attempts to determine the performance of the test after providing instructions by the teacher, provided that the ball is thrown directly behind the service line by the thrower, if there is one, or by the specialized teacher. The player begins by trying to return the ball with his racket using the forehand or the backhand. Each player is allocated ten attempts for the forehand and ten attempts for the backhand

- The player’s grades are the sum of the points he obtains by adding up his ten attempts. The ball must cross the net and the bottom of the rope. The student receives ascending grades from (1-5) grades. If the ball passes over the rope, it gives half the evaluation mark to the correct area on which it falls.

Main Experience:

On Sunday, at ten o'clock in the morning, the researchers carried out measurements of the diameter of the carotid artery and the blood flowing into it from a resting state. After that, the physical effort related to the research was performed, then the previous two measurements were repeated, and the mental measurements were tested. On the second day, Monday, at ten o'clock in the morning, the researchers selected the accuracy of the skill performance of the serve and the forehand and backhand skills.

Analyses

The statistical program (SPSS), version 22, was used and the 1- arithmetic mean 2- standard deviations 3- Pearson correlation coefficient were extracted.

Results

Table (3) shows the arithmetic means, standard deviations, calculated (T) value, and the significance of the differences between the pre- and post-tests.

* Tabulated T value (2.18) at significance level (0.05) and in front of degree of freedom (4)

Table (3) shows the values of the arithmetic means and standard deviations for the pre- and post-tests of the experimental group on the variables under study.

Level of significance	sig	Calculated t value	Posttest		Pretest		measruing unit	Variables
			Std	Mean	Std	Mean		
Moral	0.000	6.53	0.29	5.84	0.31	5.68	ml	Diameter of carotid artery before effort
moral	0.000	4.00	0.24	6.00	0.16	5.84	ml	Diameter of the carotid artery after exertion
moral	0.000	7.20	0.83	40.20	1.58	36.00	liter	Blood flowing from the carotid artery of the head before effort
moral	0.000	6.53	1.34	44.40	1.30	41.40	liter	Blood flowing from the carotid artery of the head after effort
moral	0.000	8.85	0.37	7.48	0.95	12.04	second	Focus of attention Before the effort
moral	0.000	13.84	0.05	8.88	0.83	13.80	second	Focus of attention After the effort
moral	0.000	30.98	0.08	3.34	0.09	8.90	second	Diversion of attention Before the effort
moral	0.000	20.34	0.29	4.62	0.35	9.52	second	Diversion of attention After the effort
moral	0.000	10.59	1.58	46.00	1.67	40.60	Once/second	Skill to send
moral	0.000	16.00	4.52	42.00	5.12	32.40	Once/second	Forehand
moral	0.000	7.77	5.22	42.40	4.97	31.80	Once/second	Backhand

The arithmetic mean of the pre-test in the ratio of the diameter of the carotid artery before exertion was (5.68) with a standard deviation of (0.31)

While the arithmetic mean for the post-test was (5.84) with a standard deviation of (0.29), and when applying the (T) test it appeared that the calculated value was (6.53), and when compared to the tabular value it was noted that it is greater than the tabular value and therefore there are significant differences in the pre- and post-test and in favor of the post-test.

The arithmetic mean of the pre-test in the proportion of carotid artery diameter after exertion was (5.84).With a standard deviation of (0.16), while the arithmetic mean of the post-test reached (6.00) and with a standard deviation of (0.24), and when applying the (T) test it appeared that the calculated value is (4.00), and when compared to the tabulated value it is

noted that it is larger than the tabulated value and therefore there are significant differences in the pre- and post-test and in favor of the post-test The arithmetic mean for the pre-test in the percentage of blood flowing from the carotid artery to the head before exertion was (36.00) with a standard deviation of (1.58), while the arithmetic mean for the post-test was (40.20) with a standard deviation of (0.83). When applying the (T) test it appeared that the calculated value was (7.20), and when compared to the tabulated value it was noted that it was greater than The tabular value and accordingly, there are significant differences in the pre- and post-test, in favor of the post-test

The arithmetic mean for the pre-test in the percentage of blood flowing from the carotid artery to the head after exertion was (41.40) with a standard deviation of (1.30), while the arithmetic mean for the post-test was (44.40) with a standard deviation of (1.34). When applying the (T) test it appeared that the calculated value was (6.53), and when compared to the tabular value it was noted that it was greater than the tabular value and therefore There are significant differences in the pre-test and post-test, in favor of the post-test As for the arithmetic mean of the pre-test in focusing attention before effort, it was (12.04) with a standard deviation of (0.95), while the arithmetic mean of the post-test was (7.48) with a standard deviation of (0.37). When applying the (T) test, it appeared that the calculated value was (8.85), and when comparing it to the tabular value, it is noted that it is greater than the tabular value, and therefore there are differences. Significant in the pre- and post-test and in favor of the post-test.

As for the arithmetic mean of the pre-test in focusing attention after effort, it was (13.80) with a standard deviation of (0.83), while the arithmetic mean of the post-test was (8.88) with a standard deviation of (0.05). When applying the (T) test, it appeared that the calculated value was (13.84), and when compared to the tabular value, it is noted that it is greater than the tabular value, and therefore there are significant differences in the test. Pre- and post-test, and in favor of the post-test. As for the arithmetic mean of the pre-test in shifting attention before effort, it was (8.90) with a standard deviation of (0.09), while the arithmetic mean of the post-test was (3.34) with a standard deviation of (0.08). When applying the (T) test, it appeared that the calculated value was (30.98), and when compared to the tabular value, it was noted that it is greater than the tabular value, and therefore there are significant differences. In the pre-test and post-test and in favor of the post-test. As for the arithmetic mean of the pre-test in shifting attention after effort, it was (9.52) with a standard deviation of (0.35), while the arithmetic mean of the post-test was (4.62) with a standard deviation of (0.29). When applying the (T) test, it appeared that the calculated value was (20.34), and when comparing it to the tabular value, it is noted that it is larger than the tabular value, and therefore there are differences. Significant in the pre- and post-test and in favor of the post-test The arithmetic mean of the pre-test in the transmission skill test was (40.60) with a standard deviation of (1.67), while in the post-test the arithmetic mean was (46.00) with a standard deviation of (1.58). When applying the (T) test it appeared that the calculated value was (10.59) and comparing it to the tabular value it is noted that it is greater than the tabular value and therefore there are significant differences in the pre-test. And the posttest, and in favor of the posttest

The arithmetic mean of the pre-test in the forehand skill test was (32.40) with a standard deviation of (4.97), while in the post-test the arithmetic mean was (42.40) with a standard deviation of (4.52). When applying the (T) test, it appeared that the calculated value was (16.00), and comparing it to the tabular value it is noted that it is greater than the tabular value. Therefore, there are significant differences in the pre-test. And the posttest, and in favor of the posttest

As for the arithmetic mean of the pre-test in the back-handed multiplication skill test, it was (31.80) with a standard deviation of (4.97), while the arithmetic mean of the post-test was (42.40) with a standard deviation of (42.40). When applying the (T) test, it appeared that the calculated value was (7.77), and when compared to the tabular value, it is noted that it is larger than the tabulated value, and therefore there are significant differences in the test. Pre- and post-test, and in favor of the post-test. Discussing the results of the pre- and post-tests of the experimental research group in measurements of the diameter of the carotid artery, measuring blood flowing in the carotid arteries, and some mental operations (focusing attention - shifting attention). The researcher attributes the presence of these differences in the diameter of the carotid artery to the effect of exercise, intensity, and intensity of training among players, and exercise that requires effort helps dilate the arteries and blood vessels. Chemical changes occur due to this effort, leading to the vessels expanding and increasing their flexibility (Ezz El-Din El-Minshawy, 1988). Practicing aerobic exercises with different intensities also effectively affects the dilation of these arteries at a certain level. This is because the continuation and regularity of these exercises with the intensities used has led to the occurrence of reflexive reactions in the cardiac system through increasing the nervous efficiency, that is, the adaptation of the atrial node in proportion to the type of effort. Responsible for the heart and blood circulation and thus affecting blood volume (Alfred, Bove, 2000). The non-local effect is through reflexive actions. These reflexive actions consist of sensory nerve fibers whose endings are in the walls of both the aortic arch and the carotid body or sac. It is a bulge that occurs when the common carotid artery bifurcates into the external and internal carotid arteries In the case of high pressure, the baro-sensory endings of the nerve fibers are affected due to the slight expansion of the walls of the aortic arch and the carotid sac, and thus a large number of nerve signals are received to the vasomotor center in which there is inhibition, which in turn leads to dilation of the arteries and a decrease in resistance. In addition, the aortic arch and the carotid body are supplied with the same tendon with nerve signals to another center located in the medulla oblongata. It is called the cardiac inhibitory center, which stimulates and sends a large number of signals through the vagus nerve, thus reducing cardiac pumping (Goldstein, 2002). From the same table we note that the results that appeared for the experimental group were significant differences in these tests and for the carotid artery variable and the percentage of blood flowing in the carotid artery. The reason is attributed to the practice of competitive exercises Which was combined with various intensity exercises, which led to an effective effect in raising the level of this variable. This is because the period used (relatively long) and continuously increased the effectiveness of this effect, in addition to the fact that the main lines of these exercises followed by members of this group caused an increase in nervous responses. It affected the measured

physiological variables, which are the blood volume in the carotid artery and the diameter of the carotid artery The gradual progression in the time of performing these exercises, as well as the kinetic nature of these exercises, has accelerated the adaptation process, which helped reduce the peripheral vascular resistance through the expansion of the arteries in the body, the proportion of the number and size of working muscles, and the relatively fast rhythms of these exercises, the results of which showed during the training period followed, which is (8) weeks. Also, practicing aerobic exercises of varying intensity and timing should not be less than (3) Units per week help raise heart efficiency, functional variables, and blood measurements within a few weeks of practicing these exercises.

In addition, the expansion of blood volume in the carotid artery reflects the amount of resistance to which the blood is exposed or the amount of dilation in the artery, so an increase means an increase in blood flow, which is a positive condition for players. Tennis during physical effort. It is also of great importance from a medical standpoint because it represents the actual blood volume inside the heart and is considered more stable (Gordon, 1990). As for the significant results that appeared for the (experimental) group, this is due to the state of stability that accompanies training during the weeks due to the fact that the period required to perform these exercises is (of different intensity). Which depends on fast rhythms and different conditions sufficient to affect this variable, as these exercises have caused the expansion of blood vessels by stimulating the receptors of the nervous system (Franklin, 2000). Abu Al-Ela Ahmed Abdel Fattah, 1982 also added that "regular training leads to functional changes in the human body's systems, including the heart and circulatory system. Well-trained individuals can Adapting to the functional changes that occur in the body's systems as a result of muscular effort and continuing with this effort, and one of these changes is an increase in the heart rate.

Discussing the results of the pre- and post-tests among the experimental research group for tests of mental processes (focusing attention, shifting attention) The researcher attributes the presence of these significant differences in some mental processes in concentrating and shifting attention to the effect of exercise, stress, and intensity of training that require concentration, attention, shifting attention, and accuracy in performance, because tennis is a calm game and requires very high attention, and the style of sports training has a significant impact. Within competitions, the tennis player and the distractions he endures on the court.

The researcher believes that these results are logical, as this relationship promises to be a positive influence for the players representing the research sample.

This result reached by the researcher is consistent with what was pointed out by (Kamal Bakdash and Ralph Rizkallah 1981) "In any motor activity, movement represents one of the ways the body adapts to its external surroundings, which in turn depends on the activity of the muscles whose work the nervous system regulates. . " It also agrees with what was stated by Jamil Saliba, 1977: "This process often requires effort and will, and it is the highest degree of attention that regulates the effectiveness of the soul." The researcher attributes the development in the tests (diverting attention and focusing attention) for the experimental group to the fact that diverting attention while performing tennis skills is not an easy process, but continuous training on it requires It gives positive results, and (Mohamed Sobhi

Hassanein and Hamdy Abdel Moneim, 1988) confirmed, "Attention is an important and decisive variable in the match. Concentrating at appropriate rates and quickly shifting attention to the different parts of the field in accordance with the requirements of performance in the match are two important indicators for the player who has an ambition to reach the highest levels (Mohamed Sobhi Hassanein, 1988)." The researcher believes that reaching this stage must be preceded by the player's complete feeling of being directed toward the goal, that is, the work becomes automatic. This happens as a result of continuous training, which gives the central system in the brain the opportunity to focus on the goal after the player has reached automaticity in the game of tennis This was confirmed by (Yarub Khayoun, 2002) "Excessive repetition of any action will reduce the need for attention and concentration, as well as lead to faster withdrawal of information from memory, so the player is given tactics and a way of thinking while playing" (Yarub Khayoun, 2002) This is what actually happened with the experimental group, as the game requires the player's ability to shift his attention to several variables during practice, such as his sense of the opponent's movement, his defensive movements, the distance between the net, his movements to prepare for defense or serving, or performing forehand and backhand shots, depending on the performance in which the player is. The superiority of the players of the experimental group in the game of tennis in focusing attention is consistent with what the definition of concentration of attention indicates, which is that it is directing psychological activity towards one thing or one activity only. The greater the number of passes between the player and the opponent and the continuation of successive blows between them, the greater the concentration of attention.

Discussing the results of the pre- and post-tests among the experimental research group for basic skills tests in tennis (serving accuracy test in tennis, forehand and backhand accuracy test in tennis).It is noted from Table (3) that all calculated T values were significantly significant at the significance level (0.05). This means the advantage of the arithmetic means for the post-tests for all performance and accuracy of the serve and the forehand and backhand for the experimental group, and this indicates that there has been an effective development of these variables for the members of the experimental group as a result of their exposure to the training curriculum prepared by the researcher, which is competition exercises. This means that the level of development of basic skills in the game of tennis was faster and better in the experimental group that used the training program prepared by the researcher, unlike the control group, which improved the level of oxygen in the blood. This means that the exercises carried out on members of this group achieved their goal in developing the level of tennis players.The researcher attributes the development in (testing the serve in tennis) for the benefit of the experimental group, and the reason for the development is the training curriculum prepared by the researcher in the training process of competition exercises that affects the development and improvement of skill performance for the experimental group, which was more effective in developing the basic skills of tennis players, as the improvement in testing the accuracy of forehand and backhand performance in tennis is a result of the use and focus of the exercises. There are two important aspects: exercises to develop the movements of the feet, arms, etc. when performing forehand and backhand strikes. The second aspect was exercises that focus on developing the accuracy of

directing the ball to areas that are difficult for the opponent by numbering the areas of directing the ball, or performing repetitions of hitting the ball to specific colors by the coach, or performing harmonious movements through the exercises of the training figure, and then performing forehand and backhand strikes in Tennis, and this was reflected positively in developing the accuracy of performing the forehand strike, which is one of the most important basic skills of the game, and this was confirmed by (Ali Salloum Jawad 2002): "The forehand is one of the basic, familiar, and widespread strokes in the game of tennis, and it is also characterized by the ease of its performance compared to other strokes, as the researcher confirmed during the exercises that focused on raising the level of skill performance and taking the form of exercises in. (Sarih Abdel Karim, 2010) points out, "By repeating the exercises, the kinesthetic feeling will develop and create a complex internal sensory-visual map of the surroundings in the player's mind, reaching the stage of mechanism and moving according to the sensory map stored in the brain. In light of the above, we find that the front and back ground strikes are the focus of play, so the exchange of strikes between players during play." The greatest part of it is done through these two strikes, and the researcher focused in the competitive exercises on developing the aspects that serve the skill performance and the motor paths of these two skills and the serving skill, especially the harmonic and physical abilities between the arm, eyes, feet and eyes, which have proven effective in developing aspects of accuracy in skill performance with regard to the front and back strikes and the serve.

CONCLUSIONS

1 -There are some positive changes in the diameter of the carotid scapula and the amount of blood flow as a result of practicing sports activity.

2- There is a correlation between the diameter of the carotid artery and the amount of blood flowing through it, with some mental processes and the accuracy of skill performance with a tennis ball.

3- There is a correlation between the diameter of the carotid artery and the amount of blood flowing through it with some mental operations and the accuracy of skill performance with a tennis ball.

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