The effectiveness of the cognitive technique on the levels of the enzyme (acetylcholine) and (lactic acid) and the accuracy of performing offensive skills in volleyball

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Abstract

The importance of the research was to study the effectiveness of the cognitive technique and its relationship to the level of the enzyme acetylcholine and lactic acid and the most important offensive skills in volleyball for players, as the problem of the research is that the volleyball court is characterized by a relatively small size, and this necessitates the player to possess special qualities to perform the motor duty, therefore he made a decision. To get the greatest outcomes, the researchers looked into how the enzyme acetylcholine affected the efficacy of the cognitive approach, lactic acid, and offensive skills. The study's goals were to measure volleyball players' levels of cognitive technique efficacy, acetylcholinesterase enzyme activity, lactic acid production, and offensive skill levels. The researchers used the descriptive approach in the form of a survey and correlational studies on young Middle Euphrates volleyball club players competing in the premier league for the 2022-2023 athletic season to identify the correlation between the level of effectiveness of cognitive technology and the enzyme acetylcholinesterase and lactic acid for volleyball players. After excluding the players who hold the positions of prepared player and free player, the research sample, which consisted of 20 players from the Kufa Sports Club in the Al-Najaf Governorate and the Al-Daghara Sports Club in the Diwaniyah Governorate, was chosen at random. The tests that were used by the researchers included first determining the usefulness of cognitive technology, then determining the levels of lactic acid and the enzyme acetylcholine. Third: Evaluation of volleyball attacking performance. The researchers came to the conclusion that the psychological influence on the players raised the level of efficacy of their cognitive skill. Lactic acid content in the muscle causes the enzyme acetylcholinesterase to function less efficiently, which causes instructions to be sent more slowly. Increasing the amount of lactic acid in the muscles as a result of cognitive technology's greater efficacy. It was advised that volleyball coaches use the study's findings to understand the psychological and physical effects of their athletes. Due to its significance in reflecting on the physical and physiological aspect and consequently on performance, it is important to pay attention to the general psychological preparation of the players during the training process, along with the physical, skill, and tactical preparation.

Keywords: Cognitive technology, acetylcholinesterase enzyme, lactic acid, offensive skills, volleyball

1. Introduction

Cognitive technology is one of the most important factors that affect the level of a player’s performance because it is considered variable in its form and content and is at a fixed level, but it is high at times and low at other times due to various factors. Lactic acid is considered one of the factors that negatively affects muscle function. Acetylcholine is a chemical molecule present in synaptic vesicles that transports nerve impulses from the presynaptic cell to the sensitive sensors on the postsynaptic cell. Acetylcholine levels can rise, which has a detrimental effect on muscular performance. One of the kinds of neurotransmitters that are produced at the chemical synapse is this molecule. The liver cells that release the enzyme acetylcholinesterase also express it in as one unit of effectiveness (U) is defined as the quantity of enzyme that, under ideal conditions, decomposes one micromole of the base material per minute, the effectiveness of enzymes is measured in units per litre (U/L). Acetylcholine can constrict the pupil, dilate blood vessels, and contract striated muscles, among other things.
The significance of the research is in examining how volleyball players’ lactic acid levels relate to cognitive technologies and the enzyme acetylcholinesterase.

1.1 Research Problem
The researchers investigated the impact of the enzyme acetylcholine as well as the efficacy of cognitive technology and lactic acid to achieve the best results in the accuracy of performing offensive skills in volleyball. The problem with the research was that the game of volleyball is one of the games with a relatively small area, requiring the player to possess positive qualities.

1.2 Research objective
1. Determine the degree to which cognitive technology, acetylcholinesterase, and lactic acid levels are useful in volleyball players.
2. Determining how accurate the players are with their offensive abilities (serving, spiking, blocking) junior volleyball
3. Determining the relationship between young volleyball players’ intake of lactic acid and the enzyme acetylcholine esterase as well as the efficiency of cognitive technologies.
4. To determine the relationship between the degree of cognitive technology’s usefulness and the precision with which young volleyball players conduct offensive skills (serving, spiking, and blocking).

1.3 Research hypotheses
1. According to the study, there is a connection between cognitive technology, the acetylcholinesterase enzyme, and the lactic acid concentration in volleyball players.
2. The researcher makes the supposition that there is a relationship between cognitive method and the precision of performing offensive abilities (for volleyball players, serving, spiking, and blocking).

2. Field research procedures
To best suit the nature of the issue, the researchers employed the descriptive technique using surveys and correlational investigations. The players of the youth volleyball teams in the Middle Euphrates area were from Kufa, Al-Mishkhab, Al-Qasim, Al-Hashimiyyah, Al-Rawdhatain, Al-Hindiyya, Al-Daghera, and Al-Rumaitha, according to the study community. The research sample included athletes from Kufa’s Al-Daghera Sports Club. For the 2022–2023 season, there will be (20) volleyball players. A simple random approach was used to choose the research sample, which consists of (20) players.

2.1 Tests used in the research
2.1.2 First: Cognitive technology
In the psychology lab of Al-Qadisiyah University’s College of Physical Education and Sports Sciences, the researchers conducted an assessment of cognitive technology using the following stations:
1. Preparing for the session: Once you run the CogniPlus program, an easy menu will appear in front of you, which is based on an alphabetical file arrangement system. A folder is allocated for each user, where he can enter his personal data, choose the required testing method, view the results of the sessions, and comments and notes can be added there. It includes the following stages:
2. Primary stage: Every training begins with a starting phase. Easy-to-word texts appear to explain to the user what he must do, for example, the phrases wait, start, use the right foot pedal, etc., all of which are instructions that appear on the main screen of the device so that the subject can understand them and respond to them before starting to carry out the test.
3. The exercise stage: Each elementary stage is followed by a practice phase. If the user's feedback shows that he did not understand the purpose of the exercise, the system will show him the instructions again. The user does not enter the training phase until the system has verified that he understands the questions asked.
4. The training stage: It is possible to train using the “CogniPlus” program at all levels of difficulty and ability, and when a new user begins the training stage, the program recognizes his level of ability within a short time and classifies him correctly. If the user has gone a step or two in training, the session will begin at the point where it stopped. In order to avoid over- or under-classification of the user, all phases of the training sessions are designed identically, that is, they continuously match the level of the user’s capabilities. This happens, on the one hand, in the levels of difficulty of the program, which vary in the degree of complexity of its stimuli, and on the other hand, it happens in the period of time in which the user must respond.
5. Results evaluation stage (final stage): CogniPlus cognitive technology contains two types of evaluation of results: frequency tables and graphs. Each training stage ends with an easy-to-understand review of all the training paths in the previous stages. After the session ends, the laboratory can view the detailed results of the individual tracks of one of the sessions. These results contain, for example, the average reaction times and the number of correct, delayed, incorrect, and left out reactions at each degree of difficulty of the questions. In addition, each reaction performed during training is described in the form of a graphic curve, in terms of the degree of difficulty, reaction time, and evaluation (correct, delayed, etc.). He can also compare the results of the last session with those of the previous session.

2.1.2 Second: Biochemical variables
1. How to measure lactic acid concentration: A gadget (the Lactic Prom Metre), whose image is seen below, was used to measure the amount of lactic acid in the blood. One of the athlete’s fingers is coated with sterile alcohol before being punctured with a specific needle. Instead of drawing blood with the first drop, we draw blood with the second drop and apply it to the strip test. Direct reading is carried out. From the device directly after 60 seconds.
2. Measuring the concentration of the enzyme acetylcholinesterase: Members of the study sample gave permission for the collection of (5) cm3 of venous blood, which was then put in test tubes and stored at -20°C until it was needed. The phases of analysis were carried out by the analyst after the blood was drawn and transported to a lab for evaluation. The worksheet that accompanied the details on the enzyme acetylcholinesterase said that.

2.1.3 Third: Skill variables
2.1.3.1 Testing the accuracy of performing the smash service skill
2.1.3.2 Test name: Accuracy of the smash service.
2.1.3.3 The test's objective was: To evaluate the smash service's accuracy.

2.1.3.4 Tools used
Legal volleyball court, zoning tape, measuring tape, 10 balls.

2.1.3.5 Performance specifications
The tester performs the serve by directing the ball towards areas (A - B - C - D). The total score for the test is (12) points.

2.1.3.6 Registration conditions

2.2 Diagonal spiking accuracy test
(Hassanein, Muhammad Sobhi & Moneim, Hamdi Abdeln, 1997, p. 206)\(^1\):

2.2.1 Purpose of the test
To measure the Diagonal spiking accuracy.

2.2.2 Tools
3 volleyballs, a volleyball court, and two training mats, one of which is placed in the corner of the court so that its inner corners are 5 cm from the side and end line.

2.2.3 Performance specifications
The player performs a smash hit from position 4, so that the coach passes from position 3 using the long diagonal pass. The performer must perform 15 attempts with a smash hit on the back row, then 15 attempts for the basic position. The performer is credited with the correct attempts in 30 attempts. As for the dimensions of the mattress, they are in length. It is 1.5 and 1 m wide at its edge, and is 5 cm away from the side line. The dimensions of the back striped area are 1.5 m long and 1 m wide, and the front striped area is 2 m long or wide.

2.2.4 Register
- 4 points for every successful smash in which the ball lands on the bed.
- 3 points for every successful smash in which the ball lands in the designated location.
- Two points for every successful smash in which the ball falls in either region A or B.
- 1 point for each successful smash where the ball falls in zone C.
- No points outside of these boundaries
2.2.5 Testing the accuracy of the individual blocking from center (2)
2.2.6 The test’s objective was to assess each participant’s ability to block accurately from centre (2)

Tools used
A volleyball court divided as shown in the figure, a tape to mark the areas, a measuring tape, and 10 volleyballs.

2.2.7 Performance specifications
The coach performs a smash hit. The tester stands at a distance of 25 cm from the net and blocks from position (2). Note that the total score for the test is (12) points

2.2.8 Registration conditions
2.2.9 The laboratory has three attempts
1. Points are awarded for each attempt within of area (A).
2. Attempts within of area (B) earn points.
3. Each attempt within of area (C) earns one point.
4. One point for each attempt made within of zone (D).

When the ball exits these regions, the result is (Zero). When the ball crosses a line that divides two zones, the higher zone's score is determined, and the attempt is void if a legitimate foul is made.

2.3 Main experience
In collaboration with the Diwaniyah Governorate Volleyball Sub-Federation and under the direction of the Central Iraqi Volleyball Federation, the researchers organized a match between the two teams from the Kufa Sports Club in the Najaf Governorate and the Al-Daghara Sports Club in the Diwaniyah Governorate. On February 17, 2023, the two teams were invited to the sports psychology laboratory where researchers were evaluating the impact of cognitive technology on participants in the main study. Blood was drawn in the locked gym at the College of Physical Education and Sports Sciences at Al-Qadisiyah University. It was then taken to the lab for analysis, where levels of functional variables, acetylcholinesterase, and lactic acid concentration were extracted and measured. This was done before the warm-up was performed, followed by the holding of friendly matches between the two teams, and the processing of the results.

2.4 Statistical methods
The statistical package for the social sciences (SPSS) was used.

3. Results and Discussion
This section included presenting the results of descriptive statistics between the effectiveness of the cognitive technique and between lactic acid and the enzyme acetylcholinesterase, as well as offensive skills in volleyball, as the results showed a significant correlation between the effectiveness of the cognitive technique and both lactic acid and the enzyme acetylcholinesterase, and Table (1) shows that:

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Lactic acid</th>
<th>Acetylcholinesterase</th>
<th>Service</th>
<th>Spiking</th>
<th>Blocking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive technology</td>
<td>44.54</td>
<td>6.21</td>
<td>1</td>
<td>0.65-</td>
<td>0.59-</td>
<td>0.751</td>
<td>0.798</td>
</tr>
<tr>
<td>Lactic acid</td>
<td>2.47</td>
<td>0.13</td>
<td>1</td>
<td>0.78</td>
<td>0.652</td>
<td>0.478</td>
<td>-0.584</td>
</tr>
<tr>
<td>Acetylcholinesterase</td>
<td>313.62</td>
<td>43.95</td>
<td>1</td>
<td>0.588</td>
<td>0.476</td>
<td>-0.654</td>
<td></td>
</tr>
<tr>
<td>Service</td>
<td>8.36</td>
<td>2.36</td>
<td>1</td>
<td>0.898</td>
<td>0.784</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Spiking</td>
<td>53.96</td>
<td>1.24</td>
<td>1</td>
<td>0.742</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blocking</td>
<td>7.94</td>
<td>1.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Discussion
The nerve signal and the termination of muscular contraction are brought about by the enzyme acetylcholinesterase, which is present at the terminals of nerve cells. Cysts are transferred when the calcium ion enters through channels known as calcium channels when the nerve impulse reaches the end of the axon (neuron). A neurotransmitter known as pastylcholine is secreted from the synapse towards the cell membrane. For the purpose of binding to its receptors, this substance enters the synaptic cleft. As a result, sodium channels are opened, allowing sodium to enter the neighbouring cell and spark a nerve impulse. The research sample's participants had high levels of the enzyme acetylcholinesterase, which is released by liver cells, according to the data, and this appears to be a result of cognitive technology's high degree of efficiency. It resulted in more focus and energy use, which impacted the...
degree of for lactic acid, the enzyme is described as "lactic acid is the final form of anaerobic glycogen consumption (without oxygen), but this percentage increases when performing high-intensity sports activities, or it is the final product of the glucose decomposition process without O2" (Salama, Bahaa El-Din Ibrahim, 1990, p. 107) [2]. Despite not exerting any physical effort, several physiological sources claim that a small amount of lactic acid is present in the blood during rest. The fixed percentage for this % was determined by many sources. It was also acknowledged that during physical effort, this proportion rises over what it was at rest. As lactic acid builds up in the muscles and causes exhaustion, the proportion of lactic acid increases dramatically with physical exertion, especially high intensity. Then, after some time, it disappears. This is because heightened attention causes more energy to be used up from mental strain. The results support Ukla Suleiman's theory that the effectiveness of cognitive technology has a significant impact on functional indicators. The researchers attribute the high rate of acetylcholinesterase to the participants in the research sample as a result of tension, intense emotion, and the increased concentration of attention to which the players were exposed. This increased rate of Impulse was in turn caused by this increase in concentration of attention. According to Suleiman, Ukla, and Abboud (2009) [3], p. 170, "Emotions are characterised by their association with organic changes and physiological manifestations, and these changes are typically different from one emotion to another. However, they are frequently represented by changes in blood circulation, breathing patterns, and heart rate. Joy, pleasure, fear, worry, and tension are all emotional states that the player goes through when competing, especially when this competition is serious and has tremendous relevance for the players. This is because the psychological state is vital to the degree of players' performance. Marwan Abdel Majeed and Muhammad Jassim Al-Yasiri acknowledged that a person's psychological condition has an impact on their degree of performance as players. (Abdel Majeed, Marwan, and Al-Yasiri, Muhammad Jassim, 2003, p. 65) [4] Heart rate, particularly in conditions of rage, excitement, worry, and terror. The researchers believe that the correct behavior at the right time helps the player scan the entire field in order to take the correct decision-making behavior, taking into account the accuracy of performance as it is the influential factor in building the attack, and this is reflected in the level of development of the players, as the tests used in the research are a means of measuring and examining. Diagnosis is made through the system of devices used. In addition to the great and very important impact, the researcher uses these modern scientific techniques and methods, which give a high degree of accuracy and objectivity, which reflects positively on the work of the players. Whereas, the higher the players possess a high level of cognitive technology, the more accurate their performance in offensive skills will be to a high degree. “When practicing any type of motor activity, the player is in certain places determined by certain distances that require motor performance commensurate with the place the player is in and the player’s correct awareness.” For the place present while practicing motor activity and the relationship of this place to different distances, the player is able to accurately determine the motor skills, methods and methods appropriate to the different distances of the things surrounding him” (Abdel Moneim, Osama, 2006, p. 40) [5]. As well as the perception of the feeling of the ball, as the ideal perception is based on the accuracy of controlling the ball, and perception helps the player to match his movements with the ball and its characteristics, and this is linked to the accuracy of the awareness of the weight of the ball, its shape, the strength of the strike, and the height of his pass.

5. Conclusions and recommendations

5.1 Conclusions

1. An improvement in the players' ability to use cognitive technology due to the psychological factor's influence.
2. The accumulation of lactic acid in the muscle causes the enzyme acetylcholinesterase to function less efficiently, which slows down the enzyme's work and the delivery of instructions.
3. Increasing the amount of lactic acid in the muscles as a result of enhanced cognitive technological efficacy.
4. Cognitive technology has a direct impact on the precision of attacking talents.

5.2 Recommendations

1. Utilising the study findings by volleyball instructors and coaches to better understand the psychological and physiological consequences of volleyball players.
2. Focusing on the players' overall psychological preparation during the training process in addition to their physical, skill, and tactical preparation due to the significance of this preparation in terms of how it will affect their physical and physiological state and, ultimately, their performance.
3. Working to create a department of sports medicine at the colleges of physical education and sports sciences and offering all specialised equipment to make the process of conducting research and studies easier.
4. Conducting research and related studies to codify and establish benchmarks for the degrees of the usefulness of cognitive technology on individual and group games

6. References

2. Salama, Bahaa El-Din Ibrahim. Chemistry in the Mathematical Field, Cairo, Dar Al-Fikr Al-Arabi; c1990.

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