The effect of qualitative exercises with an assistive device in developing the skill of flying strike for tennis players

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Abstract

The use of various exercises and the involvement of sports equipment and tools in raising the capabilities and vital motor capabilities had a positive and economic impact in improving the athlete's efficiency to reach higher levels related to learning and training, as it diagnoses and compares movements because it depends on accurate measurement to show the technical details of performance in its correct form, through the experience of researchers being Tennis specialists, as well as following many official matches inside and outside Iraq, note that there is an apparent slowdown in reaching the ball in time in the skill of the shot, which leads to losing many points and thus losing the match. The researcher believes that the reason for this is that the majority of coaches do not use innovative modern equipment during their training for that skill, in addition to the lack of sufficient focus on developing the flying strike skill, which makes the player play in the backline and not climb into the net to avoid losing the point, allowing the player to the opponent returns the ball without any difficulty. The research objectives were to prepare qualitative exercises with a device designed to develop flying strikes and identify the effect of qualitative exercises with a device designed to develop the flying strike in tennis.

Conclusions: The researchers concluded that there is an effect of the exercises accompanying the proposed device in developing the flying stroke of tennis players.

Introduction:

The use of various exercises and the involvement of sports equipment and tools in raising the capabilities and bio-kinetic capabilities had a positive and economic impact on improving the athlete's efficiency to reach higher levels. It is related to learning and training as it diagnoses and compares
movements because it adopts accurate measurement to show the technical details of performance in its proper form. \(^{(1)}\)

By observing many official matches inside and outside Iraq, he noticed an apparent slowness in reaching the ball at the right time in the skill of volley, which leads to the loss of many points and thus the loss of the match. The researcher believes that the reason for this is that the majority of coaches do not use Innovative modern devices during their training for that skill, in addition to that, the lack of sufficient focus on the skill of flying strike to reach the ball at the right time, which makes the player play in the backline and not climb into the net to avoid losing the point, which allows the opposing player to return the ball without any difficulty. \(^{(2)}\) The research objectives were to prepare qualitative exercises with a device designed to develop the skill of flying strike and to identify the effect of qualitative exercises with a device designed in developing the skill of flying strike \(^{(3)}\).

**Practical part:**

The researchers used the experimental method on the advanced players for the tennis team of Najaf Governorate in a comprehensive way, and they are (5) players, and thus the percentage of the sample is (100%), and the researcher gave five attempts to each player and thus the research sample is a sample of attempts consisting of (25 An attempt for each sample, which will conduct the main experiment on them)

**Sample homogeneity:**

To ensure the homogeneity of the research sample members, and motivated by adjusting the variables that affect the accuracy of the research results, the researcher verified the homogeneity of the sample members through the variables related to physical and morphological measurements that represent (mass, length, torso length, thigh length, leg length, humerus length, forearm length, training age), the researcher used the torsion coefficient, as shown in Table (1):

| Table (1) |

The statistical parameters show the arithmetic mean, standard deviation, median and torsion coefficient for the variables (mass, length, torso length, thigh length, leg length, humerus length, forearm length, training age).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Unit of measure</th>
<th>mean</th>
<th>Standard deviation</th>
<th>Median</th>
<th>skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>kg</td>
<td>76.40</td>
<td>9.65</td>
<td>78</td>
<td>0.497</td>
</tr>
<tr>
<td>Height</td>
<td>cm</td>
<td>179.40</td>
<td>4.22</td>
<td>179</td>
<td>0.284</td>
</tr>
<tr>
<td>Stem length</td>
<td>cm</td>
<td>54.40</td>
<td>3.93</td>
<td>55</td>
<td>0.458-</td>
</tr>
<tr>
<td>-------------</td>
<td>-----</td>
<td>-------</td>
<td>------</td>
<td>------</td>
<td>--------</td>
</tr>
<tr>
<td>Thigh-length</td>
<td>cm</td>
<td>44.00</td>
<td>3.46</td>
<td>45</td>
<td>0.867-</td>
</tr>
<tr>
<td>Leg length</td>
<td>cm</td>
<td>45.20</td>
<td>1.72</td>
<td>45</td>
<td>0.348</td>
</tr>
<tr>
<td>Length of the humerus</td>
<td>cm</td>
<td>30.20</td>
<td>1.60</td>
<td>30</td>
<td>0.375</td>
</tr>
<tr>
<td>Length of the forearm</td>
<td>cm</td>
<td>28.80</td>
<td>1.17</td>
<td>29</td>
<td>0.512-</td>
</tr>
<tr>
<td>Training</td>
<td>year</td>
<td>6.20</td>
<td>0.75</td>
<td>6</td>
<td>0.8</td>
</tr>
</tbody>
</table>

* Because the results of the skew coefficient are all between (+1), the research sample members are homogeneous with the mentioned variables.

**Designing a device to develop the skill of flying strike and some biokinetic variables and skill of flying strike (volley):**

The design of the device relied mainly on the technical performance of the volley in all its primary stages because this strike is distinguished from all other strikes in that the process of hitting the ball takes place before it touches the ground, either with the front strike or the back blow, and it is also characterized as the fastest of all strikes. It takes less time than the rest of the other strikes when it is executed, and I took into account the angles and heights to hit the ball, as I took three heights for the blow, which are similar to the height of the ball paths coming from the opponent, in addition to the device being installed inside the stadium to give the player the same conditions that he is exposed to in the competition. as well as away from The laboratories to which most researchers resort, where this device has been programmed according to mathematical equations calculated scientifically in terms of intensity and repetition to develop the skill of the flying strike and some biokinetic variables and the skill of the volley strike, as shown in Figure (1).
Demonstrates a device for developing the skill of flying strike and some biokinetic variables and skill of flying strike (volley)

**device specifications:**

**First / the goal of designing the device:**

The goal of designing the device is to develop the skill of flying strike and some biokinetic variables and flying strike (volley).

**Second / device details:**

A- The electrical system: The electrical system includes a fibre-class box measuring (10 * 28) cm. The box contains the electrical system that regulates the work of the lamps alternately randomly in the right and left columns

This system consists of:-

1- A switch to operate the system and shut it off-on.

2- Electrical transformer: This transformer works by converting electrical current from 220 volts to 12 volts
3- Arduino device (1) mega: It is an electronic development board consisting of an open-source electronic circuit with a microcontroller programmed by a computer, and it is designed to facilitate the use of interactive electronics in multidisciplinary projects.

4- Circuit board relays: It consists of 8 relays and is controlled by a potential difference of 5 volts to operate the loads that operate with constant or alternating current. It can be used with Arduino or Raspberry Pi. The circuit also contains an LED lamp to indicate the operational status of the relay.

Specifications

- Number of relays: 8 relays
- Operating voltage difference: 5 volts (constant current)
- Operating current: 15-20 mA
- The maximum potential difference that the relay can withstand (alternating current): 250 volts - 10 amps
- The maximum potential difference that the relay can withstand (constant current): 30 volts - 10 amps

Operating instructions:

- Quick click to display the entry and exit voltage.
- Medium pressure to enter the mode of filtering and purifying the output voltage.
- Long press to enter the power saving mode for the display screen and LED lights.
- Using a small ordinary screwdriver, the output voltage can be increased or decreased as desired.

- Features of the completed device:

1. It does not require an enormous material cost.
2. Easy to carry and transfer from one place to another.
3. It can be placed in any outdoor playground.
4. It can be used in many sports.

E - How the device works:

1- The player stands in front of the device in a standby position.
2- When the device is turned on, the device will give an audible alarm signal (intermittent sound) descending to prepare and start the test.

3- At the start of the test, the visual stimuli (the previously explained lights) work randomly for one second for each of the six lights.

4- After that, the player moves quickly towards the ball adjacent to the incandescent lamp to hit it with the skill of the flying strike.

5- If the player hits the ball within the allotted time while the lamp flashes, it is considered a valid injury, a point is recorded for him, and another lamp is lit directly, chosen by the device at random.

6- If the trained player cannot hit the target within the necessary time, it is considered an incorrect injury and faults are recorded.

7- The total exercise time and the number of touches within the exercise can be controlled through the data entry panel (Keypad).

8- At the end of the test, the device emits a distinctive sound indicating the end of the test.

9- Correct and incorrect results are taken via the LCD screen.

• **The exploratory experience of the device used:**

The exploratory experiment is one of the essential steps in implementing scientific research, through which the researcher receives information and notes regarding criticism of research procedures. This experiment was conducted on (Saturday) corresponding to (4/1/2020) at two o'clock in the afternoon at the University of Kufa Stadium, and the sample of this experiment was formed from (6) players from the original research community sample who did not participate in the leading research experiment.

**First: the skill of flying strike.**

The objective of the test: measuring the flying strikes, Figure No. (2).
Figure No. (2) Shaffer and Tider test for flying strikes

Tools:

One racket per laboratory.
- Tennis Court.

Define work:

- From the baseline, the coach hits the ball himself to the lab.

The tested player who performs the flying blow stands approximately 3 meters from the net.
- The recorder notes and records the correct hits.

The assistant person collects the balls and returns them to the coach. He also assists the scorer in observation.

Method:

- At the baseline, the coach hits two balls for the laboratory practicing the forehand and backhand, which are not counted in the scoring.
- The lab gives 10 balls to hit forehand and backhand, and the balls are not given to him in a specific system, but there are 5 balls, including the front hitting side and the other 5 balls on the back hitting side.

**Measuring the skill of the tennis ball:**

**Pretest:**

The researchers measured the skill of tennis volley through the test used

**Implementation of specific exercises with an assistant designer device:**

The researchers prepared qualitative exercises with the help of a designed device, as these exercises will include the skill and physical aspects of the skill of the flying strike in the game of tennis. They will be consistently distributed in the training units, taking into account the components of the training load (intensity, repetitions, appropriate rest periods) and will be codified. Its exercises are based on a scientific basis, as well as the biokinetic ability of the research sample and the tools used, to be able to develop the skill of the flying strike, as well as to improve the biokinetic variables and to perform the tennis strike to achieve the purposes and objectives of the training process.

The details of specific exercises with an assistive device will be as follows:

1- The total number of training units The exercises will include (24) units.

2- The number of weekly training units that will include (3) units for (8) weeks.

3- The specific exercises in one training unit (30-35) minutes (the main section only).

4- Training days during the week will be (Saturday, Monday, Wednesday).

5- The goal of specific exercises with an assistive device is to develop the skill of flying strikes.

6- The goal of specific exercises with an assistive device is to improve biokinetic variables.

7- The goal of qualitative exercises with an assistive device is to develop the skill of the front and backplane strike.

8- Taking into account the exchange of work between muscle groups.

9- Planning formations of specific exercises with an auxiliary device during the daily and weekly units are (2-1).

**Post-tests:**
The post-tests were conducted, and the same conditions, conditions and instructions that were used in the tribal tests were taken into account.

**The statistical methods:**

The researcher uses the statistical package (spss) to analyze the results of the research:

**Results:**

Presentation and analysis of the results of the pre and post-tests for the variables under study and discussion:

**Presentation and analysis of the results of the tribal and post-tests: The test of the flying skill of tennis players:**

Table (2)

It shows the arithmetic mean, standard deviation, the calculated (t) value and the significance level for testing the skill of the flying strike for the tribal and remote tennis players.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre-test</th>
<th>Post test</th>
<th>(t) calculate</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>STD.EV</td>
<td>Mean</td>
<td>STD.EV</td>
</tr>
<tr>
<td>Forehand Flying</td>
<td>14.4</td>
<td>0.332</td>
<td>17.6</td>
<td>1.467</td>
</tr>
<tr>
<td>Skill</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back Flying</td>
<td>16.4</td>
<td>1.49</td>
<td>19</td>
<td>0.89</td>
</tr>
<tr>
<td>Skill</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table (2) of the description and statistical inference shows the results of the flying strike skill test in the pre and post-tests. The values of their arithmetic mean in the forehand stroke tribal test was (14.4), with a standard deviation of (0.332). In contrast, their arithmetic means came in the post-test (17.6), with a standard deviation of (1.467), and to know the differences between the tribal and remote tests of the experimental group; the researcher used the (T. test) test for the correlated samples.

The calculated values of this test came (4), and the (SIG) value was (0.016), which is a value less than (0.05), and this confirms the significance of the differences and in favour of the post-test results.

As for the values of its arithmetic means in the tribal test of backhand (16.4), with a standard deviation (1.49), while its arithmetic means came in the post-test (19), and with a standard deviation of (0.89), and to know the differences between the tribal and remote tests of the experimental group, the researcher used the (T) test for the correlated samples, the calculated values of this test were (4) and
(3.474), and the (SIG) value was less than (0.05), which confirms the significance of the differences and is in favour of the results of the post-test.

Discussing the results of the tribal and remote tests, the test of the flying skill of tennis players:

It is clear from the results of Table (2) to clarify the development in the skill level of performance of the flying strike. We note that these results have achieved their goal in knowing the effect of specific exercises with an auxiliary device that the researcher used in developing the speed of the motor response of the skill and the development of the skill’s performance of the blow. As there were apparent differences in the development of the flying strike skill in the post-test, the researcher attributes this to the fact that the qualitative exercises with an assistant device that were practised in the post-test gave him an excellent opportunity to develop the speed of the motor response due to the specificity and accuracy of these exercises in determining the motor paths of the skill and access to the corners and focus on them during the implementation of the exercises and interaction with the training situations and through correcting and mastering those variables. This focus has increased the players' mastery of those angles and access to optimal performance by integrating qualitative exercises with the designed device used as a training method in most of the exercises.

And (Linda 1997) confirms that (if you are struggling towards moving in teaching your players skills to teach them how to use those skills in playing during competition through different qualitative exercises using various educational means, you will increase the players' experience and excitement in playing before practising specific skills, and these The idea develops the play scene as a whole for the learner to solve tactical tasks to get closer to mastering the skills)

This was confirmed by (Qasim 2005) "As the devices and auxiliary tools help to simplify the skills as well as help the transfer of knowledge, information and various skills and raise the ability to learn and develop skills faster, so it has a positive impact on the speed of learning of motor skills and improves the performance of technique and tactics

This was confirmed by (Arnold 1981) that what is required of the learner is to apply various forms to implement the skill in different situations... and to practice performing the skill in situations similar to or close to actual cases of play during competition as much as possible and interspersed with giving instructions and exercises directed to the performance and mastery of the skill and included Explanation, Presentation and feedback (9).

A group of experts and trainers from the Tennis Federation in the United States of America stressed that (within the planning for developing the performance of skills is the urgent need for several types of training and various educational methods for the skill) (10).
Conclusions:

The researchers concluded that there is an effect of the exercises accompanying the proposed device in developing the skill of the flying strike for tennis players, and that the proposed device helps in the process of measuring the speed of the motor response and helps in training to develop the skill of the flying strike.

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