The Effect of Coordination Exercises between Eye and Hand on Coordination, Passing, Dribbling, Blood pressure, and Intraocular Pressure of Handball Players

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ABSTRACT

This study aims at preparing exercises of coordination between eye and hand to identify the effect of these exercises on coordination, passing, dribbling, blood pressure, and intraocular pressure of handball players. Purposive sampling is the method used by the researchers to determine the study sample that consists of (17) players of the elite team of Al-Daghara club in the province of Al-Diwaniyah for the sports season (2017-2018). Their heights are (179+5.197cm), weights are (82+5.763 kg), and ages (23+3.924 years). On the first day of the pretest, blood pressure is tested as well as the digital mobile intraocular pressure with the Tono-pen. Then, the players exercise warming and test the ability to shoot the ball on the wall through jumping. After that, another test of blood pressure and intraocular pressure is done. On the second day, the exercise of coordination is done by shooting the ball on the wall and dribbling. The prepared exercises of coordination between eye and hand are practiced for (10 weeks). These exercises are done with the interval training method. After analyzing the data, the researchers present and discuss the results by using statistic means which are appropriate for the study.

The study concludes that the exercises of coordination between eye and hand reduce blood pressure and intraocular pressure of handball players what improves performance and maintain good coordination, passing, and dribbling.

Keywords: coordination, passing, dribbling, blood pressure, intraocular pressure, and handball, sports medicine

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INTRODUCTION

The science of sports training is concerning to physiology closely, which represent the right and fundamental and effective base of great significance for the development of the sport level if it is built up on a sound and scientific basis that concomitant with the individual's vital organs, and abilities to realize the training objectives[1].

Handball became one of the most beautiful and exciting sports that cannot be easily settled until its last seconds. This, without a doubt, depends on the exercises and training that the coach uses to win the match. Because many players can be affected by the pressure and high physical effort during the match which in turn affects the tempo and the accuracy of attacking skills. Thus the player may lose the ball more than once what affects the final result of the match. Therefore, the researchers find out that it is crucial to develop coordination, passing, and dribbling which is considered as the key to success. This type of development can be achieved, for instance, by practicing
special training such as exercises of coordination between eye and hand to improve blood pressure and intraocular pressure. A lot of studies published about the effect of exercise on intraocular pressure but our research focuses on handball and its effect on intraocular pressure.

Moreover, less severe exercises generate a change in blood pressure. In other words, the researchers noticed that there is a reduction in the systolic and diastolic blood pressure of the players trained during the rest[2]. Intense exercise could produce a longer period of SBP reduction. Less intense exercise could decrease DBP for a rather shorter period[3]. Sport exercising, without doubt, reduces the intraocular pressure of players and maintains coordination, passing, and dribbling until the end of the match. Intraocular pressure is the pressure of the fluid inside the eyeball that can be identified through the difference between production and absorption of fluid that works on feeding the interior layers of the eye and recycling waste. It has also an important role in the refraction of light and in the process of [4]. Studies reveal that reduction in IOP occurs following a range of exercise varies from walking to exhausting exercise [5].

Accordingly, in order to develop the players attacking skills, the researchers confirm that the exercises of coordination between eye and hand can participate in developing a high level of coordination, passing and dribbling as well as to identify what is the effect that the improvement of blood pressure and intraocular pressure may have on performing these skills during the match or exercises. The player who has good coordination will undoubtedly be able to perform these skills accurately in addition to his ability in achieving quick and sudden exercises [6]. The importance of this study lies in preparing the exercises of coordination between eye and hand to identify their effect on the coordination, passing, dribbling, blood pressure, and intraocular pressure of handball players.

The study problem manifests in the players' low level of performing coordination, passing, and dribbling particularly at the end of the first half or during the second half by committing some mistakes that may affect the final result of the match. Is it because of do not giving enough time to the exercises of coordination between eye and hand to train ball passing and dribbling? This will undoubtedly affect the players' blood pressure and intraocular pressure what, in turn, affects their performance during the match. Therefore, the researchers propose to prepare the exercises of coordination between eye and hand to investigate their effects on coordination, passing, dribbling, blood pressure, and intraocular pressure of handball players.

Accordingly, the study aims at preparing exercises of coordination between eye and hand to identify their effect on coordination, passing, dribbling, blood pressure and intraocular pressure of handball players.

**MATERIAL AND METHODS**

**Participants**

The study sample is determined by the researchers purposively; it consists of the elite team of Al-Daghara Sports Club in the province of Al-Qadisiyah for the sports season (2017-2018). The total number is (20) players, but after excluding goalkeepers, they are only (17) players; their heights are (179±5.197 cm), weights are (82±5.763 kg), and ages (23±3.924 years).

**Design**

To investigate the study problem and to meet its goals, the researchers apply the experimental methodology as they find it appropriate for the purpose of the study. The experience protocols were approved by the Ethical

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Committee of College of Medicine University of al-Qadisiyah. In addition, informed approval was obtained from all study participants prior to sample gathering.

Tools

Handball field, handballs (20), tennis balls (40), cones (12), tape measure (50m), Sphygmomanometer, tonometer Tono-pen, eye drops tetracaine, tape, and timer.

Tests and measurements used in the study

1. Test of the ball passing on the wall (20 tennis ball) [7].
   - The goal of the test: to measure coordination between eyes, arms, and ball

2. Test of the ball passing on the wall through jumping, during (25 sec) for a distance of (4m).
   - The goal of the test: to measure the speed of passing through jumping-coordination.

3. Test of straight dribbling for (22m) [8].
   - The goal of the test: to measure the dribbling speed.

Procedures

Pretest

On Thursday, Aug 10, 2017, at 4:00 pm. in the sports hall of the city of Al-Diwaniyah, blood pressure and eye digital mobile pressure Tono-pen are tested. The eye digital mobile pressure is a painless and easy test; i.e. while sitting on the chair, the player will be given anesthetic eye drops (tetracaine). Then the player is asked to look straight for a short period of time before testing the intraocular pressure of the two eyes by the tonometer (Touch). Then, the player practices warm-up and test passing on the wall through jumping. The final step of the test includes measuring blood pressure and intraocular pressure with the same said above procedures.

On the following day, Friday, Aug 11, 2017, at 4:00 pm in the sports hall of the city of Al-Diwaniyah, the coordination test is done: shooting balls on the wall and handball dribbling tests with enough time to rest between the two tests.

Exercises of coordination between eye and hand

The researchers determine the intensity to be (60:80%), performance length (20:40 sec), repetitions (3:6), rest between repetitions (120:130 BPM), tempo (2/1), duration (10 weeks), units (3 units/week), ball exercises and interval training method.

Posttest: Posttest is done on (Friday-Saturday) Oct 1-2, 2017 with taking into consideration the same conditions as the pretest.

Statistical analysis

The researchers use the statistic bag SPSS to find out the results of Paired-Samples T-Test.

RESULTS

Table (1)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Test</th>
<th>Mean</th>
<th>SD</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination (passing balls on the wall) (Number)</td>
<td>Pretest</td>
<td>8.82</td>
<td>0.88</td>
<td>29.33</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>14.00</td>
<td>0.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passing on the wall through jumping (Number)</td>
<td>Pretest</td>
<td>6.94</td>
<td>0.90</td>
<td>34.99</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>12.94</td>
<td>0.66</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table (1) shows the means, standard deviations, and T value of the study tests. The T value of the coordination test is (29.33) and the T value of passing the test is (34.99) while the T value of the dribbling test is (14.30). Further, the significance level is (p<0.05); that's the difference between the two tests is significant and tipped in favor of the posttest of the study sample.

Table (2)
Results of blood pressure and intraocular pressure for pretest and posttest

<table>
<thead>
<tr>
<th>Variables</th>
<th>Measurement</th>
<th>Mean</th>
<th>SD</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic blood pressure mmHg</td>
<td>Pretest</td>
<td>134.12</td>
<td>1.54</td>
<td>216.33</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>172.29</td>
<td>1.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>122.94</td>
<td>1.60</td>
<td>244.90</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>162.71</td>
<td>1.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diastolic blood pressure mmHg</td>
<td>Pretest</td>
<td>80.65</td>
<td>1.66</td>
<td>63.60</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>90.00</td>
<td>1.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>72.18</td>
<td>1.38</td>
<td>37.62</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>77.00</td>
<td>1.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intraocular pressure mmHg</td>
<td>Pretest</td>
<td>17.65</td>
<td>1.54</td>
<td>17.09</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>16.76</td>
<td>1.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>17.06</td>
<td>1.20</td>
<td>2.58</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>13.24</td>
<td>1.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table (2) shows the means, standard deviations and the T value of Systolic and diastolic blood pressure, and intraocular the pressure of the pretest and posttest. The T value of the systolic blood pressure of the pretest is (216.33) while the T value of the systolic blood pressure of the posttest is (246.84). On the other hand, the T value of the diastolic blood the pressure of the pretest is (63.60), while the T value of the diastolic blood the pressure of the posttest is (73.62). Furthermore, the T value of intraocular pressure in the pretest is (17.09), while it is (2.58) in the posttest. The significance level is (p<0.05) of the study variables which shows that the difference between the two tests is significant and tipped in favor of the posttest of the study sample.

Table (3)
Results of blood pressure and intraocular pressure of post measurements

<table>
<thead>
<tr>
<th>Variables</th>
<th>Measurement</th>
<th>Mean</th>
<th>SD</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic blood pressure mmHg</td>
<td>Posttest</td>
<td>172.29</td>
<td>1.86</td>
<td>14.93</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>162.71</td>
<td>1.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diastolic blood pressure mmHg</td>
<td>Posttest</td>
<td>90.00</td>
<td>1.84</td>
<td>17.06</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>77.00</td>
<td>1.62</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table (3) shows the means, standard deviations and T value of blood pressure and intraocular pressure of post measurements of the pre and posttest. T value of the systolic blood pressure is (14.93), while the T value of the diastolic blood pressure is (17.06). On the other hand, the T value of intraocular pressure is (6.85). The significance level is (p<0.05); that's the difference is significant between the pre and posttest and tipped in favor of the posttest of the study sample.

**DISCUSSION**

Table (1) shows the interrelated T value and the significance level (p< 0.05) of the tests of coordination, passing and dribbling of the study sample. Concerning the differences between pretest and posttest, they come in favor of the posttest.

The researchers attribute these differences in the pretest and posttests to the use of the exercises of coordination between eye and hand. The method of practicing the exercises of coordination is organized in a way that permits the player to gradually develop heights of jumping during the exercise time by using eyes, hands, and balls. It is also characterized by the variety of exercises that the player can practice as well as the number of balls used in such exercises. Therefore, the player has to develop concentration and attention during performing such type of exercises to be well adapted with them as long as possible to avoid mistakes that may result from the exerted effort during exercises. The planned exercises according to the scientific rules in handball play an important and essential role to prepare players for the typical required form at the end of the period of general and special preparation and to maintain this form during competitions to achieve the best results [9].

Therefore, the researchers suggest that the players should have a high ability to training on the exercises of coordination between arms and eyes to develop their attacking skills that can positively contribute to determining the results of their team as it is shown by the study sample. In other terms, handball shooting and dribbling is a skill to be performed by hands, so coordination between eyes and hands are seen as one of the most important factors to be done by handball players.

According to the findings of the exercises of coordination, passing, and dribbling, the results come in favor of the posttest. So, by improving coordination between arms and eyes the players' attacking skills will be developed because of the exercises of coordination between eye and hand are connected with the movement of the arms during the exercises. The exercises are performed with a strong, quick, resisting fatigue and dynamic way; That's to say, having new and various skills will be very useful for the player and such skills can be seen as the best way to invest the player and coach efforts[9].

Table (2) shows that the significance level is (p<0.05); i.e. the difference is significant between pre and post measurements of the pretest of Systolic and diastolic blood pressure and intraocular pressure of handball players. In other terms, there is a rise in blood and intraocular pressure because of the skill test that affects them and ultimately the results of the pretest of the study variables. So, the coordination between eye and hand is very weak in this stage since the players do not use the exercises of coordination. Hence, according to the rates of the consumed oxygen during the exercises of the upper part of the body, the systolic and diastolic blood pressure is high [10].
Table (3) shows the significance level is (p<0.05) which indicates that the difference in the post measurements is significant in this stage. There is a reduction in blood pressure and intraocular pressure. Therefore, coordination is considerable due to the use of the exercises of coordination between eye and hand by the study sample.

Concerning the test of intraocular pressure, the researchers point out that there is an improvement for the study sample because they use the exercises of coordination between eye and hand. These exercises have an important role in improving blood pressure as they have the ability to provide a range of variety to develop coordination according to the strength and assigned time for such exercises. The regular training will improve heart function by reducing pulse rate during load and rest what makes it more efficient to meet the biotic the body needs with fewer heartbeats. Other studies affirm that mid-strength exercise helps in reducing blood pressure when it is with a simple rise [10].

A well explained intraocular pressure test, there is a significant improvement for the study sample they practice the exercises of coordination between the eye and hand. These exercises have a significant role in improving intraocular pressure through eye adaptation and do not be affected by the exerted efforts during the match what ultimately leads to fewer mistakes when performing coordination, passing, dribbling. Handball players have to be proficient in using these exercises as long as possible by ball dribbling and moving quickly with a short time in addition to practice various exercises in all over the field to be as close as possible in the field of the competitor team to score goals[11].

Most resources and many other studies confirm that there is a relationship between practicing sport exercises and intraocular pressure. They point out that practicing exercises such as hiking and jogging reduces intraocular pressure [12, 13]. The function of intraocular pressure is to organize the passage of foodstuff and oxygen from the blood to eye tissues through the difference in the pressure between the blood vessels and eye fluid [14]. So, the regular participation in some exercises such as hiking, jogging, biking, and strength exercises helps in reducing the insulin in the human body to protect the eyes from intraocular pressure [15]. Having regular exercise can promote the health of the eye for normal and glaucomatous patients [16]. And the reduction in intraocular pressure is significant as compared to drugs [17]. Many studies show a close relation of the reduction of IOP with physical exercise [18, 19]. All of them show the reduction of IOP following strenuous exercise and the reduction was different according to the study group some authors find the same result even in elderly with cardiac disease [20].A decrease in IOP was seen because of anatomical dilatation of specific canals in the eye which drain fluid which had been investigated by special methods and imaging technics [21]. Moreover, some studied the effect of chronic exercise on long-term control of intraocular pressure for 3 years follow up and they hope even to control the disease process by regular exercise [22].

As limitations of the study, we had a little number of volunteers, as only male participants took part in the study, also, there was a difficulty in choosing the appropriate exercises for the study sample.

**CONCLUSIONS**

The prepared exercises of coordination between eye and hand reduce blood pressure and intraocular pressure of handball players what enables them to maintain good coordination, passing, and dribbling, the prepared exercises of coordination between eye and hand improve coordination, passing, and dribbling, and the best-achieved improvement is in the posttest because of practicing the exercises of coordination between eye and hand.
REFERENCES


