THE IMPACTS OF VISUAL TRAINING ON EYE SEARCH AND BASICS SKILLS AMONG FEMALE HANDBALL PLAYERS

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Abstract

Purpose. Sports vision is conceived as a group of techniques directed to preserve and improve the visual function with a goal of enhancing sports performance through a process, which involves teaching the visual behavior required for different sporting activities. The aim of this study was to determine the impacts of visual training on eye search among female handball players.

Methods. (20) Female handball players. Divided into two groups. The experimental group comprised of (10) female handball players in the age groups of 18-22 years, all participations are members of a handball team of faculty of physical education, Helwan university. The subjects in this group underwent visual training program for (2) months. The control group comprised of (10) female handball players at the same age for the experimental group. Parameters assessed the high, weight, training age and saccadic eye movements. All subjects were free of any disorders known to affect performance, such as bone fractures, osteoporosis, diabetes and cardiovascular disease. The participants did not report use of any anti-seizure drugs, alcohol consumption, and neither smoking cigarette. And all participants were fully informed about the aims of the study, and gave their voluntary consent before participation. The measurement procedures were in agreement with the ethical human experimentation. All statistical analyses were calculated by the SPSS statistical package. The results are reported as means and standard deviations (SD). Differences between two groups were reported as mean difference ±95% confidence intervals (meandiff ± 95%). T test for samples was used to determine the differences in the parameters between the two groups. And Pearson correlations between all variables was used, the p<0.05 was considered as statistically significant.

Results. There were significant changes between pre-and post-training scores for all variables (P≤ 0.05) except The efficiency of sight for the eyes for experimental group. however no significant differences was shown between pre-and post-training scores for all variables , and significant changes between pre-and post-training scores for all variables (P≤ 0.05) for experimental group. however no significant differences was shown between pre-and post-training scores for all variables for control group(P≥ 0.05)

Conclusions. Future research should consider these results, and determines the vision tests which strong connect with handball game.

Key words: eye movements, sports vision, handball

Introduction

There are many factors that influence sports performance, and one fundamental area of extreme importance is training. Athletes commonly train their muscles, their understanding of the game, and their strategies to outperform their opponents. But relatively little attention has been dedicated to training visual and attentional abilities within the sports world (Erickson, 2007).

Speed, strength and agility are qualities that are easily observed in elite athletes. On the other hand, vision is an important asset in sports performance.

The acuteness of view of is the most important and integral indicator state of the function visual analyzer, and conventional methods of determining based on an assessment of the ability of view of distinguish between the details of static, high-contrast of visual of objects. The certain in such a way acuteness of referred to as a static the exigencies of view of (POPs). In everyday life and in the of professional activity the visual analyzer Rights should be constantly assess the such qualities of visual objects how their the volume of, the movement of objects, the distance between the objects, on the basis of the corporate representation of three-dimensional visual space (Stereopsis) of one of the important characteristics of view of man is the ability of the optic analyzer to perceive and distinguish details of moving objects. Humans receive information from the external environment through several sensory organs. Vision is the most dominant sense, with 70% of all sensory receptors in the eye. (Yoshimitsu, Hiroshi, 2004). Vision, with components such as visual skills, contributes up to 80% of information obtained (Buys, 2004). Sports vision can be defined as the study of the visual abilities that are required in recreational and competitive sports, as well as the development of visual strategies for improvement of accuracy, stamina, consistency and hence performance of the visual system (Daune, Darlene, 1997). If the visual system is not receiving messages accurately or quickly enough, performance may suffer (Berman, 1990). It is
important for visual systems to be functioning at advanced levels because athletic performance can be one of the most rigorous activities for the visual system (Hitzemen, Beckerman, 1993). If the visual system is not receiving messages accurately or quickly enough, performance may suffer. It is important for visual systems to be functioning at advanced levels because athletic performance can be one of the most rigorous activities for the visual system. The principle of training specificity indicates that athletes should train like they compete, meaning a cyclist will compete better in cycling if he/she trains riding the bike as compared to practicing running. Wilmore & Costill (2004) take the Principle of Specificity concept one step further when they say, “The training program must stress the physiological systems that are critical for optimal performance in the given sport.”

Vision is much more than seeing 20/20. Vision is composed of many interrelated skills that can be trained and refined in order to enhance athletic performance. Demands on the visual system during athletic performance are rigorous. Therefore, an athlete who has superior visual skills will have a leading edge over his opponent.

The perceptual mechanism is made up of 2 different levels of visual information.

Firstly: Hardware
The first type of visual information processing involves the perception of visual information; this is affected by the ocular characteristics of the athletes' visual system. The hardware components of the visual system can be measured using Orthoptic or Optometric tests and forms the basis for a sports vision eye examination e.g. a Snellen chart to measure static visual acuity.

Secondly: Software
The second type of visual information processing involves the perception of visual information this is influenced by the strategies an athlete develops through experience, which results in processing the incoming information more efficiently. Software aspects of sports vision include information processing strategies, encoding and retrieving perceptual information from memory, extracting relevant information from both advance cues and ball flight cues and the use of anticipatory skills.

According to (Reichow & Stern, 1986) Sports vision encompasses performance orientated comprehensive vision care programmers involving education, evaluation, correction, protecting, and enhancement of an athlete.

At the 1994 Olympic Games in Lillehammer, from the 342 athletes representing 46 countries and ranging in age from 16 to 41, more than 171 (50%) had never received a comprehensive visual examination (Olympic Vision Centre, 1995). This corresponds with previous results from (Garner, 1977) who concluded that a significant amount of elite athletes compete in their specific sports with uncorrected visual defects. This may be because the sports they participate in are perhaps of low visual demand, or they compensate with higher functioning of other skills (Neil, 1995) or they may be performing below their true potential.

Studies in human vision are increasingly addressing the dynamic nature of visual activity (Ballard, et al. 1997; Findlay, 1998; Gilchrist, et al., 2001). Under most situations in which vision is employed, saccadic eye movements are used to scan the visual scene actively at a rate of three or four movements each second. The task of visual search has proved to be a very productive paradigm to investigate active vision (Findlay, Gilchrist, 2001).

The ability to catch a ball requires continuous convergence of the eyes, assessing the speed of the ball and predicting its path. To actually catch a ball, one must combine the eye's inputs with activation of the body's motor system to get the hands in the correct place. Lenoir et al showed that athletes with better depth perception would be more successful at catching compared to athletes with poor depth perception. Hoyt states, “It would seem difficult to find fault with the concept of training biological systems to maximize their normal functions”. This would be especially true when it comes to athletic performance. Over the past few years, there has been an increase in utilization and acceptance of sports vision training. However, there is still an unmet need for sports vision training at the high school, college and professional levels. Not everyone is a proponent of vision training, perhaps as all people were not proponents of weight training 30 years ago. Concluding whether or not sports vision training, in a testing environment, results in better performance on the playing field is a difficult dilemma. Articles written by Abernethy & Woods (2001) claim that sports vision training is ineffective because the improved performance achieved after training is a result of test familiarity, although their sample size was very small. The real question here is, does training on a vision board, or other piece of sports vision training equipment, just make an athlete better at doing that piece of equipment or does it transfer to the real world? Like with most pieces of equipment, there is a learning factor regarding how the equipment works.

So, The visual system plays a critical role in sports performance, as it does in the performance of virtually all perceptual-motor skills. To improve sports performance through improving vision an understanding of the visual demands of different sports is required. One also needs to consider the extent that different visual parameters can be modified through vision training. However, the ultimate question is whether training certain aspects of the visual system can be translated into improvements with on field performance.

- Defining Sports Vision in a clinical environment: Sports vision testing incorporates:
- Vision screening and testing of athletes
The human performs skilled movements is not a spontaneous muscular response but represents a sequence of complicated processes within the central nervous system. An athlete absorbs information from the surrounding sporting environment and processes this information. The final output produces a movement response. This model of humans as information processing systems is commonly used to explain the role of vision in producing and controlling skilled movement. The human performance model was originally presented by Christenson, Winkelstein, (1988) The model assumes that perceptual-motor performance occurs when sensory input information is converted into a purposeful output action. In between the input and output actions information passes through 3 hypothetical central processing mechanisms.

Perceptual mechanism
This mechanism receives information from receptors such as the retina for visual information and the inner ear for balance information. The perceptual mechanism organizes and interprets the information. The selection of information can be influenced by the athlete’s previous experiences.

Decision mechanism
Information from the perceptual mechanism is passed through to the decision mechanism, which decides the appropriate action. This mechanism is concerned with response selection and strategy formation. This can also be influenced by the athlete’s previous experience.

Effector mechanism
If the decision mechanism selects a motor response, the relevant information is passed onto the effector mechanism, which controls and organizes the sequence.

However, to the author’s knowledge, a systematic analysis of the sports vision involved in handball game is still lacking. Hence, the aim of this study was to determine the impacts of visual training on eye search among female handball players.

Methods
Participants.

Visual skills tests
- Eye-hand Coordination
- Static visual accuracy

Fig 1 explain Videonystagmography (VNG)
- Dynamic visual accuracy
- Peripheral Vision
- Visual tracking of the dominant eye

20) Female handball players. Divided into two groups. The experimental group comprised of (10) female handball players in the age groups of 18-22 years, all participants are members of a handball team of faculty of physical education, Helwan university. The subjects in this group underwent visual training program for (2) months. The control group comprised of (10) female handball players at the same age for the experimental group. Parameters assessed the high, weight, training age and saccadic eye movements. All subjects were free of any disorders known to affect performance, such as bone fractures, osteoporosis, diabetes and cardiovascular disease. The participants did not report use of any anti-seizure drugs, alcohol consumption, and neither smoking cigarette. And all participants were fully informed about the aims of the study, and gave their voluntary consent before participation. The measurement procedures were in agreement with the ethical human experimentation.

Measurement
Eye movements of participants were recorded via Videonystagmography (VNG).

Videonystagmography (VNG) is a series of tests used to determine the causes of a patient's dizziness or balance disorders. If dizziness is not caused by the vestibular portion of the inner ear, it might be caused by the brain, by medical disorders such as low blood pressure, or by psychological problems such as anxiety. VNG is a test used to determine whether or not dizziness may be due to inner ear disease.

VNG is a complete diagnostic system for recording, analyzing and reporting involuntary eye movements, called nystagmus, using video imaging technology. Hi-tech video goggles with infrared cameras are worn while you look or lie in different positions.

There are four main parts to the VNG. The saccadic test evaluates rapid eye movements. The tracking test evaluates movement of the eyes as they follow a visual target. The positional test measures dizziness associated with positions of the head. The caloric test measures responses to warm and cold water circulated through a small, soft tube in the ear canal. The cameras record the eye movements and display them on a video/computer screen. This allows the examiner to see how the eyes move which is very helpful in assessing balance system health.
• Visual reaction time
• Depth perception
  From a distance of 10 cm
  From a distance of 20 cm
  From a distance of 30 cm
• Visual recognize to the dominant eye
  Vertical up
  Vertical down
  Horizontal Right
  Horizontal Left
• The efficiency of sight for the eyes

**Basics skills tests**
• Shooting
• Dripping
• Passing

**Visual Training program protocol.**
The proposed program aims using the visual development of training and capacity development of the eye and visual skills variables in handball for female students at the Faculty of Physical Education for Girls – Helwan University.

**The foundations of the proposed training program:**
The researcher built visual training program in accordance with the scientific foundations of the following:

**Results.**
Table 1. Age, Anthropometric Characteristics and Training Experience of the Groups (Mean ± SD)

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Age [years]</th>
<th>Weight [kg]</th>
<th>Height [cm]</th>
<th>BMI [kg/m2]</th>
<th>Training experience [years]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handball players</td>
<td>20</td>
<td>21.63 ± 3.9</td>
<td>70.54 ± 4.1*</td>
<td>172.22 ± 5.2</td>
<td>24.1 ± 2.1</td>
<td>5.1 ± 1.3</td>
</tr>
</tbody>
</table>

Table 1 shows the age and anthropometric characteristics of the subjects. There were no significant differences observed in the anthropometric characteristics, age and Training experience among the subjects.

**Table 2. Mean ±SD in visual skills between the control and experimental groups**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Unit</th>
<th>Control</th>
<th></th>
<th></th>
<th></th>
<th>T test between two groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>pre</td>
<td>post</td>
<td>T test</td>
<td>pre</td>
<td>post</td>
</tr>
<tr>
<td>Eye -hand Coordination</td>
<td>Count(N)</td>
<td>18.23 ± 1.62</td>
<td>19.12 ± 1.44</td>
<td>Not Sign</td>
<td>17.99 ± 1.45</td>
<td>22.35 ± 1.87</td>
</tr>
<tr>
<td>Static visual accuracy</td>
<td>Count(N)</td>
<td>20.15 ± 2.11</td>
<td>21.84 ± 1.94</td>
<td>Not Sign</td>
<td>20.36 ± 2.25</td>
<td>25.71 ± 2.66</td>
</tr>
<tr>
<td>Dynamic visual accuracy</td>
<td>Degree</td>
<td>2.71 ± 0.49</td>
<td>2.79 ± 0.56</td>
<td>Not Sign</td>
<td>2.73 ± 0.51</td>
<td>2.83 ± 0.57</td>
</tr>
<tr>
<td>Peripheral vision</td>
<td>Degree</td>
<td>6.17 ± 1.58</td>
<td>6.23 ± 1.54</td>
<td>Not Sign</td>
<td>6.09 ± 1.47</td>
<td>6.49 ± 1.33</td>
</tr>
<tr>
<td>Visual tracking of the dominant eye</td>
<td>Degree</td>
<td>2.11 ± 0.77</td>
<td>2.26 ± 0.51</td>
<td>Not Sign</td>
<td>2.13 ± 0.58</td>
<td>2.37 ± 0.49</td>
</tr>
<tr>
<td>Visual reaction time</td>
<td>100/ Second</td>
<td>20.98 ± 1.17</td>
<td>20.89 ± 1.33</td>
<td>Not Sign</td>
<td>21.00 ± 1.02</td>
<td>20.22 ± 1.33</td>
</tr>
<tr>
<td>Depth perception</td>
<td>Cm</td>
<td>6.47 ± 1.17</td>
<td>5.11 ± 1.67</td>
<td>Not Sign</td>
<td>6.68 ± 1.69</td>
<td>6.09±1.95</td>
</tr>
<tr>
<td></td>
<td>From a distance of 10 cm</td>
<td>6.47 ± 1.17</td>
<td>5.11 ± 1.67</td>
<td>Not Sign</td>
<td>6.68 ± 1.69</td>
<td>6.09±1.95</td>
</tr>
<tr>
<td></td>
<td>From a distance of 20 cm</td>
<td>7.69 ± 1.38</td>
<td>7.22 ± 2.03</td>
<td>Not Sign</td>
<td>7.62 ± 1.38</td>
<td>7.02±2.13</td>
</tr>
<tr>
<td></td>
<td>From a distance of 30 cm</td>
<td>7.91 ± 1.74</td>
<td>7.84 ± 2.11</td>
<td>Not Sign</td>
<td>7.88 ± 1.69</td>
<td>7.70±2.24</td>
</tr>
<tr>
<td>Visual recognize (dominant)</td>
<td>Vertical up</td>
<td>70.26 ± 4.32</td>
<td>71.34 ± 5.01</td>
<td>Not Sign</td>
<td>69.84 ± 4.32</td>
<td>74.64±4.77</td>
</tr>
<tr>
<td></td>
<td>Vertical down</td>
<td>58.36 ± 60.14</td>
<td>58.22 ± 63.25</td>
<td>Not Sign</td>
<td>58.22 ± 63.25</td>
<td>58.22±63.25</td>
</tr>
</tbody>
</table>
Table 2. showed a significant changes between pre-and post-training scores for all variables (P≤ 0.05) except The efficiency of sight for the eyes for experimental group however no significant differences was shown between pre- and post-training scores for all variables.

Table 3. Mean ±SD in basic handball skills between the control and experimental groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Unit</th>
<th>Control</th>
<th>T test</th>
<th>Experimental</th>
<th>T test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>pre</td>
<td>post</td>
<td>pre</td>
<td>post</td>
</tr>
<tr>
<td>Shooting</td>
<td>Degree</td>
<td>4.33 ± 1.29</td>
<td>5.36 ± 1.21</td>
<td>Not Sign</td>
<td>4.41 ± 1.62</td>
</tr>
<tr>
<td>Dripping</td>
<td>Degree</td>
<td>4.15 ± 1.11</td>
<td>5.84 ± 1.94</td>
<td>Not Sign</td>
<td>4.19 ± 2.11</td>
</tr>
<tr>
<td>Passing</td>
<td>Degree</td>
<td>4.71 ± 1.49</td>
<td>5.79 ± 1.56</td>
<td>Not Sign</td>
<td>4.76 ± 1.37</td>
</tr>
</tbody>
</table>

Table 3. showed a significant changes between pre-and post-training scores for all variables (P≤ 0.05) for experimental group however no significant differences was shown between pre-and post-training scores for all variables for control group (P≥ 0.05).

Fig 2 explain the visual skills between the control and experimental groups.
Fig 3 explain the basic handball skills between the control and experimental groups

**Discussion**

This study aimed to determine the impacts of visual training on eye search among female handball players. This study is the first report on the dynamics of saccadic adaptation in handball and to investigate whether athletes perform better with respect to saccadic adaptation in both positive and negative directions. The results clearly show that there is change in the magnitude of saccadic adaptation between taekwondo players with high level and low level in both gain increasing and decreasing saccadic adaptation.

This supports the idea that the ocular motor system does tolerate overshooting of the target and also that undershooting is common during saccade execution.

The visual training in the field of sports is a relatively small area in the system of athletic performance, but of great importance, and became a great interest in them and is increasingly active in recent periods.

In this regard, underlines Feisal, (2004) that the human body does not respond, but what meets the eye, as well as the coaches ask their players to be a sample on the ball and follow up and watching the ball accurately and this is just a confirmation of the importance of the role of visual in the sport of tennis, however, we find the lack of attention visual exercises in the sport of Handball.

Based on the foregoing, the researcher has conducted this study under the title "exercises visual impact on the performance of the skill level transmitter and some physical variables among emerging Handball".

Quick and accurate eye movements are essential to athletic success. Fencers and handball players require eye movement in a variety of directions. Saccadic eye movements are used to direct favela fixation towards objects of interest (Henderson, Hollingworth, 2003). Saccades depend on information from the periphery of the retina to tell the brain that there is something of interest in the field that should be recognised

**Conclusion.** The time constant for gain reduction is much shorter in comparison to a gain increase.

Since, the results suggest that magnitude differences in saccadic adaptation between the groups is significant, this results is consistent with earlier findings in literature. (Raiju, 2004)

Future research should consider these results, and determines the vision tests which strong connect with handball game.

**References**


