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Original article

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 ($P\leq 0.05$) 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 ($P\leq 0.05$) for experimental group .however no significant differences was shown between pre-and post-training scores for all variables for control group($P\geq 0.05$)

*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 sportsperformance, and one fundamental area ofextreme importance is training. Athletescommonly train their muscles, theirunderstanding of the game, and theirstrategies to outperform their opponents . But relatively little attention has beendedicated to training visual and attentionabilities 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 (Stereoopsis) 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

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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 reception of visualinformation; this is affected by the ocular characteristics of the athletes visualsystem. The hardware components of the visual system can be measured using Orthoptic or Optometric tests and forms the basis for a sports vision eyeexamination e.g. a snellens 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 throughexperience, which results in processing the incoming information more efficiently . Software aspects of sports vision includes information processing strategies ,encoding and retrieving perceptual information from memory, extracting relevantinformation from both advance cues and ball flight cues and the use ofanticipatory 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 theperformance of virtually all perceptual-motor skills. To improve sportsperformance through improving vision an understanding of the visual demands ofdifferent sports is required. One also needs to consider the extent that differentvisual parameters can be modified through vision training. However the ultimatequestion is whether training certain aspects of the visual system can betranslated into improvements with on field performance .

- Defining Sports Vision in a clinical environmentSports vision testing incorporates :
- Vision screening and testing of athletes

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- The prescription of sunglasses and protective eyewear
- The management of eye injuries
- Vision enhancement to improve performance .

The relationship between vision and skilled movements is not a spontaneous muscular response but represents asequence of complicated processes within the central nervous system. Anathlete absorbs information from the surrounding sporting environment andprocesses this information. The final output produces a movement response . This model of humans as information processing systems is commonly used toexplain the role of vision in producing and controlling skilled movement. Thehuman performance model was originally presented by Christenson, Winkelstein, (1988) The model assumes that perceptual-motor performance occurs when sensoryinput information is converted into a purposeful output action. In between theinput and output actions information passes through 3 hypothetical central processing mechanisms .

Perceptual mechanism

This mechanism receives information from receptors such as the retina for visualinformation and the inner ear for balance information. The perceptual mechanismre-organizes and interprets the information. The selection of information can beinfluenced by the athlete's previous experiences .

Decision mechanism

Information from the perceptual mechanism is passed through to the decisionmechanism, which decides the appropriate action. This mechanism is concernedwith response selection and strategy formation. This can also be influenced bythe athlete's previous experience .

Effector mechanism

If the decision mechanism selects a motor response, the relevant information ispassed 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.

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.

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 saccade 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 then on a video/computer screen. This allows the examiner to see how the eyes move which is very helpful in assessing balance system health.

Fig 1 explain Videonystagmography (VNG)

Visual skills tests

- Eye - hand Coordination
- Static visual accuracy
- Dynamic visual accuracy
- Peripheral Vision
- Visual tracking of the dominant eye

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- 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 forfemale 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:

- Taking into account the principle of diversity in the performance of the training exercises inside the unit so as not to feel bored student and monotony.

Taking into account that the training modules include (4) main themes are:

1. Exercisesfor firming put the head
2. Exercises to improve sight distance
3. Exercises for the development of precision optical
4. Exercises for the development of visual perception

Temporal distribution of the proposed training program:

- Physical configuration (warm-up). (5) M
- Stretchmuscles. (10) M
- Visual exercises. (20) M
- Calm and closing. (5) M

Statistical analysis

All statistical analyses were calculated by the SPSS statistical package. The results are reported as means andstandard deviations (SD). Differences between two groups were reported as mean difference ±95% confidence intervals (meandiff± 95% CI).Student's t-test for independent samples was used to determine the differences in fitness parameters between the two groups. The $p<0.05$ was considered as statistically significant.

Results.

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

Group	N	Age [years]	Weight [kg]	Height [cm]	BMI [kg/m2]	Training experience[years]
Handballplayers	20	**21.63 ± 3.9**	**70.54 ± 4.1***	**172.22 ± 5.2**	**24.1 ± 2.1**	**5.1 ± 1.3**

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

Table 2. Mean ±SD in visual skillsbetween the control and experimental groups

Variables		Unit	Control			Experimental			T test between two groups
			pre	post	T test	pre	post	T test	
Eye - hand Coordination		Count(N)	18.23 ± 1.62	19.12 ± 1.44	Not Sign	17.99± 1.45	22.35 ±1.87	Sign	Sign
Static visual accuracy		Count(N)	20.15 ± 2.11	21.84 ± 1.94	Not Sign	20.36 ± 2.25	25.71 ±2.66	Sign	Sign
Dynamic visual accuracy		Degree	2.71 ± 0.49	2.79 ± 0.56	Not Sign	2.73 ± 0.51	2.83 ± 0.57	Sign	Sign
Peripheral Vision		Degree	6.17 ± 1.58	6.23 ± 1.54	Not Sign	6.09 ± 1.47	6.49 ± 1.33	Sign	Sign
Visual tracking of the dominant eye		Degree	2.11 ± 0.77	2.26 ± 0.51	Not Sign	2.13 ± 0.58	2.37 ± 0.49	Sign	Sign
Visual reaction time		100/ Second	20.98 ± 1.17	20.89 ± 1.33	Not Sign	21.00 ± 1.02	20.22 ± 1.33	Sign	Sign
Depth perception	From a distance of 10cm	Cm	6.47 ± 1.17	5.11 ±1.67	Not Sign	6.68 ± 1.69	4.09±1.95	Sign	Sign
	From a distance of 20cm	Cm	7.69 ± 1.38	7.22 ±2.03	Not Sign	7.62 ± 1.38	7.02 ±2.13	Sign	Sign
	From a distance of 30cm	Cm	7.91 ± 1.74	7.84 ±2.11	Not Sign	7.88 ± 1.69	7.70 ±2.24	Sign	Sign
Visual recognize (dominant	Vertical up	Cm	70.26 ± 4.32	71.34 ±5.01	Not Sign	69.84 ± 4.32	74.64 ±4.77	Sign	Sign
	Vertical down	Cm	58.36	60.14	Not Sign	58.22	63.25	Sign	Sign

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eye)			± 4.47	±4.76		± 4.35	±4.69		
	Horizontal Right	Cm	79.87 ± 4.36	81.27 ±4.82	Not Sign	80.00 ± 4.00	83.02 ±4.66	Sign	Sign
	Horizontal Left	Cm	75.37 ± 5.03	77.69 ±5.11	Not Sign	74.74 ±4.81	81.06 ±4.92	Sign	Sign
The efficiency of sight for the eyes		Degree	4.42 ± 1.15	4.45 ±1.23	Not Sign	4.00 ± 1.02	4.05 ±1.10	Not Sign	Not Sign
saccadic movements		Degree	6.75 ±0.87	6.80 ±0.69	Not Sign	6.69 ±0.55	8.24 ±0.63	Sign	Sign
gaze behavior		Degree	7.11 ±0.91	7.25 ±1.01	Not Sign	7.36 ±0.91	8.92 ±0.95	Sign	Sign
Optokinetic		Degree	6.28 ±0.75	6.34 ±0.81	Not Sign	6.31 ±0.79	7.94 ±0.83	Sign	Sign

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 eyesfor experimental group .however no significant differences was shown between pre-and post-training scores for all variables .

Table 3. Mean ±SD in basichandball skillsbetween the control and experimental groups

Variables	Unit	Control			Experimental			T test between two groups
		pre	post	T test	pre	post	T test	
Shooting	Degree	4.33 ± 1.29	5.36 ± 1.21	Not Sign	4.41 ± 1.62	7.22 ± 1.68	Sign	Sign
Dripping	Degree	4.15 ±1.11	5.84 ± 1.94	Not Sign	4.19 ± 2.11	8.71 ± 1.53	Sign	Sign
Passing	Degree	4.71 ±1.49	5.79 ±1.56	Not Sign	4.76 ±1.37	8.73 ±1.35	Sign	Sign

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) .

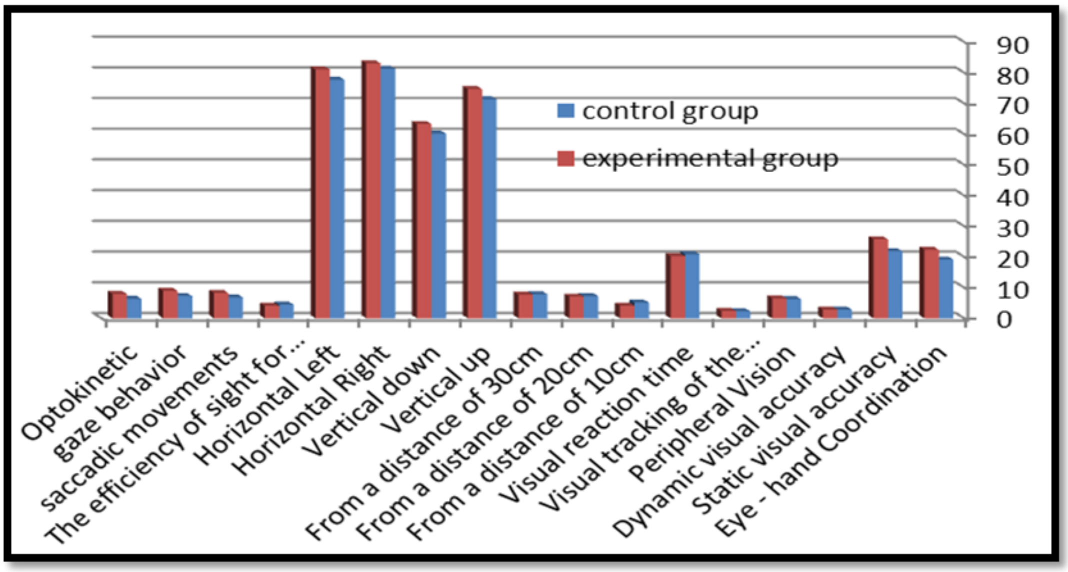

Fig 2 explain the visual skillsbetween the control and experimental groups

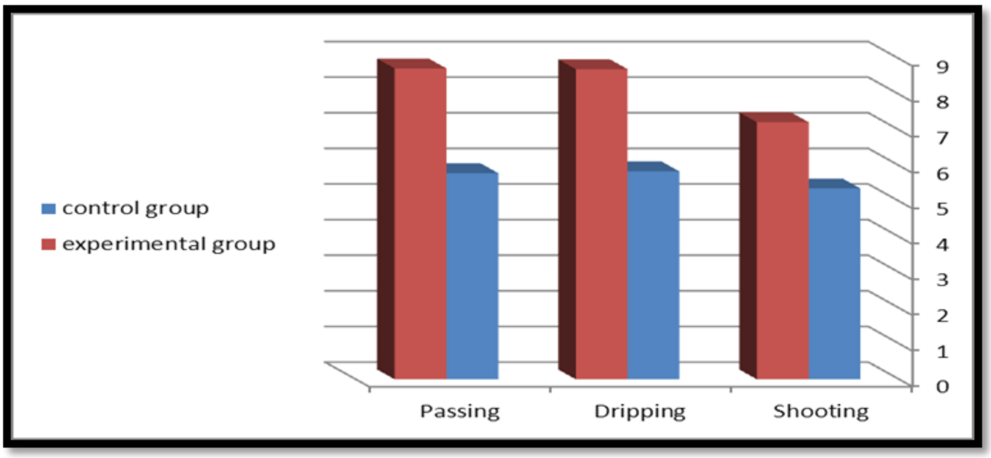

Fig 3 explain the basic handball skillsbetween the control and experimental groups

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 recognised12

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.

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