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Effect of Visual Training on Accuracy of Attack Shots Performance in Badminton.

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Abstract

This research was conducted to identify the effect of visual training on some visual abilities and badminton attack shots performance accuracy. Visual abilities studied are (Vision peripheral. Visual tracking, depth perception, Vision field perception, static visual acuity, dynamic visual acuity, Visual reaction speed, Visual focus, and Eye-Hand-Body coordination). Badminton skills studied are (Forehand smash shot, forehand drop shot, forehand clear shot, and lob attacking shot). Study participants consisted of (30) players at Alexandria University, who divided randomly into two equal groups (experimental group = 15 players, and control group = 15 players). With following characteristics: (mean ± SD) age = (21.16 ± 0.9498 years), height = (177.46 ± 6.693 cm), mass = (72.766 ± 9.179 kg), and visual acuity for two eyes = (1.30± 0.60). Experimental design was used with two groups, experimental group who used visual training program and other control group who used traditional training related to badminton. Group of tests that suits to pre-mentioned visual abilities and badminton skills were used as data collecting tools. Statistical analysis was done with SPSS software package using following statistics coefficients and tests: mean, standard deviation, Kolmogorov-Smirnov and Shapiro-Wilk tests, T test, simple correlation coefficient, change ratio. It is concluded that visual training has had positive effect on visual abilities and badminton attack shots performance accuracy

Key words:Visual training - visual abilities – smash shot - Badminton..

Introduction:

Recently, badminton has remarkable development in playing laws and offensive, defensive performances. This evolution in game performance level was owing to use advanced and varied ways to improve all aspects required in the game. Particularly skill and physical sides that leads to improvement in performance power and speed during competition (EL-Gizawy, 2007)

Badminton is like other sports, it has important attack motor skills. Forehand smash shot, drop shot, attack clear shot and lob shot are of the almost important and almost common attack skills. Which requires a great deal of accuracy to send shuttlecock to suitable places in the competitive court (EL-Gizawy, 2007; Grice, 2004; Paup & Fernhall, 2000) .

Badminton is one of the fastest games in the world also it is the most exciting and interesting sports. This attributed to its fast playing rhythm, the constant interaction between attack and defense shots throughout the match and the large points number per game. Therefore, players remain in a constant struggle throughout the game in order to win a largest number of points. As winning is the final outcome point that players are looking for (El-Kholi, 2001; Saber, 2008).

Walker (2001) indicated that sports coaches, players and scholars are looking permanently and continuously for modern training methods in order to improve athletic performance and gain a competitive advantages. Visual training is one of the most new techniques presented in sports. That is considered a recurring series of eye exercises aiming to improve basic visual abilities that is important for athletes in all competitive sports.

Ancient Egyptians were the first who have used visual exercises as part of their training. Engravings in the Karnak Temple describes Set God teaches Thutmose the third how throw arrows using visual exercises since 3200 BC (Obstfeld, 2003) .

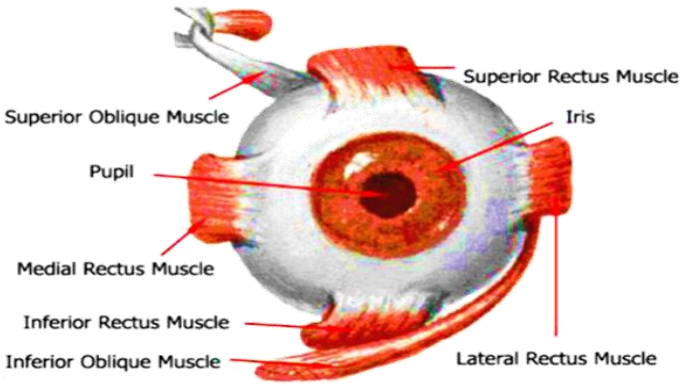
Brown (2001) pointed out in his book "sport talent" that sports vision science grew up as a natural and logical consequence of competition performance nature. In various sports; vision contributions to performance improvement are clear .

Visual training works to achieve optimal performance under playing conditions, improve visual muscles, visual perception, and tracking, develops distances and things estimation abilities, and also develops quick and accurate focus on target ability using a series of eye movements (Saber, 2008).

Eisner (2001) also assured that visual training is an advanced specialized program. That aims to improve the relationship between eyes and brain through development of visual skills and abilities. By using gradual difficulty exercises work to improve eye muscles coordination and flexibility with ability to control those muscles.

Hassanein (2011) noted that the six eye muscles of movement are: superior rectus muscle, inferior rectus muscle, lateral oblique muscle, medial rectus muscle, superior oblique muscle and inferior oblique muscle.

Fig 1. Eye muscles



Visual abilities used in sports field are about 20 visual ability including visual reaction speed, static and dynamic visual acuity and visual tracking. And also there were 80% of cognitive contribution is visual (Ariel, 2004; Risk, 2000) .

In this regard, Stine (2004) indicated that eye plays an important and vital role in sports activities as racket sports. American optometric association (AOS) committed a number of processes during physical activity. Based on these processes athlete could determine the required response .

Vision and visual abilities training did not have a place in athlete's daily preparation. While, athletes and coaches are doing training related to vision unintentionally. Recent researches demonstrated the importance of visual abilities for athlete performance. It also clarified that athletes have high visual skills when compared to non-athletes. Therefore, many researchers had verified the possibility of train these visual abilities. Furthermore, some studies results indicated the presence of positive effect of visual training(Venter, 2003).

"Keep eyes on the ball", the phrase we hear constantly from many coaches. Nothing happens until eyes guide hands what should be done. Nearly 80% from start signals in almost of sports are through sight sense. Visual accuracy and abilities have great importance. Therefore, via visual processing athlete can see the thing clearly and its place in air or how fast it moves or if this thing is going to change its direction (Abdul-Qadir, 2001).

Badminton would constitute information creating system at a certain time. As the eye provides information to brain which explains the information and after that sends signals that make hands, legs and other body parts move that happens in a split second. If this message inaccurate, incomplete, or introduced at an inconvenient time, this leads to incorrect performance.

Because of badminton speed that may exceed 300 km/h. Players may not be able to cover the internal court and possibly they cannot even see Shuttlecock movement during flight. And some high levels players suffer from a defect in sight. As a result it is advisable to protect the eye at this level (EL-Gizawy, 2007).

Badminton single match depend of a physical and mental abilities. Any laps in concentration lead to loss of a run of points which psychologically affect the player and making the player lose the whole game. In order to win the match the player should enjoy a high level of fitness and vigilance(badmintonplanet.com, 2004).

Furthermore, badminton requires high efficiency in visual functions until the player can find out the status for a competitor and places to send the Shuttlecock to them in the court of the opponent. Also can determine the competitor movement to approach or move away from the net, as well as through these sense sees the player coach signals and thus can making the right decision.

Nowadays, the main task of sport coaches is to find modern methods in training process; whether physical, skill or tactical methods. Visual training is of recent trends that can be used in training process, along with other methods because of its great importance during competition.

Concerning the positive effect of visual training in various fields, many researchers and specialists agreed on the important of this training on players' visual abilities development in other sports e.g. (Abdul-Reda & Huwaydi,

2010; Al-Zamili, 2012; Bressa, 2003; Fouad & Abdullah, 2005; Hathout & Sawy, 2008; M. Ismail, 2006). So the aim of current study is determine the effect of visual training on attack shots accuracy in badminton, by improvement of visual abilities.

1. Material and Methods:

1.1. Participants:

Thirty beginners Badminton players at Faculty of Physical Education for men at Alexandria University in Egypt (age = 21.16 ± 0.9498 years, height = 177.46 ± 6.693 cm, mass = 72.766 ± 9.179 kg, and visual acuity for two eyes = 1.30± 0.60), and divided randomly into two equal groups (experimental group = 15 player, and control group = 15 player).

2.2. Procedures:

Experimental design was used that classified participants into two groups, experimental group who used visual training program and other control group who used traditional training related to badminton.

The researcher determined the visual abilities related to badminton (vision peripheral, visual tracking, depth perception, vision field perception, static visual acuity, dynamic visual acuity, visual reaction speed, visual focus, and eye-hand-body coordination) and their tests. By using recent literatures review, the researcher adopted visual abilities tests from (Abdullah, 2011; I. S. Ismail, 2009; Shehata, 2014). Likewise, the researcher determined badminton attack shots accuracy tests (Forehand smash shot, forehand drop shot, forehand clear shot, and lob attacking shot. These tests were developed by(Abd-elftah, 2004). After that the validity and reliability of visual abilities and badminton attack shots accuracy tests were ascertained as follow:

2.2.1. Visual abilities tests:

Visual abilities tests are vision peripheral test (T test sig= .000 , r=.924**), visual tracking test (T test sig= .000, r=.895**), visual focus test (T test sig= .000, r=.899**), depth perception test (T test sig= .000 , r=.922**), visual reaction speed test (T test sig= .000, r=.933**), static visual acuity test (T test sig= .000, r= .827**), dynamic visual acuity test (T test sig= .000, r=.813**), eye-hand-body coordination test(T test sig= .000, r= .979**) and vision field perception test (T test sig= .000 , up vertical r=.970**, down vertical r=.983**, right horizontal r=.987**, left horizontal r=.970**).

2.2.2. Attack shots performance accuracy tests:

Attack shots performance accuracy tests are forehand smash shot performance accuracy test (T test sig= .000, r= .922**), forehand drop shot performance accuracy test (T test sig= .000, r=.904**), forehand clear shot performance accuracy test (T test sig= .000, r=.982**) and lob attacking shot performance accuracy test (T test sig= .000, r=.965**).

2.2.3. Rationing visual training program:

The researcher has developed the visual training program in accordance with the following scientific principles:

- Considering diversity principle in training session to overcome student being bored and monotony.
- Taking into account distributing visual variables successively within training session to avoid visual variables that cause eye stress.
- Taking into account visual exercises principles.
- Exercises are graduated from easy to difficult.
- Taking into account similarity of proposed exercises with badminton skills.
- Taking into account that training sessions contain (9) main training aspect namely: vision peripheral, visual tracking, visual focus, depth perception, visual reaction speed, static visual acuity, dynamic visual acuity, vision field perception and eye-hand-body coordination.

2.2.4. Training program implementation:

Training program implementation time has been determined by (8) weeks. Training sessions frequency has been determined by (3) training sessions/week, each training session time ranged between (90, and 120 minutes).

The main training session aspects:

- Introductory part time (warm-up period): It includes physical and physiological exercise to prepare body organs, the general preparation of the eye (15minutes).
- Main part time (basic training period) includes a variety of difficulty scalable drills aims to develop general visual abilities and specific visual abilities in badminton (100 minutes).
- Final part time (cool-down period): Includes sets of relaxation exercises that aim to return to natural state (5minutes).

Training method: High and low intensity intervals training have been determined according to research aim. Formation of a load system has been determined in form of (1:1) - (1:2).

Determine load intensity:

- Intermediate load (50%- 75%) of the maximum player ability of max heart rate.
- High load (75%-90%) of the maximum player ability.
- Maximum load (90%- 100%) of the maximum player ability.

Fig 2. Training load distribution during training weeks

Weeks		1st	2nd	3rd	4th	5th	6th	7th	8th
Load intensity / weeks	Maximum								
	High								
	Moderate								
Percent		%65	%75	%70	%85	%90	%70	%85	%90
Total time/week		290 Min	325 min	310 min	350 min	360 min	320 min	345 min	355 min
Load density/ sessions	Warm Up	min15	min15	min15	min15	min15	min15	min15	min15
	Rest between Each set	15-45 Sec	15-45 sec	15-45 sec	15-45 sec	15-45 sec	15-45 sec	15-45 sec	15-45 Sec
	Repeat in set	10	8	10	5-8	5	6-8	5-7	5
	Sets in session	5	6	5	3-5	3	3-5	3-4	3
	Cool down	5 min	5 min	5 min	5 min	5 min	5 min	5 min	5 min

Fig 3. Training load distribution during training sessions

Weeks		**1st**			**2nd**			**3rd**			**4th**		
No. of sessions		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Load density/ sessions	**Maximum**												
	High												
	moderate												
percent		**50 %**	**%75**	**%60**	**%75**	**%85**	**%75**	**%85**	**%70**	**%80**	**%85**	**%75**	**85 %**
Weeks		**5th**			**6th**			**7th**			**8th**		
No. of sessions		**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Load density/ sessions	**Maximum**												
	High												

Weeks		1st			2nd			3rd			4th		
	moderate												
percent		75 %	%90	%95	%65	%85	%70	%80	%90	%85	%75	%95	90 %

2.3. Main study:

2.3.1. Pre measurement:

Pre measurements were conducted for control and experimental groups in visual abilities and badminton attack shots performance accuracy, in the period from October 12th to October 14th 2014.

2.3.2. Program implementation:

The researcher implemented the proposed training program on the experimental research sample in the period October 18th to December 18th 2014, program period for (8) weeks with (3) training sessions per week, where visual training were implemented with experimental group members after the end of the academic day. The traditional exercises were used to train the control group on courts of Faculty of Physical Education, Alexandria University.

2.3.3. Post measurements:

Post measurements were conducted for control and experimental groups in visual abilities and badminton attack shots performance accuracy, in the period from December 20th to December 23rd, 2014, with the same pre-measurement instructions, terms and conditions. Measurement results data were dumped in specially prepared in sheets for statistically processed.

2.4. Statistical analysis:

For the statistical analysis of the data, the IBM SPSS Statistics 21 was used. Descriptive statistics, Kolmogorov-Smirnov and Shapiro-Wilk tests were used to check data normality, and results showed that all parameters had a normal distribution. After that, T-test was used to compare results for visual abilities and validity, change ratio, and the Pearson correlation was used to evaluate the relationships and reliability.

2. Results:

Table (1):
Statistical Significant Differences between Pre and Post Visual Abilities Measurements for Experimental Group (n = 15)

Variables		Pre Test		Post Test		T value	sig	Change ratio
		Mean	Std. Deviation	mean	Std. Deviation			
Vision peripheral		2.20	0.78	3.53	0.92	8.37	.000	60.59
Visual tracking		2.33	0.90	3.53	0.62	7.25	.000	51.44
Visual focus (mark)		3.47	1.13	4.93	0.26	5.73	.000	42.28
Depth perception (mark)		4.71	1.28	8.00	1.51	9.15	.000	69.96
Visual reaction speed (score)		7.00	1.31	8.67	0.72	7.90	.000	23.81
Static visual acuity (mark)		2.00	1.00	3.12	1.19	7.99	.000	56.15
Dynamic visual acuity (mark)		3.73	0.80	4.87	0.35	5.91	.000	30.37
Eye-Hand-Body coordination (second)		10.34	1.39	8.01	1.07	8.07	.000	22.52
(Dominant eye) Vision field Perception	Up vertical (cm)	62.80	1.90	67.87	2.26	7.28	.000	8.07
	Down vertical (cm)	51.53	2.39	55.60	2.32	9.28	.000	7.89
	Right horizontal (cm)	73.27	3.24	77.93	2.80	9.93	.000	6.37
	Left horizontal (cm)	66.20	2.76	69.60	3.44	8.77	.000	5.13

Table (1) results reveal existence of statistically significant differences between visual abilities pre and post-measurements for experimental group in favor of post measurement.

Table (2):
Statistical Significant Differences between Pre and Post Visual Abilities Measurements for Control Group (n = 15)

Variables	Pre Test		Post Test		T value	sig	Change ratio
	Mean	Std.	mean	Std.			

			Deviation		Deviation			
Vision peripheral (mark)		2.13	0.92	2.53	0.64	2.10	.054	18.75
Visual tracking (mark)		2.20	0.68	2.53	0.64	2.65	.019	15.14
Visual focus (mark)		3.47	0.99	3.80	0.68	1.58	.136	9.60
Depth perception (mark)		4.40	1.12	4.98	0.83	2.73	.003	13.11
Visual reaction speed (score)		7.00	1.25	7.47	0.99	2.82	.014	6.67
Static visual acuity (mark)		1.93	1.16	2.13	0.92	1.15	.271	10.35
Dynamic visual acuity (mark)		3.40	1.06	3.80	0.94	2.45	.028	11.76
Eye-Hand-Body coordination (second)		10.83	1.92	11.73	1.84	1.79	.308	8.31
(Dominant eye) Vision field Perception	Up vertical (cm)	62.20	1.97	62.77	2.09	0.37	.719	0.92
	Down vertical (cm)	51.67	2.19	52.19	2.28	0.81	.433	1.01
	Right horizontal (cm)	73.13	2.93	72.07	1.34	2.09	.056	1.46
	Left horizontal (cm)	65.20	3.34	65.78	3.19	1.00	.334	0.89

Table (5) findings reveal existence of statistical significant differences in some visual abilities between pre and post-measurements for control group namely (visual tracking, depth perception, visual reaction speed, dynamic visual acuity) in favor of post measurement. While, the remaining visual abilities differences (Vision peripheral, visual focus, static visual acuity, and eye-hand-body coordination) was found that not statistically significant.

Table (3):
Statistical Significant Differences for Visual Abilities Post Measurements between Experimental and Control Group

Variables		Experimental Group (n= 15)		Control Group (n= 15)		T value	sig	Change ratio
		mean	Std.Deviation	mean	Std.Deviation			
Vision peripheral (mark)		3.53	0.92	2.53	0.64	3.47	.000	41.84
Visual tracking (mark)		3.53	0.62	2.53	0.64	7.84	.000	36.3
Visual focus (mark)		4.93	0.26	3.80	0.68	6.06	.000	32.68
Depth perception (mark)		4.87	0.83	8.00	1.51	7.03	.000	56.85
Visual reaction speed (score)		8.67	0.72	7.27	1.34	3.57	.000	17.14
Static visual acuity (mark)		3.12	1.19	2.13	0.92	3.62	.000	45.8
Dynamic visual acuity (mark)		4.87	0.35	3.80	0.94	4.11	.000	18.61
Eye-Hand-Body coordination (second)		8.01	1.07	11.73	1.84	3.21	.007	14.21
(Dominant	Up vertical (cm)	67.87	2.26	62.77	2.09	3.27	.000	7.15
eye)	Down vertical (cm)	55.60	2.32	52.19	2.27	3.34	.000	6.88
Vision field	Right horizontal (cm)	77.93	2.80	72.07	1.33	4.33	.000	4.91
perception	Left horizontal (cm)	69.60	3.44	65.78	3.18	3.80	.000	4.24

Table (3) results reveal existence of statistical significant differences for visual abilities post measurements between experimental and control group in favor of experimental group.

Table (4):
Statistical Significant Differences between Pre and Post Attack Shots Performance Accuracy Measurements for Experimental Group (n = 15)

Variables	Pre Test		Post Test		T value	sig	Change ratio
	Mean	Std. Deviation	mean	Std. Deviation			
Forehand smash (mark)	2.93	1.10	4.70	0.99	9.44	.000	60.28
Forehand drop shot (mark)	1.93	1.39	3.23	1.03	7.08	.000	67.15
Forehand clear (mark)	3.80	2.18	5.93	1.71	6.34	.000	56.13
Forehand lob (mark)	2.07	1.53	3.20	1.60	5.59	.000	54.91

Table (4) clarified that existence of statistical significant differences between attack shots performance accuracy pre and post measurements for experimental group in favor of post measurement.

Table (5):
Statistical Significant Differences between Pre and Post Attack Shots Performance Accuracy Measurements for Control Group (n = 15)

Variables	Pre Test	Post Test	T value	sig	Change

	Mean	Std. Deviation	mean	Std. Deviation			ratio
Forehand smash (mark)	2.33	1.11	1.87	0.99	2.43	.029	20.02
Forehand drop shot (mark)	1.07	0.96	1.40	1.24	1.79	.096	31.21
Forehand clear (mark)	2.27	2.02	2.73	1.79	1.97	.068	20.56
Forehand lob (mark)	1.53	1.55	1.80	1.40	0.70	.499	17.22

Table (5) revealed that differences between some attack shots performance accuracy namely (forehand drop shot, Forehand clear shot, and lob attacking shot) were not statistically significant regarding control group. While, there were statistical significant differences at 0.05 level in forehand smash performance accuracy test.

Table (6):
Statistical Significant Differences for Post Attack Shots Performance Accuracy Measurements between Experimental and Control Group

Variables	Experimental Group (n= 15)		Control Group (n= 15)		T value	sig	Change ratio
	Mean	Std. Deviation	mean	Std. Deviation			
Forehand smash (mark)	4.70	0.99	1.87	0.99	9.79	.000	40.26
Forehand drop shot (mark)	3.23	1.03	1.40	1.24	5.59	.000	35.94
Forehand clear (mark)	5.93	1.71	2.73	1.79	5.00	.000	35.57
Forehand lob (mark)	3.20	1.60	1.80	1.40	4.02	.000	37.69

Table (6) showed that existence of statistical significant differences between attack shots performance accuracy post-measurements between experimental and control group in favor of experimental group.

Discussion:

As regard experimental group, table (1) results revealed statistical significant differences between pre and post visual abilities measurements (vision peripheral, visual tracking, visual focus, depth perception, visual reaction speed, static visual acuity, dynamic visual acuity, eye-hand-body coordination, and vision field perception) with high improvement in post measurements. Also it was found that change ratio between both measurements in the same group that ranged between (5.13 %: 60.59%).

This improvement in visual abilities within experimental group can be attributed to the effectiveness of the training program that used to develop visual abilities, which included a set of general visual exercises and visual exercises similar to the badminton motor performance. Furthermore, it can be explained this improvement due to visual exercises highly attractive that made players high willing to do it.

This finding is consistent with Hamza (2014) who indicated that the visual exercises are important for both athletes and non-athletes, which must be exercised by everyone. Especially eye exercises to overcome the visual stress, which affects negatively on vision abilities with time progress. Also this study finding is in harmony with Seller (2004) who illustrated that visual abilities could be evaluated, trained, practiced, and improved.

Moreover, visual abilities play an important role in performance effectiveness and it can be developed through designing good visual training programs (F. Hassan, 2004). Also Abdel-Rahman (2008), Ahmad (2009) and Khatab & Rashad (2005) were pointed out the positive effect of visual training programs in improving athletes' visual abilities and skills.

Table (2) results clarified that existence of statistical significant differences between pre and post-measurements in some visual abilities for control group namely (visual tracking, depth perception, visual reaction speed and dynamic visual acuity) with change ratio (15.14, 13.11, 6.67 and 11.76) respectively. These results are in favor of post measurement. Also it was found change ratio between both measurements in control group that ranged between (0.89%: 18.75%). As regarding other visual abilities, it was clarified that no statistical significant differences in the same group.

These findings attributed this improvement that has been occurred to some visual abilities within control groups are logical and acceptable. It is due to the traditional program, which they trained with and players` commitment of presence in the training where repeating of performance leads to improvement. While for other variables that with no improvement are due to non-using of the training methods used to develop visual abilities and non-using of visual programs in players` preparation as well as the lack of training goals clarity , where the player perform the

exercises without thinking or invent or imagine. This results are agreement with Abdullah (2011) and Alghalmy (2009).

Table (3) revealed that statistical significant differences for post-measurements visual abilities between experimental and control group in favor of experimental group. Also experimental group superseded control group by change ratio (4.24 %:56.85%).

This improvement related to visual abilities in experimental group may be reasonable for the effectiveness of visual training program. While the control group trained with traditional exercises, despite of the importance of visual exercises in badminton.

Homer Rice Center (2015) and Visual Fitness Institute (2015) proved that visual abilities are similar to physical skills can be learned, training and practice and development. For this not only strongly vision acuity 6/6 which is essential, but also athletes' ability to use cascaded information to them from their eyes to the performance within the court.

Regarding attack shots performance accuracy as clarified in Table (4). It was observed that statistical significant differences between pre and post measurements for experimental group in favor of post measurement with change ratio ranged between (54.91%: 67.15%).

This improvement in badminton attack shots performance accuracy could be attributed to training program, which included a general visual exercises and visual exercises related to visual performance skills. In addition the visual exercises related to performance lead to skill performance development.

These results came in agreement with Hammad (2002) Z. M. Hassan (2004) and Rateb (2000). Who assured about importance of training with more than one stimulus in the visual field. As this increases individual's attention capacity by focusing his attention for more than one stimulus so, visual abilities and skills play a crucial role during matches through player's ability to locate his competitor place and free places in the court. Therefore the player can see and recognizes the competitor's movements and can take the appropriate decisions for that.

Concerning control group, Table (5) results revealed that no statistical significant differences between pre and post measurements attack shots performance accuracy except in forehand smash performance accuracy test with change ratio 20.02%.

Non-significant differences in the most badminton attack shots accuracy can be explained by non-using of visual training program to prepare players. On the other hand the researcher attributed the improvement in forehand smash shot to its importance in badminton. And also it distinguishes by its enjoyment and very high speed during performance. That always motivate players to learn this shot and it considered the most shots which achieve high scoring points.

This findings are in harmony with EL-Gizawy (2007) who confirmed that the smash shot is one of the important shots in badminton. That enables the player to gain the point. Due to high speed to shuttlecock which sometimes reach to 300 km/hr.

It was found that statistical significant differences for attack shots performance accuracy post-measurements when compared between experimental and control group in favor of experimental group with change ratio ranged between (35.57%: 40.26%) as clarified in table (6).

High improvement to experimental group than control group in badminton attack shots performance accuracy (forehand smash- fore hand drop shot – forehand clear shot – lob attacking shot) could be reasonable to the training program. This led to improvement in visual abilities that develops attack shots accuracy.

These findings are agreement with Hassanein (2011) and Thomas & Wilson (2004) who found that visual skills improvement led to improved skills performance within athletes in various sports.

The current research findings are consistent with Marie & Mohib (2001), where they found that visual acuity usually weaken in sport activities which athlete needs to move his eye continuously in order to follow a series of visual stimuli, whether static or dynamic. Therefore, visual training had a significant effect in improving players` skills performance level.

Conclusion:

The visual training had good effect on accuracy of attack shots performance in badminton (forehand smash shot, forehand drop shot, forehand clear shot, and lob attacking shot) through improvement of visual abilities (vision peripheral. visual tracking, depth perception, vision field perception, static visual acuity, dynamic visual acuity, visual reaction speed, visual focus, and eye-hand-body coordination). On the other hand, traditional training in badminton also had effect on some visual abilities namely (visual tracking, depth perception, visual reaction speed and dynamic visual acuity) and on forehand smash accuracy shot performance. Therefore, the researcher recommended that, visual training to be an essential part in badminton

players' training and establish special laboratory for visual measurements within clubs and sports institutions.

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