The Effect of Developing Some Psychokinetic Capabilities on the Attention Characteristics and Performance Level of Some offensive Skills of Volleyball juniors

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Abstract: This research aims to develop a proposed training program for improving psychokinetic capabilities (the simple reaction of arms, the reaction accuracy on a moving target, the perception of angular orientation of the wrist, and the flexibility of neuromodulation). It also aims to identify its effect on the attention characteristics (attention focus, attention distribution, and divert attention), and the accuracy of performing some offensive skills (overhead passing, overhand serve, and straight spike) for volleyball under 16-year juniors. The researcher has used the experimental method by adopting an experimental design of pre and pot-test for two groups, one is experimental, and the other is control, on a sample of 20 young players. They have been divided into two groups, experimental and control. Each of them has 10 young players of Faqus Sports Club and Elseka Elhadid Sports Club in Al-Sharkia Volleyball Region. It is registered in the Egyptian Federation of Volleyball in the sports season in 2009/2010. The program has been applied to the experimental research sample from 06/30/2010 to 09/07/2010 for 10 continuous weeks. The results indicated that there were significant differences in the progress ratios of the effect of the training program for the experimental group rather than for the control group in the psychokinetic capabilities under discussion, the attention characteristics, and the accuracy of performing offensive skills (overhead passing, overhand serve, and straight spike) of volleyball under 16-year juniors.
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Key words: Psychokinetic capabilities, simple reaction of arms, reaction accuracy on a moving target, attention characteristics, offensive skills.

1. Introduction

The sports psychology is one of the important sciences to both processes of sports training and athletic competitions. It concerns about discussing psychological topics related to sports activity in various fields and levels. It also studies the psychological characteristics and traits of character that forms the self-basis of sports activity in order to develop this kind of human activity, and try to find out the scientific solutions to various applied problems.

Rateb (2004) indicates that the secret of excellence in sports competitions mainly depends on how athlete benefits from their psychological, physical, and mental abilities. Successful athletic performance is, therefore, the result of physical and psychological powers, which are two sides of the same currency that we can not distinguish between them. **[1]**

Ahmed, K and Ali, A (1996) indicates To boost the importance of the physical and mental power flow in one direction**, Annan** indicates that a lot of players did not win in the competitions in which they were very close to winning as a result of controlling the neural reactions on the body and mind instead of controlling and directing them for the benefit of performance through self-restraint, emotional balance, the ability to remember and understand the competitive environment. **[2]**

Allawi and Nasr elddin (2002) indicates that the athlete's success or failure to show their best abilities and skills in sports competition lies in the integration process between motor and physical skills (such as motor skills, tactical capacities, and physical attributes, such as the muscle ability, speed, endurance, flexibility, and agility), and between psychokinetic capabilities (attention, neuromodulation flexibility, ability to remember, and kinesthetic capacities) and other psychokinetic capabilities. **[3]**

Ibrahim (1997) Fawzy (1998), Al-Komi (2001a), Al-Komi (2001b), Yusuf (2002), and Abdullah (2006) agreed that psychokinetic capabilities associated with the level of motor performance in individual and team sports are "simple and compound reaction time, reaction accuracy on a moving target, attention, neuromodulation flexibility, ability to remember, and kinesthetic capacities." **[4-9]**

The efficiency of the mental processes is primarily determined by the safety condition of the nervous system. Several indicators can demonstrate

that, including the maximum frequency of movement, which also reflect the flexibility of individual's neural processes. **[10]**

Attention deficit is one of the most important problems in the sports field because it leads to mental errors during the motor performance. Therefore, training of control in focus attention is considered one of the important psychological skills to performance success and enjoyment. In addition, the excellence in performance only happens when the player achieves optimal energy through controlling the focus attention. **[38]**

Davis *et al.* (1995), Allawi & Nasr Elddin (2001) and Hassanein (2004) indicted that the types of reaction are: simple reaction, composite reaction, and the reaction accuracy on a moving target. **[11, 12, 13]**

Arnold, P (2007) states that the high accuracy of kinesthetic perceptions increases the ability of the individual athlete to conscious control and direction of the movement as a whole in space or his limbs to each other. [14**]. Davis et al. (1995)** added that the player needs a high degree of kinesthetic perceptions that contribute to supply him with adequate information he needs to make the right decision to perform a certain motor skill under changing circumstances and different amounts of speed and power and time. [11]

The skill level of the volleyball team is the final outcome, which reflects the extent of either individual or collective skill performance of the team. The full perfection of motor skills is the ultimate goal of the process of skill preparation, which is based upon access to the highest sports levels. [15, 16, 18]

The researcher indicates that spiking skills (overhead passing skill, overhand serve, and straight spike) are one of the most basic skills closely related to psychological aspect. This is due to the performance of these skills requires the availability of a great deal of stability, emotional balance, self-confidence, and a high ability to focus attention, distribution of attention, divert attention on the performance from the beginning stages until the fall of the ball in the opponent team's court.

The researcher, through his practical and scientific experience in volleyball, noticed the low accuracy of the performance of some offensive skills (overhead passing skill, overhand serve, and straight spike) of volleyball under 16 year juniors. He attributes the reason of low accuracy performance to the lack of standardized training programs for volleyball youngsters in general, and training programs to develop psychokinetic capabilities in particular. Volleyball trainers are actually interested in physical, skill, and tactical preparation without any attention to psychological aspect of volleyball youngsters. Although tactical and skill performance in volleyball sport depends on what the young player owns of the physical, technical, psychological and mental capabilities.

Hence, the idea of this research was formulated to develop the proposed training program for developing some psychokinetic capabilities, and to identify its impact on the attention characteristics, and the performance accuracy of some spiking skills (overhead passing skill, overhand serve, and straight spike) of volleyball under 16 year youngsters.

2. Material and Methods

The researcher used the experimental method through the experimental design of pre and post-test to both experimental and control groups. The sample was intentionally selected of volleyball under 16 year youngsters of Faqus Sports Club and Elseka Elhadid Sports Club in Al-Sharkia Volleyball Region and registered at the Egyptian Federation of Volleyball in the sports season 2009/2010. The total number of the sample before conducting the basic experiment was 30 volleyball under 16-year juniors. 10 of them were excluded for their involvement in the scoping study. The number of basic research sample, therefore, became 20 and was divided into two experimental and control groups, each of them had 10 volleyball under 16-year youngsters.

The researcher ascertained the extent of moderation of basic research sample distribution in the variables under discussion. All skewness coefficients of the variables (age, height, weight, training age) ranged between (0.24 - 0.95). That is, they confined between (± 3), which indicated the moderation of the research sample distribution in the growth rates and the performance accuracy of some offensive skills (overhead passing skill, overhand serve, and straight spike) in volleyball.

In addition to all skewness coefficients in psychokinetic capabilities under discussion and attention properties ranged between (0.07- 0.82). That is, they confined between (±3), which refers to moderation of the research sample distribution in these variables. The results showed that there were no statistically significant differences at the level of 0.05 between both experimental and control groups in psychokinetic capacities (under discussion) and the attention characteristics, which refers to the equality of the two groups of research in these variables.

Data collection tools:

I: Psychokinetic capabilities tests:

1- Electron scope to measure the simple reaction time and the reaction accuracy on a moving target.
2- The maximum frequency of movement Test.
3- Measuring the perception of wrist angular orientation:

The researcher used goniometer instrument to measure the perception of angular orientation of the wrist because it has high scientific coefficients (validity, reliability) and has been applied in many scientific studies such as the study of each of [26, 5, 27]

4- Bordon Anvemove Test:

The researcher used Bordon Anvemove Test to measure the attention characteristics focus attention- the distribution of attention - divert attention for volleyball youngsters. This test has been used in many scientific studies in the field of sports, including the study of each [7, 17, 28, 9, 4]

II: Skill tests under discussion:

1- The test of overhead passing accuracy.
2- The test of overhand serve accuracy.
3- The test of straight spike accuracy.

III: Devices and tools used in the research:

- Restameter to measure the length of the body.
- Goniometer instrument.
- Wooden graduated ruler in centimeters.
- Tape measure.
- Medical Scale to measure weight.
- Medical balls weighted 3 kg.
- Stopwatch.
- Legal volley balls.

Pilot Study:

Pilot study was conducted from 06/15/2010 to 24/06/2010 on a sample of 10 volleyball under 16-year youngsters. It was selected from the research sample and not from the basic sample to identify the appropriateness of the tests used for the research sample. The scientific coefficients were also conducted (validity - reliability) of the tests under discussion.

Proposed training program:

The parameters of proposed training program were identified through the literature review of scientific studies related to the research [6, 7, 8, 9, 17, 21, 28, 29, 30, and 32], and were as follows:

- The application period of the training program was 10 weeks.
- The number of weekly training units was 4 units.
- The time of training units was 60 minutes.
- The number of training units in the program was 40.
- The time of warm up was 15 minutes, and cool down time was 5 minutes during the training unit.
- Training intensity ranged in high-intensity interval training and oriented to develop the speed and reaction time from 75% to 100% of the player's ability.
- The size of training intensity ranged to develop the reaction time and the reaction accuracy on a moving target between 30 and 120 seconds.
- Heart rate was used in determining the rest periods, which lasted until the heart rate reached to 120 - 130 (BPM)

Pre-tests

Pre-tests were conducted from 25/06/2010 to 28/06/2010 to both experimental and control groups in psychokinetic capabilities, the attention characteristics, and the performance accuracy of some spiking skills in volleyball.

The application of proposed training program:

The content of the proposed training program was applied to the members of the experimental group in the time from 06/30/2010 to 09/07/2010 for 10 continuous weeks, while the traditional program was used with the control group.

Post-tests:

Post-tests were conducted from 08/09/2010 to 11/09/2010 after finishing the application of program content with the same order and conditions of pre-tests.

Statistical treatments:

Data were statistically treated by using the following statistical methods:

Mean-Standard Deviation-Median- Skewness - Correlation Coefficients - T. Test- Progress Ratios

3.Results and Discussion:

The results of table (1) indicated that there were statistically significant differences at the level 0.05 between pre and post-tests of the experimental group in psychokinetic capabilities (simple reaction of arms- reaction accuracy to a moving target- the perception of angular orientation of the wrist- the flexibility of neuromodulation) and the characteristics of attention in favor of the post-test.

The results of table (3) indicated that there were statistically significant differences at the level 0.05 between both post-tests of both experimental and control groups in psychokinetic capabilities under discussion, and attention characteristics in favor of the experimental group.

According to the researcher, this improvement in psychokinetic capabilities (under discussion) and the characteristics of attention in the experimental group is due to the effectiveness of the content of the proposed training program. It included motor duties in the form of proposed and standardized exercises, depending mostly on utilities in the training, such as hanging ball and searchlights, which work on developing the speed of simple reaction, reaction accuracy to a moving target, and maximum frequency of movement. The training program was divided into two main aspects, the first

one included exercises depending on visual stimuli and skill exercises for young players by using utilities so as to develop the time of simple reaction. The second aspect included exercises leading to develop of the speed of movement frequency. It has been taken into account in this exercise to be gradient from easy to difficult, and the intensity to be varying from 75 % to 100%. This has had the greatest effective impact in improving psychokinetic capabilities under discussion, and attention characteristics to volleyball under 16 year youngsters.

This result is consistent with the study's results of **Khaled (1997), Ibrahim (1997), Fawzy (1998), Mohamed (2000), El-komi (2001), El-komi (2001), Abdullah (2001), Yusuf (2002), Ajami (2004), Abdullah (2006), and Liu Zhang (2007)** indicating that the speed of simple and composite reaction, the reaction accuracy on a moving target and the attention characteristics can be improved through standardized training programs. [27، 4، 5، 32، 6، 7، 28، 8، 17، 9، 33]

This result is consistent with what referred by **Singer (1989)** that the player acquires the time of reaction characteristics, and the speed of movement during training by improving functional compatibility between the nervous and muscular systems, using conditional performance in the various exercises in the simulation of the activity itself. This is the best way to improve the performance and develop the reaction time. [34]

This result is also consistent with what indicated by **El- Arabi** (2001) that attention is a psychological skill can be learned and developed through psychomotor training and continuous effort. [35]

The results of (Table 2) indicated that there were no statistically significant differences between the pre and post-tests of the control group in all psychokinetic capabilities (under discussion) and attention characteristics.

The researcher attributed this result to the control group's sufficiency to the traditional training, which doesn't not often concern about the psychological aspect resulting in a lack of improvement in psychokinetic capabilities and attention characteristics.

The results of table (4) also showed that there were progress ratios of post-test of the experimental group in psychokinetic capabilities (under discussion) and characteristics of attention. The highest improvement percentage of the variable of reaction accuracy on a moving target (the second speed) was 104.76 %. And the lowest improvement percentage of the variable of the maximum frequency of movement was 13.11 % of the experimental group. While the highest improvement rate of the variable of the perception of angular orientation of the wrist was 22.22 %. Also, the lowest improvement percentage of the variable of simple reaction time of the left hand was 2.21 % of the control group.

This result is consistent with what indicated by **Bassiouni and Fadel (1994)** that psychological operations (psychokinetic capabilities - attention) can be upgraded through giving due attention to quality of exercises which have a private nature during implementation due to their relation to different characteristics of attention (focus- divert - distribution). [36]

Abdel Maksoud (1985) added that the standardized training with a clear objective is working to develop the reaction time and the reaction accuracy on a moving target. [37]

The results of table (5) indicated that there were statistically significant differences at the level 0.05 between pre and post-tests of the experimental group in the accuracy performance of some offensive skills (overhead passing skill, overhand serve, and straight spike) in volleyball in favor of the post-test.

The results of table (7) indicated that there were statistically significant differences at the level 0.05 between both post-tests of both experimental and control groups in the performance accuracy of some offensive skills in volleyball in favor of the experimental group.

According to the researcher, this improvement in the performance accuracy of some offensive skills in volleyball is due to the appropriate content of the proposed training program, which in turn led to the development of psychokinetic capabilities (under discussion) and the characteristics of attention, which had a deep impact in improving the performance accuracy of offensive skills of the volleyball under 16 year youngsters.

This result is consistent with what was **said by Galal, and Allawi** (1989) that the characteristics of attention play an important role in physical activity for being the foundation upon which other mental processes are built such as perception, recall, and visualization. The more attention is pure, the more perception is true. [24]

This result is also consistent with the results of a study conducted by **Mohamed (1997), Ibrahim (1997), fawzy (1998), Mohamed (2000), El-Komi (2001), El-Komi (2001), Mohamed (2001), Yusuf (2002), Ajami (2004), Abdullah (2006), and Zhang Liu (2007)** indicating that the development of psychokinetic capabilities and attention characteristics have a positive effect on the accuracy of motor performance of the athletes. [27، 4، 5، 32، 6، 7، 28، 8، 17، 9، 33]

The results of table (6) indicated that there were statistically significant differences at the level

0.05 between both pre and post-tests of experimental group in the performance accuracy of some offensive skills in volleyball in favor of post-test.

According to the researcher, the improvement occurring to the members of the control group in performing some offensive skills in volleyball is due to that coaches are giving due attention of skill and tactical preparation through training units.

The results of table (8) indicted that there were progress ratios of post-test rather than pre-test of both experimental and control groups in the the performance accuracy of some offensive skills in volleyball in favor of the experimental group. The researcher attributes these results to the effectiveness of the proposed training program that applied to the experimental group.

This result is consistent with what indicated by **Rateb,o** (2001) that the development of psychokinetic capabilities related to performance is essential as they allow for providing optimal psychological energy that helps the player to mobilize his physical, emotional and mental forces, which leads to enhance motor performance. [38]

Table (1): Significant differences between pre and post-tests of the experimental group in psychokinetic capabilities and attention characteristics (under discussion) *n* = 10

Variables	Measurement unit	Pretest		Posttest		*t* value
		Q	*P*	Q	*P*	
Simple reaction time of the right arm	Sec.	0.226	0.08	0.138	0.06	5.82*
Simple reaction time of the left arm	Sec	0.229	0.09	0.127	*0.05*	5.39*
The reaction accuracy on a moving target of the favorite arm (first speed)	Degree	3.70	1.57	2.00	1.19	4.77*
The reaction accuracy on a moving target of the favorite arm (second speed)	Degree	4.30	1.84	2.10	1.26	6.12*
The maximum frequency of movement	Times	58.80	3.99	66.50	3.52	5.95*
The perception of angular orientation of the wrist:	Degree	4.20	1.71	2.30	1.18	4.74*
Attention Characteristics:						
Focus Attention	Degree	9.20	*2.15*	12.80	1.86	4.21*
Divert Attention	Degree	10.60	2.61	14.90	2.30	4.37*
Attention distribution	Degree	11.50	3.14	15.20	2.81	4.15*

Tabular *t* value at 0.05 = 2.262
***Significant at 0.05**

Table (2) Significant differences between pre and post-tests of the control group in psychokinetic capabilities and attention characteristics (under discussion) *n* = 10

Variables	Measurement unit	Pretest		Posttest		*t* value
		Q	*P*	Q	*P*	
Simple reaction time of the right arm	Sec.	0.227	0.09	0.221	0.05	0.63
Simple reaction time of the left arm	Sec	0.231	0.11	0.226	*0.07*	0.56
The reaction accuracy on a moving target of the favorite arm (first speed)	Degree	3.80	1.64	3.30	1.25	0.72
The reaction accuracy on a moving target of the favorite arm (second speed)	Degree	4.50	1.88	3.70	1.39	0.80
The maximum frequency of movement	Times	58.10	3.94	59.90	3.17	0.89
The perception of angular orientation of the wrist:	Degree	4.40	1.65	3.60	1.24	0.73
Attention Characteristics:						
Focus Attention	Degree	9.00	*2.11*	9.90	1.89	0.92
Divert Attention	Degree	10.30	2.59	11.10	2.17	0.75
Attention distribution	Degree	11.10	3.02	12.00	2.64	0.79

Tabular *t* value at 0.05 = 2.262
***Significant at 0.05**

Table (3) Significant differences between pre and post-tests of both experimental and control groups in psychokinetic capabilities and attention characteristics (under discussion)

Variables	Measurement unit	Exp. group *n* = 10		Con. group *n* = 10		*t* value
		Q	*P*	Q	*P*	
Simple reaction time of the right arm	Sec.	0.138	0.06	0.221	0.05	3.19*
Simple reaction time of the left arm	Sec	0.127	*0.05*	0.226	*0.07*	3.41*
The reaction accuracy on a moving target of the favorite arm (first speed)	Degree	2.00	1.19	3.30	1.25	2.24*
The reaction accuracy on a moving target of the favorite arm (second speed)	Degree	2.10	1.26	3.70	1.39	2.54*
The maximum frequency of movement	Times	66.50	3.52	59.90	3.17	4.18*
The perception of angular orientation of the wrist:	Degree	2.30	1.18	3.60	1.24	2.28*
Attention Characteristics:						
Focus Attention	Degree	12.80	1.86	9.90	1.89	3.28*
Divert Attention	Degree	14.90	2.30	11.10	2.17	3.62*
Attention distribution	Degree	15.20	2.81	12.00	2.64	2.50*

Tabular *t* value at 0.05 = 2.101
***Significant at 0.05**

Table (4) Progress ratios of post-test rather than pre-test of both experimental and control groups in psychokinetic capabilities and attention characteristics (under discussion)

Variables	Exp. group *n* = 10			Con. group *n* = 10		
	Pre	Post	Progress ratios	Pre	Post	Progress ratios
Simple reaction time of the right arm	0.226	0.138	63.77%	0.227	0.221	2.71%
Simple reaction time of the left arm	0.229	0.127	80.31%	0.231	0.226	2.21%
The reaction accuracy on a moving target of the favorite arm (first speed)	3.70	2.00	85.00%	3.80	3.30	15.15 %
The reaction accuracy on a moving target of the favorite arm (second speed)	4.30	2.10	104.76%	4.50	3.70	21.62 %
The maximum frequency of movement	58.80	66.50	13.11%	58.10	59.90	3.10%
The perception of angular orientation of the wrist:	4.20	2.30	82.61%	4.40	3.60	22.22 %
Attention Characteristics:						
Focus Attention	9.20	12.80	39.13%	9.00	9.90	10.00 %
Divert Attention	10.60	14.90	40.57%	10.30	11.10	7.77%
Attention distribution	11.50	15.20	32.17%	11.10	12.00	8.11%

Table (5) Significant differences between pre and post-tests of the experimental group in skill variables (under discussion) *n* = 10

Variables	Measurement unit	Pretest		Posttest		*t* value
		Q	*P*	Q	*P*	
The accuracy of overhead passing.	*Degree*	18.50	2.91	24.80	2.31	4.37*
The accuracy of overhand serve.	Degree	*24.80*	*3.28*	31.50	3.16	4.92*
The accuracy of straight spike.	*Degree*	2.20	*1.01*	3.90	0.85	3.81*

Tabular *t* value at 0.05 = 2.262
***Significant at 0.05**

Table (6) Significant differences between pre and post-tests of the control group in the skill variables (under discussion) *n = 10*

Variables	Measurement unit	Pretest		Posttest		*t* value
		Q	*P*	Q	*P*	
The accuracy of overhead passing.	*Degree*	18.10	2.86	21.00	2.24	2.61*
The accuracy of overhand serve.	Degree	24.20	3.33	27.40	3.02	2.37*
The accuracy of straight spike.	*Degree*	2.00	1.00	3.00	0.91	2.49*

Tabular *t* value at 0.05 = 2.262
***Significant at 0.05**

Table (7) Significant differences between pre and post-tests of both experimental and control groups in the skill variables (under discussion)

Variables	Measurement unit	Exp. group *n* = 10		Con. group *n* = 10		*t* value
		Q	*P*	Q	*P*	
The accuracy of overhead passing.	*Degree*	24.80	2.31	21.00	2.24	3.55*
The accuracy of overhand serve.	Degree	31.50	3.16	27.40	3.02	2.81*
The accuracy of straight spike.	*Degree*	3.90	0.85	3.00	0.91	2.143*

Tabular *t* value at 0.05 = 2.101
***Significant at 0.05**

Table (8) Progress ratios of post-test rather than pre-test of both experimental and control groups in the skill variables (under discussion)

Variables	Exp. group *n* = 10			Con. group *n* = 10		
	Pre	Post	Progress ratios	Pre	Post	Progress ratios
The accuracy of overhead passing.	18.50	24.80	34.05%	18.10	21.00	16.02%
The accuracy of overhand serve.	*24.80*	31.50	27.02%	24.20	27.40	13.22%
The accuracy of straight spike.	2.20	3.90	77.27%	2.00	3.00	50.00%

Findings:

The researcher concluded the following findings:

1- There are statistically significant differences at the level 0.05 between both pre and post-tests of experimental group in psychokinetic capabilities under discussion and attention characteristics in favor of post-test.
2- There are statistically significant differences at the level 0.05 between pre and post-tests of the experimental group in the accuracy of some offensive skills performance (overhead passing skill, overhand serve, and straight spike) in volleyball in favor of the post-test.
3- There are statistically significant differences between pre and post-tests of the control group in the accuracy of some offensive skills performance (overhead passing skill, overhand serve, and straight spike) in volleyball in favor of the post-test.
4- There are no statistically significant differences between the pre and post-tests of the control group in psychokinetic capabilities (under discussion) and attention characteristics.
5- The progress ratios occurring to the the impact of the training program for members of the experimental group rather than for members of the control group in psychokinetic capabilities (under discussion), and the accuracy of performing some offensive skills (overhead passing skill, overhand serve, and straight spike) of volleyball under 16 year youngsters increased.

Recommendations:

1- Paying due attention to apply the proposed owing to its effective impact on improving the psychokinetic capabilities and the accuracy of performing some offensive skills (overhead passing skill, overhand serve, and straight spike) for volleyball under 16 year youngsters.
2- Giving due attention to exercise and training situations that contribute to develop the simple reaction time, the reaction accuracy to a moving

target, the perception of angular orientation of the wrist, and the maximum frequency of the movement because of its positive impact on the accuracy of performing the offensive skills of the volleyball youngsters.

3- The necessity to make psychological preparation for volleyball under 16 year youngsters.
4- Conducting similar research on psychokinetic capabilities and other volleyball youngsters' skills under 16 years, in different age stages.

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