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Original article

Investigation of the effect of kinetic brain exercises on agility and attention in tennis beginner

Emrah Atay
Faculty of Sports Sciences, Burdur Mehmet Akif Ersoy University, Burdur, Turkey

Abstract. *Study Objectives:* The aim of this study was to investigate the effects of kinetic brain exercises on attention and agility in beginners of tennis. *Methods:* Ten people with mean age of 23.70±0.21 years, a mean height of 1.69±0.03 m, and a mean body weight of 69.50±13.95 kg participated in the study voluntarily. In addition to basic tennis skill training, the participants were given 30 minutes of kinetic brain exercises 3 days a week for 10 weeks. D2 attention test and agility test were applied to determine the change in the performance of the participants. The data were analyzed in SPSS 22 statistical program and the Paired-T test was applied in statistical analysis, the significance value was determined as $p<0.05$. *Results:* Although there was an positive improvement in the attention levels of the participants, the difference was not statistically significant ($p>0.05$). Significant improvement was observed in the concentration and agility scores of the participants ($p<0.05$). *Conclusion:* Kinetic brain exercises contribute positively to the attention and agility abilities of the tennis beginners and affect their performance positively. Therefore kinetic brain exercises should be included in every stage of tennis beginners' training plans.

Key words: Attention, Agility, Kinetic brain exercises

Introduction

Brain exercises aim to renew the connection between the brain lobes or to establish new connections. It is advocated that neural connections between hemispheres can be improved through brain exercises. For this, brain exercises are applied to work each hemisphere or each lobe at the same time (1). In motor learning, the brain goes into a rearrangement. For this, it is necessary to create new connections between neurons or to rearrange existing neural connections. A neuron communicates with many neurons. Therefore, brain exercises are effective in structuring the connections of each neuron (2).

Because of kinetic brain exercises are complex, new neural connections are likely to be established. With the establishment of new connections, coordination, balance, and visual deficiencies are decreased and improved (3). It is ensured that the brain and body concentrate on different tasks by giving different visual stimuli to people through physical activities and by providing new neural connections, these connections are improved (4).

Kinetic brain exercises renew neural connections or create new connections (3). It enables the brain to respond faster by constantly stimulating the nerves with sequential movements and sending messages to the relevant lobes of the brain. Rejuvenation of the nerves with the exercises performed is effective in solving the balance problem, improving coordination, developing motor skills, and preventing the regression of cognitive functions such as perception and memory (1).

Kinetic brain exercises increase mental functions and efficiency (5). It is aimed to increase the performance in sports through kinetic brain exercises. Studies

have reported that brain exercises increase concentration and contribute positively to physical and motor characteristics (6). Especially in athletes, it is aimed to increase balance, coordination, and attention through brain exercises. Studies have reported that kinetic brain exercises positively affect performance by contributing to the cognitive processes and motor skills of athletes (6). All these biomotor skills are important elements for tennis performance (7). In order to increase the performance of tennis players, training practices should be done to improve biomotor characteristics, coordination, concentration and attention (8-10).

In this study, it was aimed to investigate the effect of basic tennis training supported by kinetic brain exercises on agility and attention on beginners of tennis.

Material and Method

Study design

In the study, in addition to teaching basic tennis technical skills to individuals who have just started tennis, kinetic brain exercise training was done. Training is planned three days a week for 10 weeks. Unit training was applied as approximately 120 minutes. Kinetic brain exercises were applied approximately 30 minutes after the warm-up period of each unit training.

Kinetic brain exercises are performed from easy to difficult as follows: change of direction to the opposite of what is said, changing direction by throwing the ball high, eyes closed diverting study, mutual double hand cross ball throwing, mutual double hand parallel ball throwing, double-hand cross ball throwing by bouncing to the ground, double parallel ball throwing practice by bouncing the ground, walking exercises by bouncing parallel and cross balls. It has been applied individually and in combinations. In the remaining 90 minutes of the unit training, basic tennis technical skill training was performed in addition to the warm-up and cooling training. Data were taken just before starting training (pre-test) and immediately after training (post-test).

In the application of kinetic brain exercises, it has gone from easy to difficult. Studies performed in the first week include simpler exercises. As the weeks progressed, the exercises turned into more challenging and more complex exercises.

Participants

Ten individuals with a mean age of 23.70±0.21 years participated in the study. Participants have a mean height of 1.69±0.03 m and a body weight of 69.50±13.95 kg.

Data Collection

Height and weight measurement

Height measurement was measured in meters with an accuracy of ±1 mm with a Holtain stadiometer, body weight was measured with an accuracy of ±100 g in Tanita TBF-401A.

Attention Test

Participants' attention characteristics were measured with the D2 attention test, which was developed by Brickenkamp (1981) and measures continuous attention and visual scanning ability. Before the measurements, the test was explained and the sample part was applied to the participant. The test was carried out by the procedure in a quiet environment free from different stimuli (11).

Agility Test

In the agility test, the athletes were asked to run a total distance of 36.576 meters as soon as possible (9.144 meters from A to B, 4.572 m with shear steps from B to C, 4.572 m with shear steps from point C to point B, 4.572 m with shear steps from B to D, 4.572 m with shear steps from D to B and finally running back from point B to point A). The time is recorded in seconds.

Statistical Analysis

Study data were made using SPSS 22 package program. Before analyzing the data, the homogeneity of the measurement values was checked. Normality was determined by Shapiro Wilk test. The Paired t test was used for dependent groups to determine the

difference in attention and agility values before and after kinetic brain exercises. The level of significance was evaluated according to the "p<0.05" significance level.

Result

The evaluation of the effects of kinetic brain exercises on attention and attention test sub-parameters is shown in **Table 1**.

When **Table 1** was examined, it was seen that the attention level of the participants increased from 561.40±31.08 to 564.60±54.78 [p = 0.852] but the positive development in between was not statistically significant (p>0.05). It was observed that the concentration level of the participants increased from 209.90±38.36 to 239.10±23.74 [p = 0.033] and the difference was statistically significant (p<0.05). In the FR score, which is an indicator of low motivation level, it was observed that there was a positive decrease from 11.40±7.38 to 9.00±4.66 [p = 0.413]. However, this decline was not statistically significant (p>0.05). In the E score, which indicates Error rate, there was a positive decrease from 5.14±2.04 to 4.45±2.20 [p = 0.332]. But the difference was not statistically significant (p>0.05).

When **Table 2** was examined, it was seen that the agility tests of the participants decreased positively from 12.39±2.04 to 11.42±1.49 [p = 0.01]. This decreased rate is statistically significant (p<0.05).

Discussion

Brain exercises are a combination of cognition, multitasking, and physical activity exercises. These exercises activate the brain's working system. Kinetic brain exercises improve concentration, motivation, attention, stress resistance, and memory (10). It has been observed that 10-week kinetic brain exercises supported by basic tennis level training have a positive effect on attention, error rate, and motivational performance, and significantly increase concentration and agility.

In the study by Komarudin and Awwaludin (2018), it is reported that brain exercises have a positive contribution to the development of physical abilities, coordination, and agility (12). Tafaqur, Komarudin. and Saputra (2017) found in their study on tennis players that brain exercises increase motivation and learning level of tennis skills (10). Thomas (2012) found in

Table 1. Comparison of Participants' Attention Measures

Attention test	Test Sequence	Mean ±SD	t	p
TN-E (Test Performance)	Pre Test	561.40±31.08	-0.19	.852
	Post Test	564.60±54.78		
CP (Concentration)	Pre Test	209.90±38.36	-2.51	.033*
	Post Test	239.10±23.74		
FR (Low Motivation)	Pre Test	11.40±7.38	0.85	.413
	Post Test	9.00±4.66		
E (Error Rate)	Pre Test	5.14±2.04	1.02	.332
	Post Test	4.45±2.20		

*p<0.05

Table 2. Comparison of Agility Measures of Participants

	Test Sequence	Mean±SD	t	p
Agility Test (sn)	Pre Test	12.39±2.04	4.67	.001
	Post Test	11.42±1.49		

study that brain exercises increase cognitive function and long-term memory (13). Duda (2015) reported in study on football players that life kinetics studies accelerate the development of motor skills and increase sports efficiency by contributing positively to mental activities (3). Johann et al. (2016) reported that brain exercises positively affect attention, spatial perception, and memory (attention, spatial abilities, memory) (14). Komarudin (2018) reported in study that brain exercises contribute positively to the sportive performance by improving cognitive functions such as concentration and intelligence (4). Pietsch, Böttcher, & Jansen (2017) found that brain exercises significantly improved mental rotation ability (15). Tasgın H., Peker AT (2016) stated in their study that brain exercises have positive contributions on balance, rhythm, and coordinative abilities (16).

The findings in the studies in the literature that kinetic brain exercises have positive contributions to the performance development and concentration of athletes are in line with our study findings.

Conclusion

Kinetic brain exercises contribute to the neural learning process by creating new connections between brain cells. In particular, learning takes place through brain synaptic plasticity in areas of the brain related to vision, hearing, and motor skills. Thus, the tennis beginner grasps the movement quickly and makes a quick decision. Brain exercises improve cognitive abilities and contribute positively to the development of features such as attention and agility, which are important criteria for performance. This situation reflects positively on the performance of the tennis beginner. As a result, kinetic brain exercises should form part of the training planning of tennis beginner at all stages.

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Correspondence:
Emrah Atay
Burdur Mehmet Akif Ersoy University, Faculty of Sports Sciences, Burdur, Turkey
E-mail: emrahatay@mehmetakif.edu.tr