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THE EFFECT OF LIFE KINETIC TRAININGS ON COORDINATIVE ABILITIES[1]

LIFE KİNETİK ANTRENMANLARI'NIN KOORDİNATİF YETENEKLER ÜZERİNE ETKİSİ

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ABSTRACT

This study was aimed to examine the effect of life Kinetic trainings on coordinative abilities. 24 volunteers (12=control group, 12=Life Kinetic training) have participated in the study. Each group performed football school trainings. In addition to, life Kinetic trainings for 8 weeks was applied to the life Kinetic training group. There was a significantly decrease between pre and post test results of Life kinetic training group for balance foam error score, balance total error score, rhythm ability and orientation ability. There was no a significantly difference between pre and post test results of control group for balance floor error score, balance foam error score, balance total error score, rhythm ability, orientation ability and differentiation ability. In conclusion, it can be thought that life Kinetic effects on balance, rhythm ve orientation of coordinative abilities. On the other hand, it can be thought that life Kinetic doesn't effect on differentiation ability.

Anahtar Kelimeler: Life kinetic, coordinative abilities, children, sports

ÖZET

Bu araştırmanın amacı Life Kinetik antrenmanlarının koordinatif yetenekler üzerine etkisini incelemektir. Araştırmaya 12 kontrol, 12 deney grubunda olmak üzere futbola okulu öğrencisi olan toplam 24 çocuk ailelerinden izin alınarak dahil edilmiştir. Deney grubuna 8 haftalık life kinetik antrenman programı uygulanmış olup kontrol grubu ise sadece futbol okulu antrenmanlarına devam etmiştir. Deney grubunun denge minder hata puanı, denge toplam hata puanı, ritim yeteneği ve oryantasyon yeteneği son test sonuçları, ön test sonuçlarından anlamlı derecede düşük bulunmuştur ($p<0,05$). Deney grubunun denge düz zemin hata puanı ve ayrımla yeteneği ön test-son test sonuçları arasında anlamlı farklılık bulunmamıştır ($p>0,05$). Kontrol grubunun denge düz zemin hata puanı, denge minder hata puanı, denge toplam hata puanı, ritim yeteneği, oryantasyon yeteneği ve ayrımlama yeteneği ön test - son test sonuçları arasında anlamlı farklılık bulunmamıştır ($P>0,05$). Sonuç olarak, life kinetik antrenmanlarının koordinatif yeteneklerden denge, ritim ve oryantasyon yeteneği üzerine etkisinin olduğu, ayrımlama yeteneği üzerine ise etkisinin olmadığı düşünülmektedir.

Keywords: Life kinetik, koordinatif yetenekler, çocuklar, spor

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INTRODUCTION

Coordinative abilities are known as motor control and arrangement process. These abilities are basically based on the control and regulation processes of central nervous system (Nigam et al., 2014). Seven different abilities as Orientation, Differentiation, Rhythm, Balance, Reaction, Coupling and Adaptation ability generate coordinative abilities (Singh, 2014). However, five of these abilities are significant as basic elements in literature (Hirtz, 1988). Orientation can be defined as the ability of an athlete to be aware of his or her position with regard to time, place and changeable situation (Singh, 2014).

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In other words, orientation ability is that an athlete's perceive, analyze and determine position and movement of the whole body or its parts, position of teammates and opponents in space and time (Singh, 1991). Differentiation is the ability to exhibit separate body movement and mechanical phase of the whole movement in a high quality economically (Hirtz, 1988). Rhythm ability is an athlete's detection capability externally given rhythm and to reveal it in a motor action. It also means the ability to produce a rhythm, existing in motor memory, while performing a movement (Nigam et al., 2014). Balance can be described the ability to maintain body position which is essential for optimal performance in both a static condition and a dynamic condition (Erkmen et al., 2010). Reaction ability is the ability to initiate quickly and to perform rapid and well directed actions following a signal (Singh, 1991). Coordinative abilities are components of our motor system to decide actions and separate elements of actions. Coordinative abilities assist for learning faster and also to exhibit high level of performance (Chowdhary et al., 2014). Coordinative abilities are important performance components in order to exhibit conditional talents, technical and tactical skills in difficult conditions (Singh and Gaurav, 2014).

Life Kinetic is a way of training based on movement and entertainment in order to improve mentally athletes. Life Kinetic exercises affect all areas of brain to actively attend and overcome the formidable motions and thus, the training generates extra neural connections in parts of brain. It contains cognitive tasks, visual components and simultaneous complex exercises which consisted of different motion ways (Piffrader, 2018). As level of players and athletes develop, we can make Life Kinetic exercises more complicated with more visual and cognitive tasks to force their brain. In addition to, life Kinetic trainings can be differently designed for the skills of every athlete (Lutz, 2010). This extraordinary and complicated training model provides the coordination between physical exercise and lifelong learning. Life Kinetic contributes neuronal learning processes and produces new brain cells. A previous study has shown that elite athletes is among them World- and Olympic Champions, coaches in different sports and especially soccer such as Bayern München, Borussia Dortmund and German national soccer team players, have perceived the effect of Life Kinetic. Scientific studies display that Life Kinetic trainings improve your physical and mental well-being and your ability to concentrate, also you can delay symptoms of dementia by doing just one hour of Life Kinetic Training per week (Lutz, 2014b; Lutz, 2010; Piffrader, 2018). Life Kinetic is a new exercise program and there are not a lot of studies about life Kinetic in literature.

Therefore, the aim of this study is to determine effect of life Kinetic training on coordinative abilities.

MATERIAL AND METHODS

Participants

This investigation involved sectional design to evaluate the effect of life Kinetic training on coordinative abilities. A total of 24 children soccer players who are allowed by parents participated in this study after having all risks explained to them and their parents before the investigation. They were divided randomly into 1 of 2 groups: life Kinetic training group (LKTG; n = 12) and control group (CG; n = 12). The mean (SD) age was 12,75±1,36 years, height was 139±0,06 m, and weight was 33,75±7,40 kg for the life Kinetic training group; the mean (SD) age was 11,75±1,29 years, height was 141±0,08 m, and weight was 34,66±10,03 kg for the control group. None of the subjects reported any medical or orthopedic problems that would compromise his participation and performance in the study. The study conformed to the declaration of Helsinki. Prior to data collection, parents of all participants signed a university approved consent form. After receiving a detailed explanation of the study's

benefits and risks, parents of all subjects signed an informed consent document that was approved by the local ethics committee for medical and health research in Turkey (Project no:2013/25).

Measures

To evaluate the effect of life Kinetic training on coordinative abilities, we applied a testing procedure that included measurements of the Balance error scorring system, Numbered medicine ball run test, Backward medicine ball throw test and sprint of given rhythm test. The balance error scorring system was used to evaluate Balance ability of the subjects, the numbered medicine ball run test was used to evaluate orientation ability of the subjects, the backward medicine ball throw test was used to evaluate differentiation ability of the subjects and the sprint of given rhythm test was used to evaluate rhythm ability of the subjects. Each subject was familiarized with the testing procedures prior to data collection. Testing was conducted before and after 8 weeks of life Kinetic training. Subjects abstained from physical activity not related to the study during the testing period. Furthermore, during the testing periods and throughout the 8 weeks of life Kinetic training subjects were instructed to maintain normal dietary habits. Test-retest intraclass reliabilities for the balance error scorring system, the numbered medicine ball run test, the backward medicine ball throw test and the sprint of given rhythm test were consecutively, .96, .92, .95, .93 (Riemann et al., 1999; Singh, 1991). The methodology used during the tests is summarized in the following paragraphs.
The warm-up procedure; about football skills; and about power, speed, and endurance. Furthermore, in the present study, the life Kinetic trainings designed by Lutz (2010) and modified by us was used. Subjects' height is measured with an instrument sensitive to 1 mm. Their body weight is measured with a weigh-bridge sensitive up to 20 g while they are dressed in only shorts (and no shoes). Height variable is in terms of meters, and body weight variable is in terms of kilograms.

The Balance error scorring system (BESS)

The Balance error scorring system (BESS) described by Riemann et al (1999). The unstable surface consisted of a 50 X 41 X 6 cm closed-cell foam airex balance pad (Alcan Airex AG, Sins, Switzerland). The stable surface was low-pile carpeting. Researchers have reported high intertester reliability (intraclass correlation coefficients = .78 to.96) and fair to good validity (r = .42 to.79) coefficients for the BESS. The procedures for the BESS test involved 3 stance positions each on the stable and unstable surfaces for dominant and nondominant limbs. The 3 stance positions were double leg stance with feet together, single-leg stance on test limb with contralateral knee in approximately 90º of flexion and tandem stance with the foot of the test limb in line and Anterior to the foot of the contralateral limb (ie, the heel of the test foot touching the toes of the back foot) as shown in fig.1. Each position was held with eyes closed and hands on hips for 20 seconds in duration and scoring was determined by recording of errors. Errors included (1) open eyes, (2) lifting hands from hips, (3) touchdown of non-stance foot, (4) step, hop or other movement of the stance foot or feet, (5) lifting forefoot or heel, (6) moving hip into more than 30º of flexion or abduction and (7) remaining out of position for longer than 5 seconds. Single leg-stance and tandem leg-stance were performed for only nondominant limb. The double leg-stance condition was not repeated for dominant and nondominant limbs. The total number of errors possible was 10 per each pose on each surface. The total score for the BESS represents the sum of errors made while balancing on the hard surface and foam pad.

Numbered medicine ball run test
This test is to determine orientation ability of the subjects. All the medicine ball weighing 3 kg were arranged as shown in fig.1 on an even ground in a semi-circle with a distance of 1,5 m between the balls. The medicine ball weighing 4 kg was kept 3 m away from these medicine balls. Behind all the medicine balls of 3 kg weight, metallic number plates of 1 sq foot size were kept from 1 to 5. Before the start of the test, the subjects were said to stand behind the start-finish photocell gate which is behind the sixth medicine ball facing toward the opposite direction. On signal ''ready-go'' the subjects turn, crossing start-finish gate and run number called by tester and touched the medicine ball and run back to touch the sixth medicine ball, immediately another number was called. Similarly, a total of three times the number was called by tester. After subjects performed accordingly three times, they completed the test by crossing start-finish gate again. Using a photocell, the tester measures the time between the ''Go'' signal and crossing the finish gate in units of 0.1 seconds. Before the actual test was administered, one Practice trial was given to all the subjects (Singh, 1991; Singh, 2014).

Backward medicine ball throw test
This test is to determine differentiation ability of the subjects. A gymnastic mat was kept 2 m away from the starting line as shown in fig 1. A circle of 40 cm was drawn in the middle of the mat and a medicine ball of 2 kgs was kept at the centre of the circle. The subjects were said to stand behind the starting line facing the opposite direction. They were said to throw five medicine balls (1kg) over the head to hit the 2 kgs balls kept on mat, one after another by Using both the hands. One Practice trial was given to all the subjects.

Scoring: (1), Medicine ball touching the mat = 1 point (2) medicine ball touching the circle line = 2 points (3), medicine ball inside the circle = 3 pts (4), medicine ball touching the ball (2kg medicine ball kept at the centre of the circle) = 4 pts. Points were decided considering the 1st pitch which the ball touched. The score of the individuals was the total points scored in all the five throws(Singh, 1991; Singh, 2014).

Sprint of given rhythm test
This test is to determine rhythm ability of the subjects. The subject had to run a distance of 30m with the maximum sprinting speed between two lines(starting and finish lines). The sprinting time of the subjects was taken by photocell which was arranged on the lines as starting gate and finish gate(Smart speed). In the second attempt the subject had to run at a particular rhythm with maximum speed through eleven hoops which were arranged systematically as shown in fig.1. three hoops were kept in a sequence adjacent to each other at a distance of 5m away from the starting line. Similarly, three hoops were kept at a distance of 5m away from the finishing line. Five more hoops were kept in a sequence in the middle of the running distance. The subject had to run through these hoops stepping between each of them adjusting to the new self-rhythm. The research scholar explained the test along with one demonstration and each subject was given one trial run.
Scoring: Difference between the timings of 1st and 2nd attempt was taken as the score (Singh, 1991; Singh, 2014).

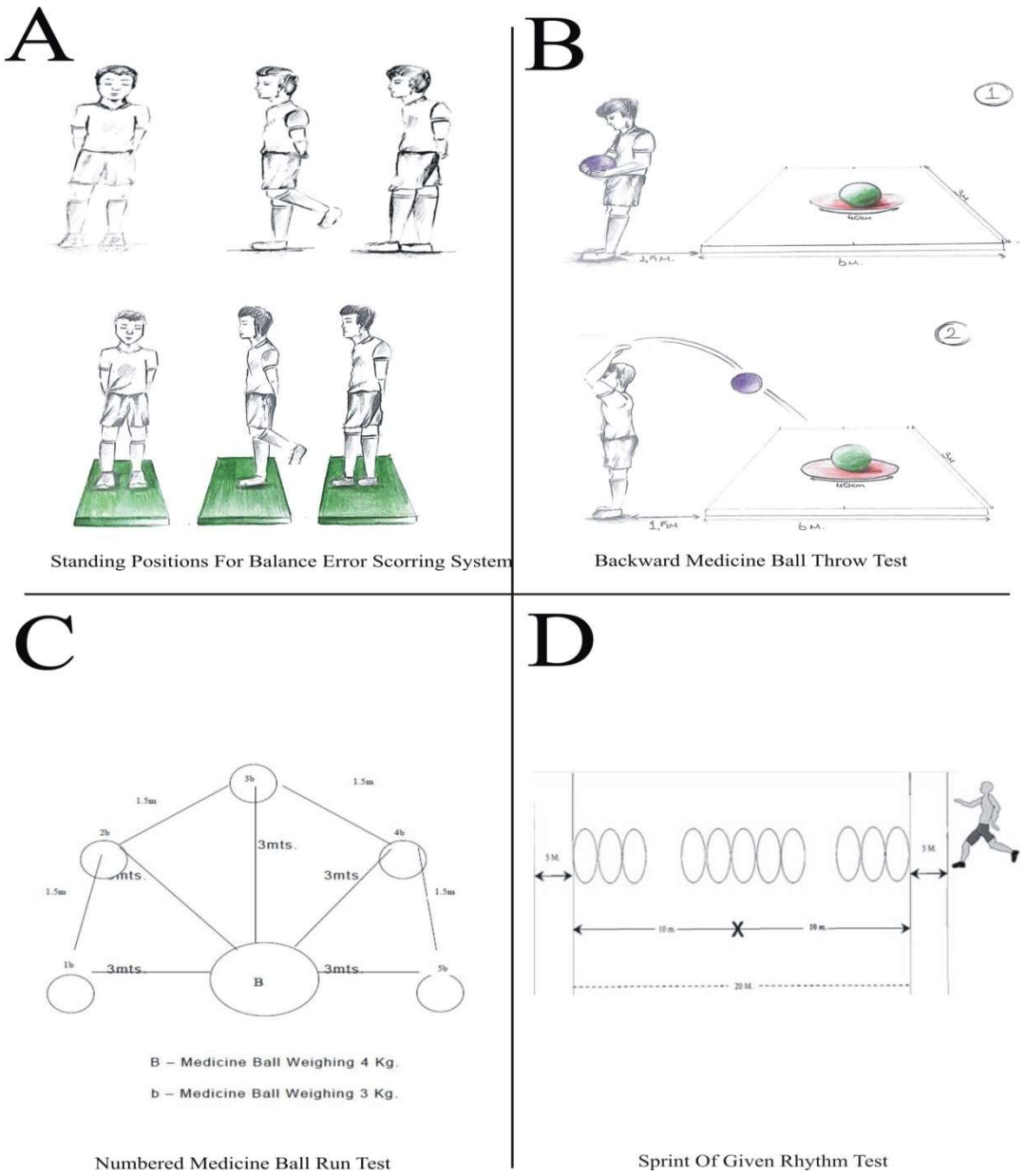

Figure 1. Tests for coordinative abilities (Singh, 1991; Singh, 2014; Riemann et al., 1999).

Procedures

All subjects were performing specific trainings of summer soccer school 3 days per a week. Additionally, life Kinetic training group performed a program of 45 minutes of specific life Kinetic exercises 3 days per a week for 8 weeks.

Life Kinetic Exercises

(1), throwing balls on hands as parallel and catching them as cross. (2), throwing balls to the box by closing eyes. (3), changing balls on hands while passing soccer ball with the partner. (4), count by adding five and reducing one on zero(0-5-4-9-8) while passing soccer ball with the partner and throwing ball on hands as parallel and catching them as cross.

(5), catching ball which is of different colour: in this exercise, the trainer has showed and explained that subjects' positions to stand facing opposite direction. When the trainer has said **''**turn**'',** subjects have turned and totally, seven balls which are 2 yellow, 2 blue, 2 purple and

1 green were thrown by trainer to subjects. Subjects have tried to catch ball which is not couple '' green ball''.
(6), finding circle which is of correct colour and number. İn this exercise, circles which are four coloured and numbered from 1 to 6 for each colour were kept on the floor as two lines. the trainer has given a command which means the circle which subjects need to find. such as first, even number on yellow circle (2) or third, odd number on blue circle (5)

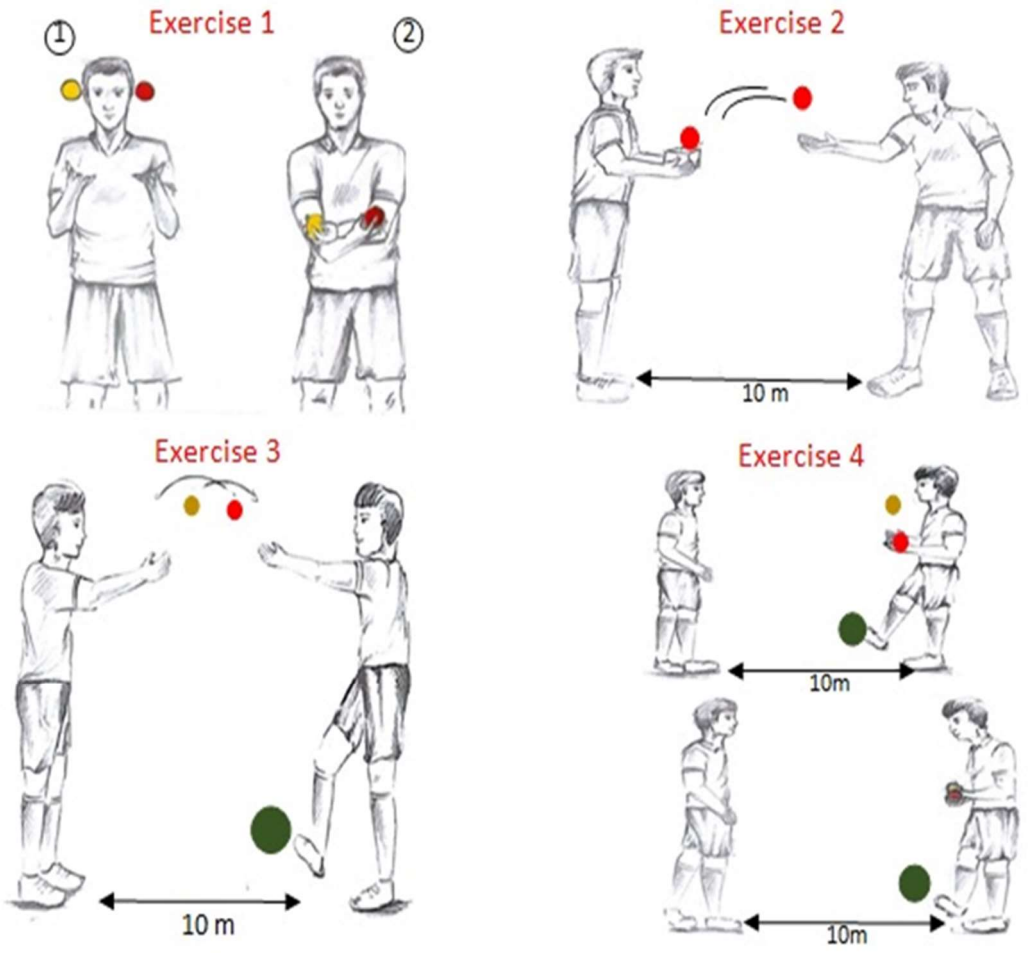

Figure 2. Life Kinetic exercises from 1 to 4

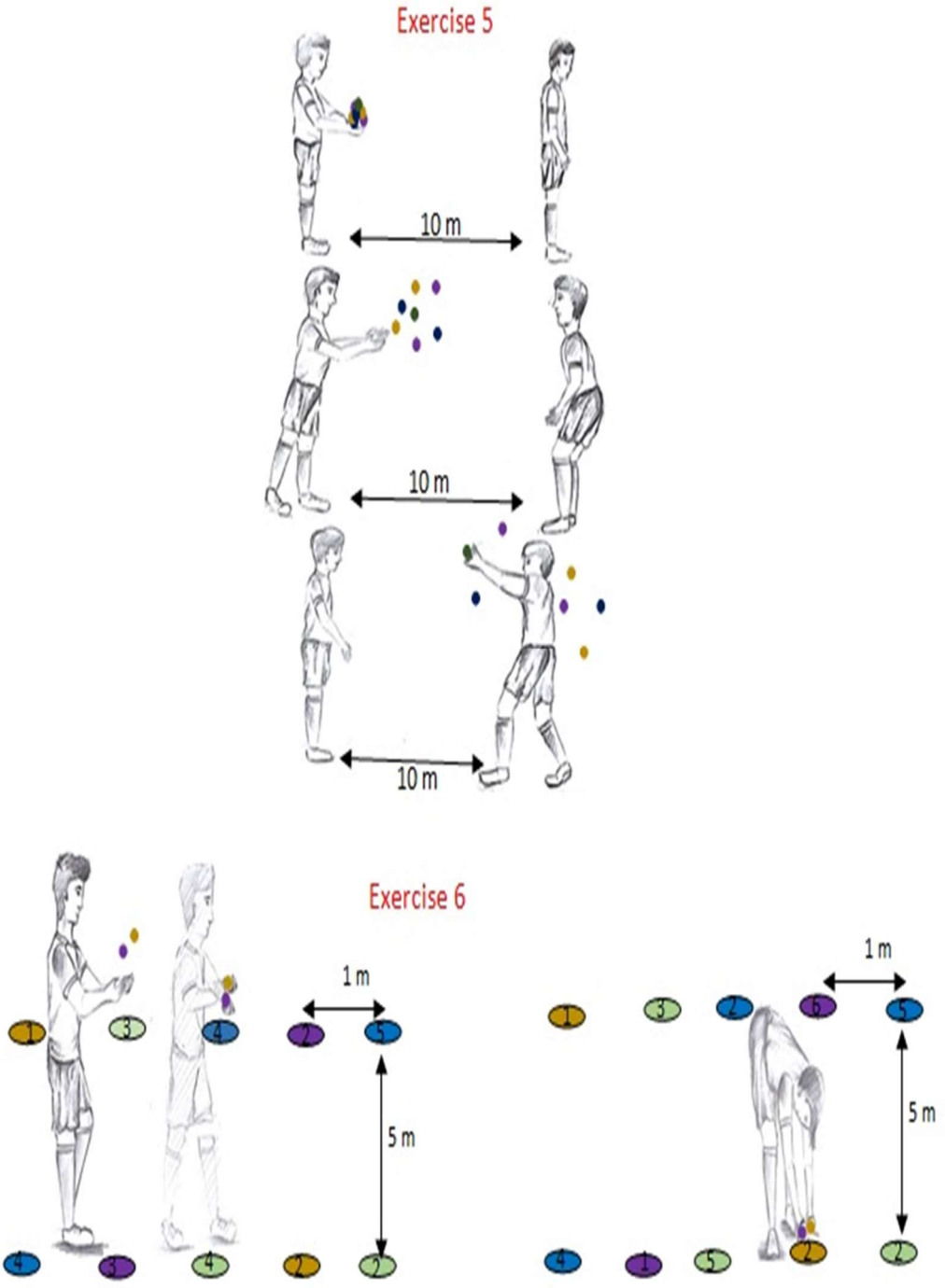

Figure 3. Life Kinetic exercises 5 and 6

Statistical Analysis

SPSS 22.0 IBM statistical software was utilized for data calculation and evaluation. According to the normality test results; In statistical assessment of data, the paired samples T test was used for dependent groups when comparing within the group and independent samples T test was used for independent groups when comparing between groups; Significant level in this study was taken as 0.05.

RESULTS

Table 1. Data Summary For The Life Kinetic Training Group And Control Group

Variables	Life Kinetic training group(N=12)		Control group(N=12)	
	Pre training mean±SD	Post training mean±SD	Pre training mean±SD	Post training mean±SD
Age (years)	12,75±1,36		11,75±1,29	
Height (cm)	139±0,07		141±0,08	
Weight (kg)	33,75±7,40		34,66±10,03	
Orientation (sec)	8,47±0,775	7,86±0,742	10,80±0,751	10,33±0,832
Differentiation(point)	8,75±3,769	11,00±2,629	8,67±3,339	9,67±3,393
Rhythm (sec)	1,46±,263	1,12±,333	1,67±0,286	1,94±0,404
BFLES (error score)	3,67±3,143	3,50±2,646	8,08±3,204	6,75±2,221
BFES (error score)	16,75±4,181	11,92±3,801	15,92±4,033	14,42±4,100
BTES (error score)	20,42±6,052	15,42±5,616	24,25±6,269	21,17±5,589
P<0,05*				

The mean (SD) age was 12.75±1.36 years, height was 139 ± 0.07 cm, weight was 33.75 ± 7.40kg for life Kinetic training group. On the other hand, The mean (SD) age was 11.75±1.29 years, height was 141 ± 0.08 cm, weight was 34.66 ± 10.03 kg for control group. In the pre-training shown in Table 1, the mean (SD) orientation is 8,47±0,775(seconds), differentiation is 8,75±3,769(points), rhythm is 1,46±0,263 (seconds), Balance floor error score (BFLES) is 3,67±3,143, Balance foam error score(BFES) is 16,75±4,181, Balance total error score(BTES) is 20,42±6,052 for the life Kinetic training group: the mean (SD) orientation is 10,80±0,751(seconds), differentiation is 8,67±3,339(points), rhythm is 1,67±0,286 (seconds), Balance floor error score(BFLES) is 8,08±3,204, Balance foam error score(BFES) is 15,92±4,033, Balance total error score(BTES) is 24,25±6,269 for the control group.

In the post-training, the mean (SD) orientation is 7,86±0,742(seconds), differentiation is 11,00±2,629(points), rhythm is 1,12±0,263 (seconds), Balance floor error score (BFLES) is 3,50±2,646, Balance foam error score(BFES) is 11,92±3,801, Balance total error score(BTES) is 15,42±56,16, for the life Kinetic training group: the mean (SD) orientation is 10,33±0,832(seconds), differentiation is 9,67±3,393(points), rhythm is 1,94±0,404 (seconds), Balance floor error score(BFLES) is 6,75±2,221, Balance foam error score(BFES) is 14,42±4,100, Balance total error score(BTES) is 21,17±5,589 for the control group (Table 1).

Table 2.Comparison Of The Pre Training And Post Training Relative Orientation, Differentiation, Rhythm, BFLES, BFES And BTES With Respect To Life Kinetic Training Group And Control Groups

Variables	Life Kinetic training group						Control group					
	Pre mean	Post mean	Pre SD	Post SD	T	P	Pre mean	Post mean	Pre SD	Post SD	T	P
Orientation (pre-post-training)	8,47	7,86	0,775	0,742	3,215	0,008*	10,80	10,33	0,751	0,832	1,711	0,115
Differentiation (pre-post-training)	8,75	11,00	3,769	2,629	-1,993	0,072	8,67	9,67	3,339	3,393	-0,785	0,449
Rhythm (pre-post-training)	1,46	1,12	0,263	,333	4,574	0,001*	1,67	1,94	0,286	0,404	-2,078	0,062
BFLES (pre-post-training)	3,67	3,50	3,143	2,646	0,236	0,818	8,08	6,75	3,204	2,221	1,292	0,223
BFES (pre-post-training)	16,75	11,92	4,181	3,801	3,514	0,005*	15,92	14,42	4,033	4,100	1,402	0,188
BTES (pre-post-training)	20,42	15,42	6,052	5,616	3,458	0,005*	24,25	21,17	6,269	5,589	1,765	0,105
P<0,05*												

As shown in Table 2, paired t-tests detected significant differences in pre- and post-tests for orientation, rhythm, BFES, BTES of the life Kinetic training group ($p < 0.05$). On the other hand, paired t-tests did not detect significant differences in pre- and posttests for any of dependent variables of the control group ($p<0.05$).

Table 3. Comparison of The Dependent Variables in Life Kinetic Training Group And Control Groups.

Dependent variables	Independent variables	N	Mean ±SD	Mean difference	T	P*
Orientation (pre-training)	Life Kinetic training group Control group	12 12	8,47±0,775 10,80±0,751	-2,33400	-7,494	0,000*
Orientation (post-training)	Life Kinetic training group Control group	12 12	7,86±0,742 10,33±0,832	-2,473	-7,684	0,000*
Differentiation (pre-training)	Life Kinetic training group Control group	12 12	8,75±3,769 8,67±3,339	0,083	0,057	0,955
Differentiation (post-training)	Life Kinetic training group Control group	12 12	11,00±2,629 9,67±3,393	1,333	1,076	0,294
Rhythm (pre-training)	Life Kinetic training group Control group	12 12	1,46±0,263 1,67±0,286	-0,21208	-1,894	0,071
Rhythm (post-training)	Life Kinetic training group Control group	12 12	1,12±0,333 1,94±0,404	-0,827	-5,476	0,000*
BFLES(pre-training)	Life Kinetic training group Control group	12 12	3,67±3,143 8,08±3,204	-4,417	-3,409	0,003*
BFLES(post-training)	Life Kinetic training group Control group	12 12	3,50±2,646 6,75±2,221	-3,250	-3,259	0,004*
BFES(pre-training)	Life Kinetic training group Control group	12 12	16,75±4,181 15,92±4,033	0,833	0,497	0,624
BFES(post-training)	Life Kinetic training group Control group	12 12	11,92±3,801 14,42±4,100	-2,500	-1,549	0,136
BTES(pre-training)	Life Kinetic training group Control group	12 12	20,42±6,052 24,25±6,269	-3,833	-1,524	0,142
BTES(post-training)	Life Kinetic training group Control group	12 12	15,42±5,616 21,17±5,589	-5,750	-2,514	0,020*
P<0,05*						

As shown in Table 3, the life Kinetic training and control groups did not differ significantly ($p<0.05$) in Differentiation and BFES of the dependent variables. However, the 2 groups did differ significantly ($p<0.05$) in post-training of the Rhythm and BTES. Additionally, each of the 2 groups did differ significantly ($p<0.05$) in both pre-training and post-training of the Orientation and BFLES.

DISCUSSION

Result of our study showed that there was a significant increase in orientation, rhythm, BFLES and BTES abilities for the life Kinetic training group ($P<0.05$). There wasn't a

significant increase in differentiation ability and BFES for the life Kinetic training group ($P<0.05$). On the other hand, there wasn't a significant increase in any of dependent variables of the control group ($P<0.05$).

In the last decades, many changes occurred in a lot of fields of sport. Such as, football was played more rapidly and it needs to decide in shorter time and tighter areas. Because of these reasons, the idea that new exercise forms were tried occurred. Life Kinetic exercises require that players or athletes think actively. New neural connections consist of compounding together active, simultaneously and intellectual tasks in brain. Thus, it can be thought that athlete have more advanced coordination skills, rapidly understanding and learning skills and correctly making decision skills (Lutz, 2010).

In one study, subjects' level of cortisol and margin of error was investigated. When comparing level of cortisol and margin of error of experiment group that applied life Kinetic exercises and control group. Statistically significant difference was determined in the comparisons of final test results between groups for level of cortisol and margin of error in favour of experiment group ($P>0.05$) (Lutz, 2014b).

Lutz (2011) researched effect of 1 hour of life Kinetic 2 times per a week for 6 week on game ability, decision making correctly and speed of decision making of handball players. There was a significantly difference for game ability and decision making correctly when comparing post-test results between experiment and control groups ($P>0.05$).

In a study which is on 34 children aged 9-12 who have learning problem, the effect of life Kinetic training on attention and the development of orientation were determined. Results of the study showed that post- test results of life Kinetic group were significantly increased when comparing pre-test results. On the other hand, there was a research which examined effect of life Kinetic training on cognitive abilities. Findings of that research showed that there was a significantly difference in comparison of pre and post test results of experiment group ($P>0.05$) (Lutz, 2011).

Lutz (2014a) investigated effect of life Kinetic training on rhythm, balance, reaction, coherence and several cognitive abilities. According to results of the study, it is found an important difference in comparison of pre and post test results of experiment group.

In a study, subjects consisted of 90 male athletes aged 17-25. Results of the study showed orientation ability 8.46±0.25 second, rhythm ability 1.52±0.20 second and differentiation ability 8.73±2.24 point. Results of this study were similar to our results (Khetmalis 2012).

In another study, Researchers investigated that coordinative abilities and physical conditions according to different playing positions on 40 female football players in the age mean(SD) 22.17±1.47. İt is observed that orientation ability for goalkeepers, midfielders, defenders and forwards were consecutively 8.32±0.14, 9.88±0.54, 8.90±0.52, 8.58±0.33. İt is found that differentiation ability for goalkeepers, midfielders, defenders and forwards were consecutively 14.40±1.57, 14.40±1.95, 14.60±1.95, 13.80±1.47 (Singh and Gaurav, 2014).

Mcload et al (2006) researched balance performance of children(26 girls and 24 boys) in the age category of 9-11 and 12-14. According to results of study, BTES for children aged 9-11, 18.47±4.74 and BTES for children aged 12-14, 13.00±5.31. Besides, BTES for girls were 13.54±5.64 and for boys were 17.39±5.19.

In a study that 100 college students participated, BTES for pre test of control group and experiment group were consecutively18.6±4.2 and 19.3±4.7 (Susco et al., 2004).

Arslan et al (2010) indicated that balance performance was changed by age, body weight, height, gender and training experience. İn a study, it is reported that orientation and rhythm abilities were effected by body weight (Verma et al., 2012).

In conclusion, some results of our study was similar to some results in literature besides, several of them was not similar. İt was thought that differences consisted of training years of athletes, training program, age and body weight. İn addition, it could be thought that life Kinetic training positively effected orientation ability, rhythm ability and balance. On the other hand, it could be thought that life Kinetic training did not effect differentiation ability.

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