THE EFFECT OF POSTURAL SWAY AND TECHNICAL PARAMETERS OF 8 WEEKS TECHNICAL TRAINING PERFORMED WITH RESTRICT OF VISUAL INPUT ON THE 10-12 AGES SOCCER PLAYERS

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Abstract
The aim of this study was to determine the effects of an 8 week soccer-specific technical training with limited vision perception on postural control and technical parameters in 10-12 aged soccer players. Subjects in this study were 24 male young soccer players (age: 11.00 ± 0.56 years, height: 150.5 ± 4.23 cm, body weight: 41.49 ± 7.56 kg). Subjects were randomly divided as two groups: Training and control. Balance performance was measured by Biodex Balance System (BBS). Short pass, speed dribbling, 20 m speed with ball, ball control, juggling tests were used to measure soccer players' technical performances with a ball. Subjects performed soccer training 3 times per week for 8 weeks. In each session, training group with limited vision perception and control group with normal vision perception committed soccer-specific technical drills for 20 min. Data were analyzed with t-test for independent samples and Mann-Whitney U between groups and paired t-test and Wilcoxon test between pretest and posttest. No significant difference was found balance scores and with eyes open and eyes closed and LOS test between training and control groups after training (p>0.05). After eight week of training there are no significant difference in balance score with eyes open for both training and control groups (p>0.05). Balance scores decreased in training and control groups after the training (p<0.05). The completion time of LOS test shortened in both training and control groups after training (p<0.05). The training developed speed dribbling performance of training group (p<0.05). On the other hand, soccer players' performance in training and control groups increased in 20 m speed with a ball after eight week training (p<0.05). In conclusion; the results of this study indicate that soccer-specific training with limited vision perception may not improves balance performance in 10-12 aged soccer players, but it develops speed dribbling performance.
Keywords: *Young soccer players, vision perception, postural control, technical.*

INTRODUCTION

The technique in soccer is to have the ball even in the hardest cases and to be able to use it most appropriately and successfully. All players formed a soccer team should control the ball in every position, pass the ball incisively, be able to shoot directly and lobbing incisively, be able to keep the ball well and be able to win the ball from the competitive soccer players. The soccer player should be able to perform the technical actions special to the soccer most efficiently even in the hard conditions. It is also only possible with the basic and development technical trainings of the children and youths in the available ages (Karanfilci, 1998). The soccer technique is to be able to perform the actions required by the soccer and faultlessly and timely in conformity with that moment's conditions (Başer, 1996). Some duties are in the important status in continuing an orientation in conformity with the risk of the stability. The clearing of a goal in the soccer or succeeding of catching of a ball in air in basketball requires that the player always remains in a position in relationship with the ball, sometimes falls into the place during any effort in order to prevent the goal or to catch the ball. In this way; the requirements of the stability and orientation changes with each action while the postural control is a common requirement owned by most of the actions. The postural actions occur from the environmental difficulties in the postural activities and actions with its postural requirement special to him, the individual's interaction (Shumway-Cook & Woolacott, 2001).

The balance is also defined as the adaptation made in the postural way and fast against the changes of the gravity during the resting and activity (Kitamura & Matsunaga, 1990). The postural sway is commonly used as an indication of maintain of the balance (Lichtenstein, Shields, Shiavi & Burger, 1988; Berg, Maki, Williams, Holliday & Wood-Dauphinee, 1992). The environmental components upon the balance include the somatosensory (sensory), visual (optical) and vestibular (auditory) systems. The central nervous system units the environmental inputs coming from these systems, selects many appropriate muscular answers in order to check the posture on the supportive base and the body's position (Nashner, Black & Wall, 1982; Shumway-Cook & Horak, 1986). The environmental nervous system's afferent part carries information from the periphery to the central nervous system. The information is fixed by the sensual (sensory) receptors reacting to the warnings' special kinds. The others named as the visceral receptors fix the

warning arisen out of inside of the body while some of these receptors fix the warnings in the external environment (German & Stanfield, 2005). The afferent information is processed in the brain stem and cerebellum and then the motor commands are started in order to continue the balance (Nardone & Schieppati, 1988). The central nervous system generally trusts only to the perception at once for the orientation information although it could obtain many sensory inputs. For the healthy adults, the sense preferred in the balance control comes from the somatosensory resource (the feet in fixation of the joints' actions and contact with the supportive surface) (Guskiewicz, 2004).

It is determined that the top level athletes exhibit the balance control developed depending on each discipline's necessity of them. Learning any sports and training in the period of a long time develop the efficiency of the dynamic and static postural control (Perrin, Deviterne, Hugel & Perrot, 2002). The elite athletes use the definite sensory information in order to arrange the posture according to the branches' needs (Perrin, Schneider, Deviterne, Perrot & Constantinescu, 1998; Vuillerme et al., 2001). For example the somatosensory signs are much more informative than the autolytic signs at the experienced gymnasts (Bringoux, Marin, Nougier, Barraud & Raphel, 2000); however seeing is a strong factor in the posture's arrangement at the dancers (Golomer, Cremieux, Dupui, Isableu & Ohlmann, 1999).

In the study made by Paillard & Noe (2005) the postural control performances of the amateur and professional soccer players were searched and it was informed by the result of the research that the soccer generates a strong visual dependency regarding the ball, competitor and teammates, it requires that the soccer players look down in the way conflicting with the obligation to follow the other player's substitutions the obligation to control the ball with feet. Therefore the top level players' skills to turn their looks to the other way totally in order to increase the time to observe the match developed. It is emphasized that the less dependency to see for the postural control at the professional soccer players, controlling without following the ball might be some sample of gaining this skill. It is determined that the top level soccer players' proprioceptive capacities might be developed in order to control the ball while the balance is being continued. Cote, Brunet, Gansneder & Shultz (2005) informed that the postural control and dynamic balance are necessary for the optimum performance in the daily life activities and sports activities. Perrin et al. (2002) compared the static balance's test performance to the judo, dance and control group. Any meaningful difference was not found between the values of the control group and the judoists. In the provision where the visual inputs are prevented the judoists showed higher performances at the meaningful level than the dancers did. It is informed at the end of the study that the high level athletes exhibited the balance's control developing in relation to each sports branch's needs.

It determined by the result of the study where two groups playing soccer and not playing soccer that all balance parameters were different in favor of the ones playing soccer, this case was explained in the way that the physiological system ensuring balance in the ones playing soccer had to have a better control (Sucan, Yılmaz, Can & Süer, 2005). Paillard, Costes-Salon, Lafont & Dupui (2002) informed that there were not any differences in the postural control performances of 2 groups of judoists having the different levels of competition; the trained judoists' available visual information might be able to be more important in the posture kinetic activities.

It might be told that the lower extremities have less perceiving receptors when they are compared to the upper extremities (Pinel, 1997). The distance between the eyes and the feet in point of the increase in the warning transmission time is more than the distance between the eyes and hands. The surface's area of the feet is also much more than the hands' one. The soccer player has to keep the ball closed to his feet. This case has the possibility to make more mistakes for an effective activity when it is compared to the coupling phase during catching by hand (Alderson, Sully & Sully, 1974). When it is compared to the upper extremity these differences show that the lower extremity can/might include the separate mechanisms when it performed/realized the simultaneous activities (Williams et al., 2002). The comparative importance of the visual and joint proprioception might change between the lower and upper extremities' activities. The visual proprioception ensures information regarding the body's orientation and action (Lee, 1978). Its importance might be similar to the articular receptors such as the muscular fiber, joints' receptors and Golgi tendon organs. Proprioceptive input is assumed to be in interaction in the control of activity of these two supply purposes (Harris & Jenkin, 1998). Consequently in this research it was aimed to examine the effect of the technical training of 8 weeks, trained by restricting the visual perception to the postural sway and the technical parameters in the 10-12 aged soccer players.

MATERIAL AND METHOD

Subjects

Twenty four male young soccer players (age: 11.00 ± 0.56 years, height: 150.5 ± 4.23 cm, body weight: 41.49 ± 7.56 kg) were voluntarily included into the study. Subjects consist of the soccer players who did not sustain any injury of extremity seriously within the last 6 months and did not have any neurological disease, vestibular-visual disorder in the last 1 year, regularly trained 3 days a week. Subjects were randomly separated into 2 groups before study: The Training Group (TG, n=12), Control Group (CG, n=12).

The necessary permissions were obtained permission from subjects' parents and coaches before the study. This research was approved by the Ethics Committee of School of Physical Education and Sports in Selcuk University.

Testing Procedure

All measurements as before and after the training of eight weeks were performed twice per subject. *Balance measurements:* Subjects' balance performances were measured by using Biodex Balance System (BBS, Biodex Medical System Inc., Shirley, NY, USA). BBS is an apparatus that can test the balance performances of subjects objectively under the dynamic stress. This measuring means that can record its data by the help of the computer program has a circular platform in diameter of 55 cm that can incline horizontally at 20 degrees and the action width of 360 degrees. BBS has the resistance level that can be adjusted and vary from 12 to 1. The first level is the least stable level, 12. level is the highest stable level, increasing of the balance scores points out that the balance performance decreased. The Overall Stability Index (OSI) obtained from this measurement means shows the subjects' balance skills. In many researches it is informed that BBS is a reliable measurement means that can be used in the postural control's evaluation (Arnold & Schmitz, 1998; Hinman, 2000).

The postural control levels of subjects were determined 3 separate postural control performances with 2 separate tests by using BBS: Balance test and "Limit of Stability" (LOS) test. The resistance level of BBS was adjusted as level 8.

Subjects performed the balance test in 2 conditions: Eyes Open (EO), Eyes Closed (EC). Test was performed in the single foot's standing position on the dominant leg. The dominant leg was fixed by asking the question "Which of your legs do you use in order to shoot a ball?" asked to subjects. Subjects were required to stand on the dominant leg, to be in a slight abduction of the hip joint and in flexion of the knee joint of their other legs at 90 degrees during testing. They were instructed to maintain their arms by their sides and look straight ahead at a point on the wall approximately one meter away at eye level. Subjects were taken into the testing with barefoot and a light sportswear on them.

It was tried to find the most stable position by having the feedback from the apparatus's screen after subjects were required to be on the platform belonging to the measurement apparatus in the test position and this position was recorded into the apparatus, considered as the reference point belonging to the subject. Subjects were required to continue the testing position during 20 seconds. Meanwhile the apparatus's screen was turned off and subjects were required to look at the marked point in the eye's alignment and at distance of approximately 1 m. The test was also applied to the EC condition. The resting of 2 minutes were allowed between both tests. LOS is defined as the maximum angle where the body can incline from the vertical location without falling down and without changing the body's supportive surface (Hinman, 2000). The Dynamic LOS test with BBS evaluates that how fast and easily the person can incline to its sway border but it does not measure the maximum inclining angle. The test requires subjects move the platform that is in subjects' controls in direction of the sign showed on screen, move their bodies to the sign specified the gravity's center. The test is applied against time and the test's finishing period shows subject's score. Subjects were located in the way that his arms would be bias on the shoulders and both of his feet were on ground during testing. In this position the subject arranged his feet in the most stable position by using the feedback belonging to the weight center's projection received from the screen by him (Biodex Balance System, 1999). The test was applied while subjects' eyes were open. The resistance level of BBS was adjusted as Level 8 for LOS test.

It was allowed them to put to the test for 3 times in order to eliminate the effects of learning and application before the tests and to accustom to the measurement means.

Short Passing Test: This test measures coordination of moving with ball and the exact evaluation. The player dribbles from a distance of 4 meters to the line by dribbling and shots the ball into the goal post. It is 11 meters between the line and the goal post. The goal post has the width of 0.9 meter and the height of 0.6 meter (Figure 1). The researcher measures 5 trials in total. It is 3 points if the ball becomes in the goal post, 1 point if the ball hits the goal post (Rosch et al., 2000; FIFA, 2005).

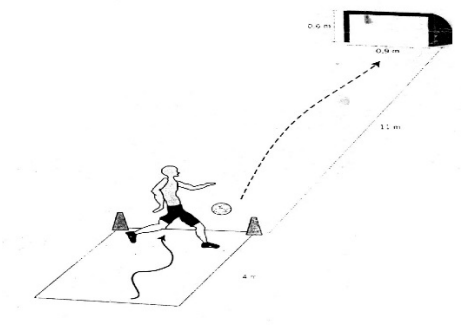

Figure 1. Short Passing Test (Rosch et al., 2000).

Speed Dribbling Test: This test allows the speed is evaluated and the coordination with the ball against time is evaluated. The player starts with the ball behind the line with the command '' ready and go out with the signal'' and completes the test track as soon as possible by dribbling (Figure 2). The measurement was made with photocell (Rosch et al., 2000; FIFA, 2005).

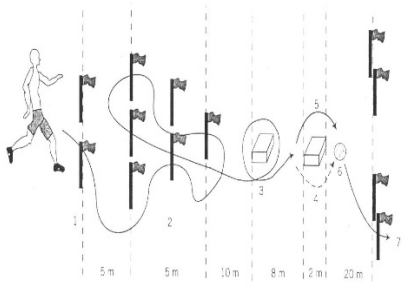

Figure 2. Speed Dribbling (Rosch et al., 2000).

20 Meters Speed Test with a Ball: The subjects' speed performances to dribble with the ball were evaluated with this test. The subjects passed the distance of 20 meters that is from the start line to the finish line by dribbling with the ball. The period to complete the test is recorded through the photocell's screen.

Ball Control Test: It is a test including controlling of the thrown from the distance of 9 meters within the area determined. The area of the dimensions 2.1 m x 2.1 m is divided into 3 equal areas from inside towards outside for the ball's control. The area where the ball stops is determined as 3 points, 2 points and 1 point from inside towards outside in the ball's control performed with one touch and pointing is performed in this way. Five trials were had made by the trials before testing and the test was applied for 10 times. Total of the point had in every control of the ball was recorded as the subject's test scores (Williams et al., 2002). The test's application was recorded with camera, the area where the ball was controlled and whether the subject controlled the ball with one touch were fixed by the help of these records.

Juggling (Test of Playing the Ball with Body): This test allows the coordination of the body with the ball is evaluated. The player bounces with all parts of body and without using his hands. Each ball bounced up 1 point will be accepted. The ball bounced on the total number of players that were recorded as the player's score.

Training Application

Subjects were included into the soccer training continued for approximately 80-90 minutes and for 3 times a week during 8 weeks. About 10 min soccer-specific warm-up exercises prior to this training were carried out. Then both the TG and the CG applied the training aimed at improving the ball technique and continued for 20 minutes. The training consists of the basic practices such as the ball control, control-pass and single pass, dribbling and subjects repeated the exercises of the training continuously during 20 minutes. Training group was performed the training using an apparatus (Figure 3) that limits the visual field. This apparatus is worn like glasses, mostly used to improve dribbling techniques in basketball. The apparatus's lower part has a structure limiting seeing the lower part from the eye's alignment. The players in the TG took off the apparatus worn on their eyes following after they performed the training with the apparatus during 20 minutes. The control group applied the training without wearing the apparatus. All players performed the soccer training for approximately other 50-60 minutes following after the specific training.

Figure 3. Dribbling apparatus (Tugra Sport, 2013)

Statistical Analyses

The data was presented as the mean and standard deviation. The normality analysis was performed with Shapiro-Wilks test. The unpaired t-test and Mann-Whitney U test were applied according to the normality analysis's results in the independent groups' comparison and the paired t-test and Wilcoxon test were applied in comparison of the dependent groups. The data analysis was performed with SPSS 16.0 package program. The level of significance was set at $p = 0.05$.

RESULTS

Table 1 shows descriptive data and comparisons for TG and CG. It was determined that no difference in ages, height and weight between TG and CG (p>0.05).

The means of LOS and the eyes-open and eyes closed balance scores before and after the training of 8 weeks are seen in Table 2. The EO and EC balance scores and the LOS test's values did not show significant differences between the TG and CG both before the training and after the training (p>0.05; Table 3).

Table 1. Subjects' Demographic Data.

Variables		Training Group		Control Group		t	p
		Mean	SD	Mean	SD		
Age (year)		11.10	0.57	10.90	0.57	0.788	0.441
Height (cm)	Pretest	152.2	3.05	148.5	4.68	1.961	0.069
	Posttest	153.8	3.36	150.8	5.59	1.407	0.179
Body Weight (kg)	Pretest	41.41	5.06	41.59	10.07	-0.045	0.965
	Posttest	42.35	4.28	39.81	7.89	0.873	0.396

Table 2. Balance and LOS scores with EO and EC

Variables	Groups	Pretest		Posttest	
		Mean	SD	Mean	SD
Balance Score with EO	TG	1.94	1.04	1.49	0.58
	CG	1.97	0.99	1.50	0.62
Balance Score with EC	TG	4.66	0.87	3.02	0.71
	CG	4.30	0.87	3.03	1.02
LOS (s)	TG	53.4	9.71	44.7	8.30
	CG	61.40	19.40	47.5	11.11

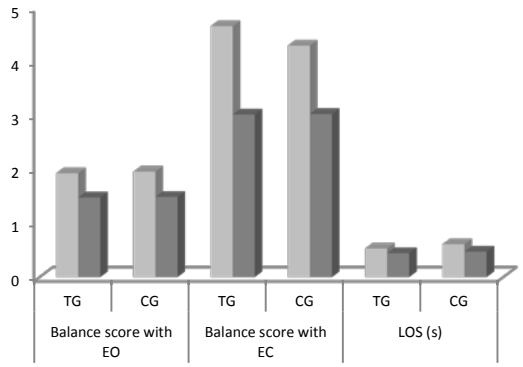

Figure 4. Subjects' Scores For Balance Tests.

Table 3. Comparisons of Balance Scores between TG and CG

Variables		Levene's Test		t	p
		F	Sig.		
Balance Score with EO	Pretest	0.129	0.724	-0.066	0.948
	Posttest	0.398	0.536	-0.037	0.971
Balance Score with EC	Pretest	0.002	0.967	0.925	0.367
	Posttest	1.193	0.289	-0.025	0.980
LOS	Pretest	2.734	0.116	-1.167	0.259
	Posttest	0.686	0.418	-0.639	0.531

It was found that the EO balance scores of both the TG and also the CG did not change after the training of 8 weeks (p>0.05). It was determined that there was a decrease at the significant level statistically in the TG's EC Balance Scores after the training (t=5.605; p<0.05). It was found that this decrease in the eyes-closed balance scores was also observed in the control group (t=4.547; p<0.05). It was determined that both the TG (t=5.394; p<0.05) and the CG (t=3.538; p<0.05) completed LOS test in the shorter period statistically after the training (Table 4).

Table 4. Comparisons of Balance Sores between Pretest and Posttest

Variables	Groups	Paired Differences		t	p
		Mean	SD		
Balance Score with EO	TG	0.45	1.07	1.335	0.215
	CG	0.47	0.87	1.705	0.122
Balance Score with EC	TG	1.64	0.93	5.605	0.000*
	CG	1.27	0.88	4.547	0.001*
LOS (s)	TG	8.70	5.10	5.394	0.000*
	CG	13.90	12.42	3.538	0.006*

* p<0.05

Soccer players' technical skill tests are presented in Table 5. It was determined that there was not any significant difference for soccer-specific technical parameters between TG and CG in both pretest and posttest (p>0.05; Table 6).

Table 5. Soccer Specific Technical Tests

Variables	Groups	Pretest		Posttest	
		Mean	SD	Mean	SD
Short Passing	TG	10.27	1.95	8.56	2.79
	CG	8.78	2.73	9.50	1.93
Speed Dribbling (s)	TG	27.84	2.66	26.25	3.05
	CG	27.96	2.94	26.88	2.66
20 m Speed with a ball (s)	TG	4.48	0.46	4.10	0.32
	CG	4.65	0.35	4.08	0.26
Ball Control	TG	4.10	2.18	3.90	2.23
	CG	4.43	2.64	2.75	2.66
Juggling	TG	29.55	17.32	34.40	34.75
	CG	37.56	36.78	37.38	39.22

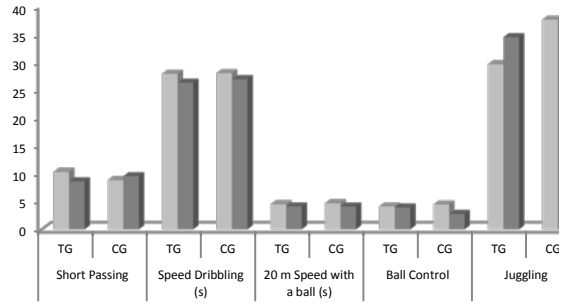

Figure 5. Subjects' Soccer Specific Skill Tests

Table 6. Comparisons of Soccer Specific Technical Tests between TG and CG

Variables			t	p
Short Passing	Pretest		1.427	0.171
	Posttest		-0.801	0.435
Speed Dribbling (s)	Pretest		-0.094	0.926
	Posttest		-0.457	0.654
20 m Speed with a ball (s)	Pretest		-0.857	0.405
	Posttest		0.089	0.930
Ball Control	Pretest		-0.281	0.783
	Posttest		0.998	0.333
			U	p
Juggling	Pretest	TG CG	49.000	0.970
	Posttest	TG CG	49.000	1.000

Table 7. The Comparisons of Soccer Specific Technical Tests between Pretest and Posttest

Variables	Groups	t	p
Speed Dribbling (s)	CG	-0.801	0.454
	TG	3.217	0.011*
20 m Speed with a ball (s)	CG	1.334	0.240
	TG	5.023	0.001*
Ball Control	CG	6.194	0.002*
	TG	0.188	0.855
	CG	1.467	0.202
		Z	p
Juggling	TG	-0.766	0.443
	TG	-1.051	0.293

The comparisons of the soccer-specific technical parameters before the training and after the training are seen in Table 7. It was determined that the Posttest scores of both the TG (t=1.084; p>0.05) and CG (t=0.801; p>0.05) did not differ from the pretest scores at the significant level statistically when the effect of the training the short pass skill was examined. It was determined that the time to complete the test after the training varied statistically (t=3.217; p<0.05) and the TG completed the test in the shorter period, when the speed dribbling test were examined. It was stated that the performances of the speed dribbling tests after the training in CG did not vary significantly(t=1.334; p>0.05). On the other hand it was determined that the performances of 20 m speed with the ball increased significantly in both groups after the training of 8 weeks (TG: t=5.023; p<0.05, CG: t=6.194; p<0.05). Any statistical difference was not seen in both of the TG and CG after the training when the ball control test were examined (TG: t=0.188; p>0.05, CG: t=1.467; p>0.05). It was stated that the juggling test performance before the training and after the training did not vary significantly in both groups (TG: Z=-0.766; p>0.05, CG: Z=-1.051; p>0.05).

DISCUSSION

The top level athletes have the characteristics to control the balance developed depending on the sports branch's conditions (Perrin et al. 2002).The surface of the pressure area of the amateur soccer players in both the eyes-open and eyes-closed conditions are higher than the professional soccer players, in other words the professional soccer players have more developed postural control performances (Paillard & Noe, 2005). Golomer et al. (1999) informed that the professional dance trainings might slide the sensory motor dominance from visual to proprioceptive in order to continue the postural control. As similar to this result, Paillard & Noe (2005) declared for the soccer trainings.

The high competition level is in connection with decrease of the visual inputs' contribution in order to maintain the posture. Therefore the balance exercises may be applied in the eyes-closed conditions in the soccer training in order to develop the postural skills and the proprioception. Such training may enable the soccer players are less dependent visually (Paillard & Noe, 2005). In this research the effect of the soccer-specific technical training made with limiting the visual perception of 8 weeks on the postural control and technical capacity was examined.

The results of this study suggest that the performances of the eyes-open balance, the eyes-closed balance and LOS of the soccer players in the training and control groups did not vary after the training of 8 weeks. It was found that the eyes-open balance score did not change after the training when the postural control performance was examined according to the results of the pretest and the Posttest. The increase of performance is observed by the result of the period of 8 weeks in both the training group and the control group in the eyes-closed balance score. The similar result is seen when the stability limits (LOS) are also examined. It is thought that occurrence of this increase of the performance in both the training group and the control group is not resulted from the soccer-specific technical training applied by limiting the visual perception but arisen out of the soccer trainings performed by both of the groups during 8 weeks.

Another aim of the study was to examine the effect of the training applied by limiting the visual perception on the technical activities. The results of this study suggest that the technical skills measured between the training group and the control group did not vary by the training of 8 weeks. On the other hand it was found that the short pass, the ball control and juggling performance in training group did not change after the training but the speed dribbling performance improved after the training. The performance of 20 m speed with the ball increased in both the training group and the control group. It is thought that the development in the performance of 20 m speed with the ball is arisen out of the soccer training applied by the both groups; the increase in the speed dribbling performance results from the training performed by limiting the visual perception. This might be an indication of that the exercise applied in the conditions by limiting the visual input might decrease the visual dependency similar to the one informed by Paillard & Noe (2005) and Golomer et al. (1999) and the proprioceptive inputs may be used more efficiently.

To our knowledge, there is no study that examining the effect of training applied by limiting the visual inputs on the postural control and the ball technique in soccer players. Amateur soccer players are dependent to the visual inputs more than the professionals (Paillard & Noe, 2005). The soccer trainings bring a strong visual dependency in connection with opponents, the teammates and the ball. The obligation to control the ball with feet in soccer requires the players look down. This case conflicts with following of displacement of the other players. The top level soccer players develop their capacities to take away their looks from the ball in order to increase the time to observe the match. Less visual dependency might be an appearance of gaining of the skill to control without looking at the ball for the professional soccer players. The proprioceptive capacities of the top level soccer players might be developed in order to control the ball while they continue the position of balance (Paillard & Noe, 2005).

In conclusion; it is determined that the soccer specific technical training with restricted visual input of 8 weeks did not change the balance performance in 10-12 ages soccer players, caused the increase only in the speed-dribbling performance. It may be useful to examine the long time effects of a similar training in the next studies.

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