EFFECTS OF A 8 WEEK-CORE STABILITY TRAINING ON JUNIOR MALE SOCCER PLAYERS´ STATIC BALANCE PERFORMANCE

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The purpose of study was to investigate effectiveness of the Core Stability exercises on junior level soccer players static balance performance. 27 soccer players participated in this study. Pre-test post-test control group design was used. Mixed Design ANOVA was conducted to understand effectiveness of exercise program on static balance performance. There were no any significant main effect of visual system and time in Anterio-Posterior and Medio-Lateral directions for bilateral stance. Moreover, no significant group effect was observed for bilateral and unilateral static balance performance. Main effects of visual system and time in Anterio-Posterior direction during unilateral stance were observed. Interaction between visual system and test were observed in Medio Lateral direction.

KEYWORDS: Soccer, Balance, Core Stability, Children

INTRODUCTION: Soccer is the one of the sports that attract attention of spectators and it has a great amount of portion in the sport economics. In order to enhance performance of athletes, a lot of study conducted (Simek, Milanovic, & Jukic, 2007). Studies conducted on soccer context focused on elite and mature population (Paillard & Noe, 2006) and there is insufficient number of studies conducted on young and junior level soccer players. However, the vast number of participants in the soccer area is younger populations and questions about these populations are need to be answered. Balance is one of the most important component for walking reaching, running, bending, etc. From the perspective of locomotion, balance is a base for other movement patterns (Woollacott, Debu, & Mowatt, 1987). Soccer consist of different movement patterns and most of them are different types of running, kicking and bending (Reilly, 2007) Therefore balance is an important component in soccer to be base for different movement patterns. On the other hand, Core Stability training methods have been used for improving major muscles in the area between lower side of pelvis and upper side of rectus abdominus called human core (Willardson, 2007). These muscles have great role on maintaining balance and stabilization (Panjabi, 1992). Even though studies focused on the effect of core stability on different performance parameters, there is no study focused on the effect of core stability on balance. The purpose of this study is to understand effectiveness of core stability training program on static balance performance of junior male soccer players.

METHODS: For the sake of purpose of the study, 27 soccer players (M_{AGE} = 147.19 month, SD_{AGE} = 3.93, $M_{EXPERIENCE}$ = 31.33 month, $SD_{EXPERIENCE}$ = 17.07) who are at the same age and at the same football club were participated in study. 15 of the soccer players were in the intervention group (M_{AGE} = 148.67 month, SD_{AGE} = 3.37, $M_{EXPERIENCE}$ = 35.20 month, $SD_{EXPERIENCE}$ = 17.83) whereas 12 of them were in the control group (M_{AGE} = 145.33 ay , SD_{AGE} = 3.91, $M_{EXPERIENCE}$ = 26.50, $SD_{EXPERIENCE}$ = 15.44). Soccer players were following the same soccer program, only in the intervention group core stability exercises were additional exercises. In order to evaluate balance performances force platform (Custom made, Bertec, OH) was used. The method have already been used by previous studies and making it possible to compare results with previous results (Calavalle et al., 2008). For the static balance the mean distances from the center of platform were taken into statistical analyses. The data taken from Anterio-Posterior (AP) distance and Medio-Lateral distance were taken into statistical analyses. Mixed design Anova conducted in order to understand effectiveness of Core Stability Exercise on two different stance type; 1) Bilateral Stance, 2) Unilateral Stance among 12 years old soccer players.

RESULTS& DISCUSSION: For bilateral static balance test, although there were some decrease observed between pre- and post-test sessions, Mixed Design Anova (Mixed Anova) revealed that there is no main effect of visual condition, participation in soccer trainings for 3 days in a week, participation in Core Stability exercises for 2 days in a week on balance performance. Moreover there were no any significant interactions of any variable on balance performance for both AP and ML directions p> .05 (See Table1 for descriptive statistics in AP direction& Table2 for descriptive statistics in ML direction during bi lateral stance). Unfortunately there is no abundance in the previous literature about effectiveness of particular exercise program on pre-adolescents and adolescents balance performance. These findings of the present study for bilateral static are in line with previous study (Sharma, Geovinson, & Singh Sandhu, 2012) Although, exercise program is more intense comparing to present study the pattern of the movements is almost the same. The improvements in performance can be explained by the improved control of leg over time (Willson, Dougherty, Ireland, & Davis, 2005)

Table 1
Descriptive Statistics for AP Direction During Bilateral Stance

	Group	M	SD	N
Pre.Bilateral Stance	Intervention	11.68	8.12	15
	Control	13.90	13.19	12
	Total	12.67	10.50	27
Post.Bilateral Stance	Intervention	10.08	5.98	15
	Control	11.78	7.16	12
	Total	10.84	6.46	27
Pre.Bilateral Stance Closed Eyes	Intervention	9.86	8.81	15
	Control	12.86	12.80	12
	Total	11.19	10.65	27
Post.Bilateral Stance Closed Eyes	Intervention	9.14	6.15	15
	Control	12.37	13.15	12
	Total	10.57	9.81	27

Table2
Descriptive Statistics for ML Direction During Bilateral Stance

	Group	M	SD	N
Pre. Bilateral Stance	Intervention	41.25	20.45	15
	Control	54.37	17.76	12
	Total	47.08	20.07	27
Post. Bilateral Stance	Intervention	49.40	20.69	15
	Control	63.57	24.29	12
	Total	55.70	23.05	27
Pre. Bilateral Stance Closed Eyes	Intervention	39.16	15.22	15
	Control	58.17	22.25	12
	Total	47.61	20.66	27
Post. Bilateral Stance Closed Eyes	Intervention	55.18	23.45	15
	Control	52.93	25.92	12
	Total	54.18	24.11	27

For unilateral static balance test statistical analyzes revealed that visiual condition is an important factor for AP direction among 12 years old soccer players $F(1, 25) = 8.45$, $p < .05$. However, this significant main effect didn't observed for ML direction $F(1, 25) = 1.14$, $p > .05$ Another main effect observed for AP direction was Time effect on unilateral static balance performance regardless of being in intervention or control group $F(1,25)= 4.28$, $p<.05$, which indicates that participation in soccer exercises for 3 weeks decrease the sway distance for 12 years old soccer players. It was emphasized before by Biec& Kuczynski (2010) soccer training

improves unipedal balance training in ML direction. However, the same effect have not been observed for ML direction F (1, 25) = .85, p> .05. Other than these effects, surprisingly there were no main foot effect for both directions. As most soccer players prefer to use their dominant foot to kick ball to be more accurate and the non-dominant leg to support body weight and maintain the mobilization Mixed Anova revealed interaction between visual condition and test for ML direction F (1, 25) = 6.35, p< .05. The results of present study was in line with previous studies which participation of soccer improves postural stability and decrease the requirement of visual system during balance task (Paillard & Noe, 2006). This interaction indicates that participation in soccer trainings for 3 weeks in a day is helpful for 12 years old soccer players to excellence their closed eyed balance performance. Although there were no group effect observed for both AP and ML direction F (1, 25), p> .05, Core Stability Exercises can be added to regular soccer trainings according to differences between pre- and post-test scores with respect to intervention and control groups. (See Table3 for descriptive statistics in AP direction& Table 4 for descriptive statistics in ML direction during unilateral stance)

Table 3
Descriptive Statistics for AP Direction During Unilateral Stance

Condition	Group	M	SD	N
Pre-test Dominant-Open Eyes	Intervention	19.47	22.95	15
	Control	17.37	11.01	12
	Total	18.54	18.33	27
Post-test Dominant-Open Eyes	Intervention	15.67	13.71	15
	Control	13.65	7.71	12
	Total	14.77	11.29	27
Pre-Test Non-Dominant Open Eyes	Intervention	25.66	27.50	15
	Control	15.44	17.87	12
	Total	21.12	23.85	27
Post-Test Non-Dominant Open Eyes	Intervention	14.51	8.17	15
	Control	17.87	13.85	12
	Total	16.00	10.95	27
Pre-Test Dominant Closed Eyes	Intervention	25.29	18.55	15
	Control	24.01	20.90	12
	Total	24.72	19.25	27
Post-Test Dominant Closed Eyes	Intervention	24.08	13.27	15
	Control	20.86	17.02	12
	Total	22.65	14.84	27
Pre-Test Non-Dominant Closed Eyes	Intervention	26.61	15.52	15
	Control	35.77	37.14	12
	Total	30.69	27.11	27
Post-Test Non-Dominant Closed Eyes	Intervention	16.99	10.37	15
	Control	17.18	7.17	12
	Total	17.07	8.92	27

Table 4

Descriptive Statistics for ML Direction During Unilateral Stance

Condition	*Group*	*M*	*SD*	*N*
Pre-test Dominant-Open Eyes	Intervention	29.20	25.14	15
	Control	39.91	37.92	12
	Total	33.96	31.28	27
Post-test Dominant-Open Eyes	Intervention	30.36	21.28	15
	Control	54.43	28.31	12
	Total	41.06	27.04	27
Pre-Test Non-Dominant Open Eyes	Intervention	33.38	17.49	15
	Control	33.21	25.78	12
	Total	33.31	21.12	27
Post-Test Non-Dominant Open Eyes	Intervention	24.87	26.00	15
	Control	45.93	32.22	12
	Total	34.23	30.28	27
Pre-Test Dominant Closed Eyes	Intervention	37.28	26.98	15
	Control	37.57	46.80	12
	Total	37.41	36.31	27
Post-Test Dominant Closed Eyes	Intervention	23.15	13.34	15
	Control	38.31	18.57	12
	Total	29.89	17.34	27
Pre-Test Non-Dominant Closed Eyes	Intervention	33.95	20.21	15
	Control	35.78	27.73	12
	Total	34.77	23.37	27
Post-Test Non-Dominant Closed Eyes	Intervention	23.14	12.98	15
	Control	33.28	16.32	12
	Total	27.65	15.16	27

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