

## The Effect of Combined Trainings on the Performance Level of Junior Male Basketball Players

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### Abstract

**Objectives:** The purpose of this study is to investigate the effects on some performance parameters of the combined training applied during the preparation period in basketball infrastructure.

**Methods:** 17 male basketball players (training age average;  $4.23 \pm 0.97$ ) with an age average of  $15.81 \pm 0.60$  from the junior team of the Selçuklu Municipality Sports Club participated in the study voluntarily. The combined training program was applied to test subject during the preparation period before basketball local league starts. The training is programmed as 6 days a week for 6 weeks and 75-90 minutes a day. Some tests (dominant and non-dominant hand grip strength, flexibility, 30 sec sit-ups, vertical jump, anaerobic power, 20 m speed and  $\text{MaxVO}_2$ ) have been applied to determine motoric features before and after the program. Statistical calculations were made using the Wilcoxon T test in the SPSS 21.0 program.

**Results:** Significance level was considered as  $p < 0.05$ . Significant differences ( $p < 0.05$ ) were determined statistically between the pre-test and post-test average values of basketball players for vertical jump, anaerobic power, 30 sec sit-ups and  $\text{MaxVO}_2$  parameters.

**Conclusion** As a result, it was determined that 6 week combined training program applied during the preparation period affected positively the motoric features of the junior basketball players playing in the infrastructure. Considering that basketball is a sport that has high fighting power, it may be suggested to apply combined trainings throughout the entire season taking into account training and loading principles.

**Key Words:** Basketball players, Biomotor properties, Combined trainings

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## **Introduction**

Basketball is one of the most popular sport branches that all age groups can participate. It is difficult to attribute performance increase to only one criterion (Gocentas et al., 2004; Trninic, & Dizdar, 2000). However, considering the characteristics of the game, it is observed that bio-motoric features such as speed, endurance, coordination, and mobility are in the forefront, and it is a sport branch with high level technique-tactic and psycho-mental features (Drinkwater et al., 2008; Kılınç 2008; Sampaio et al., 2010; Sevim, 2006).

Improving the level of the performance and preserving the improved level of the performance lie beneath the training science (Bompa, 1998). Performance is improved through adolescence and youth as requested with expedient exercises, and it is improved to superior levels by consolidating in adulthood (Tusunawake et al., 2003). Sport scientists/trainers aim to apply intense training programs in annual preparation periods in order to improve the performance levels of the players. It is observed that determining the load intensity of the factors such as strength, speed, and endurance etc. is a factor that affects performance. It is possible that performance is affected negatively when the load threshold level is unbalanced or when it is under the threshold level (Bompa, 1998).

It is possible to mention about an increase in competition performance of the players with improved motoric features. In order for an improvement, a player may need hours, days, or even months of trainings. As a result of developments in training science, it is known that the quality of different training methods have enhanced and thus, it is reflected on performance as well. Therefore, it is considered important to examine the improvement of combined training applications through motoric features.

This study is conducted to examine the effects of 6-week combined trainings, which were applied in the preparation period of basketball youth development, on some performance parameters.

## **Method**

### **Participants**

17 male basketball players voluntarily participated in the study from the junior team of Selçuklu Municipality Sport Club, with an age average of  $15.81 \pm 0.60$  (training age average:  $4.23 \pm 0.97$ ). All the subjects participating in the research signed the informed consent (volunteer) form. All of the basketball players participated in the combined training program in the preparation period before the start of the local leagues. The trainings were programmed

as 75-90 minutes a day, 6 days a week, and totally 6 weeks. Weekly training plan, load intensity, and unit training load distribution are all presented in combined training plan.

**Training Table Applied to Junior Male Basketball Players**

COMBINED TRAINING PLAN									
1	PERIODS			1				2	
2	MONTHS			AUGUST				SEPTEMBER	
3	WEEKS			1	2	3	4	1	2
4	PERFORMANCE TESTS			T					T
5	WEEKLY LOAD INTENSITY	100							
		90							
		80							
		70							
		60							
		50							
		40							
6	WEEKLY TRAINING PLANNING	MONDAY		1	1	1	1	1	1
		TUESDAY		1	1	1	1	1	1
		WEDNESDAY		1	1	1	1	1	1
		THURSDAY		1	1	1	1	1	1
		FRIDAY		1	1	1	1	1	1
		SATURDAY		1	1	1	1	1	1
		SUNDAY		Off day	Off day	Off day	Off day	Off day	Off day
7	UNIT TRAINING LOAD DISTRIBUTION	STRENGTH	Maximum Strength	5	15	20	-	-	-
			Strength Endurance	25	5	-	-	-	-
			Explosive Power	-	-	5	20	15	15
		SPEED	Maximum Speed	-	-	5	20	20	10
			Speed Endurance	-	10	20	5	5	5
		ENDURANCE		60	40	10	5	-	-
		COORDINATION		5	5	5	5	5	5
		MOBILITY-FLEXIBILITY		5	5	5	5	5	5
		TECHNIQUE		-	10	10	10	10	10
		TACTIC		-	10	20	30	40	50

Tests were applied and measurements were taken before and after the program in order to determine the bio-motoric features of the basketball players. Basketball court trainings and tests were carried out in the Yenikent Sports Hall of Selçuklu Municipality.

Necessary acknowledgements regarding the tests were announced to all of the players before the test applications. After the stature and weight measurements, a 15-minute warm up time were allowed for the players before the tests started. In each test battery, 2 measurements were made with 5 minute intervals (except for the 20 m shuttle run test, and 30 sec sit up test) and the best value was recorded.

### **Tests Applied**

**Height and Body weight:** In the linear measurements a tapeline with 0.01 m sensitivity score was used. Weight measurements were made with a digital weighing scale with a sensitivity level of 0.01 kg (Zorba, & Saygın, 2009).

**Body mass index (BMI):** Using body weights and lengths, BMI was determined using the  $BMI = \text{Body weight} / (\text{Height})^2$  formula (Mackenzie, 2005).

**Hand Grasping Strength:** Beginning from the right hand, the measurement was made with Jamar brand dynamometer and recorded in kg, while the subject was on foot, arm straight with a 10-15 degree angle from the shoulder on one side (Günay et al., 2013).

**Squat Vertical Jump:** The jump meter were fastened to the abdominal region, the hands are on waist region and the players in a certain area were asked to jump vertically after the knees are 90 degree flexion position and to step on to a certain area (Bakırcı, & Kılınç, 2014).

**Anaerobic power measurement:** Measurements of body weight with vertical jump distance (m) were determined by the Lewis formula using the resulting values (Günay et al., 2013). ( $P = \sqrt{4.9 * \text{Body weight} * \sqrt{D}}$ ) P= Anaerobic Power, D= Vertical jump distance (m).

**Sit and reach test:** The score was determined on the sit and reach platform, and recorded in cm (Mackenzie, 2005).

**30 sec Sit-ups test:** The soles of the feet are fully on the mat, knees bent (90°), hands are on each side and touching the neck, in a sitting position on the mat and the counts were recorded as the elbows touched the knees for 30 seconds (Zorba, & Saygın, 2009).

**20 m Speed Test:** A 20-m running track was prepared in the hall, and the start and finish lines were painted. The time between start and finish was detected with NewTest 2000 photocell device, and recorded in seconds (Bogdanis et al., 1998).

**Determining MaxVO<sub>2</sub>:** 20 m shuttle run test was applied, and the numbers of the runs that the subject performed were used on evaluation table, thus MaxVO<sub>2</sub> values were determined and recorded in ml/kg/min (Günay et al., 2013).

### **Statistical analysis**

SPSS 21.0 program was used in the analysis of the data, and arithmetic averages and standard deviations of the measurements and tests were determined. “Wilcoxon T Test” was applied to determine the differences between the values of the first and last tests, and significance level was admitted as  $p < 0.05$ .

### **Results**

**Table 1. Average values of the subject**

<b>Variable</b>	<b>n</b>	<b>Pre-test (Mean <math>\pm</math> SD)</b>	<b>Pos-test (Mean <math>\pm</math> SD)</b>
<b>Age</b>	17	15.81 $\pm$ 0.60	15.81 $\pm$ 0.60
<b>Height</b>	17	183.76 $\pm$ 10.75	183.94 $\pm$ 10.79
<b>Weight</b>	17	77.33 $\pm$ 11.09	77.69 $\pm$ 10.77
<b>BMI</b>	17	22.79 $\pm$ 1.36	22.87 $\pm$ 1.29
<b>Hand Grasping Strength (right)</b>	17	42.17 $\pm$ 4.49	42.61 $\pm$ 4.40
<b>Hand Grasping Strength (left)</b>	17	40.76 $\pm$ 4.11	41.29 $\pm$ 4.01
<b>Squat Vertical jump</b>	17	38.17 $\pm$ 6.13	40.05 $\pm$ 4.62
<b>Anaerobic power</b>	17	104.94 $\pm$ 14.53	108.37 $\pm$ 14.14
<b>Sit and reach</b>	17	24.05 $\pm$ 5.21	26.00 $\pm$ 4.41
<b>30 sec sit-ups</b>	17	19.76 $\pm$ 3.75	21.35 $\pm$ 4.13
<b>20 m speed</b>	17	3.34 $\pm$ 0.19	3.32 $\pm$ 0.20
<b>Max VO<sub>2</sub></b>	17	42.69 $\pm$ 3.23	45.79 $\pm$ 3.66

**Table 2. Wilcoxon T Test analysis of the research group**

Variable		n	Mean Rank	z	p
<b>Height</b>	Pre-test	17	2.00	-1.732	0.083
	Post-test	17	.00		
<b>Weight</b>	Pre-test	17	9.05	-1.734	0.083
	Post-test	17	5.90		
<b>BMI</b>	Pre-test	17	9.13	-.738	0.460
	Post-test	17	6.71		
<b>Hand Grasping Strength (right)</b>	Pre-test	17	7.79	-1.328	0.184
	Post-test	17	10.63		
<b>Hand Grasping Strength (left)</b>	Pre-test	17	7.77	-1.468	0.142
	Post-test	17	8.63		
<b>Squat Vertical jump</b>	Pre-test	17	9.12	-2.006	<b>0.045*</b>
	Post-test	17	8.63		
<b>Anaerobic power</b>	Pre-test	17	10.23	-2.675	<b>0.007*</b>
	Post-test	17	5.00		
<b>Sit and reach</b>	Pre-test	17	7.38	-1.451	0.147
	Post-test	17	13.33		
<b>30 sec sit-ups</b>	Pre-test	17	8.32	-2.463	<b>0.014*</b>
	Post-test	17	4.50		
<b>20 m speed</b>	Pre-test	17	10.08	-.758	0.448
	Post-test	17	8.41		
<b>Max VO<sub>2</sub></b>	Pre-test	17	9.44	-3.527	<b>0.000*</b>
	Post-test	17	2.00		

**\*p<0.05**

It was determined that there was a statistically significant difference between the first and the last tests with regards to squat vertical jump ( $z=-2.006$ ,  $p<0.05$ ), anaerobic power ( $z=-2.675$ ,  $p<0.05$ ), 30 sec sit-ups ( $z=-2.463$ ,  $p<0.05$ ) and Max VO<sub>2</sub> ( $z=-3.527$ ,  $p<0.05$ )

parameters; however, there was no statistically significant difference with regards to the other parameters.

### **Discussion**

In the study conducted, it was aimed to examine the effects of combined trainings, which were applied in the preparation period of basketball youth development, on some performance parameters.

Özsaydı, Salici and Orhan (2015) reported that basketball youth development trainings have a positive effect on improvement of motoric features of the juvenile. In another research on adolescent, juvenile and young basketball players it was determined that there were developments in physical figures of the players parallel to category improvement (Savucu et al., 2004). In another research on student basketball players in university, it was reported that combined training programs applied in the preparation periods improved performances of the players (Bakırcı, & Kılınç, 2014). In our study, a 6-week combined training program was applied, and improvements were detected in bio-motoric features. This situation is supported by numerous researches (Çakır Atabek, 2017; İbiş et al., 2004; Katie et al., 2003; Kürkcü et al., 2010; Opstoel et al., 2015; Özsaydı et al., 2015) that indicated the positive effects of training. Contrary to some researches (Bakırcı, & Kılınç, 2014; Bavlı, 2012; Bilim et al., 2016; Odabaş-Özgür et al., 2016) manifesting that training applications in basketball and other sport branches statistically significantly improved hand grasping power and speed parameters, in our research, no statistically significant differences were located in 20 m speed test and hand grasping power parameters. It can be mentioned that abovementioned dissociation is aroused from training protocols. Moreover, it is known that speed feature is more limited by genetic factors compared to other biometric parameters. Considering the statistically significant differences between anaerobic power and strength, and the relation between speed and strength, no improvement in speed parameter could be originated from variables at the time of the tests. Although it is considered that there was enough time allocated for the speed exercises in the training program applied to the basketball players, it can be mentioned that a 6-week period is not sufficient for statistically significant improvements.

Allocating no place for tests comprising of techniques particular to basketball in the program could be accepted as a weakness. Moreover, it is considered that extensive researches are needed to examine the possible effects of combined training programs with more participants and different age groups on performance parameters which were not included in this study.

## **Conclusion**

As a result, it was determined that the 6-week combined training program applied through the preparation period affected positively the motoric features of juvenile male basketball players in youth development. It is considered that particularly the combined training program applied in the preparation period can be an alternative model for other researches. Besides, considering the fact that basketball is a sport branch that exerts high level of struggle effort, it is suggested that the combined trainings be applied throughout the season after modifying the load intensity and unit training load distribution of the weekly training programs.

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## **References**

- Bakırcı, A., & Kılınç, F. (2014). The effect of applied combined training in the preparatory periods on the performance level of the university basketball team. *Inonu University, Journal of Physical Education and Sport Sciences*, 1(2), 48-67.
- Bavlı, Ö. (2012). Investigation the effects of combined plyometrics with basketball training on some biomotorical performance. *Pamukkale Journal of Sport Sciences*, (3)2, 90-100.
- Bilim, A. S., Çetinkaya, C., & Dayı, A. (2016). Investigation of physical fitness of 12-17 years old students who engage and do not engage in sports. *Journal of Sports and Performance Researches*, 7(2), 53-60.
- Bogdanis, G. C., Nevill, M. E., Lakomy, H. K. A., & Boobis, L. H. (1998). Power output and muscle metabolism during and following recovery from 10 and 20 s of maximal sprint exercise in humans. *Acta Physiol Scand.* (163), 261-272.
- Bompa, T. O. (1998). *Antrenman Kuramı ve Yöntemi (2. baskı)*. Ankara: Bağırhan Yayınevi.
- Çakır Atabek, H. (2017). The effects of swimming training on selected strength and respiratory function variables in pre-pubertal children. *Journal of Athletic Performance and Nutrition*, 4(1), 17-33.
- Drinkwater, E. J., Pyne D. B., & McKenna, M. J. (2008). Design and interpretation of anthropometric and fitness testing of basketball players. *Sports Medicine*, (38), 565–578.
- Gocentas A., Landör A., & Andziulis A. (2004) Dependence of intensity of specific basketball exercise from aerobic capacity. *Papers on Anthropology*, (XIII), 9–17.



- Günay, M., Tamer, K., and Cicioğlu, İ. (2013). *Spor Fizyolojisi ve Performans Ölçümü (3. baskı)*. Ankara: Gazi Kitabevi.
- İbiş, S., Gökdemir, K., & İri, R. (2004). 12-14 yaş grubu futbol yaz okuluna katılan ve katılmayan çocukların bazı fiziksel ve fizyolojik parametrelerinin incelenmesi. *Kastamonu Eğitim Dergisi*, 12(1), 285-292.
- Katie, M., Brad, S. M., Joanne, K., Linda, D. V., & Terence, J. W. (2003). Contribution of timetabled physical education to total physical activity in primary school children: Cross sectional study. *British Medical Journal*, 13(327), 592-593.
- Kılınç, F. (2008). An intensive combined training program modulates physical, physiological, biomotoric and technical parameters in basketball player women. *The J of Strength and Conditioning Research*, (22), 1064-1068.
- Kürkçü, R., Sevindi, T., Gökhan, İ., & Akçakoyun, F. (2010). The effects of badminton on body structure in children. *Turkish Kick Boxing Federation Journal of Sport Science*, 2(2), 34-41.
- Mackenzie, B. (2005). 101 Performance evaluation tests. London: Electric Word plc.
- Odabaş Özgür, B., Demirci, D., Özgür, T., & Yazıcı, G. (2016). Impact of a six week speed training on speed and agility of footballers. *Istanbul University Journal of Sport Sciences*, 6(4), 1303-1414.
- Opstoel, K., Pion, J., Elferink-Gemser, M., Hartman, E., Willemse, B., Philippaerts, R., Visscher, C., & Lenoir, M. (2015). Anthropometric characteristics, physical fitness and motor coordination of 9 to 11 year old children participating in a wide range of sports. *Plos One*, 10(5), 1-16.
- Özsaydı, Ş., Salici, O., & Orhan, H. (2015). Examination of primary school level children and youth setup of basketball motor development. *Niğde University Journal of Physical Education And Sport Sciences*, (9), Special Issue, 10-18.
- Sampaio, J., Drinkwater, E. J., & Leite, N. M. (2010). Effects of season period, team quality, and playing time on basketball players' game-related statistics. *European Journal of Sport Science*, 10(2), 141-149.
- Savucu, Y., Polat, Y., Ramazanoğlu, F., Karahüseyinoğlu, M. F., & Biçer, S. Y. (2004). The investigation of some physical fitness parameters of basketball players in the substructure. *Firat University Medical Journal of Health*, 8(4), 205-209.
- Sevim, Y. (2006). Antrenman Bilgisi. 2. Baskı. Ankara: Nobel Yayınları.
- Trninic S., & Dizdar, D. (2000). System of the performance evaluation criteria weighted perpositions in the basketball game. *Coolegium Antropologicum*, 24(1), 217-234.
- Tusunawake, N., Tahara, Y., & Moji, K. (2003). Body composition and physical fitness of female volleyball and basketball players of the japan interhigh school championship teams. *J. Phy. Antropol. and Appl. Human Sci*, 22(4), 195-201.
- Zorba, E., & Saygın, Ö. (2009). *Fiziksel Aktivite ve Fiziksel Uygunluk*. İstanbul: İnceler Ofset.