A Six Month Intervention Study on Strength Training in Youth Basketball Player in Albania

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Abstract

Introduction. The literature concerning the physical preparation for youth basketball players is huge, although the literature concerning basketball strength training is still scare. The aims of this study were; to assess basketball fitness abilities before (PRE) and after (POST) a 6-month fitness training in youth basketball players (twice weekly); to show if there is any statistically improvement on physical fitness parameters after the intervention. Methods. Twenty-eight youth (male) basketball players (age range 17-18 years) participated in this intervention study. They were assessed PRE and POST training through the basketball strength test (izokinetic and izometric dynamometer) tests. The intervention study lasted 6 months (twice weekly) on a fitness gym (strength training). The duration for each training set had lasted for each 45 min (8 fitness machines was used). Results. Regarding physical components after the intervention data show a significant improvement in strength (p=0.001) for isometric and izokinetic performance on youth basketball players. No significant difference was observed for right foot during izokinetic performance (p>0.05). Conclusion. In conclusion, it was found that the fitness training twice weekly could be useful for improving and monitoring physical parameters with regards to strength in youth basketball players.

Keywords: *youth, basketball, training, strength*

1. Introduction

The literature concerning the physical preparation is huge, although the literature concerning basketball strength training in youth is still scare (Jarani et al., 2014; Jarani et al., 2015). Different estimating techniques are known in order to define muscle coercion, endurance, and speed. For this purpose the actual study performed in youth basketball players is based on isometric, constant charge variable velocity exercise, and isokinetic activity (Alexander et al., 1973; Ellfeldf et al., 1986; Knapik et al., 1980; Walmsley, 1996). Mostly in recent years, for the reckoning of the muscle force are used the isokinetic dynamometers, which ensures a steady angular speed over the complete range of motion. Referring to the outcome of the study, when we take a professional basketball athlete who joins in a systematic training program, there is no reason in differentiating prevalent and non prevalent limb, because the workout phase does not lead to such conditions. Other researchers have come to such results too (Bandy et al, 1994; Mohtadi et al., 1990) in examples of normal populations (non-athletes). Strength training increases to the team of individual's value by growing motor skills for more efficient movement and enrich multi directional force implementation for greater sprint speed, higher jump heights, more explosive changes direction. Yet remains to be defined precisely the outcome of a systematic training program on professional basketball athletes or the extent of their physiological state. Particularly, when the required measurements were likely made by the managers of the team, who were not able to acquire a certain degree of scientific such as the isokinetic instruments could provide. There are two methods to measure strength; manual muscle testing and Isokinetic testing. Isokinetic testing is of greater used in laboratory testing using izokinetics equipment and it is of greater benefit of objective measurement, but there is debate about the protocols used expsacially the speed (Keasays et al., 2000). Isokinetic strength testing provides an objective means of quantifying existing levels of muscular strength (Nicholas, 1989).

The aims of this study were; to assess basketball fitness abilities before (PRE) and after (POST) a 6-month fitness training in youth basketball players (twice weekly); to show if there is any statistically improvement on physical fitness parameters after the intervention.

2. Methods

Twenty-eight youth (male) basketball players (age range 17-18 years) participated in this intervention study. They were assessed PRE and POST training through the basketball strength test (izokinetic and izometric dynamometer) tests. The players came from two team that take place regularly in national basketball championship for youth. The teams were chosen randomly for a pool of 12 teams. The intervention study lasted 6 months (twice weekly) on a fitness gym (strength training). The duration for each training set had lasted for each 45 min (8 fitness machines was used). Informed consent was obtained from coaches and parent,

3. Measurement

3.1 Dynamometric Analysis

The strength of lower-limb was measured with Easy Tech Izometric Machine in the biomechanical laboratory in Sports University of Tirana (Albania). The youth basketball players who underwent this test were positioned on the examination chair following the instructions in the manual. Their hips were placed in 90 of flexion, with their thighs and the trunk secured by straps.

3.2 Test Protocol

The tests were made on extension and flexion of the knee. A preliminary bout of isokinetic measurement was made for each athlete to become familiar with the testing procedure.

After calibration, adjustments of the various subject positions and gravity compensation were made. The different tests were initially made for every limb separately with concentric practice. The selection of the leg that was examined first (dominant or nondominant) was made randomly. We followed the previously described definition of limb dominance.

A pretest performance on the isokinetic device took place with 10 repetitions. The preliminary test included 2 submaximal and 1 maximal repetition at each velocity.

The following parameters were measured for every athlete at 2 different velocities for each limb: (a) peak torque of the knee flexors and extensors during isometric and izokinetic movement, (b) average peak torque of the knee flexors and extensors during isometric and izokinetic movement.

3.3 Intervention

The Intervention on youth basketball players lasted for 6 months. The total frequency was twice weekly with a duration per session 45 min. The training intervention was performed on the fitness gym (strength training) placed in the gym of Sports University of Tirana. Strength exercise was performed using 8 machines while the agility exercises (speed and agility exercises) were lasted with duration 10- 15 min (4-6 exercises).

3.4 Statistical Analysis

The data were gathered and organized in excel file. Than were transferred and analysis using statistical package SPSS (Windows version). Initially, we calculated the descriptive statistics (means and SDs) of every parameter. The statistical analysis for the comparison between the mean values of every variable was the paired t -test, where a high level of significance was adopted ($p \leq 0.005$). It was used ANOVA test for pre- post comparison for each variables and then a post hoc analysis using Bonferroni equation. Only those analysis during comparison ($p \leq 0.005$) were considered statistically difference for two time measurement. SPSS statistical program was used for calculation of the results obtained from this research study.

4. Results

The results from the table 1 show that comparison (pre and post) for Isometric left foot for maximum and average torque is statistical significant different ($p=0.002$; $p=003$) and showed improvement. The same picture is for the right foot that the results show statistical significant improvement ($p=0.001$; $p= 0.002$)

Table 1. Pre and post measurement comparison for left and right foot during isometric performance

		Mean	Std. Deviation	Std. Error	P value
Izometri_Left_MaxTor	Pre	127.75	14.975	7.4875	0.002
	Post	134.75	13.9583	7.4792	
	Total	131.25	14.6593	19.325	
Izometri_Left_AvgTor	Pre	106.25	15.1959	7.598	0.003
	Post	114.25	18.5486	8.2743	
	Total	110.25	16.4104	6.4086	
Izometri_Right_MaxTor	Pre	143.25	18.715	9.3575	0.001
	Post	153.25	27.097	13.5485	
	Total	148.25	22.2116	7.853	
Izometri_Right_AvgTor	Pre	122.25	14.0564	7.0282	0.002
	Post	135	29.9666	14.9833	
	Total	128.625	22.7152	8.0311	

Data on table 2 show the results from comparison between pre and post training during izokinetic performance test for right foot. Results show significance regarding right foot on extension and flexion performance for average peak torque (p=0.001; p=0.001). During this comparison for right foot on peak torque (extension and flexion performance) the results show significance improvement (p=0.001; 0.001).

Table 2. Pre and post measurement comparison for right foot during izokinetic performance

		Mean	Std. Deviation	Std. Error	P value
Izokinetic_Right_AvgPeakTor_Extension	Pre	121	43.5737	21.7868	0.001
	Post	130.5	28.9194	14.4597	
	Total	125.75	34.6111	12.2369	
Izokinetic_Right_AvgPeakTor_Flexion	Pre	52.25	18.6971	9.3486	0.001
	Post	84.5	25.8779	12.939	
	Total	68.375	27.0921	9.5785	
Izokinetic_Right_PeakTor_Extension	Pre	128.5	43.7683	21.8842	0.001
	Post	139.25	33.6489	16.8245	
	Total	133.875	36.596	12.9386	
Izokinetic_Right_PeakTor_Flexion	Pre	57.25	20.6781	10.339	0.001
	Post	91.25	25.3032	12.6516	
	Total	74.25	28.0701	9.9243	

Data on table 3 show comparison results for left foot during izokinetic test (performance) for extension and flexion. Results for comparison on average peak torque (extension) for left foot show no significance improvement while for flexion the results show improvement (p=0.02). Data show that during extension performance peak torque the improvement were no significant while for average peak torque the improvement were significant (p=0.04).

Table 3. Pre and post measurement comparison for left foot during izokinetic performance

		Mean	Std. Deviation	Std. Error	P value
Izokinetic_Left_AvgPeakTor_Extension	Pre	119.5	37.8109	18.9055	NS
	Post	119.75	14.3846	7.1923	
	Total	119.625	26.4842	9.3636	
Izokinetic_Left_AvgPeakTor_Flexion	Pre	55	17.5689	8.7845	0.021
	Post	62.25	18.4097	9.2048	
	Total	58.625	17.1042	6.0472	
Izokinetic_Left_PeakTor_Extension	Pre	126.75	39.3732	19.6866	NS
	Post	127.25	16.9386	8.4693	
	Total	127	28.0612	9.9211	
Izokinetic_Left_PeakTor_Flexion	Pre	63	15.384	7.692	0.045
	Post	66.5	21.1424	10.5712	
	Total	64.75	17.2192	6.0879	

5. Discussion and Conclusion

Regarding physical components after the intervention data show a significant improvement in strength (p=0.001) for isometric and izokinetic performance on youth basketball players. No significant difference was observed for right foot during izokinetic performance. Most study research have emphasized that strength and power, rather than endurance, should be the main focus of physical conditioning programes for basketball players (Drinkwater et al., 2008; McKeag et al., 2003). Referring to the outcome of the study, when we take a professional basketball athlete who joins in a systematic training program, there is no reason in differentiating prevalent and non prevalent limb, because the workout phase does not lead to such conditions. Other researchers have come to such results too (Bandy et al, 1994; Mohtadi et al., 1990) in examples of normal populations (non-athletes) Knee Force of Professional Basketball Athletes 461 (Davies, 1987), high-level tennis athletes (Todd et al., 1995), and soccer athletes (Mangine et al., 1990). The same outcome is reached by Holmes and Alderink too (Holmes et al., 1984) operating similar testing velocities throughout an endurance test, whilst Hageman et al. (Hageman et a;., 1988) came with a similar result with an example of non-athletes. Klopfer and Greij (Klopfer et al., 1988), nevertheless, introduced distinctions between prevalent and non-prevalent limb, using higher elevated speeds during testing action. These outcomes are significant, since the coercion of a wholesome leg in the event of an athletic impairment is a bench mark (Godshall, 1975; Schlinkman, 1984; Todd et al., 1995).

But the results on this study show that we have to perform (to add) more physical fitness exercises during physical training in youth for the nondominant lower limbs (foot). It is known that during shot on the move, basketball players use triple feet movement during shooting performance with the left foot touching the floor before shooting with the right hand (right hand basketball shooters).

Based on the information provided by this study, there is the capacity to establish a training plan that sees the coercion of the wholesome leg as a prescriptive level before the incidence of the athletic impairment (Godshall, 1975; Schlinkman, 1984; Todd et al., 1995)

In basketball, systematic and strenuous training of the sport leads to a major enhance in athletic harms (Apple et al., 1982; Baskiroff, 1990; Ellfeldf et al., 1986). The injuries may affect the ligaments, the muscles, or regarding the bones and can be caused by deficiency of muscle equilibrium between the lower limbs of the player, where the majority of the injuries happens (Mirkin et al., 1985; O Neil et al., 1988; Shambaugh et al., 1991). Being part of a basketball team the professional athlete must improve in continuance fulfilling these two important physical criteria: physical condition and the level of technical ability. The high levels of competition in such a sport demand these elements to be perfected continuously, mainly in professional athletes. This is achieved through energetic, zealous and regular workout. In conclusion, it was found that the fitness training twice weekly could be useful for improving and monitoring training physical parameters in youth basketball players.

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