

## IMPACT OF THE TRAINING OF VELOCITY FORCE AND FORCE AGILITY OVER SOME SPORTS PEDAGOGICAL INDICATORS RELATED TO FEMALE BASKETBALL PLAYERS

*Preliminary communication*

**Larisa Kasabova**

*University of National and World Economy, Department of Physical Education and Sports, Sofia, Bulgaria*

### **Abstract**

*The influence of velocity-force and force agility complexes in the form of circular exercises with pronounced interval-variable method on basketball players is object of study in the current paper. The results show the advantage of this methodology compared to the method used so far. A group of 25 female basketball players from the University has been formed, practicing two times a week for a fourteen week sessions. At the beginning and end of this period, control tests were conducted on fourteen indicators. Concentric training with small rest breaks between individual "sections" with relevant exercises helps to improve both the physical qualities and some technical capabilities such as shooting from the foul line and on the move. 14 test controls were used to cover the anthropometric, physical and technical qualities of the female players. Data is processed using statistical methods.*

**Keywords:** *anthropometric qualities, physical qualities, technical qualities, motor abilities, training program, coaching practice, experimental group, final measurement velocity, endurance, leap, variance analysis, t-test, interval-variate physical work*

### **INTRODUCTION**

A distinctive feature of modern basketball is mainly the technical growth of players, the tactics and the intensification of the game. While 15-20 years ago it was a problem to achieve 70-80 points per match, there is now almost no country in Europe where 90-110 points for a match not to be achieved. Speed increased in attack and organization of defense. The rapid breakthrough is performed for 3-5 seconds, whereas in the past it took 10-17 seconds. According to data of Tsvetkov (Цветков), 1997) long range rebound shot has reached 60% success rate, and in fouls up to 95%. Specialists (Tzarova, Anastasiadis, & Frutis (Църова, Анастасиадис, & Фрутис), 2004; Zhelyazkov (Желязков, 1968) attribute the increased intensity of the game, the high level of physical and technical qualities of the athletes to be among the factors for that. Motor activity of the man, including the athlete, lies in the improvement of simple and complex motor actions and their automation (Zhelyazkov (Желязков), 1968).

In this regard, the level of motor skills: speed, force, stamina, agility and flexibility will be leading in materializing in time, space and effort, i.e. in technique and tactics in the implementation of the basic driving actions of the basketball player.

Many of the authors have focused their efforts on revealing the interrelationships between individual physical qualities (Naumovski, 2004; Jovanović-Golubović, 2003; Karaleić & Jakovlević, 1998). Significantly fewer have studied the relationship between skill and, above all, power agility and success in game sports. Zhelyazkov (Желязков), (1968) defines agility as the ability of the body to coordinate individual movements in time, space, and effort. Making the moves during the game with greater speed, accuracy and economy gives extra advantages to the one who controls them. In this sense, it can be concluded that agility is a measure of "the useful muscle force, i.e. athletic level".

Kuznetsov (Кузнецов, (1978) further exacerbates the notion of "force agility" considering that it is related to the rapid change of the rhythm of the nerve impulses and their exact dosing in time, size and mode of muscle effort.

From a methodological point of view, it is recommended to use the synthetic or analytical training effect in the development of force agility, i.e. simultaneous or selective development of two or more physical qualities [Kuznetsov (Кузнецов), 1970; Zhelyazkov

(Желязков), 1968. There is an emphasis on the need to adhere to the requirements of compliance in the nature of muscular work with racing and special exercises in the selection of exercises (Jovanović-Golubović, 2003; Naumovski, 2004, Tsvetkov (Цветков), 1997).

The requirements for improving the speed and force of the basketball player are related to the use of a dynamic and overcoming muscle contraction regime. Thus, the authors mentioned above confirm the general view is that it is necessary to overcome in a short time a large amount of muscular force and especially of these muscle groups, which bear the main weight in the exercise.

In this regard, we have set ourselves the goal to build such complexes of velocity-force and force-agility that equally improve both physical qualities and specific technical capabilities. The main tasks of this study included:

1. Development of a corresponding training program.
2. Appraising the program in coaching practice.

### **METHODS**

A group of 25 female basketball players (aged 19 to 23) from the University has been formed, , two times a week for a fourteen week sessions. At the beginning and end of this period, control tests were conducted on fourteen indicators. The results are subjected to statistical processing and the main indicators of the variance analysis are presented (Naumovski (Наумовски), 2001, Gigova (Гигова) & Damyanova (Дамянова), 2012, Karaleić & Jakovljević, 1998).

Training program.

The planned three workouts per week increase in volume and intensity, rolling in a 2:1 cycle. These are completed as circular drills with twelve "stations" where physical exercise is carried out with appropriate exercises close to the character of the basketball game. As the most appropriate form of action we have chosen the interval-variable physical work. Sprint runs, jumps and jumps with and without appliances, ball throws, speed exercises with the help of a bar or gear, agility exercises, climbing, balance, etc. were included. The total duration of one round of the given workout varies from 10 to 12 minutes, performing without resting between exercises. According to the purpose and tasks of the training, 2-3 repetitions can be performed.

## RESULTS

The results obtained (Table 1) showed a significant improvement in general and specific basketball performance. Expected in the anthropometric indicators (1 and 2 of Table 1), the variations are insignificant, but with a clearly marked tendency to increase the growth and reduce the weight of the athletes. We also found changes in chest size during a "pause" (-0.6 cm) and at maximum exhalation. The difference between the two indicators for the whole group is 1.12 cm, with a significant decrease in the size of the variability (SD - 0.08), high confidence ( $t = 0.696$ ) and the standard error (Sig - 0.501).

In the exercise for speed, 20 meters from "flying start" we achieved results significantly different from the previous years. The growth on this indicator was - 0.17 sec with decreased variance coefficient level (V), standard error and the magnitude of the achievement (R - 0.12 s).

In the "shuttle" running (168m), the mean of the positive change was -2.65 seconds. Here, the results significantly narrowed, with the

minimum and maximum values decreasing by 3.15 seconds and 1.84 seconds respectively. The high confidence factor ( $t = 8,189$ ) indicates that the group is not homogeneous under this indicator and further work is needed to improve it.

The training process has positively affected the specific technical indicators. Both the shooting for the fouls and the one performed on the go improved, mainly reflecting the maximum values of the basketball players' realization capabilities. By this index the maximum values increased by 3.07 and 2.98 respectively.

The vertical rebound experienced also a significant development. The same was investigated with the help of special BTS G-SPORT wireless inerting equipment, which determines the functional kinematics and movement dynamics.

The average rebound height increased by 6.05 centimeters, mainly at the expense of increasing the maximum levels of the competitors. They improved by 11.04 cm with sufficient reliability and factors upsurge. It is interesting that these positive results were ac-

Table 1. Change in test scores of the experimental basketball team

Indicators	Test №	Statistical indicators							
		Min	Max	R	M	SD	V	t	Sig
1. Height (cm.)	I	157,3	192,3	33,0	175,1	8,700	5,02		
	II	158,5	192,8	34,3	173,5	8,530	4,92	-1,15	0,308
	Variation	-1,2	+0,5	+1,3	+0,4	-0,170	-0,1		
2. Body weight (kg.)	I	47,6	102,8	55,2	66,40	11,170	20,23		
	II	46,5	100,3	53,8	65,00	11,080	17,07	4,30	0,000
	Variation	-1,1	-2,5	-1,4	-1,1	-0,08	-3,18		
3. Chest - pause (cm.)	I	72,5	98,6	26,1	84,90	7,109	8,37		
	II	74,6	100,1	25,5	85,86	7,120	9,29	0,674	0,001
	Variation	+2,1	31,5	0,6	0,96	0,001	0,08		
4. Chest – breath difference (cm.)	I	2,1	9,3	7,2	5,58	1,620	29,29		
	II	5,2	11,6	6,4	6,70	1,540	27,01	0,696	0,030
	Variation	+3,1	+2,3	-0,8	+1,12	-0,08	-2,28		
5. 20 m. flying start (sec.)	I	2,13	4,26	2,13	2,85	0,403	14,14		
	II	2,00	4,01	2,01	2,68	0,360	13,43	1,040	0,330
	Variation	0,13	0,25	0,12	0,17	0,043	-0,71		
6. „Shuttle” running (sec.) (168 m.)	I	43,21	55,70	10,49	50,03	3,503	7,00		
	II	40,06	53,86	13,80	47,40	4,180	8,81	8,189	0,000
	Variation	-3,15	-1,84	+3,31	-2,63	+0677	+1,81		
7. Foul (success out of 10 - number)	I	2,06	7,14	5,08	4,90	1,330	27,14		
	II	5,21	10,21	5,00	6,47	1,434	22,16	-9,589	0,000
	Variation	+3,15	+3,07	-0,08	+1,57	+0,104	-4,98		
8. Shooting on the go for 1 minute (success – number)	I	2,31	9,11	6,80	7,29	1,387	19,02		
	II	6,48	12,09	5,61	8,73	1,203	13,78	-6,945	0,000
	Variation	+4,17	+2,98	+1,44	-1,184	-5,24	-5,24		
9. Vertical rebound (cm.)	I	18,02	60,76	42,74	33,75	11,60	37,33		
	II	23,43	71,80	48,36	39,80	12,01	30,17	11,810	0,000
	Variation	+5,41	+11,04	+5,63	+6,05	-0,59	-7,16		
10. Rebound force (kN)	I	0,28	1,70	1,42	0,79	0,33	37,97		
	II	0,35	2,22	1,87	0,87	0,42	48,27	-0,869	0,393
	Variation	+0,07	+0,52	+0,45	+0,08	+0,09	+10,30		
11. Landing force (kN)	I	0,48	2,30	1,82	1,48	0,58	33,78		
	II	0,78	2,86	1,98	1,68	0,52	30,95	-2,366	0,180
	Variation	+0,30	+0,56	+0,16	+0,20	-0,06	-2,83		
12. Maximum concentric force (kW)	I	0,35	5,20	4,85	1,59	1,03	64,77		
	II	0,50	6,21	5,71	1,88	1,39	33,73	-1,790	0,066
	Variation	+0,25	+1,01	+0,86	+0,29	+0,36	+9,46		
13. Peak speed (m / s)	I	1,29	3,64	2,35	2,20	0,60	27,27		
	II	1,36	3,87	2,51	2,58	0,53	20,54	4,684	0,000
	Variation	+0,07	+0,23	+0,16	+0,38	-0,07	-6,73		
14. Acceleration (m / s)	I	1,26	3,82	2,56	2,18	0,58	26,60		
	II	1,16	4,21	3,05	2,57	0,51	19,84	-4,530	0,000
	Variation	0,10	+0,39	+0,49	+0,39	-0,07	-6,76		

accompanied by a minimal improvement in the rebound force (0.09 kN), the increase in force at landing (0.09 kN) and the maximum concentric force by 0.29 kW. Concentric force occurs during the re-accruing work of cradling before the rebound and unfolding of the lower limbs. These positive changes are related to the change in the peak velocity achieved with the pushing of the support by 0.38 m / s and the acceleration of the body by 0.39 m / sec.

Changes resulting from our work. From the fourteen test benchmarks, seven are above 12%, with the highest increase being the accuracy of the fouls (32.04%), the shooting in the basket (19.75%), the vertical rebound (17.92%) and peak speed at rebound at altitude (17.27%).

These results give us the reason to make the following

## CONCLUSIONS

1. When developing the physical program of the basketball players, it is necessary to use training devices and methods close to the nature of the basic motor activity of the basketball players.

2. Concentric training with small rest breaks between individual "sections" with relevant exercises helps to improve both the physical qualities and some technical capabilities such as shooting from the foul line and on the move.

3. The method used can be perceived as a typical interval-variable and is preferable to the repeated practice used so far with separate training of the technique and the qualities of the athletes.

## REFERENCES

- Гилова, В., & Дамянова, Р. (2012). Статистика в спорта [Statistics in sport. In Bulgarian.] София: Национална Спортна Академия.
- Желязков, Цв. (1968). Баскетбол [Basketball. In Bulgarian.]

София: Медицина и физкултура.

- Кузнецов, В. (1978). Силовая подготовка спортсменов высших разрядов [Strength training of top athletes. In Russian.] Москва: Физкультура и спорт.
- Цветков, Вл. (1997). Баскетбол [Basketball. In Bulgarian.] София: Медицина и физкултура.
- Църва, Р., Анастасиадис, Т., & Фрутис, Т. (2004). Изследване на физическата и техническата готовност на 15-16 годишни баскетболисти [Study of the physical and technical fitness of 15-16 year old basketball players. In Bulgarian.] София: Национална Спортна Академия.
- Jovanović-Golubović, I. (2003). Antropološke osnove kosarke, Antropological basics of basketball . In Serbian.] Knjaževac: GIP „Timok“ AD.
- Karaljević, M., & Jakovljević, S. (1998). Testiranje i merenje u kosarci [Testing and measurement in basketball. In Serbian.] Beograd: Košarkaški savez.
- Наумовски, А. (2001). Основни статистички методи во спортот [Basic statistical methods in sport. In Macedonian.] Скопје: Факултет за физичка култура.
- Naumovski, A. (2004). Povrzanosta na antropometriskite karakteristiki i muskulnata sila kaj učenicite od petto odelenie tretirana so različni metodološko-statistički postapki [The relationship of the anthropometric characteristics and the muscular strength of fifth grade students treated with different methodological-statistical procedures. In. Macedonian.] Сборник, Научна конференция с международно участие, Благоевград, 2004, „Физическото възпитание и спортът в образователната система“ (pp. 59-61). Благоевград: Министерство на образованието и науката, Югозападен Университет „Неофит Рилски“.

Correspondence:

Larisa Kasabova,  
University of National and World Economy  
Department of Physical Education and Sports  
Studentski grad, 1700 Sofia, Bulgaria  
E-mail: larissa.kasabova@gmail.com