Review Article

The use of short physical training intervals of female juniors in basketball

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Abstract
Background. Between the level of achieved sport performances and that of sportives' physical training there is a relation of direct determination: the highest the level of physical training is, the greater the chances to obtain good results in competitions are.
Aims. Our aim in the study was to check and emphasize the effects of the use of short intervals methods in conceiving programs of physical training upon this component of training.
Methods. The study took place between September 2005 and March 2006. The experimental group was made up of 12 female sportives from "C.S.S. – M. Eminescu College" from Oradea who benefited of a formative program of special physical training, different from that of the control group. The control group was made up of 12 female sportives from L.P.S. – C.S.S. Satu Mare who followed a normal physical training program based on traditional methods. The two groups resemble regarding most studied parameters, the occurring differences being insignificant.
In order to accomplish our research, we used a wide range of research methods, the most important of them being: the experimental method, the method of analogy and modeling, the method of testing, as well as the statistical-mathematical method.
Results. After the statistical analysis of results, there were noticed significant results between the two groups, at the level of most studied parameters.
Conclusions. The formulated conclusions regarded two plans: specific motility and body adjustment to effort. The use of short physical training intervals of junior female basketball players determined positive effects in the motor area.

Key words: the interval method, modeling, short intervals, training.

Introduction

The achievement of a progress, of a jump value in the play of a team and, implicitly, of the players on each appointment separately, depends on the constant ascending level of the general and specific conditioning, on which the play technique is applied at high parameters of fairness, efficiency, and creativity observing the actual game conditions (Ionescu, Dîrjan, 1997).
The modern basketball became a game where but the high level of virtuosity while performing the technical – tactical actions is no longer sufficient to secure success. Urbach C.A. (quoted by Bompa T.O., 2003) shows that the effective time spent by a player on the field during a game and registered on the sporting watch as such represents an average of 26.3 minute. In this range, the time while the player has the ball in his possession, effectively, is very short (ranging from dozens of seconds to several minutes, depending on the appointment within the team). The rest of the time comprises the moves without the ball, while attacking and defending: marking and marking out, rebounds, peculiar moves etc. Therefore, the overwhelming importance of the conditioning of the basketball player, as decisive factor in securing the success in a competition, is crucial.

Objectives

By approaching this aspect, we try to join the experts' effort in the domain in relation with the improvement of the training methodology and technology and to contribute, through the working strategy and suggested means to enrich the resourceful methods and means used in the development of the conditioning for the girl junior basketball players.
Our research will try to show an alternative to the traditional method, based on constant working, by which normally the conditioning is accomplished for the junior players, alternative that might be extrapolated to other levels of training, with the expected adaptations.

Working Hypothesis

The shaping of the conditioning achieved by using the short intervals will entail the growth of the organism effort capacity, of the execution technique, and the maximization of the sport performances during competitions (Feflea, 2009).

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Materials and methods

Our study took place between September 2005 and March 2006. In order to verify the research hypothesis, randomly, there have been set an experimental group and a control group, that were part of a nationally representative specimen, the results obtained during the control unique tests made up as well the results of the initial testing within the carried out experiment.

The experimental group was made up of 12 players from „C.S.S. – College „Mihai Eminescu" of Oradea, who benefited from a special formative conditioning program, differing from the control group one. The control group was made up of 12 players from the L.P.S. – C.S.S. Satu Mare, who followed a normal conditioning program, based on the traditional methods. The two groups are equivalent in relation with the majority of the studied parameters; the occurring differences were insignificant (table I):

Table I

The main data of the players from the two studied groups

Studied parameters (average values) / Group	Experimental group	Control group
Age (years)	16.8	16.8
Experience in basketball (years)	6.4	7.5
Height (cm)	174.08	172.83
Weight (kg)	59.5	58.2
Full arms-span (cm)	174.8	172.5
Vital capacity (ccm)	3342	3375
Demeny index	5.5	5.8
Quetelet index	341.3	336.3

Within the educational experiment, we used 28 exercises, grouped into 12 training programs applied to the experimental group, with duration of 35 minutes and envisaged as an extension of the common training.

The practical implementation of these programs we performed by considering the effort facing features within the basketball play and were based on the intensive training method comprising intervals that allows huge possibilities of systematization, proportioning, and control, an indispensable aspect in the modern high performance sport. The programs have been applied over the entire competition year, during October 2005 – March 2006. The number of application within the weekly cycle differed: 3 applications during the weeks without games, and two applications during the weeks including games. During the given period, the control group followed the common training program, being provided for the conditioning with the same volume of time as the experimental group.

The prerequisites we started from were as follows:
- the research revealed that the periods of play without interruption and the break periods (stop play) are slightly equally distributed;
- the most frequent actions during the game (52%) comprise a duration of 11 - 40 seconds, followed by stop play of approximately the same duration (51,7%);
- in general, there is a connection between the duration of an action and the alternating stop play: if the former is increasing, the same, the duration of the stop play is increasing: for a rally of 30 seconds, the stop play is 30 seconds, generally. (Jordane and Martin, 1999).

For this type of intermittent effort, the training comprising short intervals seems to be specifically adapted, if we want to observe the game structure and this for two main reasons:
- the much longer durations of the exercises than the game sequences, the trainees will have no other option than to work by keeping a wrong rhythm, too slow and lacking in accelerations, or to quickly exhaust their reserve power;
- the training provided with short intervals allows a consistent increase of the exercise intensity. (Colli and Faina, 1985).

To these observations we added:
- the trainees' general and specific physical training level in the experimental group ascertained in pursuance of the initial testing;
- the actual material conditions;
- the observance of the trainees' age and sex singularities;
- the present trends manifesting internationally in the game for the teams of this category.

Starting from these reasons based on objective data, the framing and application methodology of the girl junior basketball players' physical training improvement programs stood out. The shaper action was aimed towards the

psycho-physical and functional challenge types, generated by the dynamic structure of the game. In relation with the effort orientation, each week comprised its ascendancy. The basic principle while conceiving the training programs was to alternate the content of the efforts. Thus, it was alternated:

- the running sequences of diverse intensity with extra jumps;
- the running sequences of diverse intensity with sequences for the lower body strength;
- the aerobic and anaerobic challenges with local muscular challenges;
- different types of jump with technical elements with the ball;
- the sequences of burdening with running sequences;
- the sequences for developing the explosive force at the upper and lower body level, with running and walking sequences;
- the submaximal force sequences with the explosive force and sprint sequences;
- vertical and horizontal jumps alternated with the carrying out of technical elements performed under burdening;
- the technique sequences with the ball with the working sequences without the ball (Cometti, 2002).

The tests applied to the two groups included: the running speed over 30 m, springiness „Suicide - drill", and running over 500 m – all provided within the unique system of control test of the Romanian Basketball Association on the date of the experiment. To secure an exact interpretation of the results, we used the Student test and Pearson and Spearman correlation rates, with a significance threshold for the tests in use of 0.05 (Tudos, Şt., 1993). The statistical calculations have been carried out by way of 13.0 SPSS and Microsoft Excel applications. We used the scoreboard of the Romanian Basketball Association (1986).

Results

The analysis of the trainees'conduct (table II), was based on:
- the estimation of each group performances in terms of the central trend indexes, dispersion, the group homogeneity, and the distribution form;
- the comparison between the results of the final and initial testing for each test and group, separately;
- the reference of the average performance of each group to the average synopsis in the reference table of the Romanian Basketball Association;
- the calculation of the differences significance between the averages for the correlated samples;
- the analysis of the actual connection between the performances obtained at diverse tests, in pursuance of the correlation indexes calculation (Pearson).

Table II

The main statistical – mathematical indexes calculated in the control tests for the two groups

Test	Indexes	Experimental group		Control group	
		Initial Test	Final Test	Initial Test	Final Test
30 m (sec)	Average **X**	4,9	4,75	4,7	4,7
	Range **W**	1,4	1,1	0,5	0,6
	Standard deviation **S**	0,38	0,31	0,2	0,19
	Variability index **Cv**	7,75	6,63	4,44	4,10
	t value for f=11	-	6,4	-	2,071
500 m (min./sec)	Average **X**	2,00	1,44	1,58	1,45
	Range **W**	1,14	0,15	1,15	0,23
	Standard deviation **S**	0,52	0,04	0,36	0,05
	Variability index **Cv**	26,32	2,96	22,57	3,60
	t value for f=11	-	2,142	-	1,415
Springinss (cm)	Average **X**	44,75	48,16	46,58	47,75
	Range **W**	19	17	28	21
	Standard deviation **S**	6,21	6,16	6,99	5,19
	Variability index **Cv**	13,17	12,79	14,99	6,33
	t value for f=11	-	7,06	-	2,006
"Suicide" (sec)	Average **X**	25,06	24,48	24,85	24,85
	Range **W**	4,2	2,4	4,3	2,6
	Standard deviation **S**	1,08	0,66	1,07	0,74
	Variability index **Cv**	4,31	2,70	4,32	2,98
	t value for f=11	-	4,142	-	0

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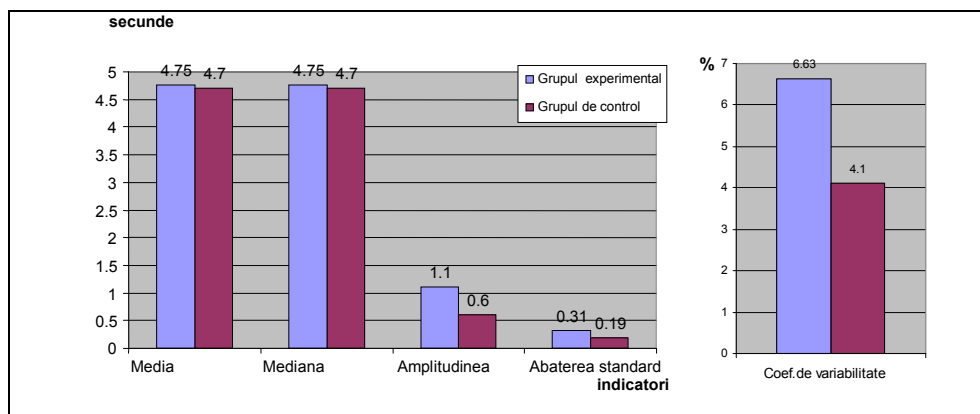
- **Sprint over 30m (fig. 1)**

Fig. 1 - The graphic representation of the main statistical – mathematical indexes calculated in the sprint over 30 m test for the studied groups – final testing

Legend, Secunde – seconds, Abaterea standard – Standard deviation, Media – Average, Coeficient de variabilitate – Variability index, Mediana – Median, Grupul experimental – Experimental group, Amplitudine – Range, Grupul de control – Control group

T value calculated for the *experimental group* during this test (t = 6.4) is higher than the *t* value for the threshold 0.01 (t = 3.106). The difference is significant, the null hypothesis is dismissed and we may ascertain with a probability of 99% that during the studied time interval, the speed significantly increased as a consequence of the training attended.

T value calculated for this test for the *control group* (t = 2.071) is inferior to that in Fisher's table on the significance threshold p = 0.05 (t = 2.201). Given these conditions, the null hypothesis is accepted, i.e. the obtained results may occur due to some random variations and not as a consequence of the training attended (fig.1).

Considered the test largely, we note that, while keeping the *control group* performances at the same level, the performances achieved by the *experimental group* significantly improved during the studied time interval, reaching the same level as the control group, comprising at the same time a dispersion of the results (less significant).
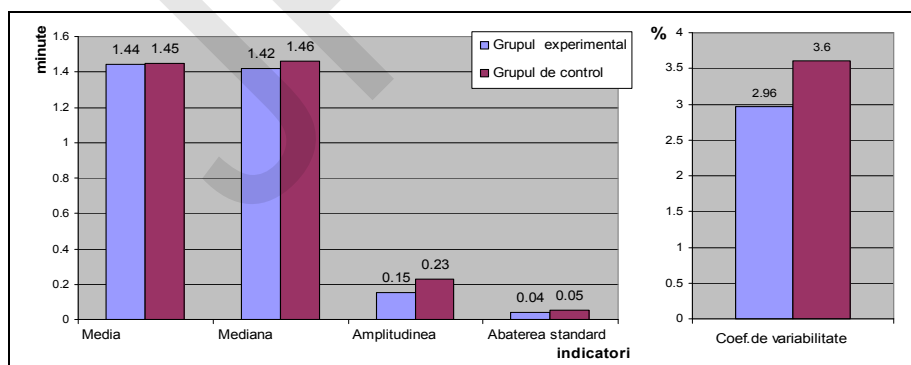
- **Running over 500 m (fig. 2)**

Fig. 2 - Graphic representation of the main statistical – mathematical indexes calculated during the running over 500 m test for the studied groups – final testing

Legend, Minute – Minutes, Abaterea standard – Standard deviation, Media – Average, Coeficient de variabilitate – Variability index, Mediana – Median, Grupul experimental – Experimental group, Amplitudine – Range, Grupul de control – Control group

In both cases, the **t** values (t = 2.142 for the *experimental group* and t = 1.415 for the *control group)*, are inferior to the value in Fisher's table, on the significance threshold p = 0.05. In this case, the null hypothesis is accepted, according to which the results obtained may be the consequence of some random variations. *Considered the test largely,* the results obtained by the two groups are almost equal, with a slight difference regarding the performances in favor of the *experimental group*.
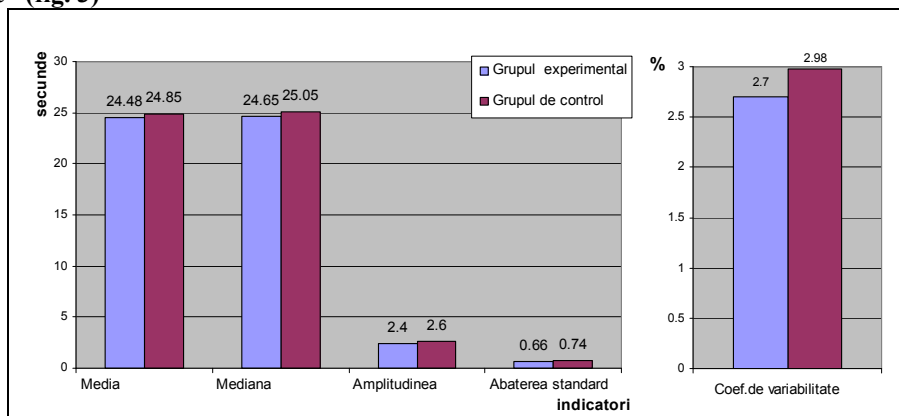
- **„ Suicide" (fig. 3)**

Fig. 3 - Graphic representation of the main statistical – mathematical indexes calculated during the "Suicide" test for the studied groups – final testing

Legend, Secunde – seconds, Abaterea standard – Standard deviation, Media – Average, Coeficient de variabilitate – Variability index, Mediana – Median, Grupul experimental – Experimental group, Amplitudine – Range   Grupul de control – Control group

Index **t** value calculated for the *experimental group* (t = 4.142) is higher than of **t** in the table on the significance threshold of 0.01. The difference is significant; therefore the obtained positive modification during the final testing associates with the training accomplished by a 99% probability.

The statistical – mathematical calculation points out for the *control group* a **t** value (t = 0), far inferior to the 0.05 threshold in Fisher's table, thus we need to accept the null hypothesis showing that the obtained result may not be associated with the attended training.

Considered the test largely, we may note that the *experimental group* show an improvement in its final performances in relation with its initial ones for all indexes, while for the *control group* we may note a stagnation in value of the results, comprising an improvement, however, when assorting the results around the average and the homogeneity of the group. We need to underline that these differences between the two groups at the "Suicide" test occur in relation with the results superior to the best performances in the reference table (fig.3).

- **Springiness (fig. 4)**

The value we obtained for **t** (7.06) for the *experimental group* is higher than the t = 3.106 value on the threshold 0.01. The difference is significant, thus the null hypothesis is dismissed and we may ascertain by a 99% probability that the trainees' springiness in the experimental group increased significantly in pursuance of the attended training programs.

By comparing the **t** value we calculated for the *control group* (t = 2.006) with the value on the threshold p = 0.05 in Fisher's table, we need to accept the null hypothesis showing that the obtained final performances may be the outcome of some random variations.

Considered the test largely (fig.4), we may conclude that the development level of the trainees'springiness in the *experimental group* is superior to that of the trainees' in the *control group,* in pursuance of the final testing. Both results stand in value terms below the reference average nationally observed (49.8 cm), but at the average performance level in Romanian Association of Basketball table (45 – 47 cm).
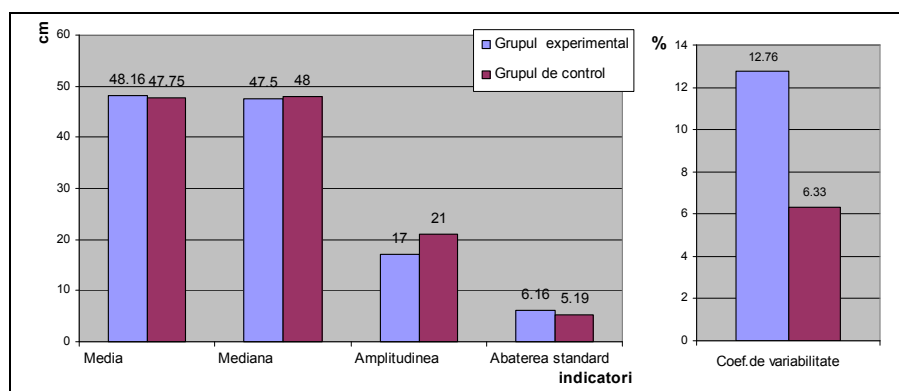

Fig. 4 - Graphic representation of the main statistical – mathematical indexes calculated during springness test for the studied groups – final testing

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Legend, Secunde – seconds, Abaterea standard – Standard deviation, Media – Average, Coeficient de variabilitate – Variability index, Mediana – Median, Grupul experimental – Experimental group, Amplitudine – Range, Grupul de control – Control group

By comparing the corresponding synopsis to the average performances achieved during the motility tests by the trainees in the *experimental group* at the two tests (fig. 5), we may note an improvement during the final testing for all the four tests.
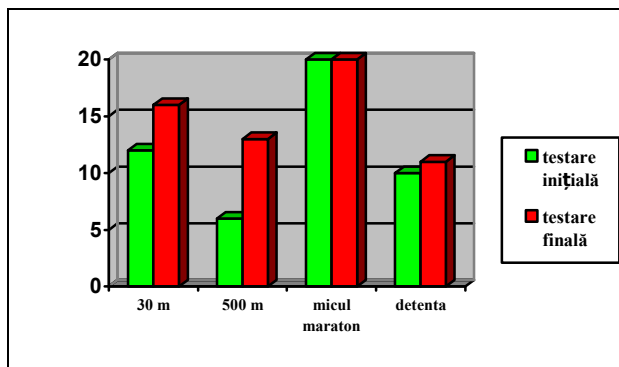
Fig. 5 - The synopsis corresponding to the average performances achieved during the motility tests at the two tests – experimental group
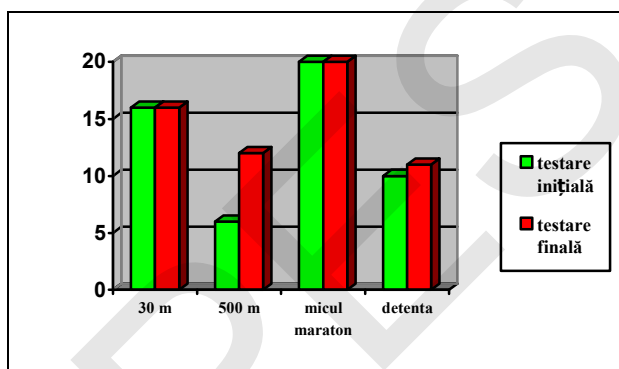

Fig. 6 - The synopsis corresponding to the average performances achieved during the motility tests at the two tests – control group
Legend, Micul maraton – "Suicide", Detenta – Springiness, Testare inițială – initial testing, Testare finală – final testing

The same comparison points out at the *control group* level a stagnancy of the performances during two tests (30 m, and "Suicide"), an obvious improvement of the performances registered during the 500 m test and results slightly better during the springiness test (fig. 6).

Conclusions and suggestions

1. In pursuance of the optimization programs implementation of the physical training by using the short intervals, the trainees in the *experimental group* accomplished superior performances to those of the trainees in the *control group.* During the 30 m test, the average performances were equal for both groups, considering the conditions where the performance during the final testing of the experimental group improved in relation with the initial testing, while the performance obtained by the control group proved to be the same. In practice, in pursuance of the final testing we may note a significant improvement of the trainees' performances in the *experimental group*, overall tests in relation with the initial testing. At the same time, the trainees in the *control group* improved their initial performances for two tests and knew a stagnancy of the performances in the other two tests. *The increasing performances rates of the experimental group ascertained during the final tests are higher than those of the control group for definitely all the tests.*
2. By reporting the average value of the accomplished performances by each group separately to the average performance and synopsis (10 points) in the Romanian Association of Basketball synopsis (1986), we may conclude that both *the experimental group* and the *control group* achieved superior performances over all the tests, as shown in the graphic below:
3. The calculated values of the variability indexes (table 1) point out the large homogeneity and small dispersion of the results of *both groups* during the investigated tests.

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Specifications
The study capitalizes the results from the author's PhD thesis (2009).
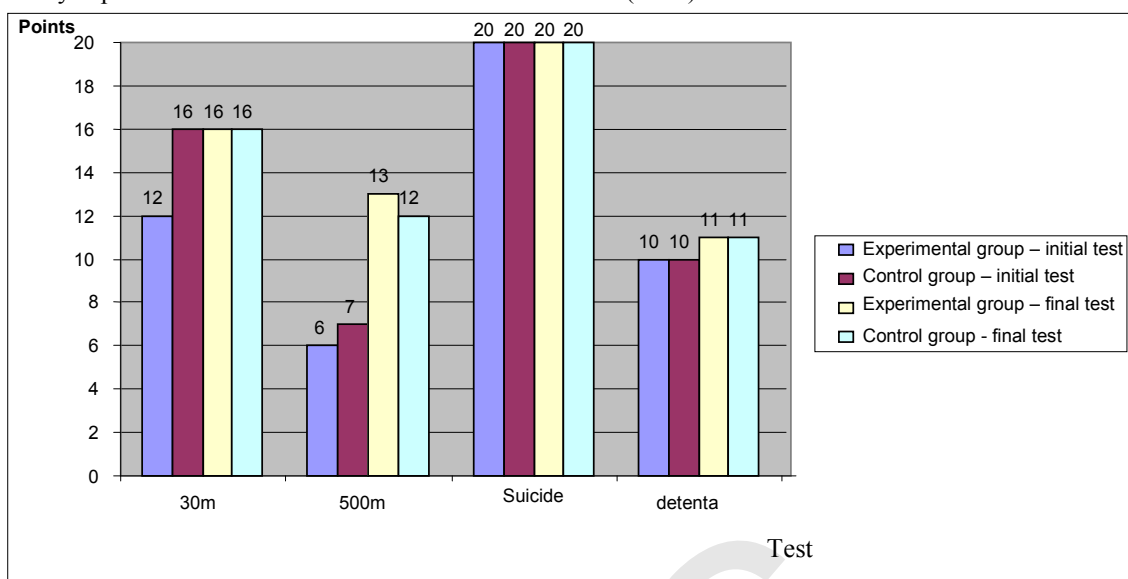

Fig. 7 - The average synopsis achieved by the trainees n the two groups

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