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Original article

INFLUENCE OF BI-COMPETITIVE TRAINING ON IMPROVING THE PERFORMANCE CAPACITY OF JUNIOR FEMALE GYMNASTS

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Abstract

The *purpose* of this paper is the presentation of bi-competitive training influence on improving the performance capacity of junior female gymnasts. With that end in view, we considered that, by providing an optimum relationship between the means content of bi-competitive training and the requirements of the training category within the same stage of preparation, we shall influence the performance capacity and the successful participation in the scheduled competitions.

Methods. The study was organized during five months of training (16 May 2011 - November 5, 2011), applied to a single gymnast, 10 years old, junior IV category, level 2, with the training objective to participate in the National Championships junior IV, level 2, Buzau; "Sergiu Popa" Memorial Gymnastics Competition, Junior III, level 3, Focsani; National Team Championship of Juniors III, level 3, Deva and in Individual National Championship Junior III, level 3, Focsani. Gymnast's evolutions in the preparatory stages of training sessions and competitions were monitored by using video methods of technical analysis, statistical - mathematical method and graphical representation method.

Results. The analysis of means content used in the bi-competitive preparation of female gymnasts junior IV showed that the training sessions aimed at the improvement of technical elements specific to category IV level 2 and at the learning of higher difficulty technical elements required by category III on every apparatus. To highlight the level of performance capacity indices within the bi-competitive training, 5 strength tests were applied, also 3 verification training sessions in each competitive stage and the results obtained on apparatuses in the 4 competitions, as for Score A1 (difficulty value - category requirements), Score B - execution score and FM - final mean

Discussions. The study focused on the physical and technical training programs, monitoring statistically the development of muscle strength and the dynamics of technical elements learning on different apparatuses. Study results show that the bi-competitive training refers to the improvement of performance capacity in women's artistic gymnastics at junior level IV, which during training sessions aimed both at improving the category elements and at learning new and more difficult elements required for participation in competitions of a higher level than gymnast's age. This training depends entirely on the competitive calendar, on gymnasts' training level and on competitive effort characteristics at different levels of training; this methodological orientation is rare in artistic gymnastics - only with talented children and good working conditions. The analysis of physical training level highlights an improvement of abdominal muscle strength, back and scapular-humeral belt strength, arms and legs strength - spring, all these having a great influence on learning and perfecting the technical elements at apparatus, as required by Junior III category level 3. As for the results of performance capacity indices during the 4 competitions, we noticed an increase of exercises difficulty value on apparatus, an improved execution technique of highly difficult elements and the increase of the final score value on apparatus. Regarding the correlation of performance capacity indices between competitions, we observed insignificant differences of difficulty value at $p > 0.05$ in terms of requirements of the training category; significant differences of the technical execution score between the first and the second competition at < 0.01 , while in the contest 3 and 4 the differences are insignificant at $p > 0.05$ and significant as for the final score between competitions.

Conclusions. The training optimization by improving the elements of category IV on each apparatus and the learning of some technical elements necessary for category III in the same training session lead to the bi-competitive training in women's artistic gymnastics. An optimum relationship provided between the content of means in bi-competitive training and the requirements of the training category within the same stage of preparation will influence the performance capacity and the successful participation in the scheduled competitions. For a correct application of this form of competitive training, its efficient utilization during training sessions is recommended only if we take into account the specific methodological aspects that allow us to use it.

Keywords: artistic gymnastics, means, performance, planning, bi-competitive training.

Introduction

Artistic gymnastics is currently experiencing a new level of development in terms of contents and assessment of exercises. The new modifications of the Code of Points addressing the difficulty of technical elements, granting of bonuses and last, but not least,

the specific requirements of each apparatus, have determined new directions and trends of the training (Potop, 2008).

The high level of performances in modern sport requires continuous improvement of all aspects of athletes' training. This level and further increase of the

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capacity for performance depend directly on a number of factors and ways to improve sports training (Dragnea, 1996).

The contents of sports training summarizes those structural elements based on functional and methodological rules and laws that determine sports performance (Niculescu, 2003).

Because the performance sport field requirements are continuously increasing and the achievement of high performances is more and more difficult, we are witnessing nowadays a transfer and adaptation of new technologies from other fields to training field (Grigore, 2001).

The development of the capacity for performance involves strategies differentiated per stages, determined by the acquisitions level and by the bio-psycho-pedagogical rules to be observed. The achievement of sports performance is determined by several factors, whose boundary is an important prerequisite for planning and modeling the training (Dragnea, Mate-Teodorescu, 2002).

Bi-competitive training in artistic gymnastics involves the content of the means on two training levels within the same training session, in pre-competitive and competitive period, aiming at the participation in two competitions with different categories of classification (Potop, 2006).

The goal of competitive preparation during workouts is to reduce the strain induced by stressing factors, to develop athletes' capacity for cognitive and lucid analysis of sports situation and to strengthen the technical answers that can be used in future competitions (Potop, 2005).

The training optimization by improving the elements of category IV on each apparatus and the learning of technical elements necessary for category III during the same workout lead to bi-competitive training in women's artistic gymnastics (Potop, 2011).

Competition is considered an activity that summarizes the results of athlete's and coach's work after a long period of time. Depending on competition nature, the focus is on compulsory and freely chosen working program, highlighting the continuity of training stage and the number of micro-cycles (.Smolevskij, Gaverdovskij, 1999).

The development of a training program for a certain period is an important stage involving from the beginning the modeling of the main quantitative and qualitative indices of workout content in conformity with athletes' level and duration of the intended training cycle (Vieru, 1997).

Some specialists believe that competitive means represent a component of training, called full component, which is practiced during sessions and micro-cycles specific to the end of the pre-competitive stage and of the competitive period. By introducing competitive means, the mentioned structures are entirely conceived according to the model of the competitions in which athletes will participate. Matveev, 1986, proposed a classification of

competition means according to the motor structure of sports branches, dividing them into classes, groups, subgroups and forms of exercises, because gymnastics is placed in the sets of exercises of polyathlon competition, with a periodically renewed content, under the form of sport art (Teodorescu, 2002).

Purpose

The purpose of this paper is to show the influence of bi-competitive training on the improvement of performance capacity of junior female gymnasts. That is why we have considered that by providing an optimum relationship between the contents of bi-competitive training means and the requirements of preparation category within the same training stage we shall influence the level of performance capacity and the successful participation in the scheduled competitions.

Methods and procedures

The study was organized throughout 5 months of training (from May 16, 2011 to November 5, 2011), applied to only one gymnast of 10 years old, Junior IV category, level 2, having as preparation goal the participation in the National Championship of Junior IV, level 2, Buzău (19-21.05.2012); „Sergiu Popa” Memorial Gymnastics Contest, Juniors III, level 3, Focșani (27-28.05.2012); Teams National Championship Juniors III, level 3, Deva (16-18.06.2012) and Individual National Championship Juniors III, level 3, Focșani (2-5.11.2012).

We monitored gymnast's performances during preparatory stages in training sessions and competitions, using the video method for technical analysis, the statistical-mathematical method and the graphical representation method.

Tests for checking up physical fitness level:

- *arms strength*, climbing the rope by means of hands and legs (sec.);
- *abdominal strength*: hanging leg raise up to the grip point on rib stall (maximum number of correct reps);
- *back strength*: torso extensions hands behind neck (maximum number of reps);
- *scapular belt, back and abdominal strength*: strength handstand from legs astride seated support (maximum number of reps);
- *explosive strength*: stretched legs up and down jumps on trampoline edge - 30 sec. (number of reps);

Content of bi-competitive training means

The bi-competitive training was materialized by verifying the initial training of Junior IV category, then by turning into good account the learning of highly difficult elements necessary for Junior III category during competitions 2 and 3 (Memorial and Qualifications); the bi-competitive training was completed by the participation in the Individual National Championship.

Training objectives: improvement of category IV performances and learning of technical elements necessary for category III on each apparatus in various stages of training throughout the same training mezzocycle.

- Physical training: improvement or maintaining of development level of muscle strength or specific joints mobility.

- Technical training:

1. Handspring vaults: improvement of front handspring and learning of Tsukahara vault with backward tucked / piked salto.

2. Asymmetric bars: preservation of category IV training level by performing the full exercise; improvement of free cartwheel and backwards Stalder on low beam and learning the 360° twist backward stretched salto dismount and the backward tucked double salto dismount (with or without help) needed to category Junior III.

3. Beam: improvement of category IV and III elements, focusing on the correct execution of full exercises.

4. Floor: improvement of acrobatic elements, learning of the following acrobatic elements: backward tucked double salto and backward stretched saltos with 540° and 720° twist.

- Artistic training: improvement and correction of mistaken elements and of artistic saltos in full exercises on beam and on floor.

Training contents on apparatus was made in an individualized manner, depending on apparatus sequence during training session; the training was achieved by number of reps, made with or without assistance, assessed as successful or unsuccessful attempts.

Results

To highlight the level of indices of performance capacity during bi-competitive training, there were applied 5 strength tests, 3 verification training sessions in each pre-competitive stage and the results achieved on apparatus in 4 competitions in terms of Score A1 (difficulty value – requirements of category), Score B – execution score and MF – final score.

Table no. 1. Results of physical training

Fitness test	Mezzo-cycle 1	Mezzo-cycle 2	Mezzo-cycle 3
Arms strength (sec.)	21	18	16
Abdominal strength (reps. no)	16	18	15
Back strength (reps. no)	26	28	26
Scapular belt strength (reps. no)	4	8	11
Explosive strength (reps. no)	28	30	34
Statistical indices			
Mean	19	20.4	20.4
SEM	4.28	3.96	4.2
SD	9.59	8.87	9.39
CV %	5.04	43.5	46.06

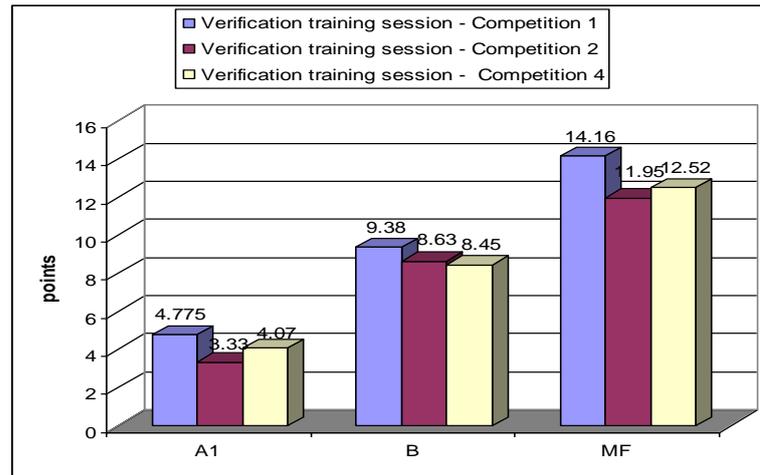
In table no.1 are listed the results of physical training level in the three pre-competitive mezzocycles, in terms of arms, abdominal, back, scapular belt and lower limbs strength in NC of Jun..

Table no. 2. Results obtained in verification training sessions

Apparatus	Verification training session - Competition 1			Verification training session - Competition 2			Verification training session - Competition 4		
	A1	B	FS	A1	B	FS	A1	B	FS
Ss	5.100	9.500	14.600	4.000	8.200	12.200	4.000	8.700	12.700
Pi	3.700	9.300	13.000	2.500	8.700	11.200	3.200	8.600	11.800
B	5.100	9.400	14.500	3.400	8.200	11.600	4.400	8.300	12.700
S	5.200	9.350	14.550	3.400	9.400	12.800	4.700	8.200	12.900
Statistical indices									
Mean	4.775	9.38	14.16	3.33	8.63	11.95	4.07	8.45	12.52
SEM	0.35	0.04	0.38	0.31	0.28	0.35	0.32	0.12	0.25
SD	0.72	0.08	0.77	0.62	0.57	0.7	0.65	0.23	0.49
CV %	15.04	9.09	5.47	18.6	6.58	5.85	15.9	28.1	3.93

Legend: A1 –difficulty value (requirements of category); B – execution score and FS – final score.

Ss- handspring vaults, Pi- asymmetric bars, B- balance beam, S- floor.



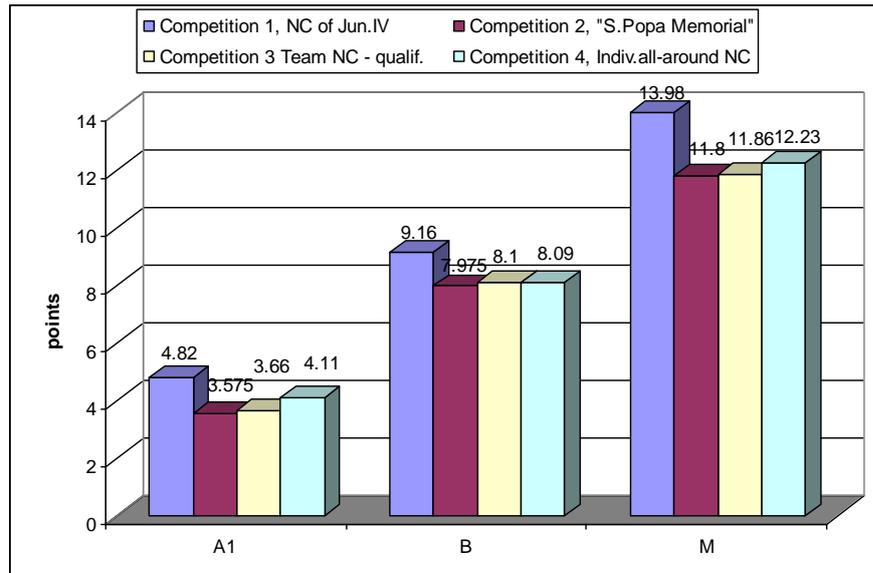
Graph 1. Results obtained in verification training sessions

In table no. 2 and graph no. 1 are shown the results achieved in the verification training sessions throughout three training pre-competitive mezzo-cycles as for score A1(difficulty/ contents), score B (execution, penalties/mistakes) and final score.

Table no. 3. Results obtained in competitions

No.	Competition 1 NC of Jun.IV			Competition 2 „S.Popa Memorial”			Competition 3 Team NC -qualif.			Competition 4 Indiv.all-around NC			
	A1	B	M	A1	B	MF	A1	B	MF	A1	B	MF	
Ss	S1			4.000	8.000	12.000	4.000	7.500	11.500	4.000	8.350	12.350	
	S2						4.000	7.300	11.300	4.000	8.400	12.400	
	FS	3.700	9.100	12.800					11.500			12.375	
Pi	4.900	8.900	13.800	2.500	7.600	11.100	2.500	8.500	11.500	3.200	8.550	11.750	
B		5.100	9.300	14.400	3.400	7.800	11.200	3.400	9.200	12.600	4.400	7.100	11.500
	AS.									4.400	8.100	12.500	
S		5.200	9.300	14.500	4.400	8.500	12.900	4.400	8.000	12.400	4.00	8.050	12.750
	AS.	5.200	9.200	14.400									
Statistical indices													
Mean	4.82	9.160	13.98	3.575	7.975	11.800	3.66	8.100	11.86	4.11	8.09	12.23	
SEM	0.28	0.07	0.32	0.41	0.19	0.41	0.33	0.34	0.26	0.21	0.21	0.17	
SD	0.64	0.17	0.71	0.82	0.38	0.83	0.74	0.77	0.59	0.52	0.52	0.44	
CV %	13.23	18.26	5.11	23.10	4.84	7.09	20.22	9.52	5.01	12.71	6.43	3.61	

Note: FS – Final score, AS –Apparatus score



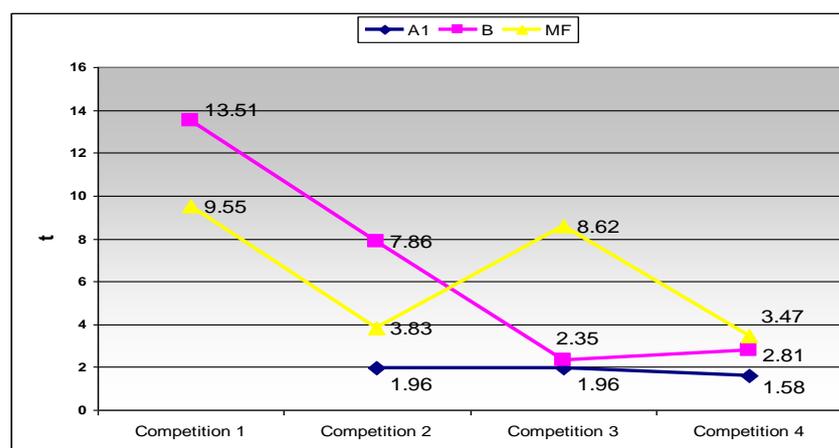
Graph no. 2. Results achieved in competitions

Table no. 3 and graph no.2 show the results obtained in competitions as for score A1 (difficulty), score B (execution) and final score.

Table no. 4. Results of performance capacity indices correlation

No.	Competition 1 NC of Jun.IV			Competition 2 „S.Popa Memorial”			Competition 3 Team NC -qualif.			Competition 4 Indiv. all-around NC			
	t, P	A1	B	FS	A1	B	FS	A1	B	FS	A1	B	FS
Competition 1 NC of Jun.IV	A1		13.51	9.55	1.96			1.96			1.58		
			<0.001	<0.001	>0.05			>0.05			>0.05		
	B					7.86			2.38			2.81	
						<0.01			>0.05			>0.05	
	FS						3.83			8.62			3.47
							<0.05			<0.01			<0.05

Table no. 4 Highlights the results of performance capacity indices correlation of score A1, B and final score between competitions.



Graph no. 3. Correlation of performance capacity indices

Discussion

The research refers to a case study applied to a single gymnast of category Junior IV, level 2, who was in bi-competitive training on two levels of preparation within the same training mezzo-cycle.

The analysis of the means content applied in gymnast's bi-competitive training proved that the preparation focused on the improvement of technical elements of category IV, level 2 and on the learning of higher difficulty elements on each apparatus, elements necessary for Junior III category of training.



The objectives of physical training aimed at improving or maintaining the level of muscle strength development and joints mobility, while the artistic training focused on the improvement and correction of mistaken elements, vaults and artistic elements of the full exercises on balance beam and floor.

The analysis of physical training level highlighted an improvement of abdominal muscles, of back and scapular-humeral belt strength, of arms and lower limbs strength – the spring, all these having a great influence on learning and improving apparatus technical elements necessary for Junior III category, level 3.

Study results showed the influence of bi-competitive training on the improvement of the capacity for performance in women's artistic gymnastics at Junior IV level. The training content was intended to ensure the preparation continuity both by improving category elements and by learning new elements of greater difficulty needed to participate in competitions of higher level than gymnast's age. This preparation depends entirely on competition calendar, on gymnast's training level and on the features of competitive effort at different levels of training; this method is rare in artistic gymnastics and is used with talented children and good working conditions only.

The contents of training means on each apparatus was individualized, depending on gymnast's training level; apparatus sequence during workouts varied and the training was governed by the number of reps, performed with or without help, assessed as successful or unsuccessful attempts.

Regarding the results obtained in the 4 scheduled competitions, we observe that in the National Championship Junior IV the score A1 has an average of 4.82 points, score B- 9.200 points and final score is 13.98 points; as for competitions 2 and 3, which were held during the same competitive mezzo-cycle, at a shorter period of time, the results of scores A1, B and MF do not represent significant differences between competitions, but the achieved performances allowed the gymnast to qualify for the Individual National Championship in which we notice an improvement of the training level by the increase of difficulty score A1 of 4.11 points, the improvement of execution technique of 8.09 points and the increase of the final score of exercises on apparatus, with an average of 12.23 points (table no. 3).

Regarding the correlation of performance capacity indices between competitions, we noticed insignificant differences of difficulty value at $p > 0.05$, in terms of training category requirements; significant differences of the technical execution value between the first and the second competition at < 0.01 , while in competitions 3 and 4 the differences are insignificant at $p > 0.05$; there are significant differences of final scores between competitions (table 4 and graph 3).

Conclusions

The training optimization by improving the elements of category IV on each apparatus and by learning the technical elements necessary for category III during the same training session lead to bi-competitive training in women's artistic gymnastics.

The results of performance capacity indices during the 4 competitions highlight the increase of the difficulty value of exercises on apparatus, the improvement of execution technique of highly difficult elements and the increase of final score value on apparatus.

An optimum relationship provided between the content of means in bi-competitive training and the requirements of the training category within the same stage of preparation will influence the performance capacity level and the successful participation in the scheduled competitions.

For a correct application of this form of competitive training, its efficient utilization during training sessions is recommended only if we take into account the specific methodological aspects that allow us to use it.

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