

## Assessment of Physical and Technical Training Level in Basic Specialization Stage in Women's Artistic Gymnastics

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### Abstract

The main goal of this paper is the assessment of the physical training influence on technical training in women's artistic gymnastics throughout basic specialization stage. With this aim in view, we have considered that the assessment of physical and technical training level would highlight the extent to which this one affects performances achieved in competitions in terms of difficulty, execution and final score on apparatus. The study was conducted from September to December 2012 in the Juniors Olympic Team of Deva, with a group of 11 female gymnasts, 12 to 14 years old. This study refers to the ascertaining stage of a post-doctoral research on the macro-methods of gymnastics exercises learning throughout basic specialization stage in women's artistic gymnastics. For this purpose, the following methods have been used: method of bibliographic study, method of observation, method of experiment, method of experts, statistical-mathematical method and graphical representation method. In order to assess the level of basic physical and technical training of junior female gymnasts aged 12 to 14, control trials were applied for monitoring the muscular strength, sense of balance and basic technical level. The results of training level testing assess the level of development of arms, abdomen, back, lower limbs muscular strength, the level of explosive strength (flashing), combined strength and sense of balance. The results of basic technical training assessed using the experts' method point out the level of technical execution on each apparatus. The results achieved in competition highlight the scores for difficulty (D), execution (E) and final score (FS) on each apparatus. The assessment of physical and technical training shows the influence exerted by this one on the results achieved in competition in terms of difficulty, execution and final score on apparatus.

**Key words:** Gymnastics, strength, training, control trials, performance.

### Introduction

At the present moment, artistic gymnastics has made remarkable progresses and has become a sport that enjoys a higher and higher popularity, characterized by a really considerable development, so that gymnasts' performances are distinguished by new elements, increase of exercises difficulty, complexity and spectacular character while technique and mastery of execution are also improved (Potop, 2008, p.7; Vieru, 1997, p.14).

Artistic gymnastics develops in accordance with the trends of performance sport, but it has its specific features too, such as: increase of sports mastership, increase and rivalry of competitive programs, processing of new complex routines, sports mastership that reaches virtuosity; improvement of components that provide the training of high classification gymnasts (financial, technical - material, methodical-scientific, biological-methodical, psychological, informational and motivational components) (Arkaev, Suchilin, 2004, p.22).

Sports mastership and special technical training are closely interrelated and represent the main part of the a periodic control system in gymnastics (Rozin, 1997, p.53).

Learning the technique of various sports branches is generally characterized by the laws and stages of motor actions and acts learning, of course with some specific, differential features determined by the particulars of sport branches (Dragnea, 1996; Dragnea, Mate- Teodorescu, 2002, p.281).

Efficient learning, in different stages of technical training, can be ensured only if learning stages and content are closely related to efficiency criteria (Platonov, 2004, p.301). The technique of gymnastics exercises, depending on biomechanical positions, is analyzed by means of "arithmetical" entry, which involves operations of improvement of the concrete problems (Smolevskij, Gaverdovskij, 1999, p.112).

Gymnastics technique is conditioned by the development level of the general, specific physical training and of the motor skills, which is in close conjunction with the artistic, psychological, tactical and theoretical training (Niculescu, 2003, p.79).

In gymnastics, the role of the technical training is very important and in close interdependence with the other components; thus, a poor physical training of the children leads to a bad, wrong technique, thus to lack of success in competition. Also, a good technical training based on a good physical training, but in the absence of an adequate psychological training results in poor performances (Grigore, 2001, p.106).

In order to enable a young gymnast to carry out in the future the technical elements of higher difficulty successfully, the coach / teacher should pay attention to the long-term syllabus too, and should work according to the scheme: “when learning the technical elements, one should go from the main purpose to the concrete situation and back to the main purpose”, keeping under control the whole learning process, based on the perspective (Boloban, 2011, p.75).

The basic functional unit in the training system of male and female gymnasts is the „coach-athlete” sub-system, which enables information to circulate through the direct and reverse channels. In order to compare the purpose with the tasks proposed to the gymnast and with the results of the action, the exercise must be divided into sequences. In the learning process we tend to an entirely ideal movement, existing in our knowledge. However, there are always deviations from the general or particular character when the exercise is performed (Suchilin, 2010, p.5).

Physical training is one of the most important factors of sports training for achieving high performance. The main objectives of physical training are to increase athlete’s physiological potential and to develop the biometric skills up to the highest level (Bompa, 2002, p.48).

Modern sports training have settled and completed the control standards and trials used by coaches in numerous measurement variations and combinations as practical tests for the assessment and evaluation of female gymnasts’ physical training (Simion, Mihăilă, Stănculescu, 2011, p.121).

Gymnastics has made great technical progresses but also progresses in performance field due to the improvement over time and to the better functional parameters of competition apparatus. Coaches must always focus on imagining and creating means, apparatus and technologies intended to help athletes to work in the training sessions and at the same time to protect them and to make easier the effort of learning and self-improving (Vieru, 1997, p.70).

Due to the impressive dynamics of gymnastics competition, at the present moment the number of technical elements created by the great male and female champions, who distinguished themselves during this period, increased considerably, some of them taking the coded names that reflect the biomechanical characteristics, besides the names of the athletes who executed them with unique virtuosity (Endo, Drăgulescu, Miloşevici, Comăneci, Şuşunova, etc.) (Nicu, 1993, p.258).

*The main purpose of this paper* is to assess the level of physical and technical training in the basic specialization stage of women’s artistic gymnastics.

*Hypothesis of the paper.* We believe that the assessment of the level of physical and technical training will highlight the extent to which these ones influence upon the performances achieved in competition in terms of difficulty, execution and final score on apparatus.

## Material & methods

The study was conducted from November to December 2012 in the Juniors Olympic Team of Deva, with a group of 11 gymnasts, 12 to 14 years old. This study refers to the ascertaining stage of a post-doctoral research on the macro-methods of gymnastics exercises learning throughout basic specialization stage in women’s artistic gymnastics. For this purpose, the following methods have been used: method of bibliographic study, method of observation, method of experiment, method of experts, statistical-mathematical method and graphical representation method. In order to assess the level of basic physical and technical training of junior female gymnasts aged 12 to 14, control trials were applied for monitoring the muscular strength, sense of balance and basic technical level, namely:

### *Control trials for physical training:*

- Trial 1: Strength of arms, rope climbing by hands (seconds);
- Trial 2: Abdominal strength, rib stall hanging leg raise in 30 seconds (no. of reps);
- Trial 3: Back strength, arms up torso extensions in 30 seconds (no. of reps);
- Trial 4: Strength of lower limbs, standing long jump (cm);
- Trial 5: Explosive strength, flashing, standing high jump (cm);
- Trial 6: Combined strength, power handstand crosswise on the beam (no. of reps);
- Trial 7: Sense of balance, maintained power handstand on the beam (seconds).

### *Control trials for basic technical training:*

- Trial 1: HS – forward handspring;
- Trial 2: UB – back giant with back stretched salto landing;
- Trial 3: UB – clear hip circle to handstand;
- Trial 4: B – two backward walkovers in a row (flick-flack on 1 leg);
- Trial 5: B – round-off, back stretched salto landing;
- Trial 6: AF – forward walkover, forward tucked somersault;
- Trial 7: AF – round-off, back walkover (flick-flack), back stretched somersault.

**Note:** HS – handspring vaults; UB – uneven bars; BB – beam; AF – Acrobatic floor.

Results

Table no. 1. Results of physical training

№	Gymnasts	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7
		sec	NR 30"	NR30"	Cm	Cm	Reps No	Sec
1	AM	16.3	21	38	192	44	15	62
2	VC	17.1	17	35	179	45	10	17
3	SS	15.5	19	32	200	39	10	23
4	TP	22.0	17	32	195	43	14	58
5	MA	11.3	21.5	32	191	43	15	63
6	CA	20.9	20	33	175	42	15	86
7	RM	21.1	18	35	192	39	2	7
8	OAM	11.8	19.5	34	205	45	20	88
9	TD	15.7	19	35	187	42	8	21
10	BA	18.8	19	33	179	44	15	66
11	IA	15.8	20	36	190	42	16	45
12	NI	17.5	19	33	189	45	18	36
13	JL	16.8	18	32	182	43	9	29
14	PA	15.5	20	34	186	44	14	58
Mean		16.86	19.14	33.86	188.71	42.86	12.93	47.07
S.E.M.		0.83	0.36	0.48	2.21	0.52	1.24	6.83
S.D.		3.14	1.34	1.79	8.28	1.96	4.65	25.5
CV%		18.60	6.98	5.29	4.39	4.56	35.9	54.28

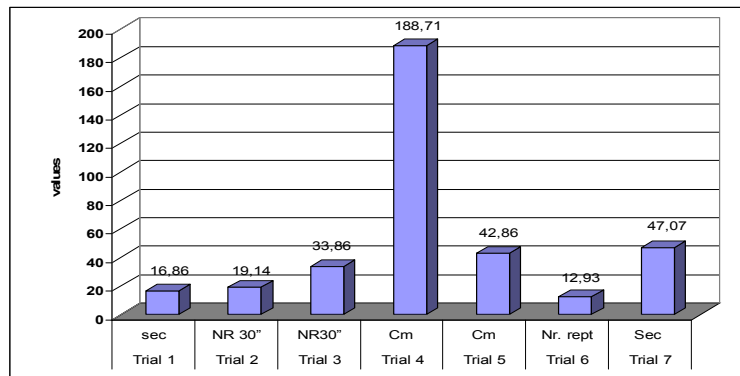


Fig.1. Results of physical training

Table no. 2. Results of basic technical training

№	Gymnasts	HV		UB			B		AF	
		Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7		
1	AM	8.88	8.78	8.68	8.88	8.98	9.12	8.8		
2	CV	9.1	8.88	8.7	9.1	9.22	9.52	9.5		
3	SS	9.5	9.02	8.92	9.36	9.28	9.3	8.98		
4	TP	9.24	9.12	9.08	9.42	9.38	9.42	9.34		
5	MA	9.5	9.24	9.24	9.4	9.48	9.52	9.42		
6	CA	9.18	8.92	8.72	9.02	9.5	9.22	9.06		
7	RM	9.44	8.96	8.78	9.2	9.26	9.32	9.24		
8	OA	9.52	9.14	9.02	8.78	9.12	9.38	9.3		
9	TD	9.2	8.82	8.8	8.94	8.98	9.24	9.08		
10	BA	9.32	9.16	8.78	9.46	9.52	9.28	9.4		
11	IA	9.46	9.18	9.12	9.32	9.08	9.2	9.16		
12	NI	9.32	8.98	8.76	9.38	8.9	9.22	9.02		
13	JL	9.2	8.86	8.68	8.9	9.2	9.3	9.32		
14	PA	9.54	8.94	8.84	8.7	9.3	9.32	9.48		
Mean		9.31	9.0	8.86	9.13	9.23	9.31	9.22		
S.E.M.		0.05	0.04	0.05	0.07	0.05	0.03	0.06		
S.D.		0.19	0.14	0.18	0.26	0.19	0.11	0.21		
CV%		2.07	16.21	20.42	2.87	21.67	12.48	2.27		

NOTE: HV – handspring vaults; UB – uneven bars; B – beam; AF- acrobatic floor

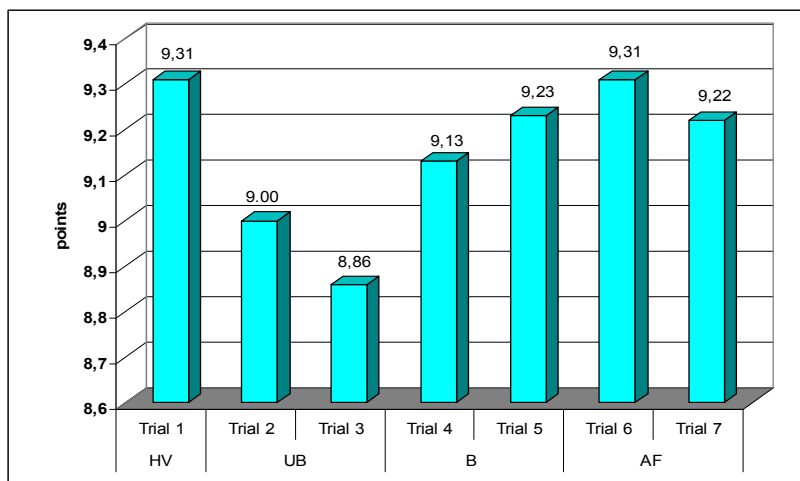


Fig.2. Results of basic technical training

Table no. 3. Results of competition scores – vaults, uneven bars  
All-around finals, 16-18.XI.2012, Onesti

№	Gymnasts	Vaults			Uneven bars		
		D	E	FS	D	E	FS
1	VC	4.400	9.100	13.500	3.700	7.200	10.900
2	SS	5.000	8.800	13.800	5.000	8.450	13.450
3	TP	4.000	9.050	13.050	5.100	8.525	13.625
4	CA	4.400	8.775	13.175	4.800	6.775	11.575
5	RM	4.400	9.000	13.400	4.900	7.050	11.950
6	OAM	5.000	9.100	14.100	5.100	8.550	13.650
7	BA	4.000	9.000	13.000	4.500	8.500	13.000
8	IA	4.400	8.800	13.200	5.300	8.900	14.200
9	NI	4.000	8.650	12.650	4.000	5.250	9.250
10	JL	5.000	9.000	13.900	4.100	7.400	11.500
11	PA	4.600	8.850	13.450	3.600	8.575	12.175
Mean		4.47	8.92	13.38	4.55	7.74	12.29
S.E.M.		0.12	0.04	0.13	0.18	0.33	0.44
S.D.		0.39	0.15	0.43	0.61	1.11	1.47
CV%		8.78	1.69	3.21	13.33	14.38	11.94

Note: D – difficulty; E – execution; FS –final score

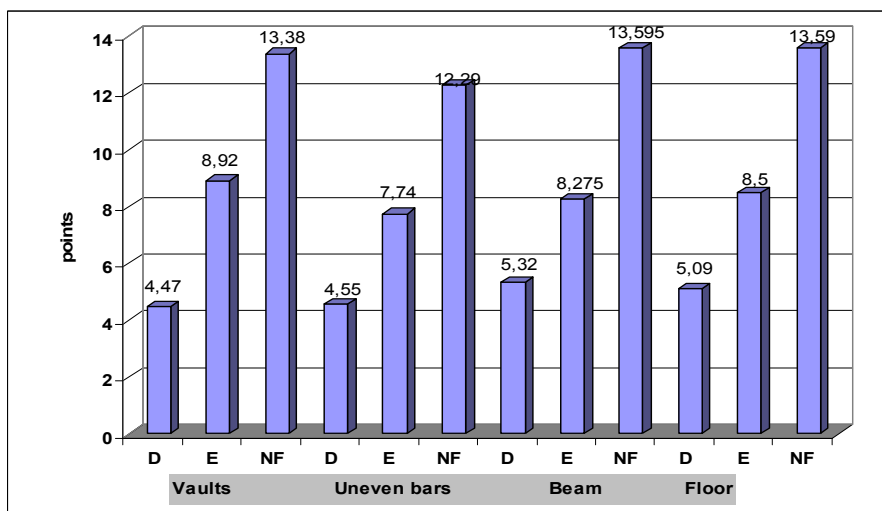


Fig.3. Results achieved in competition

**Table no. 4. Results of the scores achieved in competition – beam, floor, total score**  
All-around finals, 16-18.XI.2012, Onesti

№	Gymnasts	Beam			Floor			Total
		D	E	FS	D	E	FS	
1	VC	5.300	8.275	13.575	4.900	9.125	14.025	52.000
2	SS	5.600	8.525	14.125	5.300	7.450	12.750	54.125
3	TP	5.500	8.700	14.200	5.300	8.675	13.975	54.850
4	CA	4.800	8.700	13.500	5.100	8.200	13.300	51.550
5	RM	5.200	8.600	13.800	4.800	8.550	13.350	52.500
6	OAM	5.500	7.625	13.125	5.300	8.825	14.125	55.000
7	BA	5.700	9.125	14.825	0.000	0.000	0.000	40.825
8	IA	5.800	8.050	13.850	5.100	8.750	13.850	55.100
9	NI	5.000	6.750	11.750	4.800	7.975	12.775	46.425
10	JL	0.000	0.000	0.000	5.100	8.650	13.750	39.150
11	PA	4.800	8.400	13.200	5.200	8.825	14.025	52.850
Mean		5.32	8.275	13.595	5.09	8.50	13.59	50.39
S.E.M.		0.11	0.21	0.26	0.06	0.16	0.16	1.72
S.D.		0.36	0.67	0.82	0.19	0.49	0.52	5.70
CV%		6.79	8.12	6.03	3.87	5.79	3.81	11.31

## Discussion

Physical training is an important component in the sports training in artistic gymnastics, which has a different share depending on the level of training, on the training period and stages. In order to ensure the necessary *motor support* for learning the technical elements on various apparatus, we must take into account some method issues (Potop, 2005, 2008): establishing the defects of the special physical training and the strategy meant to correct them, etc., correlation of the general physical training means and of the special physical training depending on the training stage, etc.

To ensure an effective *technical training*, it is important to consider the following method issues (Potop, 2005, 2008): the number of reps and the passage from one exercise to another must be carried out depending on the correctness of the technical execution and on gymnasts' individual possibilities; as a specific exercise is learnt, the number of reps is gradually decreased and one passes to another exercise, more complex, etc.

The study aimed to assess the level of physical, technical and performance training of junior female gymnasts aged 12- 14, who were in the initial stage(ascertaining one) of the pedagogic experiment. The next goal was to make the biomechanical analysis of the key elements of sports technique on each apparatus throughout the following stages (according to V. Boloban), followed by the elaboration of the algorithmic programs of learning and correction of the sports technique key elements analyzed in terms of biomechanics.

The results of physical training level testing are shown in table no. 1 and figure no. 1, as for the assessment of development of muscle strength of arms, abdomen, back, lower limbs, explosive strength (flashing), combined strength and sense of balance. In terms of values of the means obtained in these tests, one can notice: trial 1– assessed by rope climbing by hands, a mean of 16.86 sec., trial 2 – assessed by rib stall hanging leg raise in 30 sec., a mean of 19.14 reps; trial 3 – assessed by torso extension from prone position in 30 sec., a mean of 33.86 reps; trial 4 – assessed by standing long jump, a mean of 188.71 cm; trial 5 – assessed by standing high jump (flashing), a mean of 42.86 cm; trial 6 – assessed by power handstand on beam, a mean of 12.93 reps; trial 7 – assessed by maintaining position in handstand on beam, a mean of 47.07 sec.

The results of the basic technical training are shown in table no. 2 and figure no. 2, using seven control trials assessed by means of five experts, with scores of 1 – 10 points. The values of the means at these tests reveal: at vaults, assessed by handspring vault - a mean of 9.31 points; on uneven bars, assessed by trial 2, for a back giant, stretched salto landing – a mean of 9.00 points and the trial with clear hip circle to handstand – a mean of 8.86 points; on beam, assessed by trial 4, for two connected back walkovers– a mean of 9.13 points and trial 5, for a round-off landing with stretched back– a mean of 9.23 points; on floor, assessed by trial 6, in terms of forward walkover, forward tucked somersault – a mean of 9.31 points and trial 7, round-off, back walkover, back stretched somersault – a mean of 9.22 points.

The results achieved in competition are listed in table 3, 4 and figure 3, highlighting the scores for difficulty (D), execution (E) and final score (FS) on each apparatus. At handspring vaults, score D has a mean of 4.47 points, score E – 8.92 points and FS of 13.38 points; on uneven bars, score D has a mean of 4.55 points, score E- 7.74 points and FS of 12.29 points; on beam, score D has a mean of 5.32 points, score E – 8.275 points and FS – de 13.595; on floor, score D has a mean of 5.09 points, score E – 8.50 points and FS – 13.59 points and the final score has a mean of 50.39 points.

## Conclusions

The results of development of muscular strength and balance sense highlight the level of physical training, while the individual values show the maximum level reached by the female gymnasts in training at the moment.

The results of the basic technical training using the method of experts emphasize the scores on each apparatus depending on the execution level.

Comparing the individual results of the physical and technical training level to the scores obtained in competition on each apparatus one can highlight the influence of exercises difficulty on the increase of the average final score.

The assessment of physical and technical training level show its influence on the performances achieved in competition in terms of difficulty, execution and final score on apparatus.

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