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Original article

COMPARATIVE STUDY BETWEEN ATHLETES IN RHYTHMIC GYMNASTICS AND DANCE ANATOMIC AND PHYSIOLOGIC AND DEVELOPMENT SPECIFIC FORCE

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Abstract*

Aim. Measurements were made on two groups of children during a workout middle cycle respectively at the end of September, October and November. Children have executed one hour classical dance. The measurement was carried out before the detent hour, after several minutes of heating.

Study objectives: determine compared the similarities and differences that arise in preparing the body of rhythmic gymnastics among children and children at the school of choreography and setting interindividually differences manifested in similar environmental conditions.

Methods: they started from measuring a physiological parameter that give us the relationship of body functioning under a specific effort or alactacide maximal anaerobic power (based on test Sargent).

Results: Considering the measurement results we can conclude that girls who do gymnastics exercise provides a much higher compared to girls from choreography. From this we can conclude that training in rhythmic gymnastics are much more demanding and much better organized. Noting that the technical choreography children from working more correctly, what should be a warning to the charge of preparing choreographic tiny gymnasts.

Conclusions: There is a difference in training between children in rhythmic gymnastics which are already in national and international competitions, to those in the dance world who are at the beginning of training, their artistic activities (performances) and competitive (dance competitions) starts at 16-18.

Keywords: choreographic training, anaerobic power alactacide, physiological development.

Introduction

Technical training is an extremely complex factor in that it brings together several types of preparations. Choreographic training in rhythmic gymnastics world is an important part of training (Macovei, 1999).

Preparing aims choreographic repertoire motor learning specific dance. Regardless of the technique of dance that approach in preparing choreographic studies (classical dance, dance character or contemporary dance) aim to: form a properly kept and execution artistic realize a running motor as correct, educate capacity harmonize the movements with music and to perform specific expressive and acquiring a repertoire of dance.

The study objectives are achieved:

- ✓ Determination compared the similarities and differences that arise between children in preparing the body of rhythmic gymnastics and choreography children and interindividually differences manifested in similar environmental conditions.
- ✓ Testing the functionality cardiovascular and determining the type of effort occurred in studies of classical dance, then reporting the type of effort that occurs in competitions or performances (Horghidan, 1984).

Methods

A study carried out simple solutions were used measurement (measuring with a ruler graduated detent) and a relatively simple instrument (the monitor bracelet), but accurate enough to highlight the differences between gymnasts and ballerinas.

It started from a comparative analysis of two groups of children:

- ✓ group of gymnasts from Category III -a representing rhythmic gymnastics section of the Club *Triumph*, Bucharest;
- ✓ a group of ballerinas, the fourth year of study (12-13 years), with the seventh grade he Choreography High School *Floria Capsali* in Bucharest.

We measured the two groups of children during a workout middlecycle respectively at the end of September, October and November. Children have executed one hour classical dance. Blood pressure measurement've done it before and after hour and expansion we measured a few

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minutes before the hour after heating.

In this study were measured two physiological parameters, relationships that give us the body functioning under stress. In this regard were evaluated:

- ✓ changes in the cardiovascular workout by measuring before and after the time of the study, blood pressure and heart rate;
- ✓ alactacidă anaerobic maximum power (based on the test Sargent) which children have carried out along a training middlecycle:
  - o for gymnasts: the period of preparation for the National Rhythmic Gymnastics Championships in Romania, including during the competition;
  - o for ballerinas: range of resuming work after the summer until the first semester assessment exam, including the exam.

The two groups of children that were performed measurements are born between 2001 and 2003, which means you are aged between 13 and 15 years. This means that girls are during puberty.

Results

In this period there were significant morphological and functional changes in the body and biological children. The characteristics of this stage of development are:

increase growth, that dynamic may take various forms: sudden and violent; arrhythmic and long; arrhythmic and short; slow and gradual. But growth does not occur proportionately nor occurs simultaneously in all body segments. Faster the growth in height, the weight slower.

Table 1. Height measured in centimeters

Nr.crt.	Club Triumph				Floria High School Capsali			
	Name	***Sept.***	***Oct.***	***Nov.***	**Name**	***Sept.***	***Oct.***	***Nov.***
1	G.I.	152	152,5	154	D. A.	146	147	148
2.	B.A.	161	161	162	S. V.	148,5	151	151
3.	G. A.	146	146,4	147	C.O.	151	153	153
4.	I.V.	138	138	140	S. A.	154,5	156,5	157
5.	H.I.	160	160	161	T. D.	143,5	145,5	146,5
6.	V.A.	160	160	161	A. L.	161	162,5	163
7.	P. A..	151	152	153,5	S. A.	151,5	153	154
8.	I.O.	147	147,5	149	C. O.	150	152,5	152,5
9.	C. S.	149	149	150	B. L.	162,5	163	163,5
10.	C. E.	150	150	150	L. I.	157	157,5	158,5

Table 2. Weight variation measured in kilograms

Nr.crt.	Club Triumph				Floria High School Capsali			
	Name	***Sept.***	***Oct.***	***Nov.***	**Name**	***Sept.***	***Oct.***	***Nov.***
1	G.I.	33	33	35	D. A.	32	34	32
2.	B.A.	42	41,5	41,5	S. V.	35	36	35,5
3.	G. A.	34	33,5	35	C.O.	33	35	34
4.	I.V.	27	28	28	S. A.	35,5	38	37,5
5.	H.I.	37	37	38,5	T. D.	28	30	30,5
6.	V.A.	41	42,5	42,5	A. L.	44	45	45,5
7.	P. A..	38	38	37,5	S. A.	39	42	43
8.	I.O.	32	32	31	C. O.	36	37,5	36,5
9.	C. S.	35	36,5	39	B. L.	43	47	46
10.	C. E.	37	37	37,5	L. I.	38	38	37,5

- ✓ appear physiological disorders (fatigue, headache, irritability) and strong state of psychological discomfort (anxiety, insecurity, unrest, moments of inattention). Psychological discomfort is amplified by biological changes unpleasant for pubescent acne, sweating, flushing of modesty and pale in different emotional situations, deepening of the voice and some awkward movements and reactions (Bota, 2000).

Other biological changes concern: Hand ossification process is completed with precision and rigor consequences movements, permanent

teeth conclusion growth and increasing the muscle mass resulting from these changes and morfogramei staturogramei change, ie the ratio between height, weight and different body segments .

- ✓ Amend and rhythm running the glands of internal secretion: atrophied thymus gland growth, but increases in size, the thyroid gland. Develops sexual glands whose secretion functions start at 10-11 and reproductive maturation occurs in girls between 12 and 14 years (Macovei, Buţu, 2007).

Anatomic and physiological changes of behavior actually put their mark on the girls.

It is known that intrinsic myocardial adaptation to the effort taken by the so-called "law of the heart", which says that cardiac muscle contraction is much stronger as cardiac fibers are elongated when the contraction begins. This state of cardiac fibers is influenced by the amount of blood from the heart.

Important in the functioning of the heart muscle is how it responds to excitations. To exercise intensity below the threshold, the myocardium does not shrink. But if the intensity stimulant achieve liminal value, myocardial contraction is maximal, that is the strongest contraction that may cause myocardium in those conditions. This character is known as the law of "all or nothing". Maximal contraction is not something absolute, it varies with many conditions, particularly myocardial state.

Another feature of myocardial contraction forming a refractory phase existence. Myocardium, like all other muscles in the body during contraction manifests a state of inexcitabilitate, phase condition called refractory (unresponsive muscle contractions nor the strongest excitatory) so that during systole he did not answer excitations. This is very important because it provides cardiac rhythm movements and the possibility of filling and emptying the heart and sending blood into the arteries.

After completion systole, the heart muscle becomes excitable. If this occurs while an excitation before the end of systole, it causes an extra systole, which was called extrasystole effort.

Another feature of the contractions of the myocardium is the fact that all the fibers of the atria or ventricles to contract simultaneously. If there is a sequential contraction of various fibers, dysfunctions occur in the blood, very serious consequences. Following an exercise, the heart adapts its work done.

Changes in training the cardiovascular system are the type of exercise you submit children. Calls studies classical dance body, making it necessary to adapt cardiovascular exercise. But we must not forget that with effort interruption, the changes in the cardiovascular system erases insidious, slowly, in the same rhythm that were installed (Dragnea, 1996).

The present study assessed changes late workout. These changes slowly and is an appropriate response increasing needs imposed by exercise. We stopped to measure and evaluate two aspects of cardiovascular late changes:

- ✓ reducing heart rate;
- ✓ lowering blood pressure.

The heart rate measured before, during and after exercise, on the one hand gives the relationship of the condition of the effort made, and on the other hand the manner in which the effort is tolerated by the body.

Resting a trained athlete has a low heart rate, called bradycardia sports. Bradycardia makes longer break between systole allow a better myocardial relaxation and a better recovery of the biological potential of the heart. So installing bradycardia looks in good training.

In general, blood pressure values are less affected by training.

Blood pressure and, in particular, the systolic down, reaching values of 100-110 mm Hg at rest. Blood pressure changes during exercise. Maximum voltage (systolic) increases according to the intensity and duration of exercise, and the voltage minimum (diastolic) also suffers small changes.În gimnastica ritmică, ca de altfel şi în dans este necesar un permanent echilibru aerob-anaerob, care să se încadreze în valorile optimale, respectiv capacitate de efort foarte mare anaerob lactacidă şi o capacitate de efort bună aerobă.

In principle there is a similarity between the two groups of children that we have measured. Rhythmic gymnastics exercise lasts 1'30" and a competition, running 4 exercises with 4 different objects. In a show, a soloist has variations which takes about 1'30" and there are 3-4 every ballet variations, plus parts adagio (about 2'each) and other inputs (which asks less body). This means that in principle, children will be ready to reach the same kind of effort as in rhythmic gymnastics.

So the type of effort for both groups is predominantly anaerobic lactacid though, we must not forget, that arrive daily training effort but aerobic type (through aerobic metabolism, oxidative phosphorylation substrate carbohydrate and lipid).

The maximum power or maximum power lactacid anaerobic glycolytic flow is limited by glycolysis and in particular by enzymes importance in the reactions of glycolysis (NAD and LDH) (Drăgan, 1994).

Measurement and evaluation of exercise capacity

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It started from Sargent test, which aims to assess anaerobic alactacide maximum power in kg / s by measuring detention cm.

Effort and Procedure: Children were conducted prior warming of about 10-15" after having executed all three maximum vertical jumping. I measured in cm vertical expansion and we considered the best jump.

The results we have interpreted according to the scale of assessment made by Dal Monte in 1988 (quoted by Bota, 2000).

The results we have obtained the following formula: $P = \sqrt{4,95xG}x\sqrt{D}$

where: P = power (measured in kg / s);
G = weight;
D = expansion (in cm).

We note that the ideal values for both groups of children must be between the environment and well.

Table 3. Exercise capacity Clubul Triumph

Nr. crt.	Name	SEPTEMBER				OCTOBER				NOVEMBER			
		Expansion (in cm)			Power	Expansion (in cm)			Power	Expansion (in cm)			Power
		I	II	III	(kg/sec)	I	II	III	(kg/sec)	I	II	III	(kg/sec)
1.	G.I.	25	27	26	66,40	38	36	40	80,82	31	34	37	80,05
2.	B.A.	31	34	35	85,29	37	39	41	91,76	41	39	43	93,97
3.	G. A.	32	39	37	81,00	38	37	39	80,4	38	39	39	82,18
4.	I.V.	28	29	34	67,39	34	36	32	70,63	30	31	34	86,61
5.	H.I.	24	18	22	66,28	28	27	25	71,00	30	31	28	77,84
6.	V.A.	32	29	28	80,57	36	37	37	86,64	34	36	37	88,21
7.	P. A..	21	23	25	68,57	30	32	33	78,77	30	31	32	77,05
8.	I.O.	23	24	27	65,39	28	27	25	66,58	24	27	28	65,53
9.	C. S.	31	33	34	76,74	40	41	42	87,09	38	40	41	88,96
10.	C. E.	28	29	27	72,87	39	41	40	86,65	38	41	36	87,23
Average power					73,05				80,094				80,96

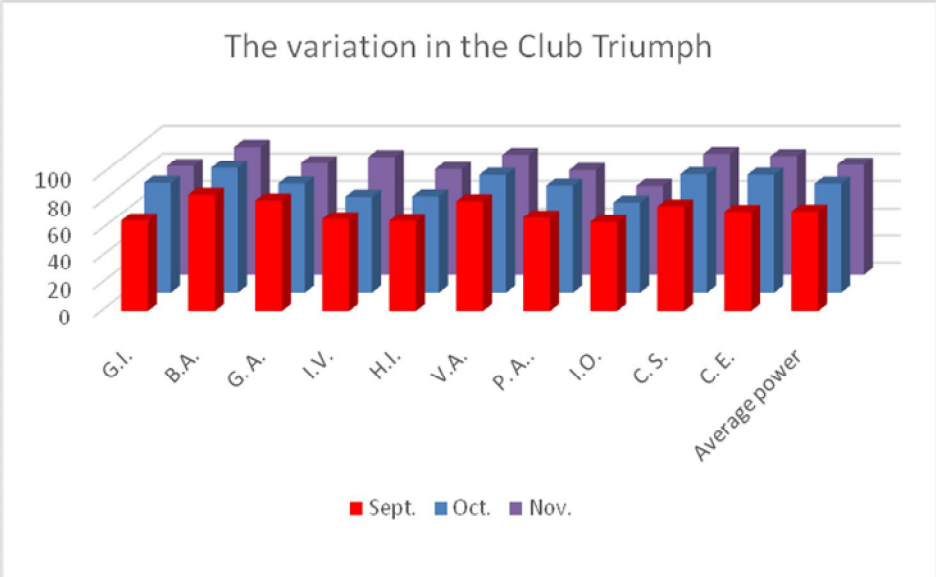

Figure no.1. ***Variation in the club Triumph***

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Tabel 4. Exercise capacity Floria High School Capsali

Nr. crt.	Name	SEPTEMBER				OCTOBER				NOVEMBER			
		Expansion (in cm)			Power	Expansion (in cm)			Power	Expansion (in cm)			Power
		I	II	III	(kg/sec)	I	II	III	(kg/sec)	I	II	III	(kg/sec)
1.	D. A.	27	29	31	70,07	36	35	36	77,84	30	32	36	75,51
2.	S. V.	34	32	31	76,74	28	30	29	73,11	33	34	36	79,53
3.	C.O.	34	35	32	75,60	31	32	27	74,44	34	32	31	75,63
4.	S. A.	35	28	26	78,33	30	32	34	79,95	28	30	34	79,42
5.	T. D.	26	28	27	62,27	30	31	34	71,63	25	28	30	66,74
6.	A. L.	26	25	26	75,25	38	34	29	91,99	30	36	34	89,04
7.	S. A.	21	22	25	67,47	22	24	21	70,62	24	26	28	77,19
8.	C. O.	22	27	31	74,31	27	28	31	75,84	28	32	36	81,19
9.	B. L.	25	24	26	74,38	31	32	30	86,26	31	28	29	84,00
10.	L. I.	21	22	25	67,47	31	32	27	74,44	24	26	28	77,19
Average power					72,94				77,86				79,09

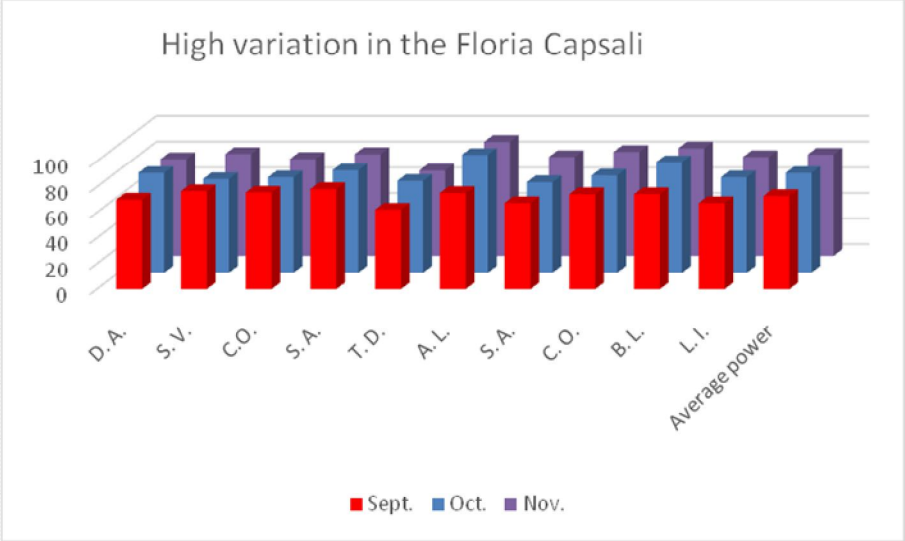

Figure no.2. *Variation in Floria High School Capsali*

Discussions

In terms of growth in height and weight, note: the girls from choreography have slow growth and gradual, normal for their age, the girls from the gym notice a trend of stagnation of growth, due to excess physical exertion.

Regarding the development of secondary characters: the girls from choreography is a normal development (pubic hair, breast development), the girls from the gym is a very slow development (Drăgan, 1994).

The girls at the onset of puberty choreography stands at two thirds while the gymnasts none of the girls has not reached puberty (not having menstrual cycle).

Considering the measurement results we can conclude that girls who do gymnastics performing physical exercise much greater (occurring physiological changes to adapt to effort and a slower development) compared with girls from choreography (which falls within development a normal child).

Regarding heart rate note:

- ✓ girls from rhythmic gymnastics all show bradycardia rest (tables not record this because studies classical dance were held generally after training gym, but previous measurements on this group of children highlights this);
- ✓ girls from bradycardia athletic choreography not a single child reach this modification training, barely in November.

Another aspect that differentiates children, it is your time exercising:

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- ✓ in rhythmic gymnastics: girls working 3 hours a day, 7 days a week (they do technical training, physical training and choreographic + mobility);
- ✓ dance: girls working about 1 hour and a half a day, 6 days a week (they do only classical study and little mobility).

Also note that in rhythmic gymnastics breaks in the annual cycle of training are few and short, while High choreography strictly comply with the structure of the school year (including summer holidays for 3 months).

In terms of blood pressure in both groups noted a drop in blood, so it appears adaptation to exercise. And voltage values after exercise shows that children perform an effort to moderate/high (Demeter, 1979).

Sargent test was conducted during 3 months (September, October, November) and data were summarized in the following table.

Table 5. Power variation

Nr. Crt.	Initial Club Triumph	Sept.	Oct.	Nov.	Initial Floria *High School* Capsali	Sept.	Oct.	Nov.
1.	G.I.	66,40	80,82	80,05	D. A.	70,07	77,84	75,51
2.	B.A.	85,29	91,76	93,97	S. V.	76,74	73,11	79,53
3.	G. A.	81,00	80,4	82,18	C.O.	75,60	74,44	75,63
4.	I.V.	67,39	70,63	86,61	S. A.	78,33	79,95	79,42
5.	H.I.	66,28	71,00	77,84	T. D.	62,27	71,63	66,74
6.	V.A.	80,57	86,64	88,21	A. L.	75,25	91,99	89,04
7.	P. A..	68,57	78,77	77,05	S. A.	67,47	70,62	77,19
8.	I.O.	65,39	66,58	65,53	C. O.	74,31	75,84	81,19
9.	C. S.	76,74	87,09	88,96	B. L.	74,38	86,26	84,00
10.	C. E.	72,87	86,65	87,23	L. I.	67,47	74,44	77,19
Average power		73,05	80,094	80,96	**Average power**	72,94	77,86	79,09

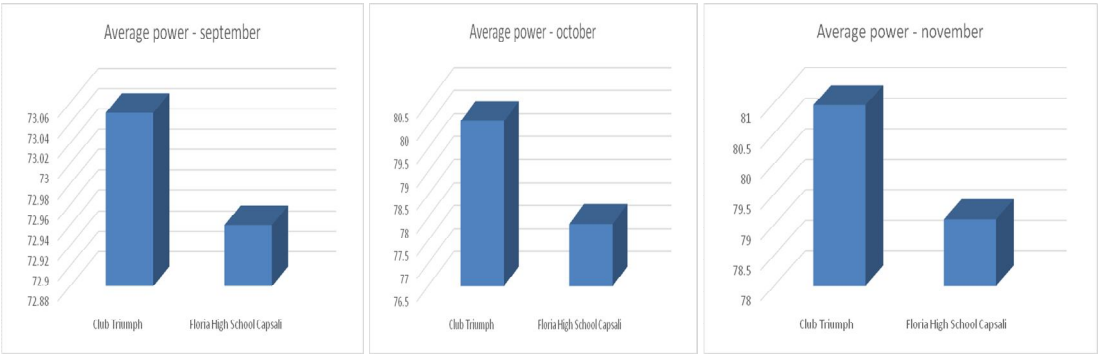

Figure no.3. Average power

As reflected in the table obtained values range for both groups, between satisfactory and the environment. It is also noted in both groups a dramatic increase in power value from September to October. In November preceding the Rhythmic Gymnastics National Championship of Romania and the end of the semester exam for choreography, increased power is very small, with a focus this month on the technical accuracy and smoothness of execution.

Remarkably, the data obtained for each child:

- ✓ the rhythmic gymnastics for girls: preparation of this stage (category III and II -a), seeking to obtain the maximum yield for each gymnast in part, why there is an individualization in their preparation;
- ✓ for girls from choreography: there is an equal readiness of the entire group, as they are at the beginning of their professional development, individualization being made in the final years of high school.

We believe that this difference occurs because children training in rhythmic gymnastics are already in national and international competitions, while in her dance training at the beginning, their artistic work (performances) and competitive (dance competitions) starts at 16-18.

Conclusion

Conclude that training in rhythmic gymnastics are much more demanding and much better organized (aside time classic study and specific training rhythmic gymnastics, are programs for developing strength and mobility, which leads obviously to the complexity of training).

Paradoxically, however, the technically choreography children from working more correctly, what should be a warning to the charge of preparing choreographic tiny gymnasts.

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