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CONTRIBUTIONS TO THE OPTIMIZATION OF STRENGTH CONVERSION TRAINING IN JUNIOR SPRINT EVENTS

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Abstract: *The conversion phenomenon, one of the major factors of high-performance physical training methodology, has been carefully monitored. It is known that with age speed stabilizes at a maximum value. For a certain stage, the increase or stability depends on the gradual development of other parameters such as strength, endurance, coordination, flexibility. We assume that the junior stage is a very fertile period in creating the pre-conditions of high performance progress, with direct reference to high-speed explosive power training which is specific to senior sprinters.*

Key words**:** *optimization, conversion training, sprint, juniors.*

1. Present Situation

The current strength training of junior sprinters is of crucial importance for acquiring top performance. Practice has undoubtedly demonstrated that during puberty, the characteristic lability of the processes taking place in young sprinters' bodies is frequently a source of surprises (even accidents) as a consequence of misunderstood correlations between motrical qualities. Another reason for undertaking the present study is the high variability of performance results and frequent „staleness" occurrences.

This age offers good prospects for progress but there are equally certain risks involved. Practice has demonstrated that muscular adaptation requires a long time, measurable in years of training. Logical, perseverant training will result in good adaptation to sports activity, overcoming trial constraints which become more restrictive, as performance staleness or decline become evident. Well trained athletes show adaptations that are demonstrated by good synchronization between a motor activity and a warm-up pattern while, in our opinion, the greatest challenge resides in physiological adaptation, which is a critical moment for power display and consists in setting free a maximum of muscular fibers in a very short time.

2. Research Hypothesis

Assuming an integrative image of long-term strength training through poly-athletic workouts, we will create the approach conditions without any negative consequences on the strength training for juniors, by careful training management during the conversion stage.

This will have a significant influence on sport shape by improving results in major performance competitions

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2.1. Research Aim

The research aims to obtain improved quality parameters in junior sprinter training in order to optimize strength training during the conversion stage, characteristic of the pre-competition or competition period.

2.2. Research Tasks

- Data analysis based on technical literature regarding training optimization in sprint events;
- Determining the variation of dynamic strength indicators in the pre-competition period;
- Preparing the strength training program in the conversion period;
- Assessing the sport shape level onset in order to obtain the top level for the major competition.

2.3. Organizing and Conducting the Research

For this research, we chose to undertake a case study. The subject of this study was the athlete Zanfirescu Maria Ana, member of the national junior group, Balkan junior II vice-champion in 4 x 100 m relay (Bar, Serbia 2008).

In the individual events she obtained the following results:

- 400 m flat – 59.00 –IIIrd place N. Ch. J II – indoor;
- 100 m flat – 12.30 –IInd place N. Ch. J II – outdoor;
- 200 m flat - 25.57 – Int. Ch.;
- 400 m flat – 56.65 – G.P.J II – outdoor.

With strict reference to strength exercises, the trainer presented us his views regarding the approach of this bio-motrical characteristic based on several genetic prerequisites and the already existing motrical endowment. Considering the morpho–functional features of 15-17 year old girls, strength training is at the same time interesting and challenging. The training was based on the study of specialized scientific materials and the practical application of data during the training period.

Remarkably, strength was approached only within the context of the qualities system, never separately. The level of maturity was considered along with the impossibility of applying through workouts at this level, given the risk of physically overstressing the subject and determining him to refuse a prospective increased stress.

The athlete mentioned the mental stress she experienced during the training and the fact that she had to be aware of as many motions as possible against a background of extreme strain and fatigue. Another remarkable aspect which was also worked on was muscular coordination – "the agonist – antagonist interplay and the capacity of contracting and relaxing them consciously if possible". These considerations helped both trainer and athlete to gain a clear view on placing and distributing the means over the year plan – including the strength ones.

Based on the fundamental laws of strength training, a good anatomical adaptation was acquired for training, especially through articulation mobility exercises (knee, ankle, hip), stretching and fortifying exercises for these ligaments and tendons. A special attention was granted to strength in the midsection of the body (pectorals, abdominals, pelvis, dorsal, thigh).

Also, special attention was granted to achieving the support for ensuring future load increase. The methodical indications provided by the FRA during a conference of the Senior National Group, the participations and discussions with trainers were extremely useful for the trainer. We consider the great importance of the principle "Train the movement, not the muscle". This methodical vision is essential in athletic training for superior classifications. "Not all that's new applies to me" – is another reasoning which was helpful in understanding balance in terms of constructing a coherent, long-term, training plan. The training plan was constructed over two macro-cycles:

Table 1

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul	Aug.	Sep.
Training I			Competition I		T	Training II		Competition II		T	
AA	FMx		Conv. to P	Maint.	AA	FMx		Conv. to P	Maint.	Compensation	

Dominant energy systems: anaerobic, alactacid, lactacid.

Energy generation: 80% alactacidic, 20% lactacidic,

Energy supplier: phosphocreatine.

Limitative factors: reaction power, start power, acceleration power, power endurance.

Training objectives: maximum strength, reaction power, start power, acceleration power, power endurance.

Table 2

Date	Oct	Nov	Dec	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul	Aug	Sep.
Periodiz.	Training. I			Competition I		T	Training II		Compet. II		T	
Periodiz of strength	5 AA	6FMx		4 Conversion to P	10 Maint Power improv, Specific Power	2 AA	5 FMx	4 Conversion to P	9 Maint Power improv, Specific Power		6 Competi-tion	
Periodiz of energy system	A.LO_2	A.L. Alactacid O_2		Alactacid		A.L. Alac-tacid O^2	A.L. Alactacid		Alactacid Tolerance to lactate		Games Sports	

3. Main Objectives (pre-competition stage)

Gradual entry into competition stress (especially in week 5-6)

Increase of general physical condition indicators and proportional increase of speed indicators

Factor correlations: physical – technical training in order to increase traveling velocity by conversion of power into maximum speed

Modeling by mental training

Stress level: 80 – 95 %

Volume: 2 - 1 ½ x event

Precompetition Stage (May-June) Table 3

	Mon	Tue	Wed	Thu	Fri	Sat
1	5-6 series x 2 min ATM recovery	Pliometry 9x8 fences	Power: lying leg lift (4x15) pull-ups (4x3) jumps (70cm→max)	Speed 2x (30, 60, 80, 120m) P=10min	Pliometry: penta jump 6x boxes10x3	Cross-country
2	Special exs. 6-8 x 3 x 200 90% p=7-10'	Indoors dorsals: 5x40; 20kg: 5x20 abdomen: 5x12, 15 g	Recovery: swim	Rep. 200m 300m	Pliometry: fences (9x8)	Competition – assessment 100m(achieved 12.80)
3	A1: long light A2:10x30m slope P=3-5min	A1:reh. A2:indoors or slopes	A1: light run A2:technical	Pliometry:. boxes 10x3	Walking (warm-up)	Competition (without object.)
4	Rehearsals 2x120 p=2min	Pliometry: 10x6 fences (40cm) boxes10x3	Starts	Break or light run	Warm-up for competition	School N.Ch. (achieved 200m- 25.70)

4. Main Objectives (competition period)

Conversion of power into maximum speed at the beginning of the period.

The physical training indicators decrease in contrast with quality indicators of work intensity.

Prevalence of pliometric exercises for explosive force.

Recovery and alimentation factors become a priority.

Exploitation of intellectual capacity indicators (attention and concentration) through mental training.

Stress level: 85-98%;

Volume: 1½-1 x event.

Table 4

	Mon	Tue	Wed	Thu	Fri	Sat
1	5-6 series x 2 min ATM recovery	Pliometry 9x8 fences	Power: lying leg lift (4x15) pull-ups (4x3) jumps (70cm→max)	Speed 2x (30, 60, 80, 120m) P=10min	Pliometry: penta jump 6x boxes10x3	Cross-country
2	Special exerc. for technique 6-8 x 3 x 200 90% p=7-10'	Indoors dorsals: 5x20 20kg: back: 5x20 abdomen: 5x12, 15 kg	Recovery: swim	Rehears. 200m 300m	Pliometry: fences (9x8)	Competition – assessment 100m (achieved 12.80)
3	A1: long light A2:10x30m slope P=3-5min	A1:rehears A2:indoors or slopes	A1: light run A2: technical	Pliometry:boxes 10x3	Walking (worm-up)	Competition (without obj.)
4	Rehearsals 2x120 p=2min	Pliometry: 10x6 fences (40cm) boxes10x3	Starts	Break or light run	Warm-up for competition	School N.Ch. (achieved 200 m- 25.70)
5	Spec. tech exerc 6-8 x; starts 6x 80% 2x250 m90% p=7-10' or 1x500m + 1x150m p=5-7min	Isotonic dynamic: 20 grass p.s.r. Slope run 3-5x 50m 90% p= 7min vol. can be modif. dep. on subject condition	3x200m p= 1min 85-90%	50m light run+ 50m accel run 90-98% 2x400m p=10min	Pliometry. Penta jump 4x depth jump 60cm 6-8x 10 p=5min	Fartlek 60-70% pool
6	Training. model 400m: 5x80m 82-90% p=80m mL	Pliometry: 10x6 fences(40cm) boxes 10x3□□ (40-60 cm)	2x120m 85-90% p=15min Fc=110-120/min	Tonus. abd., back pull-up acc.run : 6-8x80m	Specific.compet warm-up 3-4 bend starts	400mp 200mp - (Sunday)

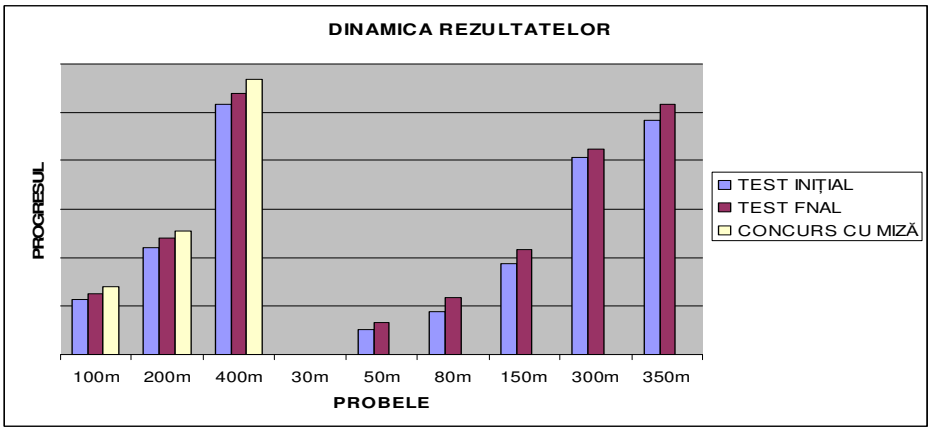
In the pre-competition and competition period, when the athlete is running at nearly maximum speed, were introduced exercises which stimulate both anaerobic capacity and the tolerance to lactate using rehearsals of 60, 100, 150 m. The velocity of the movement can be monitored by calculating the difference between the 30-60 m running sequences. If the recorded times on the fractions (in the case of 150-200 m rehearsals) are close, it can be considered that the speed increase for the endurance mode is good. If the time recorded on the last fraction is longer (by 0.25") this can indicate a non-adaptation or an error in effort distribution. To correctly

determine the athlete's capabilities the trainer can impose an evaluation test in order to redirect the training towards performance improvement.

The evaluation test was achieved by recording the times for 50, 100,150, 200 m. The time difference between the 200 run and the 150 m run should not exceed by more than 0.25s the difference between 150 m and 100 m times. The differences occur depending on the technique used, manual or electronic timing (0.27"-0.50") but also on the start technique used. The results of the initial test were recorded during the training while the final test results were recorded for the standard events during competitions.

Table 5

EVENT	100m	200m	400m	30m	50m	80m	150m	300m	350m
INITIAL TEST 20 - 25 April	12.8	26.3	60.0	4,8	6.9	10.2	20.2	42.1	51.0
FINAL TEST 14 May	**12.5**	**25.8**	**58.1**	4,6	6.6	9.8	19.7	40.6	49.2
COMPETITION WITH STAKE	**12.37**	**25.57**	**56.65**						



5. Conclusions

1. By examining the steadily ascending curve of the athlete's performance, which was subject of the case study, we can conclude that the training, particularly the strength one, was correctly coordinated.
2. Strength, a biomedical quality characteristic in humans, has become a dimension of human personality. Therefore it is probably one of the most coveted qualities. It requires passion in order to approach the development of this quality so intensely desired by adolescents.
3. In the absence of a thorough study and coherent teaching, training can degenerate producing negative effects.
4. Strength training can improve performance dynamics in a normal athlete condition, even in staleness or decline moments.

Recommendations

The proportional distribution of training methods during the conversion stage is given by the following formula:

- Strength trainings: 6-isotonic: 7-pliometric
- Speed and technical trainings: 20. The greater amount of energy is reserved for technical and tactical training while much less is left for power training
- A strictly individualized load in strength trainings, the selection of means in accordance with the athlete's characteristics
- Power and speed level evaluation through proposed events.

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