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Original article

TECHNIQUES AND METHODS OF STRENGTH DEVELOPMENT BY USING THE BODYBUILDING MEANS

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Abstract

Objective. The purpose of this work is to highlight the progress made in the development of strength motor skill in order to obtain some guide results, registered for the main muscle groups involved in the training of the junior bodybuilders.

Methods. A study was organized to that end in the fitness and bodybuilding gym of Pescariu Club. A number of 12 athletes – beginner bodybuilders – of 17-18 years old participated in this research. Research methods used: review of the specialized literature, pedagogical observation, method of tests, statistical and mathematical method and graphical representation of data. The training program was applied throughout the entire period of the study, namely from October 2013 to September 2014. The investigated group was submitted to a number of seven test events for specific motricity: barbell bench press, seated behind the neck press, standing EZ-bar curls, lying EZ-bar French press for triceps muscles, bar squats, seated calf raises on machine, barbell dead lifts.

Results. The lessons were carried out according to the experimental curriculum proposed by this research and prove a significant positive influence in all the physical test events, leading to obvious differences between tests at the end of the experiment. This conclusion is supported by the significant differences between the arithmetical means of the tests at $P < 0.001$. We are able to draw the conclusion that the programmed workouts can be successfully used in the training of the juniors, which proves that the methods implemented during a calendar year can have a benefic influence on the development of the strength motor skill.

Conclusions. The selection of some methodical procedures for strength development by using bodybuilding specific means resulted in the improvement of the strength development process during the workouts.

Key Words: bodybuilding, strength, methods, training, juniors.

Introduction

Bodybuilding currently enjoys an increasing popularity worldwide because it is a discipline that has large potential capacities in the field of physical training and motor skills development of the athletes of different ages (Amzuică, 1993; Voicu, 2007).

The bodybuilding is the sport meant to develop the muscle mass by a combination of workouts with weights, increase of consumed calories and rest (Hîtru, 1993; Sakizlian, 2011).

This desideratum is conditioned by a series of factors specific to the bodybuilding including all the important elements of the theory and methods for training the strength motor skill which is the basic motor skill that contributes largely to the development of the other skills (Zatsiorsky & Kraemer, 2006; Verkoshansky & Siff, 2009).

In this context, some specialists (Bompa, 2002; Voicu, 1995; Szekely, 1981) conclude that the workouts, consistent with the bodybuilding methods, lead to effective results, namely the muscle hypertrophy and the increase of strength, regardless

of the age of the practitioners. At the same time, the capacity for motor activity is improved and there are no negative influences on the body functional systems.

Bodybuilding methods orientation toward the body training deals also with the development of the motor skills. But the presence of the direct inter-connection between the volume of the muscle mass and the maximal strength level determines the bodybuilders' increased possibilities of strength (Baroga, 1972).

In order to highlight the value of the muscle development, J. Weider created a number of generally valid training principles reunited in a unitary whole depending on the nature of the workouts and the execution of the exercises (Weider & Reynolds, 1988).

The generalization of bodybuilding experience improves considerably the methods of physical training for strength gaining not only in bodybuilding, but practically in all sporting events: weight lifting, athletics, wrestling, gymnastics,

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rowing, sport games, swimming etc. (Sakizlian, 2011; Ulăreanu. 2014; Voicu, 1995).

The purpose of the study is to highlight the progress made in the development of the strength motor skill in order to obtain some guiding results, registered for the main muscle groups involved in the training of the junior bodybuilders.

Hypothesis of the study. The selection of the method procedures for strength development by means specific to the bodybuilding will lead to the optimization of the process of strength development during the training sessions.

Methods

This scientific approach entailed the organization of a study in the fitness and bodybuilding gym of "Pescariu" Club of Bucharest from September 2013 to October 2014. A number of 12 bodybuilders of 17-18 years old participated in this study.

The test events used in this study were meant to check the maximum strength while performing a rep with maximum load (1RM) in initial and final testing: Test event 1 - bar bench press (kg), Test event 2 - seated behind the neck press (kg), Test event 3 - standing EZ-bar curls for biceps muscles (kg), Test event 4 - lying EZ-bar French press for triceps muscles (kg), Test event 5 - squats (kg), Test event 6 - seated calf raises on machine for calf muscles (kg), Test event 7 - barbell dead lifts for lumbar muscles (kg).

In order to highlight the efficient use of the bodybuilding specific means throughout this research, we present the weekly training program in table no. 1.

Table no. 1. Planning of weekly workouts

Days	No of weeks			
	1	2	3	4
Monday	P-B-U	Ti	P-B-U	Ti
Tuesday	S-T-Tp	P-B-U	S-T-Tp	P-B-U
Wednesday	Ti	S-T-Tp	Ti	S-T-Tp
Thursday	Rest day			
Friday	P-B-U	Ti	P-B-U	Ti
Saturday	S-T-Tp	U-B-Tp	S-T-Tp	U-B-Tp

Sunday

Rest day

Notes: S- back; Tp- trapezius muscle; P- chest; U-shoulders; Ti-lower limbs; B-biceps; T-triceps.

The study used the method of hypertrophy (bodybuilding) with the following *parameters* (Bompa, 2002): duration of the hypertrophy phase - 4-6 weeks, loading of effort - 70-80 %, number of exercises per training session - 6-9, number of reps per set - 6-12 reps, number of sets per exercise - 4-6 (8), period of rest - 3-5 minutes, speed of execution - low to medium and frequency per weeks - 2-4.

For example, we present hereby a strength training session

Monday: chest, biceps, shoulders

1. Chest:

- flat barbell press: 4 sets (10x50kg, 8x60kg, 4x70kg, 8x60kg);

- incline dumbbell flye: 4 sets (10x20kg, 8x25kg, 5x30kg, 8x25kg);

- decline dumbbell flye: 4 sets (10x20kg, 8x25kg, 5x30kg, 8x25kg);

2. Biceps:

- standing barbell curls: 4 sets (12x20kg, 10x30kg, 6x35kg, 10x30kg);

- dumbbell alternative curls with „neutral” grip: 3 sets (12x15kg, 10x20kg, 8x35kg);

- EZ-bar preacher curls: 3 sets (12x25kg, 10x30kg, 10x30kg).

3. Shoulders:

- seated behind the neck press: 4 sets (12x50kg, 10x60kg, 6x70kg, 8x60kg);

- dumbbell lateral raises: 3 sets (20x10kg, 15x15kg, 10x20kg);

- upright barbell row: 3 sets (12x30kg, 10x35kg, 8x40kg).

Results

Table no. 2 and figure no. 1 show the results of the maximum strength development in the athletes-subjects of the study regarding the strength of the chest, shoulders, biceps, triceps, quadriceps, lumbar and calf muscles.

Table no 2. Results of maximum muscular strength development

No	Test events	Variables				t	P
		mean		SD			
		initial	final	initial	final		
1	Bar bench press max weight (kg)	81.67	96.67	9.61	7.70	<0.001	
2	Seated behind the neck press (kg)	57.92	70.42	3.34	10.85	<0.001	
3	Standing EZ-bar	40.00	53.33	3.26	9.38	<0.001	

	curls - Biceps (kg)					
	Lying EZ-bar					
4	French press	32.08	45.42	3.96	11.86	<0.001
	Triceps (kg)					
5	Squats (kg)	75.83	96.67	5.77	14.01	<0.001
6	Seated calf raises on machine (kg)	44.58	60.00	4.26	13.46	<0.001
7	Dead lifts (kg)	65.00	83.33	5.77	7.15	<0.001

Notes. No 1 to 7 – test events; SD - standard deviation; t- test Student

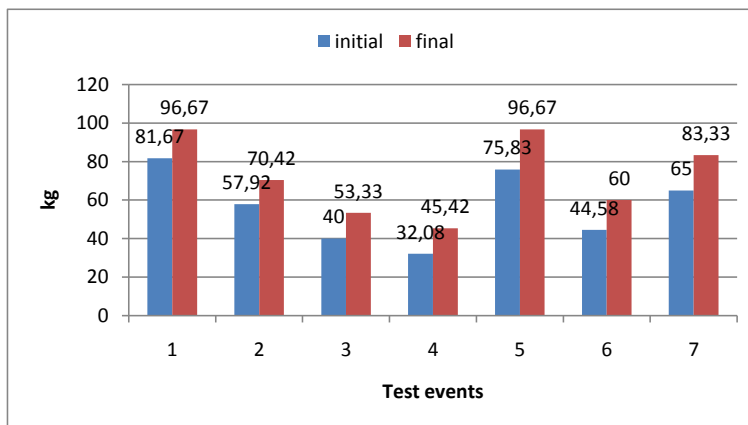


Figure no 1. Level of maximum muscular strength development in the subjects of the study

The analysis of the results of statistical calculations and individual values in the test events highlight the following matters:

Test event 1 - Bar bench press, chest muscles: the arithmetical mean is 81.67 kg in initial testing and 96.67 kg in final testing; it proves an increase of 15 kg between tests and significant differences between the means of the tests at $p < 0.001$.

Test event 2 - Seated behind the neck press, shoulder muscles: the arithmetical mean is 57.92 kg in initial testing and 70.42 kg in final testing; it highlights an increase by 12.5 kg between the two tests and significant differences of the means between tests at $p < 0.001$.

Test event 3 - Standing EZ-bar curls, biceps muscles: the arithmetical mean has the value of 40 kg in initial testing and 53.33 kg in final testing; it shows an increase by 13.33 kg between the two tests and significant differences of the means between tests at $p < 0.001$.

Test event 4 - Lying EZ-bar French press, triceps muscles: the arithmetical mean has the value of 32.08 kg in initial testing and 45.42 kg in final testing; it highlights an increase by 13.34 kg between the two tests and significant differences of the means between tests at $p < 0.001$.

Test event 5 - Squats, hip muscles: the arithmetical mean is 75.83 kg in initial testing and

96.67 kg in final testing; it shows an increase by 20.84 kg between the two tests and significant differences of the means between tests at $p < 0.001$.

Test event 6 - Seated calf raises on machine, calf muscles: the arithmetical mean has the value of 44.58 kg in initial testing and 60 kg in final testing; it highlights an increase by 15.42 kg between the two tests and significant differences of the means between tests at $p < 0.001$.

Test event 7 - Olympic bar dead lifts, lumbar muscles: the arithmetical mean has the value of 65 kg in initial testing and 83.33 kg in final testing; it shows an increase by 18.33 kg between the two tests and significant differences of the means between tests at $p < 0.001$.

The workouts carried out according to the experimental curriculum proposed in our research prove the significant positive influence exerted in all the fitness tests; they also entailed obvious differences between tests in all fitness tests passed at the end of the study. This conclusion is supported by the significant differences between the arithmetical means of the tests at $P < 0.001$.

We are entitled to draw the conclusion that the programmed workouts can be successfully used in the training of junior athletes. These workouts prove that the methods applied along a calendar year have

a benefic influence upon the development of strength motor skill.

Discussion

The purpose of this study is to highlight the progress made in the development of the strength motor skill in order to obtain some guide results, registered for the main muscle groups involved in the training of the junior bodybuilders.

The following training methods were used for highlighting the muscular strength development by bodybuilding means consistent with the strength periodization model (Bompa, 2002): anatomic adaptation, hypertrophy method and maximum load method.

The specialized literature shows the evolution and transformation of the body by bodybuilding practicing (Andreasson & Johansson, 2018) and draws the attention to the critical readings in bodybuilding (Locks, & Richardson, 2012).

Featuring solid scientific principles and the latest research, the study named "Serious Strength Training" provides the blueprint for increasing muscle mass and achieving strength gains that might have been thought impossible. (Bompa, Pasquale, & Cornacchia, 2018; Zatsiorsky, & Kraemer, 2006).

It is thought that strength and power adaptation is mediated by mechanical stimuli, namely the kinematics and kinetics associated with resistance exercise and their interaction with other hormonal and metabolic factors (Crewther, Cronin, & Keogh, 2005).

There are more studies to investigate the effects of anabolic steroids abuse on liver enzymes activity and lipid profiles in male bodybuilders (Arazi, 2018); to compare the blood markers of 03 groups with 08 volunteers in each one: bodybuilders using AAS/GH, amateur strength athletes drugs free and sedentary individuals as control (Fett, Maruyama, Brandão, & Fett, 2018); the findings suggest that 7 weeks of bodybuilding can increase total testosterone, lean body mass, and strength in lesser trained bodybuilders, and that boron supplementation had no effect on these measures (Ferrando, & Green, 1993); to determine the prevalence and characteristics of anabolic androgenic steroids (AAS) use among male bodybuilders in Shiraz, Iran (Fijan, Eftekhari, & Dashtabi, 2018); to determine the incidence of anabolic steroid use among competitive male and female bodybuilders in Kansas and Missouri (Tricker, O'Neill, & Cook, 1989); to assess protein (PRO) requirements during the early stages of intensive bodybuilding training and determine whether supplemental PRO intake (PROIN)

enhanced muscle mass/strength gains (Lemon, Tarnopolsky, MacDougall, & Atkinson, 1992); to examine eating and weight control practices and associated psychological characteristics among bodybuilders. Research indicates that serious recreational and competitive body-building may potentiate the risk of eating disorders (Gary, Harper, & Blouin, 1998);

In terms of bodybuilding training sessions, there are also concerns about the combination of strength workouts and cardio workouts in alternative days, in the same day but at different hours or during the same training session. There are studies to describe training practices and ergogenic aids used by competitive bodybuilders and to determine whether training practices comply with current recommendations for muscular hypertrophy (Hackett, Johnson, & Chow, 2013). The variables of the endurance training program are manipulated in order to optimize the maximum strength in men (Tan, 1999) and to determine whether combined elastic and free weight resistance provides different strength and power adaptations than free weight resistance training alone (Anderson, Sforzo, & Sigg, 2008). A great number of research studies focus on the fact that bodybuilding is deemed safe and on the clinical relevance for treating and preventing a vast number of diseases through a time-efficient and minimal dose of exercise (Figueiredo, de Salles, & Trajano, 2018); some studies determine the change in weight training repetition power output as a consequence of inter-repetition rest intervals (Drinkwater, Lawton, Mckenna et al., 2007). The specialists compared single and multiple sets of weight training for strength gains in recreationally trained individuals (Rhea, Alvar, Ball, & Burkett, 2002), they examined the chronic effects on lower-body strength in resistance trained men who performed varying training volumes over 6 weeks (Robbins, Marshall, & McEwen, 2012). They also traced changes of somatotype of bodybuilders of first and second class during mass gaining period (Tykhorskyi, Dzhym, Galashko, & Dzhym, 2018).

Various aspects of neuromuscular, anaerobic, and aerobic performance capacity were investigated in four powerlifters, seven bodybuilders, and three wrestlers with a history of specific training for several years (Häkkinen, Alén, & Komi, 1984). Some studies dealt with the acute and residual effects of vibratory stimulation on explosive strength in elite and amateur athletes (Issurin, & Tenenbaum, 1999), they developed a measurement instrument of muscle dysmorphia using empirical data reduction techniques (Hale, Kollock, & Resnick, 2018). The

specialists compared the effects of a high versus a moderate training frequency on the maximal strength and body composition (Colquhoun, Gai, Aguilar, et al., 2018); they also compared the partial range of motion versus full range of motion training in the development of maximal strength (Massey, Vincent, & Maneval et al., 2004); they identified this relationship in the collegiate, professional and elite athletes, maximizing the strength development in athletes (Peterson, Rhea, & Alvar, 2004). There were also identified the kinesiological differences in approaches and methods of training in the field of Crossfit and Bodybuilding, based on the kinesiological, anthropological and technical characteristics; the difference between recreationists and athletes in engagement programs such as Crossfit and Bodybuilding was determined as well (Mikić, Bozoljac, & Ivanek, et al., 2017). Other studies evaluated how body composition can be used in athletes, paying particular attention to the bioelectrical impedance analysis technique (Moon, 2013).

The applied experimental program monitored:

- the reps focusing on upper limbs muscle groups every 3-4 days in the training weeks I-III;
- the reps focusing on lower limbs muscle groups twice a week, during the training weeks II-IV;
- average duration of training session of 70-80 minutes with pauses of maximum 2 minutes between sets;
- reps of sets executed with maximal weights, as a guideline, taking into consideration the individual possibilities of the subjects;
- during the rest days : easy running, swimming, biking or exercises for abdominal muscles.

Conclusions

The establishment of the particularities of strength development methods used in bodybuilding practice led to the improvement of athletes' training level.

The methodology of strength motor skill development in junior age is a key factor for the achievement of bodybuilders' performances.

The selection of some methodical procedures for strength development by using bodybuilding specific means resulted in the optimization of the strength development process during the training session, which confirms the hypothesis of the proposed study.

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