

DEVELOPMENT OF BACK LEVEL MUSCULAR STRENGTH UNDER ENDURANCE CONDITIONS IN PERFORMANCE BODYBUILDING

POTOP VLADIMIR, TOMA SANDA URICHIANU, ULĂREANU MARIUS VIOREL

Ecologic University of Bucharest, ROMANIA

Abstract

Premises. The bodybuilding is the sport practiced by the persons who intend to develop a proportioned body and a musculature massive and symmetrical as much as possible, but to reduce drastically the fat layer under the skin in the same time. With this aim in view we have considered that an efficient use of the training method by „giant sets” for the back strength development will contribute to the muscular strength development under endurance conditions, to the contouring of the muscular groups involved in the effort and to the diminution of the body weight.

Method. That is why we decided to organize a study of case within the „Tonik Fitness Club” of Bucharest, along a one year long training mezzo-cycle period (December 2009), four training sessions a week, with only one subject aged 34. The athlete’s evolutions were recorded at each workout for back strength, by means of the statistical-mathematical method and of the anthropometrical measurements and control trial results graphical representation method.

Results. The results of the anthropometric measurements make evident a decrease of the waist and an increase of the thoracic amplitude at the final test. And the results of the control trials regarding the back musculature strength under endurance conditions, appraised by pull-ups and by tractions at the cable machine, prove an increase of the reps number at both trials. The growing of the back musculature strength was obtained thanks to an efficient use of the method by „giant sets” during the training sessions and by the observance of a proper diet, elements that lead to the increase of the muscular mass and to the weight loss.

Conclusions. The correct use of the methodic procedure for the muscular strength development under endurance conditions at the back level during the body building training sessions lead to an increase of the muscular strength and of the muscular mass. The efficient utilization of the procedure by “giant sets” during the back strength training sessions contributed to the development of the muscular strength under endurance conditions and to the contouring of the muscular groups involved in the effort and to the decrease of the body weight.

Key words: body building, strength under endurance conditions, muscular mass, training.

Introduction

The bodybuilding is the sport practiced by persons who intend to develop a well proportioned body and a massive and symmetrical musculature as much as possible, but in the same time they want to diminish as much as possible the fat layer under the skin (D. Hîtru 2002). For this purpose are used exercises with dumb bells, bar bells, cables machines or other types of machines, but also aerobic exercises such as cycling, running, swimming, etc. The diet is also very important for a body builder training as it has a double purpose: to provide all needed to the increase of the muscular mass, but in the same time to reduce the fat layer (A.V. Voicu 1995).

The main *purpose* of the study is to point out the contents of the training means by using the methodical procedure for the muscular strength development under endurance conditions in the performance bodybuilding.

Hypotheses of the study:

The correct use of the methodical procedure for the muscular strength development under endurance conditions at the level of the back, during the bodybuilding training sessions, will lead to the increase of the strength and of the muscular mass.

By an efficient utilization of the giant sets procedure during the training sessions meant to develop the back strength, the muscular strength under endurance conditions will be developed, the muscular groups involved in effort will be defined and the body weight will decrease.

Place of the study carrying out, subjects

In order to emphasize the contents of the training means by using the methodical procedure for the development of the muscular mass under endurance conditions at the back level in the performance bodybuilding, we have organized a case study within the Sports Club „Tonik Fitness Club” of Bucharest; the subject of the study aged 34 is a former amateur bodybuilder, with a motivation to participate in the local area or even national competitions for the future.

Duration and stages of the study carrying out

The study was carried out along a training mezzo-cycle (December 2009), four times a week.

Stages of the study carrying out:

1. *Initial stage* (30.XI.09), the initial testing of the control trials and measurements.
2. *Fundamental stage* (1.XII-25.XII.09), application of the training program.
3. *Final stage* (28.XII.09), final testing of the control trials and measurements.

Methods of research used as follows:

- *Bibliographic study* - theoretical documentation of the paper;
- *Observation method* – observation of the subjects’ progresses during the training;
- *Video method* – used for recording various exercises on the fitness machines;
- *Method of experimental study*– method used to confirm or invalidate the study hypotheses;

- *Statistical-mathematical method* – used for the calculation of the main statistical indices (Ş. Tüdös, 1993);
- *Graphical representation method* – it contributed to a more efficient interpretation of the study results.

Control trials and tests applied

In order to render obvious the subjects' progresses as for the pectoral musculature development, we have used the following tests and control tests:

A. Anthropometrical measurements:

1. Height (cm);
2. Weight (kg);
3. Thoracic perimeter (cm): inspiration, expiration and thoracic amplitude;
4. Arms perimeter (cm): right and left

B. Control trials applied:

1. Chest press with distanced hands grasp, a 80kg weight, assessed by maximum number of reps.
2. Pull-ups with distanced grasp, assessed by maximum number of reps.

Training program applied for the development of the back strength under endurance conditions

For the development of the back musculature strength under endurance conditions we have used the methodical procedure „Giant sets”.

Results of the study

This procedure aimed to the increase of the muscular mass and to the decrease of the body weight (fig.1).

“The giant sets” represent the training methodical procedure according to which two or several different exercises are made without any pause between them, for the same muscular group (D. Oprea, 2009).

1. Pull ups + Chest press
 - Series I-a: 8x + 8x40kg;
 - Series II-a: 8x + 8x48kg;
 - Series III-a: 8x + 8x56kg;
 - Series IV-a: 8x + 8x64kg.
2. Pull-ups + chest press + seated row
 - Series I-a: 7x + 7x72kg + 8x33kg;
 - Series II-a: 7x + 6x80kg; + 8x41kg;
 - Series III-a: 6 ½ x + 5 ½ 88kg + 8x49kg;
 - Series IV-a: 7x + 8x40kg + 8x57kg.
3. Pull ups – chest press – seated row + Smith tractions:
 - Series I: 5x + 10x48kg + 5x65kg + 10x40kg;
 - Series II-a: 4x + 10x56kg + 10x41kg + 10x48kg;
 - Series III-a: 5x + 8x64kg + 8x49kg + 8x56kg;
 - Series IV-a: 3 ½ x + 6x72kg + 7x57kg + 3 + 3x64kg.



Fig.1. Giant sets exercises

Table no.1. Anthropometrical measurements

No.	Full name	Age (years)	Weight (kg)		Height (cm)	Waist (cm)	
			Initial	Final		Initial	Final
1	R.V.	34	80	75	166	89	87.5

Table no.2. Anthropometrical measurements - thoracic perimeter

No.	Full name	Thoracic amplitude (cm)				Arms perimeter (cm)					
		Rest		Inspiration		Rest		Right		Left	
		Initial	Final	Initial	Final	I	F	Initial	Final	Initial	Final
1	R.V.	106	105	112	114.5	38	38.5	42	42.5	41.5	42

Table no.3. Results of control trials for back musculature strength-endurance

Full name	Pull-ups (max reps number)		Chest press (80kg)	
	Initial	Final	Initial	Final
R.V.	21	24	31	36

Table no.4. Back strength results (exercise no.1 Giant series)

Exercise 1		Pull-ups		Chest press	
		Reps.		Reps.	Kg
	Series I-a	8	8	8	40
	Series II-a	8	8	8	48
	Series III-a	8	8	8	56
Series IV-a	8	8	8	64	
Statistical indicators					
X- arithmetical mean		8.0	8.0	8.0	53.0
Am-average deviation		0.0	0.0	0.0	8.0

s- standard deviation	0.0	0.0	8.94
Cv %- var. coeff.	0.0	0.0	17.2
r- Spearman correlation	0.50		
t- Student,	0.82		
$t_{critical}$ - 2.920, p-0.05			

Table no.5. Results for back strength (exercise no.2 Giant sets)

Exercise 2		Pull-ups		Chest press		Prone position row		
		Reps.	Reps.	Kg	Reps.	Kg		
	Series I	7	7	72	8	33		
	Series II	7	6	80	8	41		
	Series III	6.5	5.5	88	8	49		
Series IV	7	8	40	8	57			
Statistical Indicators								
X-arithmetic mean	6.88	6.63	70.0	8.0	45.0			
Am-average deviation	0.19	0.88	15.0	0.0	8.0			
s- standard deviation	0.22	0.96	18.2	0.0	8.89			
Cv%- var. coeff.	3.15	14.49	26.03	0.0	19.88			

Graph no.1.Exercise no.1 Giant sets (Pull-ups + Chest press)

Graph no.2. Exercise no.2 Giant sets (Pull-ups + Chest press +seated row)

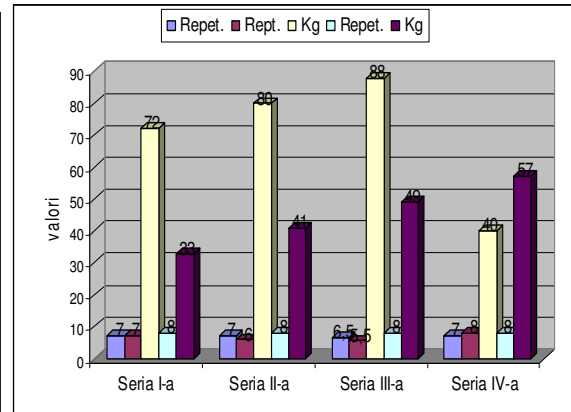
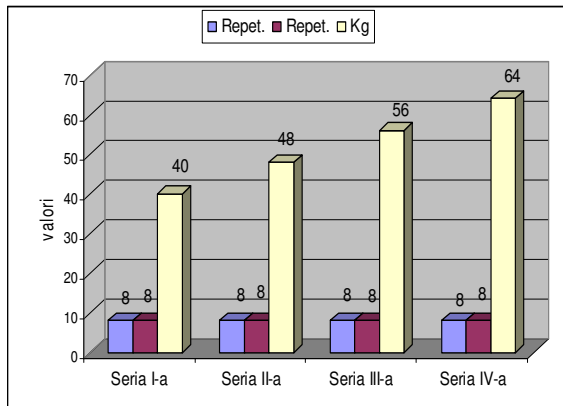


Table no.6. Correlation and significance of correlation between giant sets no.2 exercises

r- Spearman t- student $t_{critical}$ - 2.920, p-0.05		Pull-ups	Chest press		Supine position row	
		Reps	Reps	Kg	Reps	Kg
Chest press	Reps	0.80				
	Kg	-0.40	-1.0			
Supine position seated row	Reps	0.70	0.50	0.50		
		1.39	0.82	0.82		
	Kg	0.0	0.20	-0.20	0.50	
		0.0	0.29	-0.29	0.82	

Table no.7. Back strength results (exercise nor.3 giant series)

Exercise 3		Pull-ups	Chest press		Seated row, supine position grasp		Smith Traction	
		Reps	Reps	Kg	Reps	Kg	Reps	Kg
Series I-a	5	10	48	5	65	10	40	
Series II-a	4	10	56	10	41	10	48	
Series III-a	5	8	64	8	49	8	56	
Series IV-a	3.5	6	72	7	57	6	64	
Statistical Indicators								
X-arithmetic mean	4.38	8.50	60.0	7.50	53.00	8.75	52.00	
Am-average deviation	0.63	1.50	8.0	1.50	8.00	1.25	8.0	

s- standard deviation	0.65	1.66	8.94	1.80	8.94	1.30	8.94
Cv%- var. coeff.	14.85	19.51	14.91	24.04	16.88	14.85	17.20

Graph no.3. Exercise no.3 Giant sets
(Pull-ups + Chest press + Seated row + Smith tractions)

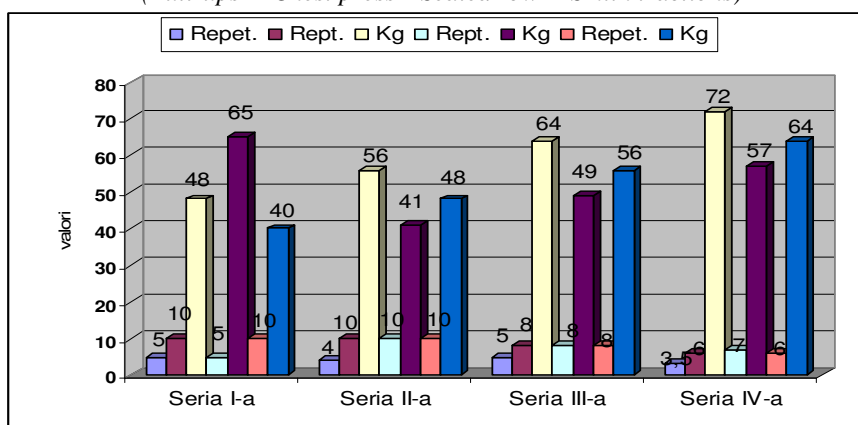


Table no.8. Correlation and significance of correlation

r- Spearman t- student t critical- 2.920, p-0.05		Pull-ups	Chest press		Seated row, supine position grasp		Smith tractions	
		Reps	Reps	Kg	Reps	Kg	Reps	Kg
Chest press	Reps	0.50 0.93						
	Kg	-0.55 -0.93	-0.85 -2.28					
Seated row, supine position	Reps	-0.15 -0.21	0.15 0.21	0.20 0.29				
	Kg	0.25 0.37	-0.05 -0.07	-0.20 -0.29	-1.0 ***			
Smith machine tractions	Reps	0.55 0.93	1.0 ****	-0.85 -2.28	0.15 0.21	-0.05 -0.07		
	Kg	-0.55 -0.93	-0.85 -2.28	1.0 ***	0.20 0.29	-0.20 -0.29	-0.85 -2.28	

Interpretation of the study results

1. The results of the anthropometrical measurements point out the fact that the subject of the study aged 34, with a height of 166 cm, had a weight of 80 kg at the initial testing and a decrease by 5 kg at the final test, while the waist had a value of 89 cm at the initial testing and a decrease by 1.5 cm at the final testing (table no.1).

- Thoracic perimeter at rest – it had a value of 106cm at the final testing and a decrease by 1 cm at the final testing; during the inspiration a value of 112cm was recorded at the initial testing and an increase by 2.5cm at the final testing.

By comparing both tests, the thoracic amplitude and the waist, it is obvious that a waist decrease and a thoracic amplitude increase by 9.5 cm are recorded at the final test.

- Arms perimeter- the measurements had the following values: the right arm had an average size of 42 cm at the initial test and a growth by 0.5cm at the final testing, the left arm had an average value of 41.5cm at the initial testing and an increase by 0.5cm at the final testing, with an average value of 38cm at rest at the initial testing and of 38.5cm at the final testing (table no.2)

2. Results of the control trials (table no.3):

- Pull-ups with distanced grasp, evaluated by the maximum number of correct reps: the initial testing has 21 reps and the final testing has an increase by 4 reps.

- Chest press with a 80 kg weight, distanced grasp, assessed by the maximum number of reps: 31 reps are recorded at the initial testing and an increase by 5 reps is recorded at the final testing.

Back strength results, table no.4, exercise no.1 giant sets, formed of pull-ups and chest press, performed one after another, without any pause; a number of 8 reps is maintained at both exercises and a progressive weight increase is recorded from a set to another, with an average value of 53kg and a moderate homogeneity.

As for the correlation of the number of reps with the weight used in the 4 sets of chest press exercises, a non-significant correlation is proved at p-0.05, with the t_{calculated} of 0.82 smaller than the tabular t_{critical} of 2.920.

Regarding the dynamics of the progressive increase of the effort loading at each exercise in giant set no.1, a conservation of the reps number for the pull-ups and the chest press is evident, in accordance with the increase of the load weight.

Back strength results, table no.5, exercise no.2, giant supersets, formed of pull-ups, chest press and seated rows, performed one after another, without any pause; the recorded values are the following ones: an average reps value of 6.88 at pull-ups, 6.63 at chest press and 70kg weight, while in the 4th series the weight was again 40kg; the seated row recorded an average value of 8 reps and 45kg weight.

An observation of the weight progressive increase dynamics at each exercise of the giant series no. 2 demonstrates a decrease of the pull-up reps number and a return of the weight at chest press and a progressive growth of the weights at seated row.

Regarding the correlation and the significance of the correlation of the giant supersets exercise no.2 (table no.6), an insignificant correlation is pointed out, whose values are smaller than the tabular $t_{critical}$ of 2.920 and a significant correlation between the reps number and the weight used for the chest press, but with a negative value between these ones.

Back strength results, table no 7, giant supersets exercise no.3, formed of 4 exercises: pull-ups, chest press, seated rows and Smith tractions performed one after another, without any pause; the average values recorded are the following ones: 4.38 reps for the pull-ups, 8 reps and 60 kg weight for the chest press, 7.5 reps and 53kg weight for the seated row and 8.75 reps, 52kg weight at Smith tractions.

Regarding the correlation and the significance of the correlation of the giant supersets exercise no.3 (table no.8), there is a significant correlation of the chest press exercises and the Smith tractions as for the reps number and the load weight, with values higher than the tabular $t_{critical}$ of 2.920; the other correlations are insignificant.

As for the dynamics of the progressive increase of the weights at each exercise during the giant set no.3, the following elements can be noticed: a decrease of the number of reps at the pull-ups, a progressive increase of the weight and the decrease of the number of reps at chest press, the return of the weight and the decrease of the number of reps at seated row and the diminution of the number of reps in conformity with the increase of the weight at Smith machine tractions.

Conclusions

The results of the anthropometric measurements point out a diminution of the waist and an increase of the thoracic amplitude.

The results of the control trial, assessed by pull-ups and chest press prove an increase of the reps number at both trials.

Regarding the dynamics of the progressive growth of the effort load at each exercise of the giant sets, the following elements can be noticed:

- maintaining of the pull-ups and chest press reps number according to the increase of the load weight;
- decrease of the pull-up reps number and a return of the weight at chest press and a progressive increase of the weight at seated row;
- decrease of the pull-up reps number, progressive increase of the weight and decrease of reps number at the chest press, return of the weight and decrease of the reps number at the seated row and decrease of the reps number in conformity with the weight increase at the Smith machine tractions.

After a review of the effort dynamics during the giant sets, we can say that the correct use of the methodical procedure for the muscular strength development under endurance conditions at back level during the bodybuilding workouts lead to the growth of the muscular mass and strength.

Also, the efficient use of the procedure by giant sets during the back strength workouts had a contribution to the development of the muscular strength under endurance conditions, to the definition of the muscular groups involved in the effort and to the diminution of the body weight.

References

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