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A new method to develop maximum power through charge contrast: the ”Top & Down” method

O nouă metodă de dezvoltare a forţei maxime, prin contrast de sarcină: metoda „Top & Down”

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Abstract

Background. With very few exceptions (such as bodybuilding or sumo) one of the basic principles of developing explosive power involves *a maximum achievement of power with a minimum muscle mass increase*. This principle is a priority in sport disciplines, where competition requirements separate the athletes into weight categories (such as weightlifting, judo, boxing, wrestling etc.). Coaches, nutritionists and doctors deal with well-known problems related to maintaining a certain weight category in order to achieve a medal in a high level competition (Olympic Games, World Championships, etc.). This principle is equally important in sports where the individual power index is related to the athlete's body weight (sprint or long jump or triple jump in athletics, gymnastics etc.).

Objectives. The purpose of our study was to investigate the evolution of the maximum individual power using a new method based on charge contrast – the *Top & Down* method. The research was performed on ten bodybuilders (n=10) who practice bodybuilding at a high level of performance.

Methods. We applied our new method, named *Top & Down*, in one experimental training session (three months length) containing two planned moments (initial and final) for ordered testing. The training session involved completing sets of five power exercises (Barbell Bench Press, Barbell Deadlift, Barbell Half Squat, Barbell Preacher Curls and Barbell Shoulder Press).

Results. Our findings showed statistically significant differences in t-distribution ($p<0.05$) between initial and final sessions.

Conclusions. It was concluded that the *Top & Down* method is an intensive and extremely useful method to increase power output for bodybuilders with relatively high strength levels. It can be used in combination with other specific extensive methods aimed at increasing muscle mass. The *Top & Down* method is an important and necessary precondition to increasing the power index for predominantly extensive training specific to muscle mass increasing. We also recommend that the *Top & Down* method should be applied in other sports in which explosive power is a determining factor of individual performance.

Key words: charge contrast method; intensive power training; extensive power training; maximum power; individual power index; bipolar cyclic system; motor unit recruitment-derecruitment.

Rezumat

Premize. Cu foarte puţine excepţii de discipline sportive (ex. culturism, sumo), unul dintre principiile fundamentale din antrenamentul pentru dezvoltarea forţei explozive constă în obţinerea unui *maximum de forţă bazat pe un minimum de masă musculară*. Acest principiu devine prioritar în disciplinele sportive la care cerinţele regulamentare încadrează sportivii pe categorii de greutate (ex. haltere, judo, box, lupte libere etc.). Sunt foarte bine cunoscute problemele majore pe care le întâmpină antrenorii, nutriţioniştii şi medicii din staff-ul unui sportiv de mare performanţă, respectiv, sportivii în cauză, în menţinerea într-o anumită categorie de greutate, cu potenţialitate în obţinerea unei medalii la o competiţie de mare anvergură. În egală măsură, acest principiu este deosebit de important în disciplinele sau probele sportive fără o încadrare a sportivilor în categorii de greutate, dar la care relativizarea indicelui de forţă maximală se face în raport cu greutatea corporală a sportivului (sprint sau sărituri în atletism, gimnastică sportivă etc.).

Obiective. Scopul studiului nostru a fost acela de a investiga evoluţia forţei maxime individuale, experimentând o metodă personală, denumită *Top & Down*, ca o nouă variantă a metodei de dezvoltare a forţei prin contrast de sarcină, aplicată în cazul nostru pe un grup de zece culturişti, care practică acest sport la nivel de performanţă.

Metodă. Am aplicat metoda *Top & Down* într-o singură sesiune experimentală, timp de trei luni, la care am prevăzut două momente de testare: iniţială şi finală. Variabila dependentă a experimentului nostru a constat în utilizarea a cinci exerciţii specifice de dezvoltare a forţei: împins culcat, genuflexiuni, îndreptări cu bara, flexii ale antebraţului pe braţ şi împins şezând, cu bara la ceafă.

Rezultate. În urma aplicării experimentului am constat diferenţe statistic semnificative prin calcularea indicelui „t” al lui Student la un prag de probabilitate de ($p<0,05$), între rezultatele individuale iniţiale şi finale, ca o consecinţă a metodei aplicate.

Concluzii. Metoda *Top & Down* este o metodă intensivă deosebit de eficientă în dezvoltarea forţei maxime a sportivilor culturişti, cu un nivel ridicat de pregătire. Ea poate fi utilizată combinativ cu alte metode specifice, orientate spre creşterea masei musculare. Astfel, metoda *Top & Down* se constituie într-o premiză importantă şi necesară în ceea ce priveşte creşterea indicelui individual de forţă al unui sportiv, ca suport pentru antrenamentul consecutiv, predominant extensiv, specific creşterii masei musculare. De asemenea, concluzionăm faptul că metoda *Top & Down* poate fi aplicată la disciplinele la care forţa

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maxim-explozivă este factor determinant sau favorizant al performanţelor individuale.

Cuvinte cheie: metodă prin contrast de sarcină; antrenament intensiv; antrenament extensiv; forţă maximă; indice individual de forţă; sistem ciclic bipolar; recrutare-derecrutare de unităţi motorii.

Introduction

The *Top & Down* method (T&DM) is a personal method, designed, developed and applied over an about six year period - in weightlifting and then, for about fifteen years in athletics power training – speed running events, hurdles (short distance events), jumping (long and triple jump). Although the method is commonly used, no systematic experimental studies have been conducted so far, research being limited to the efficiency recording and a significant maximal explosive power development of weightlifters and athletes.

When we started effective scientific studies - in 2012, we found that our experimental T&DM method was basically a version of Bulgarian power school methods, generically named the *charge contrast method* (CCM) of maximum power development (Kraemer & Zatsiorsky, 2006).

This method involves the performance, during a training session or during a single exercise execution (e.g. squats), of alternative sets such as heavy load sets (high intensity effort) alternating with light load sets (fatigue free). The *Bulgarian* method (MB) is based on training principles embodied in three ways of power development (Fig. 1). They were promoted by Vladimir Zatsiorski (PhD Professor of *Kinesiology* at Pennsylvania State University, USA), in the 70s of the 20th century, Zatsiorsky (1995); Cometti (2005); Sellin (2010); Lejeune (2012).

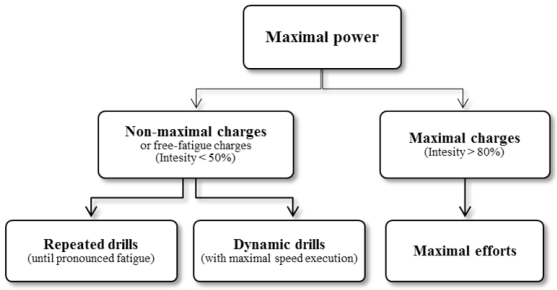

Fig. 1 – Power development modalities proposed by Zatsiorski.

Briefly, in our proposed T&D method, the loads are structured in *biphasic or bipolar cycles* (e.g. sets) such as *increasing* ↔ *decreasing* of load intensity, hence the generic name of the method (top ↑ - down ↓). This system can be configured in several versions and one of them is shown below (Fig. 2).

The principle of the TDM method is based on the fact that by increasing the load levels (intensity = I) performed from submaximal to maximal efforts (I = 80% → 100%), we are maintaining a high level of cerebral cortex excitability and of the involved cortical areas, namely *nervous centers* responsible for the required muscle groups contractions.

Repeats carried out in heavy load sets (HLS) with maximum intensity (I>80%) are performed at a slower rate due to the increased load, but "must be performed with the highest possible speed" Veillette & Decloître (1999). Repeats carried out in light load sets (LLS) with low intensity (I <50%) must be performed at an individual speed of execution, being aimed at the plyometric workout system. Therefore, the time gap (TG) between failure ↔ overcoming muscle action is the shortest possible (ideally TG = 0 secs). In this context, Shmidt & Lee (2011) mention an "Agonist ↔ Antagonist Pattern" (AAP), exemplifying the relationship between the biceps and triceps (e.g. brachial or femoral muscles), in which the completion of agonist muscle action leads to a very fast antagonistic muscle action, through the pattern revealed by electromyography (EMG) in 1979 by Wadman, (works cited by Shmidt & Lee, 2011).

The result is a phenomenon termed *motor unit recruitment-derecruitment* process (MURD), based on the "Size Principle" (Henneman's Size Principle) (Henneman et al., 1965), which is based on "the relationship between the number of recruited MU, the effort intensity level and the recruitment threshold" (Baech & Earle, 2008). This principle can generate a "selective recruitment" where the recruitment of the involved MU will determine very fast contractions under certain circumstances (in our case, maximal intensity sets) and a slow MU inhibition, leading to "a very fast alternation between critical and optimal speed executions, related to the request level" (Baech & Earle, 2008).

Eventually, after the so-called "overloading" generated by submaximal and maximal requests of heavy sets, the explosive power improvement of muscle contractions occurs. This is referred to as "post-activation potentiation" (PAP), a concept introduced by Verkhoshansky (cited by Tumminello, 2009). Verkhoshansky is a Russian researcher in Sports science, called the "father" of another concept - *plyometric training* or *plyometric workout*, introduced in the years 1966-1967.

Simultaneously, due to the high intensity level of effort, an increased number of MU in the concerned muscle groups are activated and, based on neurovegetative regulation, a significant number of arteriolo-venular sphincters in the proximal areas of muscle contractions are opened. The nervous centers, under the influence of peripheral receptors (e.g. chemoreceptors, mechanoreceptors, baroreceptors), "change by parasympathetic or sympathetic ways the local blood flow level as a response to exercise requests, inducing and stimulating the occurrence of a *metabolic-reflex* "regulatory, particularly during maximal requests" (McArdle et al., 2010).

Thus, a significant number of muscle fibers are strongly activated and, due to the effects of adaptation mechanisms of the cardiovascular system (e.g. increased systolic blood pressure, high volemia, respiratory rate and amplitude) and of local mechanisms (e.g. proximal vasodilation, several opened arteriolo-venular sphincters), the blood flow is directed to the requested muscle areas in increased amounts. All these regulatory mechanisms will provide

the necessary substances such as energy generator and functional support to muscle contractions (e.g. ATP, ADP, PC, C, glycogen, O_2 etc.). In this case, all these processes will support and maintain at high parameters the mixed anaerobic efforts (e.g. alactacid & lactacid efforts).

In the case of the *T&D* method, an increased number of repetitions are performed in the 7th set - reaching up to 36 repetitions/set, carried out at a lower intensity (I = 30%). As a result, the muscle tissue which performs considerable effort is strengthened, the catabolic products during submaximal and maximal intensity effort (e.g. post-exercise lactate) and an optimum level of pH (pH ≈ 7.35) and local temperature is maintained. Note that the breaks between two sets with submaximal and maximal loads are *active breaks;* during these "breaks" fast and numerous repetitions (FR) with low loads (R_{Set3} → 24 rep.; R_{Set5} → 30 rep.; R_{Set7} → 36 rep.) and with regressive intensity (I), (e.g. I_{Set3} → 50%; I_{Set5} → 40%; I_{Set5} → 30%) are performed. Therefore, the T&D method is extremely overloaded and must be used only in athletes with a long personal sport training experience (Fig. 1).

The 9th program set has a *control function* (as a pointer) of the athlete's momentary maximum power, proved by the individual ability to perform one single repetition, which represents 100% of its momentary potential. If in this set the athlete achieves more than 16 repetitions - which were performed at the same level of intensity as in the 1st set, the coach will have to test again the athlete to establish a new individual maximum performance of the specific exercise. Conversely, if the athlete is not able to perform at least 16 repetitions, this could be a sign of fatigue, overtraining, psychophysical overworking etc. In both cases the coach should intervene appropriately.

The *Top & Down* method can be applied to any exercise of power development when working with barbells, dumbbells and other sport equipment with quantifiable and adjustable (variable) weights.

In this context, we have the ethical obligation of the objective researcher to highlight the advantages and some possible warnings related to the use of power development methods – e.g. *charge contrast methods* in general, and thus the proposed *T&D* method.

Advantages

- The increase of the maximal explosive power with no increase of muscle mass.
- The activation of an increased number of MU.
- The recruitment of an increased number of MU is conditioned by the overall increased activation of the superior central nervous system (SCN) in case of training sets with maximal intensity (I > 80%).
- The engagement of an increased number of MU is directly proportional to the ability of motor cortical areas to send impulses to the involved muscle groups (e.g. irradiation of cortical excitation to adjacent areas) and the participation and activation of the subcortical central nervous system (SCCN).
- An increased frequency of efferent nerve impulses.
- Synchronization of involved MU and muscle contractions (MC).

Possible warnings

- The application of the T&D method requires a long training experience of the athletes.
- It is inappropriate for children, young juniors and any novice athletes.
- Energy and electrolyte restoration is less than 72 hours.
- Generally avoid using only this method for a long time.
- The T&D method must be combined with other complementary methods in terms of level and form of tasks.

Hypothesis

By using the new Top & Down method, applied within three months to a group of performance bodybuilders (n=10), the maximum power developed by the involved muscle groups increases statistically significantly at a probability threshold of $p<0.05$.

Material and methods

Research protocol

We mention that our research protocol is in conformity with the *Helsinki Declaration, Amsterdam Protocol and Directive 86/609/EEC*, and the approval of the *Ethics Commission* of the Faculty of Medicine*, Department of Human Movement Sciences* of the University of Medicine and Pharmacy Tirgu Mureş, regarding research on human subjects, as well as the consent of the subjects for participation in the study were obtained.

a) Period and place of the research

The period of investigation was from February to May, 2012. The place was the bodybuilding hall of the "Titanic" Sport Club in Tirgu Mures, Romania.

b) Subjects and groups (dependent variable)

The subjects included in the experiment were ten male bodybuilders, assigned to a single experimental group. The subjects were aged between 21 and 36 years, the mean age being 24.5 years.

Table I

Subjects' synthetic data.

n	Subjects	Parameters			
		Age (years)	Gender	Height (cm)	Weight (kg)
1	R.P.	21	M	186	95
2	P.S.	28	M	195	118
3	S.S.	23	M	180	93
4	C.Vs.	23	M	183	93
5	C.V.	24	M	178	88
6	N.L.	36	M	179	105
7	P.A.	21	M	182	83
8	F.D.	22	M	181	95
9	M.M.	22	M	185	85
10	P.S.	25	M	175	70
	$\overline{X}$	24.5	-	182.4	92.5

c) Applied tests (independent variable)

The independent variable was represented by the *Top & Down* method and consisted of the application of five exercises - twice a week and two tests (initial and final) for muscle strength development, as follows:

- Exercise 1 - *Barbell Bench Press;*
- Exercise 2 - *Barbell Half Squat;*
- Exercise 3 - *Barbell Deadlift;*

- Exercise 4 - *Barbell Preacher Curls;*
- Exercise 5 - *Barbell Shoulder Press* (sitting position).

Briefly, in the proposed method, the set loads are structured in an alternating increasing and decreasing intensity of the effort level, hence the generic name of the method. The starting set is at 60% intensity level with 16 repetitions (Fig. 2).

Fig. 2 – Sets and executions chronology - the *Top & Down* method.

d) Statistical processing

For statistical analysis, we used the Graphpad Program by calculating Student's "t" test for two sequences of one group data, n = 10, $p<0.05$.

Results

Exercise 1 - Barbell Bench Press (Table II and Fig. 3)

Table II

Barbell Bench Press - Results evolution.

n	Initial Test			Final Test		
	X_i (kg)	$X_i - \overline{X}$	$(X_i - \overline{X})^2$	X_i (kg)	$X_i - \overline{X}$	$(X_i - \overline{X})^2$
1	165	40	1600	172	37.7	1421.29
2	140	15	225	148	13.7	187.69
3	150	25	625	160	25.7	660.49
4	130	5	25	136	1.7	2.89
5	120	-5	25	130	-4.3	18.49
6	135	10	100	145	10.7	114.49
7	100	-25	625	110	-24.3	590.49
8	110	-15	225	120	-14.3	204.49
9	90	-35	1225	97	-37.3	1391.29
10	110	-15	225	125	-9.3	86.49
$\overline{X}$	125	-		134.3	-	
	$\Sigma(X_i - \overline{X})^2$		4900	$\Sigma(X_i - \overline{X})^2$		4678.1
	$S_{Initial\ Test} = \pm 22.14$			$S_{Final\ Test} = \pm 21.63$		
	$t = 4.45\ (p<0.05)$					

Indicator legend

n	participants' frequency	$\overline{X}$	mean values
X_i	data values	S	standard deviation
t	Student's t significance at 95% confidence level	P	probability significance (p-value)

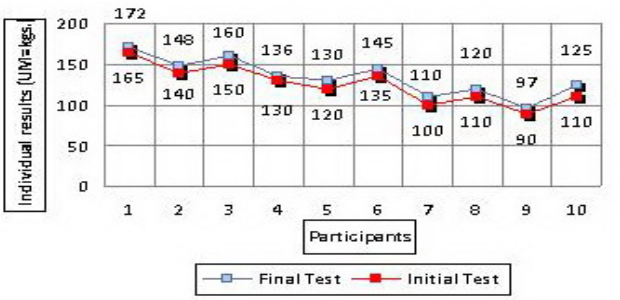

Fig. 3 – Barbell Bench Press - Individual results evolution.

Exercise 2 - Barbell Half Squat (Table III and Fig. 4)

Table III

Barbell Half Squat - Results evolution.

n	Initial Test			Final Test		
	X_i (kg)	$X_i - \overline{X}$	$(X_i - \overline{X})^2$	X_i (kg)	$X_i - \overline{X}$	$(X_i - \overline{X})^2$
1	230	66	4356	250	70.7	4998.49
2	250	86	7396	255	75.7	5730.49
3	190	26	676	195	15.7	246.49
4	160	-4	16	178	-1.3	1.69
5	150	-14	196	165	-14.3	204.49
6	140	-24	576	155	-24.3	590.49
7	130	-34	1156	145	-34.3	1176.49
8	130	-34	1156	140	-39.3	1544.49
9	120	-44	1936	150	-29.3	858.49
10	140	-24	576	160	-19.3	372.49
$\overline{X}$	164	-		179. 3	-	
	$\Sigma(X_i - \overline{X})^2$		18040	$\Sigma(X_i - \overline{X})^2$		15724.1
	$S_{Initial\ Test} = \pm 42.47$			$S_{Final\ Test} = \pm 39.65$		
	$t = 4.39\ (p<0.05)$					

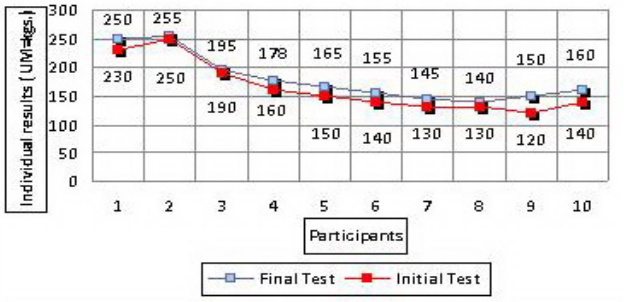

Fig. 4 – Barbell Half Squat - Individual results evolution

Exercise 3 - Barbell Deadlift (Table IV and Fig. 5)

Table IV

Barbell Deadlift - Results evolution.

n	Initial Test			Final Test		
	X_i (kg)	$X_i - \overline{X}$	$(X_i - \overline{X})^2$	X_i (kg)	$X_i - \overline{X}$	$(X_i - \overline{X})^2$
1	230	66.5	4422.25	245	68.4	4678.56
2	235	71.5	5112.25	250	73.4	5387.56
3	220	56.5	3192.25	235	58.4	3410.56
4	165	1.5	2.25	180	3.4	11.56
5	160	-3.5	12.25	170	-6.6	43.56
6	150	-13.5	182.25	162	-14.6	213.16
7	120	-43.5	1892.25	134	-42.6	1814.76
8	105	-58.5	3422.25	125	-51.6	2662.56
9	110	-53.5	2862.25	120	-56.6	3203.56
10	140	-23.5	552.25	145	-31.6	998.56
$\overline{X}$	163.5	-		176.6	-	
	$\Sigma(X_i - \overline{X})^2$		21652.5	$\Sigma(X_i - \overline{X})^2$		22424.4
	$S_{Initial\ Test} = \pm 46.53$			$S_{Final\ Test} = \pm 47.35$		
	$t = 4.28\ (p < 0.05)$					

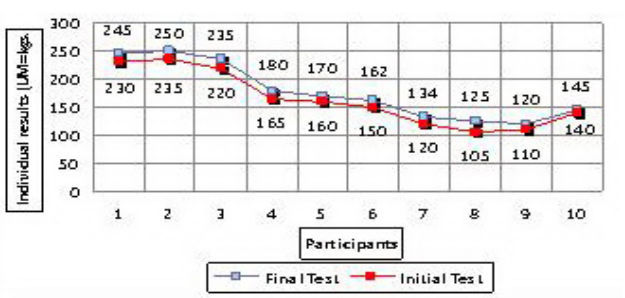

Fig. 5 – Barbell Deadlift Individual results evolution.

Exercise 4 - Barbell Preacher Curls (Table V and Fig. 6)

Table V

Barbell Preacher Curls - Results evolution.

n	Initial Test			Final Test		
	X_i (kg)	$X_i - \overline{X}$	$(X_i - \overline{X})^2$	X_i (kg)	$X_i - \overline{X}$	$(X_i - \overline{X})^2$
1	90	22	484	92	19.9	396.01
2	85	17	289	88	15.9	252.81
3	75	7	49	78	5.9	34.81
4	65	-3	9	70	-2.1	4.41
5	60	-8	64	65	-7.1	50.41
6	65	-3	9	70	-2.1	4.41
7	50	-18	324	55	-17.1	292.41
8	65	-3	9	68	-4.1	16.81
9	55	-13	169	60	-12.1	146.41
10	70	2	4	75	2.9	8.41
$\overline{X}$	68		-	72.1		-
	$\Sigma(X_i - \overline{X})^2$		1410	$\Sigma(X_i - \overline{X})^2$		1206.9
	$S_{\text{Initial Test}} = \pm 42.47$			$S_{\text{Final Test}} = \pm 39.65$		
	$t = 2.72\ (p < 0.05)$					

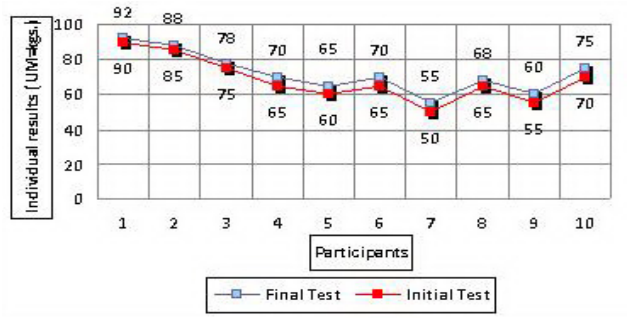

Fig. 6 – Barbell Preacher Curls – Results evolution.

Exercise 5 - Barbell Shoulder Press (Table VI and Fig. 7)

Table VI

Barbell Shoulder Press - Results evolution.

n	Initial Test			Final Test		
	X_i (kg)	$X_i - \overline{X}$	$(X_i - \overline{X})^2$	X_i (kg)	$X_i - \overline{X}$	$(X_i - \overline{X})^2$
1	95	21.5	462.25	100	20.4	416.16
2	90	16.5	272.25	95	15.4	237.16
3	80	6.5	42.25	82	2.4	5.76
4	70	-3.5	12.25	75	-4.6	21.16
5	70	-3.5	12.25	74	-5.6	31.36
6	75	1.5	2.25	80	0.4	0.16
7	60	-13.5	182.25	65	-14.6	213.16
8	70	-3.5	12.25	75	-4.6	21.16
9	50	-23.5	552.25	70	-9.6	92.16
10	75	1.5	2.25	80	0.4	0.16
$\overline{X}$	73.5		-	79.6		-
	$\Sigma(X_i - \overline{X})^2 = 1552.5$			$\Sigma(X_i - \overline{X})^2 = 1038.4$		
	$S_{\text{Initial Test}} = \pm 12.46$			$S_{\text{Final Test}} = \pm 10.19$		
	$t = 4.06\ (p < 0.05)$					

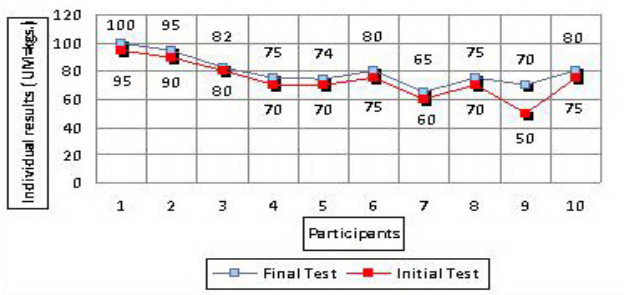

Fig. 7 – Barbell Shoulder Press - Individual results evolution.

Discussions

In order to interpret the scientific validity of the results, at least three conditions must be fulfilled (Chelcea, 1982, cited by Epuran, 2005):

- Between the independent variable (the applied method) and the dependent variable (subjects' results) there must be a temporal relationship of antecedence of the independent variable, based on the fact that the cause always precedes the effect.
- Between both categories of variables, there must be a covariance, at a probability threshold of $p<0.05$, by highlighting the changes of parameters, statistical significance proved through calculation; the statistical parameters used for evidence of "t" were:
- arithmetic mean;
- individual deviation from the mean;
- square mean deviation;
- Student **t** index.
- There is no alternative explanation of the dependent variable changes outside of the independent variable influences used in the experiment.

We are aware that there may be a number of disturbing factors in our experimental research. These factors can lead to "inconsistent result values" (Aniţei, 2007). By the rigorous way in which we applied the independent variable and by the accuracy of the results registration, we tried to avoid the discrepancy that could occur between our level of expectation and the possible effect below our expectations - the influence on the dependent variables, which would lead to that kind of incautiousness, defined by the same author as "error variance" (Aniţei, 2007). All this would significantly alter the predictive value of the independent variable.

In the context of the above and after the statistical processing of the recorded data, we found the following:

- for *Barbell Bench Press* exercise the group mean of the initial test was $\overline{X}/T_i = 125$ kg and of the final test was $\overline{X}/T_f = 134.3$ kg. Student's **t** index was $t = 4.45$ ($p<0.05$). It shows a highly statistically significant difference between the initial and final group means.
- for *Barbell Half Squat* exercise the group mean of the initial test was $\overline{X}/T_i = 164$ kg and of the final test was $\overline{X}/T_f = 179.3$ kg. Student's **t** index was $t = 4.39$ ($p<0.05$). It shows a highly statistically significant difference between the initial and final group means.
- for *Barbell Deadlift* exercise the group mean of the initial test was $\overline{X}/T_i = 163.5$ kg and of the final test was $\overline{X}/T_f = 176.6$ kg. Student's **t** index was $t = 4.28$ ($p<0.05$). It shows a highly statistically significant difference between the initial and final group means.
- for *Barbell Preacher Curls* exercise the group mean of the initial test was $\overline{X}/T_i = 68$ kg and of the final test was $\overline{X}/T_f = 72.1$ kg. Student's **t** index was $t = 2.72$ ($p<0.05$). It shows a relatively statistically significant difference between the initial and final group means.
- for *Barbell Shoulder Press* exercise the group mean of the initial test was $\overline{X}/T_i = 73.5$ kg and of the final test was $\overline{X}/T_f = 79.6$ kg. Student's **t** index was $t = 4.06$ ($p<0.05$). It shows a highly statistically significant difference between the initial and final group means.

Conclusions and recommendations

Conclusions

1. By applying this experiment, we can confirm once more that power is one of the most plastic motor skills, as a "genotypic component of the motor capacity of an individual", which can be spectacularly developed in a relatively short time (Neagu, 2010, Neagu, 2012).

2. The experiment confirmed the hypothesis that by using the Top & Down method, applied in a three month experimental session, the maximum power developed by the involved muscle groups revealed a statistically significant muscle power increase at a probability threshold $p<0.05$, for all five exercises applied to targeted muscle groups.

3. In four of the exercises, the "t" index value was >4.06 [Δ (4.07 to 4.45) = 0.38] at a probability threshold $p<0.05$ for small groups with $n = 10$. In one single exercise - Barbell Preacher Curls, the significance was slightly lower; "t" value was 2.72. The explanation of this lower significance is that its action is focused on a single brachial biceps muscle. Consequence: the progress rating was lower.

Recommendations

We propose to extend the use of the *Top & Down* method as part of power developing methods not only to bodybuilding, but to all sports disciplines where power is a determinant or a contributing factor to individual performance. It will be approached in connection with other power developing methods, in a complementary relationship. However, to acquire scientific validity and consolidated results in sport practice or applied research, we must accept "uncertainty and doubt - even scepticism and also openness towards discussion to achieve new scientific and rigorous approaches", Saoul (1996).

Conflicts of interests

No statement.

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