

System of methodological procedures for the elaboration of the training plans for the force with weights

Sistema de procedimientos metodológicos para la elaboración de los planes de entrenamiento de la fuerza con pesas

Fernando Shariff Rossell-Contreras¹, Dorges Heredia-Guilarte²

¹ Ms.Sc. Contemporary University of the Americas. Michoacan, Mexico.

² Dr.Sc. CDEFIS University. Michoacan, Mexico.

Email:

sharifffernandorossell@gmail.com

drdorges@gmail.com

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ABSTRACT

The elaboration of training plans to the force with weights is a process that is still has deficiencies. The scientific problem consisted on: how to contribute to improving the elaboration of training plans to the force with weights in systematic practitioners and gym athletes? The solution was in the design of a system of methodological procedures. The methods and/or techniques of analytical-synthetic, hypothetical-deductive research, document analysis, systemic, specialist criteria, survey and the Delphi statistical method. The criteria of specialists revealed agreement in the theoretical relevance and feasibility forecast of the proposal.

RESUMEN

La elaboración de planes de entrenamiento de la fuerza con pesas es un proceso que aún presenta deficiencias. El problema científico consistió en: ¿cómo contribuir al perfeccionamiento de la elaboración de los planes de entrenamiento de la fuerza con pesas en practicantes sistemáticos y deportistas de los gimnasios? La solución fue en el diseño de un sistema de procedimientos metodológicos. Se emplearon los métodos y/o técnicas de investigación analítico-sintético, hipotético-deductivo, análisis de documentos, sistémico, criterios de especialistas, encuesta y el método estadístico Delphi. Los criterios de especialistas revelaron concordancia en la pertinencia teórica y pronóstico de factibilidad de la propuesta.

Keywords

Methodological procedures; Training plans; Force with weights.

Palabras clave

Procedimientos metodológicos; Planes de entrenamiento; Fuerza con pesas.

INTRODUCTION

The systematic practice of force with weights training that is developed for systematic practitioners and athletes in public and private gyms, whether with purposes towards physical preparation, bodybuilding and body aesthetics, it still presents manifestations of improvisation and empiricism. All of this is due to various causes, both administrative (example: hiring of human resources with skills gaps professionals) as well as from the scientific-methodological point of view (which are the essential), which do not allow adequate direction of guidance services of physical training, especially the preparation of training plans of force with weights.

Among the causes of scientific-methodological origin, there are deficiencies in the methodology itself or methodological procedures to develop the preparation of training plans to the force with weights that the trainers or gym instructors learned in their training or training process. undergraduate and/or postgraduate. To argue this approach, it is important to develop a synthetic analysis of the state of knowledge.

When we refer to the methodology of developing training plans to the force with weights, we are referring to the procedures that allow us to develop, with scientific foundations, the determination of the objectives, means or exercises, methods, etc. such as the distribution and dosage of load components (volume, intensity, rest, duration and frequency) in planning documents such as the load estimation plan, the graphic macrocycle, the graphic microcycle and the training sessions training.

The object of study of “the methodology for developing training plans sports physique” and its corresponding field of action of “the methodology for the development of strength training plans with weights” have been discussed by various authors, among the most important we can find the works of: Forteza and Ranzola (1988), García et al (1996), Forteza (2001, 2007), Oroceno (2003), Cuervo et al (2005), Román (2005), Romero (2006), Collazo et al (2006), Naclerio (2007), Navarro et al (2010), Romero and Becali (2014), Laróvere (2015), Bompa (2016), Figueredo (2017), Collazo (2020, 2021) and Heredia (2023).

These authors have provided the general procedures for distribution and dosage of the physical loads in the different temporal structures of the planning (periods, stages, mesocycles, microcycles and training sessions) based on different perspectives or forms that are explained below:

1. Distribution and dosage of the physical load of force based on percentages of the volume general macrocycle using training time as magnitude (Strength and Ranzola, 1988; Forteza, 2001; Forteza and Ramírez, 2007).

The main limitation of this methodological procedure is that time is not the adequate magnitude to plan the volume, since it only reveals the duration of the training, for example, 10 hours for maximum strength training. Therefore, The volume that is expressed in time for the force is not real, nor does it allow real control or individualization.

2. Distribution and dosage of the physical load of force based on percentages of the volumen theoretical macrocycle using the repetitions of each manifestation as magnitude of force (García et al, 1996; Román, 2005; Romero, 2006; Collazo et al, 2006; Figueredo, 2017).

This methodological procedure manages to give adequate magnitude to the content of the different manifestations of strength, since volume is expressed in repetitions. However, not ensures that, as the percentage breakdown of the overall volume given in repetitions, reach the ideal number of these for the microcycle or training sesión achievement of the objectives and for the application of a specific method, since generally repetitions may be left over or missing. Furthermore, not all stages or mesocycles have the same number of weeks or microcycles, which can create mathematical conflicts when distribute and dose the physical load. It is also not clear how to output the individualization in planning.

3. Distribution and dosage of the physical force load based on load plans based on of the volume and intensity in the different microcycles or weeks of work by stages of preparation (Orocene, 2003; Navarro et al, 2010; Romero and Becalli, 2014; Bompa, 2016; Collazo, 2020, 2021; Heredia, 2023). The methodology for preparing planning documents that take as starting point for charging plans, constitutes an appropriate innovation, as it allows determine a more realistic volume of repetitions of strength exercises. Be part of appropriately assign what can truly be performed in repetitions for a subject or group in a training session or work microcycle, even with ranges permissible minimums and maximums, which does allow a treatment for the individualization of the loads.

However, methodological challenges remain in its use, for example: it must be given treatment to the characteristics of the manifestations of force as to how it should The characteristics of each component of the load must be taken into account. It is also necessary consider the training method, especially in the distribution and dosage of the series in the training session, since in the different series it can manifest itself differently volume, intensity and rest differently.

As it can be interpreted, each methodological procedure for the preparation of the physical or sports training planning documents, especially in the context of strength capacity with weights, it evolved so that the distribution and dosage of loads is the most efficient, real, controllable and individualized.

The existing limitations in the methodology for preparing the action plans strength training with weights were revealed in the process of diagnosing the following problematic situation: deficiencies in the preparation of strength training with weights in systematic practitioners and athletes in the gym “Golds Gym” from Pachuca, Mexico.

The main manifestations of the deficiencies detected with the application of the method document analysis (group and individual training plans) were:

- The methodological characterization of the training plans is deficient components of the physical load due to manifestations of strength to be trained in correspondence with the objectives and tasks by training stages.
- Poor treatment in planning documents (planning sessions) training) to training methods, which negatively affects the dosage of the components of physical strength loads with weights.
- A percentage distribution of the physical force loads is produced in the stages of training from a theoretical volume, which is not considered adequate because it gives rise to the coach's improvisation when he is going to apply the loads in microcycles or training sessions, since there are too many or too few series or repetitions.
- There is a lack of a solid starting point in the distribution and dosage of the load physics based on what can be done in a session or microcycle of strength training with weights.
- The programming of the control of the strength training. Based on analysis of the state of knowledge and identification of the situation problematic allowed us to formulate the following scientific problem:
¿how to contribute to improving the development of strength training plans with weights in systematic practitioners and athletes in gyms?

Since, the essential cause of the manifestation of the scientific problem lies in the aspect methodological so that training planning is real, controllable and individualized, it is proposed as a general objective: to design a system of procedures methodological that contributes to the improvement of the development of strength training with weights in systematic practitioners and athletes in the gyms.

METHODS

For the development of this investigative work, the following methods and/or scientific research techniques:

- Analytical-synthetic: for the analysis of the theoretical and investigative background in the object of study and its corresponding field of action, for the study of the theoretical and methodological foundations that must support the system of proposed procedures; and for the interpretation of the results of the application of the survey to specialists and that of statistical processing on the relevance and feasibility of this scientific result.

- Inductive-deductive: to establish the generalizations and conclusions that are derived from the results of the application of the survey to specialists on the relevance and feasibility of the system of methodological procedures designed.
- Document analysis: to analyze project planning documents strength training with weights. Systemic-structural-functional: for the determination of the components structures of the designed methodological procedure system and the relationships systemic among the components that make it up.
- Specialist criteria: for the assessment of theoretical relevance and feasibility of practical application on different aspects of the procedural system designed methodologies.
- Survey: used as a technique to obtain the criteria of the specialists who assessed the theoretical relevance and feasibility of application practice of the system of methodological procedures that was presented to them.
- Delphy method: for statistical processing of the results of the criteria of the selected specialists.

RESULTS

A system of methodological procedures is an organized and structured set of detailed and sequential steps or actions that are followed to carry out a process or specific activity. It is used to guide the execution of tasks efficiently, coherent and often with the goal of obtaining consistent results.

Any system of methodological procedures must be designed to achieve effective execution efficient and consistent tasks or processes. Since, by following the procedures established, the possibility of errors is minimized and the quality and uniformity of the results.

In the context addressed in this research work, a system of methodological procedures for the preparation of training plans for the strength in systematic practitioners and athletes. This scientific result is supported by the following laws and principles:

Laws of strength training (Bompa, 2016):

- Development of muscle flexibility.
- Development of strength in the tendons.
- Development of trunk strength.
- Development of stabilizing muscles.
- Development of training with movements (especially for athletes). Principios Pedagógicos and Didactic (Collazo et al, 2006):
- Leading role of the coach in the active and conscious participation of the trained.
- Illustrated teaching (adequate demonstration) of physical exercises and their techniques of realization.
- Scientificity in the application of knowledge for planning, execution and carrying out physical loads.
- Systematization or continuity of physical training.
- Planning physical training.

- Individualization of physical training, according to the real possibilities of each practicing.
- Accessibility and affordability of physical training loads.
- Instructive and educational nature of the physical training process.

Biological Principles (Collazo et al, 2006):

- Successive adaptation to physical training loads.
- Recovery of energy systems and substrates during the application of the physical loads.
- Supercompensation of the body to adequately assimilate the loads in new sessions or weeks of physical training.

Methodological Principles (Collazo et al, 2006):

- Periodization of physical training.
- Progression of physical loads in terms of the main components (volume, intensity, rest, duration and frequency).
- Continuity of physical loads for the time required for the development of the expected biological adaptations.
- Multilaterality in the content of the physical loads to be developed. □ Repetition of physical loads to achieve biological adaptations required.
- Frequent control of the physical training process. □ Appropriate selection of content (exercises based on physical abilities, volume, intensity, rest, duration and frequency of loads). □ Appropriate alternation of physical loads for correct recovery and achievement of biological adaptations due to physical abilities to develop.

Next, the system of methodological principles for the preparation of the strength training plans with weights in systematic practitioners of the gyms.

System of methodological procedures:

1. Individual characterization of the systematic gym practitioner.
2. State the objectives of the strength training plan.
3. Determine the times and frequency of strength training.
4. Determine the number of weeks of the strength training plan or cycle.
5. Determine duration, start and end dates of each period and stage of the strength training.
6. Determine the number and types of weeks or microcycles by stages of the strength training.
7. Define and methodologically characterize the contents of the training of force.
8. Select the system of strength exercises to develop.
9. Schedule strength training controls and their objectives.
10. Define Next, the system of methodological principles for the preparation of the strength training plans with weights in systematic practitioners of the gyms.

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7. Define and methodologically characterize the contents of the training of force.
8. Select the system of strength exercises to develop.
9. Schedule strength training controls and their objectives.
10. Define the system of strength training methods to be used.
11. Design the estimation plan for the different components of the load by manifestations of strength to train.
12. Distribute the volumes and intensities in the graphic macrocycle of the training of strength. *ir el sistema de métodos de entrenamiento de fuerza a emplear.*
13. Design the estimation plan for the different components of the load by manifestations of strength to train.
14. Distribute the volumes and intensities in the graphic macrocycle of the training of strength.
15. Dosage strength training sessions at the microcycle level.
16. Dosage individual strength training sessions.

Below are some examples of the content of the methodological procedures:

Table 1

Characterization of the manifestation of strength with weights in terms of volumen of work, intensity, rithm of movement, rest interval, weekly frequency.

Type of strenght	Volume	Intensity (with weigth)	Rithm of movement	Interval of rest	Weekly frecueny
Maximun strenght	1 -5 Rep.	80 -100 %RM	Half – Slow.	1 -3 min.	3-4 (Development) 1 -2 (Upkeep)
Fast strenght.	4-15 Rep.	20 – 75 %RM	Fast – Very Fast.	1 -3 min.	4-6 (Development) 2-3 (Upkeep)
Explosive strenght.	4-15 Rep.	20 – 75 %RM.	Very Fast.	1 -3 min.	4-6 (Development) 2-3 (Upkeep)
Resistance to Fast strenght	+10 Rep.	20 – 75 %RM	Fast – Very Fast.	3-5 min.	4-6 (Development) 2-3 (Upkeep)
Resistance to strenght.	+ 6 - 8 Rep.	20 – 75 %RM	Half – Slow.	30 s - 2 min.	3-4 (Development) 2 (Upkeep)

Source: Heredia (2023).

Figure 1

Example of the grafic plan of estimation of the Physical load of strength training with weights at the macrocycle level.

TYPE OF STRENGTH	INTENSITY RANGE		MICROCYCLE SESSIONS		EXERCISES PER SESSION		REPEATS BY SERIES		SERIES BY EXERCISE		REPEATS PER SESSION		REPEATS BY MICROCYCLE		REST INTERVALS		HOURS BETWEEN SESSIONS	
	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
Maximum strength.	80 %RM	100 %RM	2	5	3	6	1	5	3	5	9	150	27	750	1 min.	3 min.	24	72
Fast strength.	20 %RM	75 %RM	2	5	4	8	6	12	3	5	72	480	144	2400	1 min.	3 min.	24	72
Explosive strength.	20 %RM	75 %RM	2	5	4	8	6	12	3	5	72	480	144	2400	1 min.	3 min.	24	72
Rapid strength endurance.	20 %RM	75 %RM	2	5	4	8	6	15	3	5	72	600	144	3000	3 min.	5 min.	24	72
Strength endurance.	20 %RM	75 %RM	2	5	4	8	8	20	3	5	96	800	192	4000	30 s.	2 min.	24	72

Source: Oroceno (2003), adaptado por Heredia (2023).

Figure 2

Example of a graphycal plan for estimating the Physical load of strength training máximo with weights at the microcycle level. (ATR Model).

TYPE OF MICROCYCLE	RANGE INTENSITY		SESSIONS FOR MICROCYCLE		EXERCISES FOR SESSION		REPETITIONS FOR SERIES		SERIES FOR EXERCISES		REPETITIONS FOR SESSION		REPETITIONS FOR MICROCYCLE		REST INTERVALS		TIME BETWEEN SESSIONS	
	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
Adjustment	80 %RM	90 %RM	3	4	3	4	4	5	3	5	9	150	27	750	1 min.	3 min.	24	48
Burden	90 %RM	95 %RM	4	5	4	6	2	4	4	5	32	120	128	600	1 min.	3 min.	24	48
Impact	95 %RM	100 %RM	4	5	4	6	1	3	4	5	16	90	64	450	3 min.	3 min.	24	48
Activation	95 %RM	100 %RM	1	2	3	4	1	3	3	3	9	36	9	72	3 min.	3 min.	24	72
Competition	95 %RM	100 %RM	1	2	3	4	1	3	3	3	9	36	9	72	3 min.	3 min.	24	72
Recovery	80 %RM	90 %RM	1	2	3	3	4	5	3	3	36	45	36	90	3 min.	3 min.	24	72

Fuente: Heredia (2023).

Table 2*Classic periodization of strength training with weights.*

PERIOD	Preparation			Competition		Transient
ESTAGE	General	Special		Precompetitive	Competitive	Transition
PHASES OF TRAINING OF THE FORCE	Adaptation Anatomical	Hypertrophy	Maximum Force	Conversion	Maitendance	Transition
TYPES OF MYCROCYCLES AND LOGICAL SEQUENCE	O+O+O+R	O+O+CH+R	O+CH+CH+R	O+A+A+R	A+A+C+R	O+R+O+R
DEMONSTRATIONS FROM FORCE TO WORK	Resistance to the force (20-60%RM)	Resistance to the force (20-60%RM)	Maximum Force (80-100 %RM)	Fast Force (20-75 %RM) Explosive Force (20-75 %RM)	Maximum Force (80-100 %RM) Fast Force (20-75 %RM) Explosive Force (20-75 %RM)	Resistance to the force (20-60%RM)

Legend: O-Ordinary, R-Recuperation, CH- Intensive Shock, A- Aproximation, C-Competition.

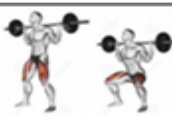
Table 3*Contemporary periodization of strength training with weights (ATR Model).*

MESOCYCLES BLOCKS	Acumulation	Transformation	Realization
TYPES OF MICRICYCLESAND SEQUENCE	AJ+C+I+R	AJ+C+I+R	C+I+AC+CO
MANIFESTATIONS OF THE FORCE TO WORK	Maximun Force (80-100 %RM)	Resistance to force (20-75 %RM) Resistance to fast force (20-75 %RM)	Fast force (20-75 %RM) Explosive force (20-75 %RM)

Legend: AJ-Adjustment, C-Charge, R-Recovery, I-Impact, AC-Activation, CO-Competition.

Figura 3

Example of a graphic model for planning the individual strength training session with weights in the special stage of maximum strength.

NOMBRES Y APELLIDOS: Juan Antonio Pérez Rodríguez.														
SESION: 1.	ETAPA: Especial de Fuerza Máxima			MICROCICLO: 7. Ordinario.								FECHA:		
OBJETIVO(S)	Ejecutar ejercicios multiarticulares con pesas para el desarrollo de la fuerza máxima con los métodos estándar, piramidal y progresivo por repeticiones.													
Contenidos	Ejercicios	Métodos		Series	Series	Series	Series	Series	Series	Series	Series	Series	Plan	Real
				1	2	3	4	5	6	7	8			
Fuerza máxima (brazos y pecho)		Progresivo a repeticiones	V	5	4	3	2	1					15	
			I	80	85	90	95	100						
			D	3	3	3	3	3						
Resistencia a la Fuerza (piernas y glúteos)		Piramidal a repeticiones	V	4	3	2	3	4					16	
			I	85	90	95	90	85						
			D	3	3	3	3	3						
Resistencia a la Fuerza (espalda baja, glúteos e isquiotibiales)		Estándar a repeticiones	V	5	5	5	5	5					25	
			I	80	80	80	80	80						
			D	3	3	3	3	3						

Legend: V-Volume in repetitions, I-Intensity in %RM, D-Rest in minutes.

To evaluate the theoretical relevance and predict the feasibility of practical application of the proposed system of methodological procedures, the criterion method of specialists. For the selection of potential specialists, they were taken into account the following criteria: possess extensive professional experience related in some way with the topic being addressed (10 or more years of professional experience), have studies postgraduate and/or specialized courses related to training planning sports physique, have research linked in some way to the topic being addresses, possess a Doctorate or Master's Degree in Physical Culture and Sports.

The group of 13 selected specialists presents the following characterization: eight (8) of They have the title of Doctor in Physical Culture and Sports, five (5) of them have Master in Sports Training, all have 10 or more years of experience professional.

A survey was applied to the selected specialists aimed at evaluating the relevance theory and the feasibility of practical application of the system of procedures methodological. Processing was applied to the results obtained in the surveys statistical, as proposed by the Delphi method.

In the results, it was noted that the evaluations made by the specialists for each aspect are positive, since they were among the categories of Very Adequate, Fairly Adequate and Adequate, with Very Adequate predominating in percentage frequencies which ranged between 80 and 100 percent.

Tabla 4

Resultados de la evaluación del sistema de procedimientos metodológicos por el método criterio de especialistas (frecuencias absolutas).

ASPECTS TO ASSESSED BY SPECIALISTS	MA	BA	A	PA	NA	Total
1. The theoretical and methodological foundation.	11	2	0	0	0	13
2. Formulation of the content and logical sequence of methodological procedures.	12	1	0	0	0	13
3. The effects of the proposals.	11	2	0	0	0	13
4. The mildness of the proposals.	11	2	0	0	0	13
5. Viability of proposals.	12	1	0	0	0	13
6. Relevance of the proposals.	13	0	0	0	0	13

Legend: MA - Very Suitable, BA - Fairly Suitable, A – Suitable, PA - Poorly Suitable, NA – Not Suitable.

Table 5

Results of the evaluation of the system of methodological procedures by the method specialist criteria (cut-off points).

ASPECTOS A VALORAR POR LOS ESPECIALISTAS	MA	BA	A	PA	NA	SUM A	P	N-P	VALORACIÓN
1	1.02	3.49				4.51	1.13	-0.23	Muy adecuado
2	1.43	3.49				4.92	1.23	-0.33	Muy adecuado
3	1.02	3.49				4.51	1.13	-0.23	Muy adecuado
4	1.02	3.49				4.51	1.13	-0.23	Muy adecuado
5	1.43	3.49				4.92	1.23	-0.33	Muy adecuado
6	3.49					3.49	0.87	0.02	Muy adecuado
PUNTOS DE CORTE	1.57	2.91	0.00	0	0	N=	0,90		

Legend: MA - Very Suitable, BA - Fairly Suitable, A – Suitable, PA - Poorly Suitable, NA – Not Suitable.

According to the cut-off points obtained, the values were concentrated in the range of Very Adequate, indicating a very high level of adequacy according to the established criteria, for example Therefore, a consensus or agreement has been reached among specialists. The results exposed demonstrate the high level of theoretical relevance and prognosis of feasibility of practical application of the proposal.

DISCUSSION

A system of methodological procedures was designed to contribute to a adequate preparation of strength training plans with weights in practitioners systematics of the gyms. The scientific result achieved in the present investigation Regarding the studies that constituted theoretical and investigative background, they exceed the existing limitations in the methodology for developing training plans of strength with weights. The above is based on the fact that the system of procedures designed methodological has the following qualities:

- It is based on a system of planning, pedagogical and didactic, biological and methodological for the correct direction of the preparation strength physics with weights.
- The planning of strength training is guided by the characterization individual of the systematic practitioner or athlete; of the objectives and demands of the physical strength training and the system of competencies to be faced; of the scientific-methodological characterization of the different manifestations of force that they must be worked on, according to the structural planning model that is assumed; and the correct selection of exercises and methods.
- The procedures for filling out the planning documents are developed from the estimation plan of the minimum and maximum allowable values of each component of the load that can be performed in a session or microcycle of training, which contributes to the distribution and dosage of the loads being real, controllable and individualized.
- The method is considered the essential didactic component for dosage of the physical load of strength in the training session, since from it the determines the behavior in each series of volume, intensity and rest during each exercise. □The control system of the system is programmed as part of the planning content, training with physical tests to be developed by type of manifestation of the force to work.

The theoretical relevance and prognosis of the feasibility of practical application of the system of procedures designed by 13 high-level specialists academic and scientific level in the context of planning training of the strength with weights. The results obtained from the application of the criterion method of specialists denote a high level of acceptance of the proposal.

The need to produce prior training and practical application of the system of methodological procedures in different populations of physical trainers of strength with dumbbells to measure its impact on professional planning skills and in the physical performances of systematic practitioners and athletes.

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