

## Ejercicios para desarrollar la fuerza explosiva en la selección de levantamiento de pesas en la ESPOL

### Exercises to develop explosive strength in the selection of weightlifting in ESPOL

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#### RESUMEN

El levantamiento de pesas es una de las disciplinas deportivas más antiguas. Sus orígenes se sitúan en torno al año 3600 antes de Cristo en China, ya que fueron los emperadores chinos quienes comenzaron a practicar este ejercicio de fuerza. En su ejecución se ponen de manifiesto las capacidades físicas condicionales y coordinativas, dentro de ellas la fuerza es por ello que la investigación que se presenta tiene por objetivo elaborar una alternativa metodológica para desarrollar la fuerza explosiva que permita mejorar los niveles de preparación física en la selección de levantamiento de pesas en la Escuela Superior Politécnica del Litoral, para su cumplimiento se utilizaron métodos del nivel empírico y teóricos para recopilar, procesar e interpretar los datos necesarios. El procedimiento utilizado, de acuerdo con la naturaleza de las variables implicadas en el estudio, permitió aceptar la significación estadística en los cambios producidos por la influencia de la variable alternativa metodológica a un nivel del 95%, las conclusiones expresan los principales resultados concretos obtenidos.

**Palabras claves:** Levantamiento de pesas; Capacidades físicas; Fuerza explosiva; Preparación física

## ABSTRACT

Lifting weights is one of the oldest sports disciplines. Its origins are around the year 3600 before Christ in China, since it was the Chinese emperors who began to practice this exercise of strength. In its execution the conditional and coordinative physical capacities are shown, within them the strength is that the research presented aims to develop a methodological alternative to develop the explosive force that allows to improve the levels of physical preparation in the selection of weightlifting in the Polytechnic School of the Litoral, for its fulfillment empirical and theoretical level methods were used to collect, process and interpret the necessary data. The procedure used, according to the nature of the variables involved in the study, allowed accepting the statistical significance in the changes produced by the influence of the alternative methodological variable at a level of 95%, the conclusions express the main concrete results obtained.

**Key words:** Weightlifting; Physical abilities; Explosive strength; Physical preparation

## INTRODUCTION

Weightlifting is one of the oldest sports disciplines, its origins are around 3600 BC. in China, in the year 1896, it was included among the Olympic sports. Weightlifting, also known as weightlifting or powerlifting (Powerlifting) is a sport of strength whose purpose is to lift as much weight as possible in three different styles. Muscle strength training occupies an important place in sports training. Muscle strength is a complex capacity for its study, oriented both towards aspects of physics and also to biological motors.

The execution of weight exercises is related to the basic laws of muscle strength training. In that sense, Bompa (2000) proposed: "train movements, not isolated muscles" (p. 105). This idea offers the possibility of training strength with exercises combined with weights, similar to the dynamic structure of the competition movement. The use of this procedure allowed Cortegaza and Luong (2011) to consider that, as a basic premise in the preparation of force, one must work to convert or transform the general force acquired into a specific force; for this reason

they admit it as a characteristic feature of the preparation of the athlete today, where a high percentage of special exercises prevails over the general exercises. In the Polytechnic School of the Coast (ESPOL), sport is recognized as an essential factor in the human and professional development of human beings; hence it is a fundamental aspect of the integral education model promoted by the institution. Sports provide a healthy environment, generate a sense of well-being, encourage teamwork, leadership and discipline. To verify the need to carry out an investigation related to the possibility of applying physical exercises with weights, we proceeded to apply a diagnosis based on, surveys, interviews and observations to the activities where the subjects under investigation are developed, which allowed to know the main existing limitations

- There is no alternative method of weight training to develop explosive force in the selection of weightlifting in ESPOL
- Insufficient physical exercises to develop strength in different muscle planes involved in weightlifting

### **Trouble situation**

Although there are professionals in physical culture with sufficient knowledge and the possibilities of continuous improvement, there are still inadequacies in the physical preparation of the selection of weightlifting in ESPOL.

Scientific Problem:

How to contribute to solve the manifest inadequacies in the physical preparation of the weightlifting selection of the Polytechnic School of the Coast?. Objective: To elaborate a methodological alternative to develop the explosive force that allows to improve the levels of physical preparation in the selection of weightlifting in the Polytechnic Superior School of the Coast. Hypothesis. If a methodological alternative is applied for explosive strength training in athletes of the weightlifting selection of the Polytechnic Superior School of the Coastline, the physical preparation levels will be improved.

### **DEVELOPMENT**

### **METHODS**

Historical-logical: this allowed contextualizing the object in its evolution, with emphasis on the most significant moments, systematizing its conceptualization to elucidate them regarding the current state of scientific knowledge around the problem. Analysis and criticism of the sources of information: this method was used to study the materials related to the object of study and the delimited field of action, supported by the logical procedures of thought: analysis-synthesis, induction-deduction and hypothetical-deductive. Systemic-structural-functional: it was used with the objective of determining the relationships, structure and hierarchy between the different methodological alternative components

#### Empirical methods and techniques

Unstructured observation: its use allowed verifying the quality in the execution and application of the exercises. Experiment: it was implemented to determine the validity of the hypothesis raised through a pre-experiment design; an initial test, treatment (independent variable) and a final test taken as a comparison criterion are applied. The measurement: it was used in the variables related to physical preparation, because these are metrics, continuous and being on a scale of relationships or proportions. Mathematical-statistical: by means of descriptive statistics, a set of data was ordered, analyzed and represented, in order to describe the characteristics of this, the study is complemented with inferential statistics, with methods and procedures by means of induction, the properties of a statistical population, from a part of it. The Shapiro Wilk test was applied in order to know the distribution of the sample, if a student is normal, but the non-parametric test of the Wilcoxon signed ranges.

#### **Techniques**

Survey: in order to know the changes produced by the subjects of the selection of weights of the ESPOL School, it was applied to the subjects of the sample, in two moments, before the application of the exercises and after they were applied. Appendix 1. Document analysis: through this technique it was possible to study: scientific journals, doctoral and master thesis, manuals, curricula and programs, necessary to be aware of the state and trends of the object of study. User criteria: its purpose in the investigation is for the

evaluation of the feasibility of the system and to characterize the initial and final state of the object of investigation.

## RESULTS

The alternative constitutes a modality, an option between two variants of a certain practical structure within the teaching-educational process and responds to a need. The classroom or other place designated by the teacher can be used as a realization space and aims to influence the integral formation of the students. (González 2005).

It can be seen that, although these authors address the definitions interchangeably, they are designed to achieve superior results. However, the alternative that is developed is for the purpose of raising competitive levels, on which no precedents have been found in the literature consulted, although it is based on the above criteria.

The importance attached to the development of the explosive force within sports practice is manifested in the application of different forms, within them: methodological strategies and methodologies, methodological alternative, evaluation procedures. The elaboration of an alternative is justified in the fact of conceiving it as a relationship between components tending to obtain a new quality and by the need to organize in a systemic way elements that do not exist or not related so far, based on theoretical assumptions of a pedagogical nature and sciences related to its precision and operation in the experience, through its concretion in a methodological alternative contentive of exercises to facilitate the pedagogical practice.

The conception of the methodological alternative to working with weights to develop the explosive force is based on the structural-functional systemic method by recognizing the totality as a dialectical unit of its elements, where its properties are qualitatively different from the properties of the constituent elements.

The structure proposed by De Armas (2003) was considered in the development of the alternative

General objective. Raise the level of development of the explosive force in the selection of weightlifting in ESPOL

Conceptual apparatus of the methodological alternative

It is based on the historical-dialectical foundations when conceiving the object of study in its constant progress and transformation, to face the formative processes in their

humanistic, creative, systemic and integrative character. The historical functioned as a general theory and as a philosophical-methodological basis for research. The dialectic allowed basing some positions taken during the research process in its evolution and promotion.

The psychological basis justifies the relationship between maturation, learning and development, each evolutionary stage is characterized by certain morphological and functional features, whose patterns are manifested in an orderly manner, and can be found in any normal child, favoring learning processes with their individual peculiarities, in this way to achieve the development of the kinesthetic sensations that are associated, according to Carvajal (2015) "... to the visual and labyrinthine in the construction of the body scheme and the phantom and gnostic systems". (p. 1).

The pedagogical foundation allows addressing as general principles in the process of development of physical capabilities those provided by Calderón, et al. (2006): adequate selection of content, relationship between training and recovery potential, gradual and gradual increase in loads, repetition of physical exercise, multilateral nature of loads, adequate dosage of loads, control and evaluation of loads frequently, individualized nature of the load in training, the alternation of loads, adequate use of sensitive periods for the development of physical capacities and the need to balance energy expenditure and consumption during the practice of sports physical exercises and in particular the Procopio (2007) for work with force, in the thesis, those contributed by considering them fair and adequate for the purposes of this are considered: Functional unit, multilaterality, overload and progression, specificity, variety, individualization, periodization and ordering of exercises.

Instrumental body of the methodological alternative

It consists of three stages with its actions (in 3 stages)

### **First. Initial diagnostic**

To this end, methods and techniques of the empirical level are applied to gather the information and deepen the problem situation

Actions

1. For the organization of information collection it is designed to guarantee the collection of data in the second stage adjusted to the scientific and methodological requirements of the research
2. To know the status of the problem in the normative documents of the teaching related to the conceptions of the managers about the problem under study
3. To determine the strength levels of the weightlifting selection second. Implementation

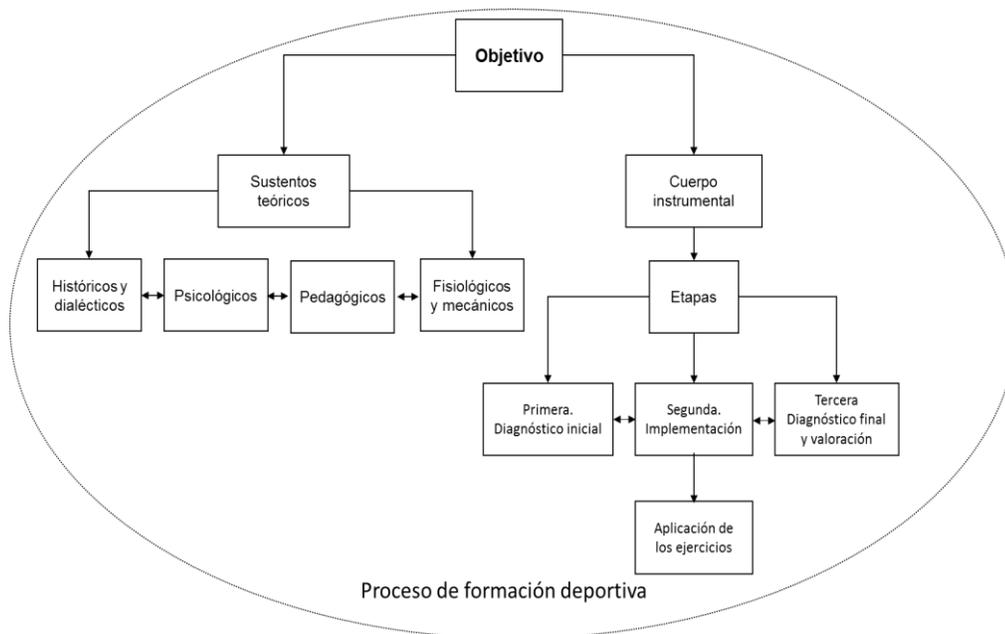
**Actions**

1. For execution
  2. For the application of the exercises
- Third Final Diagnosis and Assessment

**Actions**

1. To determine the effectiveness of the methodological alternative
2. To validate the application of the exercises

Graphic representation of the alternative



**Evaluation**

Recommendations for its instrumentation

The proposed alternative is structured so that its elements expose in an organized and hierarchical way according to the needs of professional practice. The components of the

alternative presented are interrelated with each other through subordination and coordination functions with a common objective.

Its meaning as a whole: They must represent the configuration of integrated elements to achieve a common purpose, be the product of an abstraction of reality, but projectable to practice and operationalized in it, be historical, specifically close and corresponding to the scientific development achieved in its theoretical foundations should harmonically contemplate structural, organizational and functional properties. Presentación de los ejercicios

They were structured in 4 states to meet the objectives pursued in each of them with the necessary indications. A total of 22 were selected for the different parts of the body: chest-shoulders and trapeze-back - arms - leg - twins and forearms.

Order

The order in which the exercises with weights are located is dependent on the muscular planes that work: arms, trunk and legs, it is based on the fact that in the exercises for arms weights are used lower than in the others and therefore they serve as a basis for subsequent work with larger weights. The exercises for the trunk that use intermediate weights so they are located in the central part of the class where a previous base has already been created. Finally, there are the exercises for the legs that are the employees with the greatest weight.

In daily practice, three criteria are observed to determine the appropriate weight for the practitioner.

1. Body weight.
2. The number of repetitions that can be executed in a batch with a certain weight.
3. The maximum result in the exercise to be performed.

When using the body weight of the practitioner as a means to determine the weights that are used in the exercises, the mistake is made of not taking into account the real possibilities of the subject, so the weight used can be very light or very heavy. This criterion is the least suitable since it does not contemplate the development of the practitioner's strength skills.

The amount of repetitions that can be executed in a batch is an applicable criterion when the athlete is in a stage of learning or adaptation to weight training. It allows

the execution of workouts with less chance of injury, since the important thing is to meet the number of repetitions in each batch, the weight of the lever is not decisive.

The criterion of the maximum result in the exercise is determined by means of a pedagogical test, after having passed a learning stage or a period of muscular adaptation. This result is considered 100% of the possibilities of the athlete and on this basis the training load is planned, this allows to take into account the possibilities of each individual.

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Ways of applying weight exercises

It consists of 4 stages:

First muscle adaptation

Second initial or beginner

Third intermediate or advanced

Fourth stable

First muscle adaptation

Goals:

Adapt the exercises to the characteristics and possibilities of the participants for the work in the later stages.

Methodological indications

This stage will last 3 weeks.

There will be 4 to 6 exercises.

The different muscle planes will be worked.

The intensity of the load will be between 40 - 60%.

There will be between 4 and 6 repetitions per batch.

The number of batches will range between 3 and 5 per exercise.

The rest will be between 3 and 5 minutes.

Second initial or beginner Objectives:

Develop the largest muscle groups and increase the number of myofibrils

Develop physical strength and endurance capabilities

Strengthen tendons, joints, osteo-muscular and nervous system in general with a view to supporting future exercise loads

Methodological indications

This stage will last 12 to 16 weeks

5 to 7 exercises will be performed

The different muscle planes will be worked

The intensity of the load will be between 60 - 75%.

There will be between 8 and 12 repetitions per batch

The number of batches will range between 4 and 6 per exercise

The rest will be between 2 and 4 minutes

Third intermediate or advanced

goals

Achieve proportions and harmony between muscle groups.

Improve muscle contractile capacity (dynamic strength)

Perform the muscle aesthetic test at the end of the stage.

Methodological indications

This stage will last from 16 to 20 weeks.

There will be 6 and 8 exercises.

The different muscle planes will be worked.

The intensity of the load will be between 75-85%.

There will be between 6 and 8 repetitions per batch.

The number of batches will range between 6 and 8 per exercise.

The rest will be between 2 and 4 minutes.

Fourth stable

Objective

Maintain the optimum strength achieved

Methodological indications

This stage will last 12 to 16 weeks.

There will be 5 to 6 exercises.

The different muscle planes will be worked.

The intensity of the load will be between 85 - 95%.

There will be between 2 and 5 repetitions per batch.

The number of batches will range between 6 and 8 per exercise.

The rest will be between 3 and 5 minutes.

For the application of the exercises, the principle for the determination of the maximum weight and the structuring of the exercise plan must be considered, for which the maximum force in the three large muscle groups is determined, being the ones that are most exercised based on achieve the harmonic relationship between different parts of the body.

1. Force lying down. (pre-banking) in this the muscles involved are: pectorals, deltoids, triceps and biceps
2. Back strength (bar, paddle or pulley) The muscles that participate are: dorsal, infra and supra spiny, trapezius
3. Leg strength (semi-squatting or leg press strength) the muscles involved: quadriceps, biceps femoris, semi-membranous and tendon, buttocks greater.

There is a traditional way to determine the maximum force that consists of making three markings and taking the greatest. In this opportunity another variant is offered.

- 1) With 30% of body weight, perform 10 repetitions and rest 2 minutes
- 2) With 50% of body weight, perform 5 repetitions and rest 2 minutes
- 3) With 70% of body weight, repeat
- 4) Find the maximum weight starting at 70% by increasing it by 10% until you can, do a single repetition, finding your maximum weight, rest (5 minutes)
- 5) With 75% of the maximum weight, perform as many repetitions as you can without deforming the technique

If he achieves 13 or more repetitions they have the 1st level.

If he achieves between 8 and 13 repetitions, they have the 2nd level.

If he achieves less than 8 repetitions they have the 3rd level.

Recommendations for structuring the exercises based on the test results.

- For the 1<sup>st</sup> level 2 light and 1 heavy exercise
- For the 2<sup>nd</sup> level 2 heavy and 1 light exercises
- For the 3<sup>rd</sup> level 1 light and 1 light exercises alternately

The exercises are classified in correspondence with the% worked and the number of repetitions.

Light exercises: from 70% to 80% of the maximum weight of 12 to 15 repetitions, 3 sets or batches.

Heavy exercises: from 89 to 100% of the maximum weight. 1 to 10 repetitions.

To exercise the small muscle groups or specific muscles you should know what benefits they may receive depending on the percentage used and the series you perform.

Development of cardiovascular and pulmonary resistance.

Small.

60% maximum weight. More than 20 repetitions, 2 or 3 series.

Muscle strength development and definitions.

Means, medium.

70% maximum weight, 12 to 15 repetitions, 2 or 3 sets.

Development of specific resistance .

Big.

80% maximum weight, 8 to 12 repetitions, 2 or 3 sets.

Development of muscle mass and power.

Sub-Maximum

90% maximum weight, 4 to 8 repetitions.

Development of maximum strength.

100% maximum weight, 1 to 3 repetitions.

To prepare the classes, it must be taken into account that large muscle groups must be exercised at least 3 times a week with 2 or 3 sets. Sample routines for 6 days of the week.

### Example of exercises

Weekdays	
Monday	Tuesday
Prom	Rondana back (front and back) - dorsal

Inclined	Shoulder (front and back)
Pullover	Preacher
Inverted triceps	Bicepsnormal - reverse biceps
Triceps stopped	Prom
Triceps Rondana (the two types)	Inclined Prom
Wednesday	Thursday
Halon horse	Pullover
Trapezium triceps france	Preacher
Triceps stopped	Normal biceps
Rondana normal	Inverted biceps
Friday	Sunday
(Super Series)	Parallel
Inverted triceps and preacher triceps	Bar (sides – vallita)
Triceps stopped and normal biceps	Abdominal iron (A and C)
Rondana biceps inverted	Rondana thorax and legs

## CONCLUSIONS

The application of the methodological alternative for strength training in athletes of the weightlifting selection of the Polytechnic School of the Coast, the results achieved corroborate the lack of studies related to the subject developed in this research. The results of the methods and techniques applied allowed to elaborate the methodological alternative, as well as demonstrated the feasibility of the same after its application.

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