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Original Article

# Medial epicondylitis in pitchers of La Isla de la Juventud

# La epicondilitis medial en los lanzadores de la Isla de la Juventud

# Epicondilite medial em lançadores da Ilha da Juventude

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## ABSTRACT

Tendinopathy is a major cause of musculoskeletal morbidity. A high incidence of sports-related injuries of 30-50 % in professional and recreational athletes, which can compromise sports performance and cause disability. Mostly, it is caused by an alteration in the muscle-tendontium origins in the humeral condyles. In most cases, it is in the working population, so it has a high impact on reducing productivity due to absences from work, which, depending on the severity, can range from days to weeks. The general objective of the research is to propose a complex of physical exercises that will contribute to the recovery of such injury in baseball pitchers. Theoretical and empirical methods were used and the theoretical foundations for the rehabilitation of medial epicondylitis were determined. The information obtained after interviewing the coaches was analyzed in order to characterize the current state of the rehabilitation process for this injury. Based on the results obtained, a set of physical exercises was designed to rehabilitate this injury in the training area. The exercises designed are classified into passive, assisted active, free active, and resisted active; the latter being divided into two groups. In order to facilitate the work of the trainers, the form of execution of the exercises is described, as well as the methodological indications, muscles involved, organization and variants.

**Keywords:** Medial epicondylitis; physical exercises; pitchers; tendinopathy.

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## RESUMEN

La tendinopatía es una causa importante de morbilidad musculo-esquelética. Tiene una alta incidencia en el ámbito deportivo de 30 a 50 % de las lesiones, en atletas profesionales y recreativos, que pueden comprometer el rendimiento deportivo y causar discapacidad. En gran medida, es causada por una alteración en los orígenes músculo-tendinosos, en los cóndilos humerales. En la mayoría de los casos, se encuentra en población laboralmente activa, por lo cual tiene alto impacto en la reducción de la productividad por ausencias laborales, que de acuerdo con la severidad pueden ser días o semanas. El objetivo general de la investigación consiste en proponer un complejo de ejercicios físicos que contribuyan a la recuperación de dicha lesión en lanzadores de béisbol. Se emplearon los métodos teóricos, empíricos y se determinaron los fundamentos teóricos que componen la rehabilitación de la epicondilitis medial. Se analizó la información obtenida luego de aplicar una entrevista a los entrenadores, con la finalidad de caracterizar el estado actual del proceso de rehabilitación de esta lesión. A partir de los resultados obtenidos, se diseñó un conjunto de ejercicios físicos para rehabilitar dicha lesión en el área de entrenamiento. Los ejercicios diseñados se clasifican en pasivos, activos asistidos, activos libres, activos resistidos; este último dividido en dos grupos. Para facilitar la labor de los entrenadores, se describen la forma de ejecución de los ejercicios, así como las indicaciones metodológicas, músculos implicados, organización y variantes.

**Palabras clave**: Epicondilitis medial; ejercicios físicos; lanzadores; tendinopatía.

## RESUMO

A Tendinopatia é uma das principais causas de morbidade músculo-esquelética. Tem uma alta incidência no ambiente desportivo de 30-50% das lesões em atletas profissionais e recreativos, o que pode comprometer o desempenho desportivo e causar incapacidade. Em grande medida, é causada por uma alteração na origem músculo-tendão nos côndilos umerais. Na maioria dos casos, encontra-se na população ativa, pelo que tem um elevado impacto na redução da produtividade por faltas ao trabalho, que de acordo com a gravidade pode variar de dias a semanas. O objetivo geral da pesquisa é propor um complexo de exercícios físicos que contribuam para a recuperação desta lesão em arremessadores de beisebol. Os métodos teóricos e empíricos foram utilizados e os fundamentos teóricos que compõem a reabilitação da Epicondilite medial foram determinados. As informações obtidas após a entrevista com os treinadores foram analisadas a fim de caracterizar o estado atual do processo de reabilitação para esta lesão. Com base nos resultados obtidos, um conjunto de exercícios físicos foi concebido para reabilitar esta lesão na área de treino. Os exercícios concebidos são classificados em passivos, ativos assistidos, ativos livres e ativos resistidos; sendo estes últimos divididos em dois grupos. Para facilitar o trabalho dos treinadores, é descrita a forma de execução dos exercícios, assim como as indicações metodológicas, músculos envolvidos, organização e variantes.

**Palavras-chave:** Epicondilite medial; exercícios físicos; arremessadores; tendinopatia.

## INTRODUCTION

Baseball is a competitive sport, according to the rules that govern it. The game is composed of two groups of nine players each, with the possibility of changing their positions (line-up), until reaching the number of 18 to 25 members approximately. It is precisely because of the number of participants, or from the social point of view, that it is classified as a collective and, because of the particularities of its actions as a social movement or, more specifically, as cooperation-opposition.

Despite the fact that the energy expenditure and the variations of the functional indexes (pulsations, respiratory rate) are not calculated exactly, these depend, to a great extent, on the quality of the opponent; that is to say, the physical effort that is made will be in correspondence with the competitive power of the opponent, which is why it has been considered a sport of variable effort and moderate power. Despite the fact that the games usually last two to three hours and even more, except for the pitcher and the catcher, the team members do not work very hard and their energy expenditure varies depending on the various situations that occur during the episodes.

During a baseball game, actions performed in the game can be both cyclical and acyclical, with those of an acyclical nature occurring more frequently. From a biochemical point of view, anaerobic alactases prevail. Considering the methodological aspect and the place where it takes place, baseball is included among indoor and outdoor sports, with primacy of the latter condition.

For the psychology, both the successful accomplishment of the plays and the participation of the competition, allow tracing the tactics to optimize the energetic expense and the use of the technique, for which to baseball is attributed preponderantly the denomination technical-tactical, that is in essence its main classification.

Therefore, he agrees with the author Balbuena, F. (2006) when he understands that:

> "baseball is a collective technical-tactical game, of cooperation-opposition, variable effort, moderate power, alactasic anaerobic actions and acyclic character, which usually takes place outdoors and offers the opponents identical possibilities of being at bat in each half inning".

Throughout their sporting careers, Cuban athletes go through different stages in the development of their technical-tactical skills and physical capacities. For each of these stages, there is an institution, which is responsible for providing, in a planned and strictly controlled way, all the necessary aspects for the learning of all the components required for the formation of a high performance athlete.

Our baseball athletes are no strangers to this. As in other sports, they also go through the different stages of the so-called High Performance Pyramid. This pyramid has its base in the sports areas that are in charge of initiating and teaching the athletes massiveness, then passing to another very important step of this pyramid. That is why the School of Sports Initiation (Eide) is the consolidation of the teaching of the lower levels; in it, there are the best quality athletes, between the ages of 13 and 16.

The highest sporting level achieved by these athletes takes place in the Escuela Superior de Perfeccionamiento Atletico (Espa) and in the Sports Academies. In these institutions, athletes between the ages of 18 and 23 are found, the last level where athletes share the sport with the teaching profile before moving on to the first category. At the top of the pyramid are the players who participate in national competitions, who are trained in all aspects of the game.

On the other hand, this sports system is one of the secrets of Cuban sport and its results in the international arena, which guarantees the constant training of athletes in all sports disciplines. In this way, sports results are guaranteed, which requires attention to each of these institutions and their athletes in order to once again highlight the achievements of the Cuban Socialist Revolution.

Tendinopathy is a major cause of musculoskeletal morbidity. It has a high incidence in the sports environment, 30 to 50 % of injuries in professional and recreational athletes. They can compromise sports performance and cause disability. In the United States, consultation for tendinopathies corresponds to 7 % of all consultations for sports injuries. Thirty percent of runners, 35 % of basketball players and 45 % of volleyball players have patellar or Achilles tendinopathy and up to 40 % of tennis players have epicondylitis, Skjong C. M., (2012). On the other hand, tendinopathy is the most frequent soft tissue disorder of the elbow, affecting an estimated 1-3 % of the general population at some point in their lives. It occurs most frequently between the ages of 30 and 50, and is not associated with increased risk by gender. Morales, Lavanderos, Haase, & Riquelme, (2015). It is also a degenerative process of the tendons, due to overuse, more specifically the short radial carpal extensor (SCNE) tendon. In most (80 %), it is related to microtrauma or repetitive movements. It is the constant contraction of the ECRB that contributes to this. There is a high incidence of this disease in professions that require repetitive and prolonged manual activities, energetic effort, and uncomfortable static postures, among others. Gómez Miranda, R. (2017). It is one of the most frequent pathologies affecting the elbow. Its prevalence is estimated between 1 and 3 % of the general population, increasing to 7 % (2-23 %) in manual workers with repetitive movements of extension and pro-supination of the forearm and wrist, such as professionals who use pneumatic hammers. There are no differences in terms of gender; the peak incidence is between 45 and 60 years of age. R. López-Vidriero Tejedor, (2018). Epicondylitis is a chronic tendinosis caused, in most cases, by repetitive injury of the forearm extensor muscles, related to work or sport. It has a clear occupational profile like other chronic tendinopathies of the upper extremities and can appear simultaneously with them. It affects 1 to 3 % of the population; only 5 % of all patients seen are recreational tennis players. Although the syndrome has been identified in patients who are between 20 and 60 years old, it occurs predominantly in the fourth and fifth decade. Prevalence rates in men and women are reported to be equal. Seventy-five percent of patients are symptomatic in their dominant arms Soriano, C. F. (2019).

Medial epicondylitis can affect golf players ("golf elbow") and throwing, over the head, like javelin throwers and baseball pitchers. It has also been observed in tennis players, especially with the right hit (drive), the serve and the smash Ávila Lafuente, J. L. (2018).

For the authors, epicondylitis is one of the most frequent pathologies generating painful symptoms in the elbow. It is also called epicondylitis, elbow tendinosis or elbow tendinopathy. Largely, it is caused by an alteration in the muscle-tendontium origins, in the humeral condyles and, in most cases, it is found in the working

population, which is why it has a high impact on the reduction of productivity, due to absences from work, which, according to the severity, may be days or weeks.

## MATERIALS AND METHODS

The research was carried out at the "Fladio Álvarez Galán" School of Sports Initiation (Eide), with a population of 18 subjects, composed of 14 pitchers from the baseball team, in the 15-16 year-old category; four of them were diagnosed with medial epicondylitis, which represents 28.5 %, in addition to three coaches, which represents 16.66 % and a physiotherapist representing 5.55 %, where a sample of eight subjects representing 44.44 % of the total population was taken, distributed among three coaches with more than five years of experience, representing 37.5 %; of these, only one works in the area of pitching.

Four athletes representing 50 %, all right-handed throwers; three are from the second year of the category and one has five years of experience. The selection of the population was intentional.

The following methods were used to work on the conceptions of rehabilitation of medial epicondylitis in pitchers:

Analytical-synthetic: it was used throughout the process of elaboration of the theoretical foundation, because each of the elements related to epicondylitis was studied individually, determining its particularities. In addition, the analysis was used during the study of data from diagnostic tests. Through the synthesis process, overall assessments of the content studied were made.

Inductive-deductive: it was used during the systematization of the theoretical foundations that made up the research and in the design of physical exercises to rehabilitate medial epicondylitis. In the complex process of theoretical elaboration, we logically proceeded to define medial epicondylitis. Furthermore, based on certain ideas and contents, generalizations and conclusions were established.

Historical-logical: it allowed us to know the behavior of the phenomenon studied through the collection of existing information, the trajectory in the course of its history was analyzed, as well as the study of the different treatments used in the rehabilitation of medial epicondylitis.

Scientific observation: it was used to obtain information about symptoms related to medial epicondylitis, reported by body areas (symptoms in neck, shoulders or dorsal spine, lumbar spine, elbows, hands and wrists, legs, knees, feet) to corroborate the existence of the scientific problem in the research.

Review of documents: facilitated the analysis of Law No. 116 of the Labour Code, Article 132 on the list of nationally recognized occupational diseases, scientific articles, monographs, doctoral theses that guide the process of rehabilitation of medial epicondylitis.

Interview: we resorted to explore some topics of interest, where we made a guide of questions directed to the baseball coaches' body, of the category 15-16 of the Eide "Fladio Álvarez Galán", with the objective of knowing the current state in the process of rehabilitation of medial epicondylitis in athletes.

Mathematical-statistical: it was carried out through the percentage calculation for the quantitative evaluation, expressed in the results obtained and valuations of the empirical level.

Below are the results of the instruments applied in the research, the information obtained about the rehabilitation process that allowed directing the research activity towards the solution of the problem.

One hundred percent of the coaches interviewed agreed with the following criteria:

The attention that the pitchers received was planned and directed by the specialists in physiotherapy of the sports medicine clinic, however, the rehabilitation process was not characterized by the required systematization, due to different problems such as: opening hours, which sometimes coincide with the students' classes, in addition, informalities in the attendance to the work place by the specialists.

The treatment received by the pitchers consisted mainly in the reduction of pain-causing activities; in the specific case of this injury, the reduction of the pitching activity was recommended. The treatment, also, consisted of anti-inflammatory drugs, the use of cryotherapy, vibratory massages, diathermy and the placement of bandages to reduce inflammation and, in some cases, local infiltrations.

The pitchers received specialized treatment within the sports training; they were separated from the rest of the pitchers with the purpose of returning to the sports activity through readaptation exercises. These exercises were nourished by common actions of the pitchers; the load of these was dosed taking into account the condition of the injury, until they achieved, progressively, an apparent recovery. For this, it was necessary to apply exercises based on the characteristics of the injury, the dosage and methodological indications, among other requirements.

Pitchers did not receive kinesiological treatment after the acute phase of the injury. When the main symptoms of the injury disappeared, they were discharged and returned to training.

Pitchers are not treated with the specific exercises that are required in the rehabilitation process of this injury, due to the lack of knowledge about the muscles and structures that are affected when medial epicondylitis is present in pitchers.

From the information obtained in the interview, it is concluded that the treatment received by the pitchers in the clinic is adequate until the first phase of the injury is finished, which consisted of reducing the activities that cause pain, the medical treatment and placement of elastic bandages to reduce inflammation, as well as other physical therapy modalities.

The difficulty arises in that the throwers do not receive kinesiological treatment once the first phase has been completed and the athletes return to training, lacking this treatment, which is of great importance in the recovery of the injury and in the prevention of possible relapses or the appearance of new injuries.

Once they are back in training, pitchers begin to do a different kind of work, which is not based on the methodology required in these cases, since they must first do a group of specific exercises to strengthen the affected muscles. These exercises are not applied, at any time, during the entire rehabilitation process and the coaches have no knowledge of which are the most appropriate exercises.

Therefore, with the results obtained, it is concluded that: there is a lack of a group of specific exercises planned to rehabilitate the injury, which considerably affects the recovery process and increases the risks of incidence in new injuries. In addition, regardless of the anatomical structure that is injured within the elbow joint, the physical rehabilitation program should be designed to address problems such as: restricted mobility and weakness, to allow rehabilitation of elbow injuries in a general way, aimed at complete functional restoration and that the athlete can return to activity, without risk of relapse.

## RESULTS AND DISCUSSION

### Design of physical exercises

The following physical exercise complex is aimed at rehabilitating the medial epicondylitis in the elbow of baseball pitchers, category 15-16 of the "Fladio Álvarez Galán" Eide. This component is the last one applied during the treatment of the injury, once the physiotherapeutic modalities fulfill their objectives. The exercises were distributed in four stages to be performed as follows (Table 1).

**Table 1. -** Distribution of the stages

| Stages of the design | Type of exercises | Objectives |
|---|---|---|
| **Stage 1** | Passive | Restoring the flexibility of the affected muscles. |
| **Stage 2** | Active Assisted | Improve the flexibility of the affected muscles. |
| **Stage 3** | Resisted Type 1 | Improve the strength of the flexor muscles of the wrist and pronator muscles of the forearm. |
| | Resisted Type 2 | Improve the strength of the upper extremity muscles. |

The exercise complex was carried out between the months of June and August 2017, during the transit or rest period of the planned training plan, with a frequency of three times per week, progressively increasing by one hour for each rehabilitation session and was carried out from 9:00 to 11:00 am. During the last stage of the rehabilitation process, in the pitchers under study, it was necessary to use the following movements:

- Flexion: movement of the forearm towards the shoulder, curving the elbow to decrease its angle.
- Extension: movement of the forearm away from the shoulder, placing the elbow straight to increase the angle.
- Pronation: internal rotating movement of the radius over the ulna, which results in a movement of the hand, from a palm downward position.
- Supination: external rotary movement of the radius over the ulna, which results in a movement of the hand from a palm-down position to a palm-up position.

## Design of some physical exercises

### Stage 1: passive exercises

Exercise: # 1

Objetive: Restoring the flexibility of the affected muscles.

Muscles: wrist extensors. Due to the characteristics of the type of exercise, the muscles do not perform direct work, but are elongated by the rehabilitator.

Organisational form: pairs.

Activity: perform flexion of wrists.

Repetitions: between 6-12.

Methodological indications: IP. With the arm extended in front, the patient can sit or stand. The rehabilitator will hold the patient's hand in his right hand, while the other hand will hold the arm at elbow level.

### Stage 2: assisted exercises

Exsercise # 1

Objective: Improve the flexibility of the affected muscles.

Muscles: flexors of the wrist. Due to the characteristics of the type of exercise, the muscles do not perform direct work, but are elongated by the rehabilitator.

Organizational forma: Pairs.

Activity: make wrist extensions.

Repetitions: between 6-12.

Methodological Indications: IP. With the arm extended in front, the patient can sit or stand. The rehabilitator will hold the patient's hand in his right hand, while the other hand will hold the arm at elbow level.

### Stage 3: Resisted exercises Type 1

Exercise: # 1

Objective: Improve the strength of the flexor muscles of the wrist and pronator muscles of the forearm.

Main muscles in the execution of the exercise:

Deep flexor of the fingers.

Superficial flexor of the fingers.

Long thumb flexor.

Organizational form: individual.

Activity: flexión de los dedos.

Repetitions: between 6-12 R.

Methodological Indications: IP. The patient will be in the desired position, with a rubber ball in the hand of the affected arm, performing gentle finger compressions against the ball.

Variant: to use a harder ball.

### Stage 3: Resisted exercise Type 2

Exercise: # 1

Objective: Improve the strength of the upper extremity muscles.

Main muscles involved in the exercise performance:

Deltoids.

Triceps.

Ancon.

Pectorals.

Organizational form: individual.

Activity: (Push-ups).

Repetitions: between 6-12.

Methodological indications: IP. Leaning against the ground, hands shoulder-width apart, feet together or slightly apart. Push on the ground until the arms are fully extended.

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## Conflict of interests:

The authors declare not to have any interest conflicts.

## Authors' contribution:

The authors have participated in the writing of the work and analysis of the documents.