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Physio-prophylactic intervention strategy for sports injuries in athletics jumpers

[Estrategia de intervención fisioprofiláctica para las lesiones deportivas en saltadores del atletismo]

[Estratégia de intervenção fisioprofilática para lesões esportivas em saltadores de atletismo]

Danay Cabrera Varona^{1*} , José Ignacio Ruiz Sánchez² 

¹Provincial Center of Sports Medicine in Camagüey. Camagüey, Cuba

²University of Camagüey "Ignacio Agramonte Loynaz". Camagüey, Cuba

* Corresponding author: dcv190981@gmail.com

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ABSTRACT

Introduction: the prevention of sports injuries is a relevant topic in high performance sports, given the changes in the way athletes are prepared.

Objective: to design a physio-prophylactic intervention strategy for sports injuries in athletics jumpers.

Materials and methods: research methods and techniques were used to determine the regularities of theory and practice, to substantiate the scientific result and to process the data obtained in the diagnosis and practical implementation.



Results: a physio-prophylactic intervention strategy was designed for injuries in athletes of athletics jumping events. Which contains a plan with a systemic and integral approach that achieves from the conception of its action. The plan consider prevention as a way to reinforce the work of the physiotherapist and to stimulate the level of preparation of the coach and the athlete, as well as to involve the family in this process as a guarantor of teamwork for the solution of the problem.

Conclusions: The practical implementation of the physio-prophylactic intervention strategy showed qualitative and quantitative changes in the indicators that were controlled, which demonstrate the effectiveness of its actions, as well as the conception of the design of the strategy in general to mitigate a scourge inherent to performance sports, such as, sports injuries.

Keywords: physio-prophylactic intervention; sports injuries; athletics jumpers.

RESUMEN

Introducción: la prevención de lesiones deportivas constituye un tema de relevancia en el deporte de alto rendimiento, dados los cambios que se experimentan en las formas de preparar a los deportistas.

Objetivo: diseñar una estrategia de intervención fisioprofiláctica para las lesiones deportivas en saltadores del atletismo.

Materiales y métodos: fueron utilizados métodos y técnicas de investigación que propiciaron determinar las regularidades de la teoría y la práctica, fundamentar el resultado científico y, procesar los datos obtenidos en el diagnóstico y la implementación práctica.

Resultados: se diseñó una estrategia de intervención fisioprofiláctica para las lesiones en atletas de las pruebas de salto del atletismo, que contiene un plan para este fin, con enfoque sistémico e integral que logra a partir de la concepción de sus acciones, ponderar la prevención como vía para reforzar la labor del fisioterapeuta, estimular el nivel de preparación del entrenador y el atleta, así como implicar a la familia en dicho proceso como garante del trabajo en equipo para la solución de la problemática.



Conclusiones: la implementación práctica de la estrategia de intervención fisioproláctica mostró cambios cualitativos y cuantitativos en los indicadores que fueron controlados, los que demuestran la eficacia de sus acciones, así como la concepción del diseño de la estrategia en general para atenuar un flagelo inherente al deporte de rendimiento como son, las lesiones deportivas.

Palabras clave: intervención fisioproláctica; lesiones deportivas; saltadores del atletismo.

RESUMO

Introdução: a prevenção de lesões esportivas é um tema relevante no esporte de alto rendimento, dadas as mudanças vivenciadas nas formas de preparação dos atletas.

Objetivo: desenhar uma estratégia de intervenção fisioproláctica para lesões esportivas em saltadores de atletismo.

Materiais e métodos: foram utilizados métodos e técnicas de pesquisa que ajudaram a determinar as regularidades da teoria e da prática, fundamentar o resultado científico e processar os dados obtidos no diagnóstico e implementação prática.

Resultados: desenhou-se uma estratégia de intervenção fisioproláctica para lesões em atletas de provas de salto de atletismo, que contém um plano para esse fim, com abordagem sistêmica e abrangente que consegue, desde a concepção de suas ações, ponderar a prevenção como forma de reforçar o trabalho de o fisioterapeuta, estimular o nível de preparo do técnico e do atleta, bem como envolver a família nesse processo como garantidora do trabalho em equipe para resolução do problema.

Conclusões: a implementação prática da estratégia de intervenção fisioproláctica revelou alterações qualitativas e quantitativas nos indicadores que foram controlados, que demonstram a eficácia das suas ações, bem como a concepção do desenho da estratégia em geral para mitigar um flagelo inerente ao desporto . como lesões esportivas.

Palavras-chave: intervenção fisioproláctica; lesões esportivas; saltadores de atletismo.



INTRODUCTION

Sports injuries have been and will be a problem to be solved by sports medicine and sport, where prevention plays a very important role using fundamental techniques to achieve greater control over the musculoskeletal system and increase performance in sports rehabilitation. These injuries, which occur during training or competition, cause damage to the soft tissues and skeletal system if not treated quickly and properly, Silva Villa, A. and Calero Saa, PA (2020).

Jumping events in athletics are very technically demanding for their intended purpose and therefore most performance improvements will come from physiological development.

The guarantee of sporting success, the achievement of increasingly demanding grades and the prevention of injuries and complications lies in the proper functioning of the musculoskeletal system through the prevention and rehabilitation of existing injuries, Peña Pitarch, U. (2023) . An injury that is of little importance to another subject can represent a serious deterioration in an athlete.

The work of physiotherapists is often more focused on treatment than prevention, even though in physio-prophylaxis the main objective is prevention. In practice today, the tendency is more focused on the care and treatment of established injuries than preventive work. That is why, it is important the realization of adequate diagnoses and development of treatment methods in high-performance sport, since the strength and quality of health care and investigative medical practice in sport is largely based on the application of scientific and technological advances to achieve accurate and timely diagnoses from the aforementioned perspective.

In this sense, Alfonso, Mantilla, J, I. (2018) argues that physiotherapy ensures the adaptation and recovery of the movement of the human body in the sports field, performing works of injury prevention, recovery, rehabilitation and training to achieve that the athlete is in optimal conditions.



The author Saa, P. A. C. (2020) in his work states that in physiotherapy we work to observe care, promotion, prevention and physiological, biomechanical, pathological support, execution problems and movement analysis related to physical activity and sport. Which is guaranteed within the framework of preventive measures and which reduces the appearance and recurrence of injuries and develops an optimal athlete profile.

For Rosales, M. Y. M., & Mercado, G. M. (2022) state that, the physiotherapist pursues the prevention, treatment and recovery of diseases and injuries through the use of various physical treatments with the aim of restoring, maintaining and improving the patient's health and, therefore, their quality of life.

The aforementioned authors agree that prevention is the fundamental basis of treatment, for which it is necessary to carry out measures or exercise systems during the athlete's preparation. However, the importance of taking into account the different stages or moments of the athlete's preparation is not reflected in any of the criteria discussed and, generally, more emphasis is placed on treatment than on prevention as an integral part of the physiotherapist's work.

Therefore, the authors of this article consider that physio-prophylaxis is understood as a set of actions with an integral approach included in the preparation system of athletes in order to avoid injuries due to muscle fatigue and excessive training, ensure recovery and intervene in the preparation of the athlete. According with the objectives and content of each of the moments of the preparation based on the interaction between the physiotherapist, sports coaches, athletes and the family.

From the documentary analysis, the application of surveys, interviews and observations to sports coaches, athletes and families, the following regularities could be established:

- Lack the necessary theoretical-methodological knowledge for the prevention of sports injuries.
- In the general and special preparation stage, the greatest number of injuries, such as muscle strains, patellar tendinitis, muscle contractures, lower back pain and sprains were reported.



- It was evidence that they do not perform the following aspects correctly: general warm-up, muscle stretching exercises, relationship, work, rest, hydration, use of sports equipment, recovery, nor the application of physio-prophylactic techniques.

In view of the aspects described above, the prevalence of sports injuries in athletes in the area of athletics jumping and the limited methodological guidelines for their prevention are revealed. In order to attenuate this problem, the objective designing a physio-prophylactic intervention strategy for sports injuries in athletics jumpers is formulated.

MATERIALS AND METHODS

Methods and techniques such as *analytical-synthetic, inductive-deductive, systemic structural-functional*, were used to analyze the evolution of the process of prevention of sports injuries in general and athletics in particular to determine the regularities in terms of their prevalence, prevention and treatment. In such a way that it propitiates to assume a theoretical position regarding its prophylaxis, to guarantee a synergy between all the possible forms and types of preventive therapies to attenuate the appearance of sports injuries in athletics jumping athletes. As well as, to offer the integrative and systemic treatment of the stages that make up the strategy, based on the logical structure with which they were conceived to favor the function and fulfillment of the purpose for which it was designed.

The *documentary analysis, observation, interview, survey and the mathematical-statistical*, allowed with the review of training plans, Comprehensive Athlete Preparation Programs to determine the risk factors in the prevention of sports injuries. Just as to assess the arguments about the physio-prophylaxis in the process of preparation of the athlete of coaches and managers; as well as for the processing of the quantitative data obtained in the diagnosis and the practical implementation of the physio-prophylactic intervention strategy designed.



The research worked with 18 jumpers of both sexes from Camagüey province. Three controls were applied, which correspond to the stages of preparation during the 2022-2023 and 2023-2024 school years. For the controls carried out, it was necessary to conceive the following dimensions and indicators, which were developed by the authors of this article (Table 1):

Table 1.- Dimensions and indicators

Dimensions	Indicators
Theoretical-practical mastery of the most frequent sports injuries in jumpers.	Physio-prophylactic actions and skills before, during and after competition
	Frequency of application of physio-prophylaxis
	Factors to consider for prevention
Physio-prophylactic intervention	Physio-prophylactic actions at different stages of preparation
	Interactivity between the entities directly involved in the training process of the athletes.
Performance assessment of the implementation of the physio-prophylactic intervention.	Systematic and partial control of actions,
	Evolution of the interactivity between the entities directly involved in the training process of the athletes.

RESULTS AND DISCUSSION

The physio-prophylactic intervention strategy for sports injuries in athletics jumpers is organized under an integral and systemic approach, as a starting point the premises on which it is based were established with the following aspects, which agree with those established by Sollerhed, A.-C., Horn, A., Culpan, I., & Lynch, J. (2020).

- Ensure the willingness of coaches, athletes and family to accept changes in the sports injury prevention process.
- Theoretical-methodological preparation of coaches, athletes and their families regarding risk factors causes of possible occurrence of sports injuries; as well as physio-prophylactic actions and skills.



- Constantly encourage interactivity between the physiotherapist, coaches, athletes and family during the training process for the prevention of sports injuries

The physio-prophylactic intervention strategy is inherent to general characteristics such as dialectical, contextualized, flexible and integrative. Which contribute to the direction of the process of prevention of sports injuries in jumpers, as a way to reinforce the work of the physiotherapist, stimulate the level of preparation of the coach and the athlete, as well as involve the family in said process as a guarantor of teamwork to solve the problem. Aspects that generally conform to those exposed by Slauterbeck, J. R., Choquette, R., Tourville, T. W., Krug, M., Mandelbaum, B. R., Vacek, P., & Beynnon, B. D. (2019) and Romero Lozano, H; Niño Méndez, O. (2023), in their research.

Objective of the strategy: to favor the prevention of sports injuries with an integral approach in athletics jumpers.

Stage I. Theoretical-practical diagnosis on the prevention of the most frequent sports injuries in athletics jumpers

Objective: to determine the inadequacies and strengths associated with the process of prevention of the most frequent sports injuries in athletics jumpers.

The diagnosis has a comprehensive, detailed approach, delving from each technique into the needs, perspectives and interests according to the proposed goal, Gimigliano, F., Resmini, G., Moretti, A., Aulicino, M., Gargiulo, F., Gimigliano, A., Liguori, S., Paoletta, M., & Iolascon, G. (2021). The general knowledge of the research intentions should be taken into account as a function of the quality of this exploratory procedure. The diagnosed aspects have as reference what is described by Slauterbeck, J. R., Choquette, R., Tourville, T. W., Krug, M., Mandelbaum, B. R., Vacek, P., & Beynnon, B. D. (2019); as well as Romero Lozano, H; Niño Méndez, O. (2023). The five steps to be follow in this stage are proposed below:

I. To determine the indicators to evaluate the process of preventing of sports injuries in jumpers.



- Level of knowledge on sports injuries prevention.
- Methodological characterization of the jumping events in athletics.
- Characterization of the ages of the jumping athletes.
- Skills for the management of sports injury prevention.

II. Determination of the potentialities, weaknesses and needs of the sports injury prevention process in athletics jumpers.

III. Generation of conditions for the willingness and motivation of coaches, athletes and families in the process of preventing sports injuries.

IV. Analysis and coordination of the material conditions available to address the process of preventing sports injuries.

V. Determination of trends in changes in the conception of the sports injury prevention process at group and individual level.

The logical sequence in the fulfillment of the diagnostic steps allows with precision and objectivity to identify and solve the deficiencies of the process. Likewise, the potentialities, in a way that allows with the balance of these aspects, to favor the opportune actions that lead to the fulfillment of the objective of the physio-prophylactic intervention strategy, which constitutes the prevention of sports injuries Slauterbeck, J. R., Choquette, R., Tourville, T. W., Krug, M., Mandelbaum, B. R., Vacek, P., & Beynnon, B, D. (2019). In so far diagnosis is assumed as a dynamic process during the investigation.

Stage II. Design of the physio-prophylactic intervention plan for the most frequent sports injuries in athletics jumpers

Objective of stage II. To design a physio-prophylactic intervention plan with an integral approach for the most frequent sports injuries in athletics jumpers.

Premises to take into account for the concretion of the actions of the physio-prophylactic intervention plan, which take positive aspects raised by Romero Lozano, H; Niño Méndez, O. (2023):



Collaboration: the physio-prophylactic intervention plan is based on a collaborative approach or character, since there is interaction between all the entities involved in the athlete's training process.

Social responsibility: in order to carry out these activities, we will work on the athlete's decision-making, motivation and organization to achieve their goals and objectives through the fulfillment of their responsibilities and obligations in society.

Participation: the active participation of the athlete-coaches will be essential to the success of the injury prevention plan, taking into account that the coaches will have the greatest responsibility for the athlete's actions.

Communication: being assertive will allow us to express ideas in a direct way and thus strengthen relationships in a context of respect and trust in order to carry out injury prevention actions.

Physio-prophylactic intervention plan for the most frequent sports injuries in athletics jumpers

Objective: To prevent the most frequent sports injuries in athletics jumpers in correspondence with the moment of preparation, from the implementation of physio-prophylactic actions with systemic character.

Structure of the plan: Day, actions (distributed in: 17 in the general preparation stage, 18 stages of special preparation and 11 competitive period), means or implements and purpose.

Direct and indirect responsible parties: Physiotherapist, sports trainer, athletes, family.

Moments of application: General preparation stage, special preparation stage and competitive period.



Organizational logic of actions and techniques for the prevention of sports injuries in athletics jumpers in Camagüey

General preparation stage:

- Warm-up, Static and dynamic stretching, Cryotherapy, Analgesic currents, Tens, Isometric exercises, Strengthening with eccentric and concentric exercises and Fitball exercises for the Core, (Peña Pitarch, U. (2023).

Special preparation stage:

- Warm-up, stretching (Peña Pitarch, U. (2023), cryotherapy, infrared heat, stimulating currents, (Olaizola, J. (2024), plyometric exercises, sauna, sports massages.

Competitive period:

- Warm-up, Stretching, Cryotherapy, Isometric exercises, Pressotherapy techniques.

Stage III. Execution and control of physio-prophylactic intervention actions for the most frequent sports injuries in athletics jumpers

Objective of stage III. To evaluate the behavior and efficacy of the physio-prophylactic intervention strategy implemented.

In this stage, the actions contained in the plan will be implemented in practice and simultaneously their compliance will be monitored. Likewise, the evolution of sports coaches, athletes and family, in such a way as to establish the weaknesses and potentialities in the different controls carried out, Slauterbeck, J. R., Choquette, R., Tourville, T. W., Krug, M., Mandelbaum, B. R., Vacek, P., & Beynnon, B. D. (2019).

Frequent controls are used, the partial ones corresponding to (general preparation stage, special preparation stage and competitive period) which, in turn, reveal the behavior of the controlled aspects and create the conditions to issue integral evaluative judgments at the end of the preparation cycle of the athletes with their fundamental competence.



Stage IV. Evaluation of physio-prophylactic intervention for the most frequent sports injuries in athletics jumpers

Objective of stage IV: to evaluate the evolution of sports coaches, athletes and families in the process of preventing sports injuries.

In this stage, the results of the controls carried out in the previous stage are taken up again to establish the trends of the behavior of the controlled indicators. In order to assert that the physio-prophylactic intervention strategy for injuries in athletes in the athletics jumping events favors the decrease in the prevalence of the most frequent sports injuries in athletics jumpers based on the integral and systemic approach of the conceived scientific result. In this way, guarantee the feedback to the diagnostic stage as part of the sustainability process over time of the designed scientific product.

Synthesis of the results achieved with the practical implementation of the physio-prophylactic intervention strategy

- 100 % of coaches and athletes achieve an accurate understanding and significance of the physio-prophylactic intervention to favor the sports training process.
- It is possible to incorporate the physio-prophylactic intervention plan as part of the preparation system for athletes in the area of jumping in the province.
- Athletes and coaches acquire theoretical and practical skills for injury prophylaxis (coach-athlete-physiotherapist relationship).
- A favorable increase in physio-prophylactic actions is achieved in the different moments of the preparation from a frequency per week, to a range between 3-4 (cryotherapy, analgesic currents, tens, infrared heat, stimulating currents, sports massages and pressotherapy techniques).
- Greater interactivity of the family is achieved in the process of preventing athlete injuries.
- There is evidence of a significant decrease (from 70 % to 22 %) in athletes injured due to causes inherent to the preparation during the implementation of the strategy.



- As part of the practical intervention of the strategy, there is a tendency to control, inside and outside the training sessions, the factors that can cause the occurrence of sports injuries. This aspect agrees with what Silva, Villa, A. and Calero Saa, P. A. (2020) pointed out.
- Periodic analysis of the evolution of the knowledge and skills acquired by coaches and athletes regarding the prevention of sports injuries is carried out.
- The organizational logic of actions and techniques for the prevention of sports injuries is established and controlled.
- Managers, coaches, athletes and family of the conception of the physio- prophylactic intervention strategy designed value it favorably.

Finally, based on the argumentation of each of the stages and components that make up the designed strategy, the scientific result is presented as a whole (Figure 1).

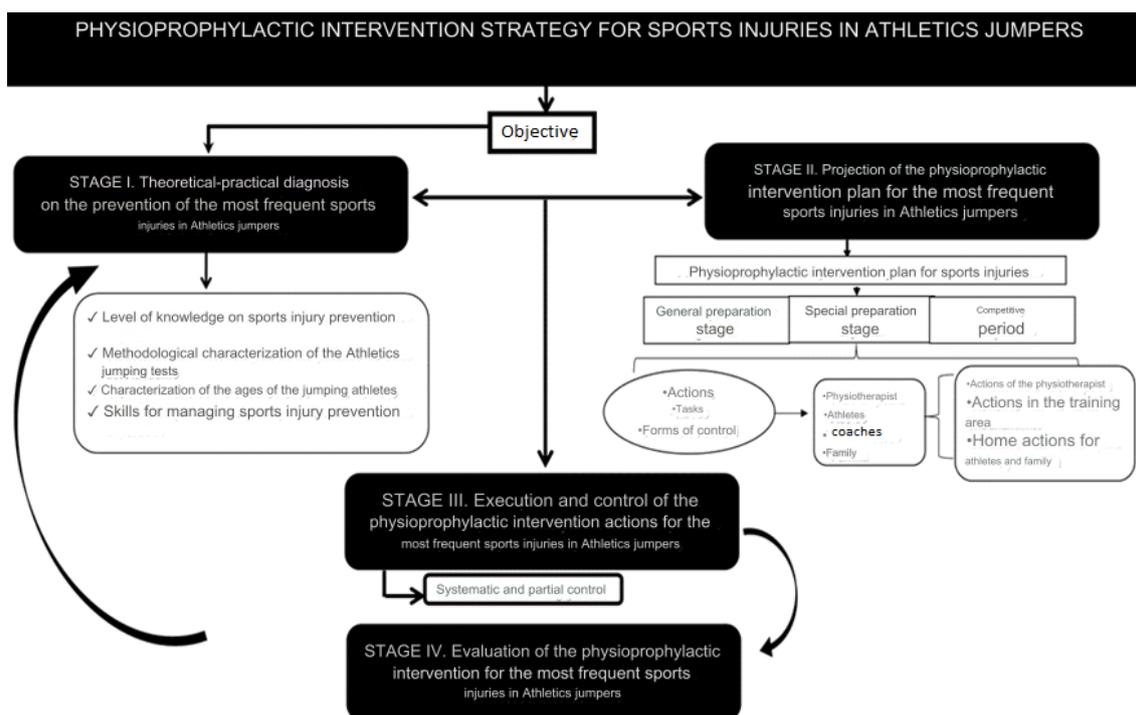


Fig. 1. - Graphical representation of the strategy as a whole



CONCLUSIONS

The process of treating sports injuries has had, throughout history, a nuance focused more on their treatment from the use of various techniques ranging from traditional to the most innovative. However, little has been addressed the role of preventing them and especially incorporate a physio-prophylactic plan as part of the preparation system of the jumpers in the particular case of this research.

The empirical-theoretical analysis of the athletics jumping area revealed the prevalence of tendon, muscle and joint injuries, given the number of athletes injured for various reasons, as well as the lack of evidence of a physio-prophylactic plan to mitigate such sports injuries.

A physio-prophylactic intervention strategy was designed for injuries in athletes in athletics jumping events. Which contains a plan for this purpose, with a systemic and comprehensive approach that manages from the conception of its actions, to consider prevention as a way to reinforce the work of the physiotherapist, to stimulate the level of preparation of the coach and the athlete. Likewise, to involve the family in this process as a guarantor of teamwork to solve the problem.

The practical implementation of the physio-prophylactic intervention strategy showed qualitative and quantitative changes in the indicators that were controlled, which demonstrate the effectiveness of its actions, as well as the conception of the design of the strategy in general to mitigate a scourge inherent to high-performance sports such as sports injuries.

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Conflict of interest:

The authors declare that they have no conflicts of interest.

Authors' contribution:

Danay Cabrera Varona. Introduction, results, discussion, conclusions.

José Ignacio Ruiz Sánchez. Methods, results and discussion, references.



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