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Prevention and Prophylaxis of Physiotherapy in Sports Trauma in Volleyball Athletes

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***Abstract*---**Sports injuries in volleyball athletes are a frequent cause of medical consultation at the Provincial Center of Sports Medicine. An intervention study was carried out in the youth category of this sport, with the aim of to evaluate the effectiveness of the application of preventive measures and prophylactic physiotherapy treatment. In the interpretation of results, low back pain was obtained as the most significant with 50%, followed by strains and ligament ruptures with 25%; in the variable traumas and relationship with the variability of the affected regions, the highest percentage was observed in the trunk with lumbar injuries with 33.3%. Most of the population of athletes responded positively with 81.7% after the application of preventive measures and prophylactic physiotherapy treatment, thus demonstrating its effectiveness.

***Keywords*---**physiotherapy, prevention, sports injury, sports prophylaxis, volleyball.

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Introduction

Traumatism is a situation with physical damage to the body, an injury with alteration, or without it, of the integrity of the tissues, caused by external influences. In the extremities. Because of the application of a force on the skeleton, directly or indirectly, an injury can be produced in the osteo-articular or muscular systems. An injury to the limbs rarely causes a life-threatening situation but, depending on its first treatment, it can cause significant disabilities. For the diagnosis, it is usually necessary to resort to radiographs, nuclear magnetic resonance, arthroscopy, and arthrocentesis (Yves, 2002; Alvarez et al., 2004).

There are numerous injuries related to sports practice in which acute ones are classified, of which, bone (fractures, tears), joints (dislocations, sub-dislocations, meniscus injuries), tendon (tears), muscular and ligamentous (tear or tears, strains). Others are contusions, chafing and wounds, chronic injuries occur progressively due to sports microtrauma, these include bone (periostitis), joint (capsulitis, bursitis, chondropathies), ligamentous (chronic laxity), tendinous (tendinitis, tenosynovitis) (Yves, 2002; Bahr & Reeser, et al., 2003; Capote et al., 2009; Aldana, 2018). Each sport makes specific demands and specific requirements for its performance and for the prevention of injuries. To identify athletes who may be at risk of injury, it is useful to analyze the suitability or suitability profiles for the practice of each sport (Yves, 2002; Alvarez et al., 2004; Ring et al., 2016).

The injuries that players in this discipline can suffer are defined as cumulative when there is excessive use (overuse) of the joint and acute (traumatic), these are sports accidents. The first ones occur over time, this is related to the stress of the muscles, joints, and soft tissues without the adequate period for recovery. While acute traumatic injuries occur due to a sudden force or impact, they can be very dramatic (Yves, 2002; Pedret et al., 2016; Sansone et al., 2016; Garrick, 2017; Sánchez, 2017; Junquera, 2018). The latter are of interest in this research. In the opinion of authors such as Yves (2002); De Los Santos (2004); Ring et al. (2016), describe that when an adequate warm-up has not been carried out and the preventive indications are not followed, injuries can appear in the joint regions; the characteristics of the jumps in both defensive and offensive actions, the knee and ankle joints are kept in constant movement in different directions as in volleyball, at the same time that they receive continuous repetitive microtraumas which make them more vulnerable to injuries, as well as direct or acute traumas due to falls or unexpected collisions with other athletes (Hammond, 2000; Bithell, 2000).

Authors such as Yves (2002); Roa (2016), argue that in sports like basketball, baseball, volleyball, among others, the most common injuries are sprains, wrist injuries and fingers, fractures and dislocations the phalanges (eventually with disinsertion of the extensor tendons at the level of the last phalanx of the finger), and injuries to the knee joints; Patellar tendonitis occurs in people who play sports that involve repeated jumping. Sprains (48%), wrist injuries (12%) and fingers (8.05%) are frequent. Injuries in these regions are the main cause of medical consultation in the sports field of the province of Santiago de Cuba. The

fundamental objective of the research is to evaluate the effectiveness of the application of preventive measures and prophylactic treatment of physiotherapy in volleyball athletes (Gansevoort et al., 2013; Büchler et al., 1992).

Materials and Method

An intervention study was carried out in athletes of the male volleyball sport, in the juvenile category room modality, during the period September 2018-July 2019. The sample consisted of 12 athletes to whom the intervention of preventive measures and prophylactic physiotherapy treatment, with the aim of evaluating their effectiveness. The information was recorded on the data collection sheet for the investigation made by the authors, referents of sports history, other data of interest and the variables necessary for the investigation. The information obtained was processed in Excel support for the analysis and interpretation of the results, the percentage statistical study was used to determine the existence or not of relationships or significant differences and effectiveness and validity between the variables (Finch, 2006; Ahern & Lohr, 1997).

Procedures used for the investigation

Application of preventive measures and prophylactic treatment which consisted of:

- Preventive measures
  - Fatigue due to over training was avoided.
  - Verification of the proper application of daily warm-up and stretching of all joints on the field of play, in the gym or physical training area and the limits and competitions. Stretching at the beginning and at the end of activities.
  - Correspondence of the good physical condition of the athletes.
  - Execution of planned relaxation exercises together with the sports psychologist.
  - Application of strengthening or empowerment exercise sections 3 weekly sessions according to training stages and athlete objectives.
  - Application of sections of resistance exercises 2 or 3 weekly sessions according to stages of training and goals of the athlete.
  - Application of sections of specific sports activities.
  - Do not resume sport too quickly after the occurrence of moderate or severe trauma.
  - Use of adapted materials such as (elastic bandages, anklets, and technique correction).
  - Detection and correction of static alterations.
  - Application of a balanced diet with adequate energy intake for each athlete.
  - Application of local muscle massage sections 2 times a week, general massage once a week, after training, butt events and competitions.
  - Application of hydromassage sections 2 times a week, after training, butt events and competitions.

- Application of sections of cryotherapy in joints of greater overuse for this sport, the application time depended on the parts of the body and the relief of pain in the presence of it due to over training or overloads, in the joint regions to be treated:
  - For the upper body: in joints such as the shoulders, applications of 10 to 20 minutes were made with ice bags, this in a frapped form after training, butt events and competitions. In joints of the elbows, wrists, hands, and fingers, the same as the previous one, but they were preferred due to better management since they are prominent bony and irregular areas, massages with ice cubes for 5 to 7 minutes, and in the area's fat or wide as the dorsal region of the thorax and in the upper spine (cervical and dorsal and back), the bags with a time of 30 minutes or double application.
  - For the lower body: apply to the knees for 10 to 20 minutes with crushed ice packs after training, butt events and competitions. In ankles, feet and toes, ice cubes for 5 to 7 minutes and in fatty areas such as the quadriceps, lower spine calves (lumbar and sacral), the bag with a time of 30 minutes or double application.
- Application of other physical agents such as paraffins, infra-red, analgesic currents I and II, magnets in case of pain due to overloads, old injuries, after training, peak events and competitions.

Physiatric prophylactic treatment

In the occurrence of emergencies or acute trauma, the physiatric prophylactic treatment was aimed at applying the PRICE principle, an acronym for English widely used by sports medicine professionals, consisting of the following care:

- Protection with immobilizations: in ankle trauma placement of (elastic bandages, slat reinforcement).
- In shoulder straps (slings or bandage around the neck with the elbow flexed).
- Restriction of activity, this varied according to the type of injury: in mild traumas, restraint was applied from 48 to 72 hours. In moderate to severe traumas proceeded to the immediate arrest of the effort and sent to specialized centers in hospitals. In both, cardiovascular activity, and mobility of the joints free of immobilization were maintained.
- Application of ice or cryotherapy in trauma equal to the previous recommendations.
- Compression: placement of soft containment with elastic bandages.
- Elevation of the member.
- Physical agents like the previous ones were also applied, also carrying out a comprehensive rehabilitation treatment in the presence of injuries.

The patients were distributed according to the evaluation variables:

- The generality of the cases of traumas in the volleyball sport and the relative frequency of appearance of occurrence: it was distributed by groups of traumatic injuries, as well as the predominance between them (Table 1).

- Appearance of traumas and relationship with the variability of the affected regions in volleyball sport: It was distributed by groups of traumatic injuries, as well as the predominance between them and the regions most affected by these traumas (table 2).
- Behavior of preventive measures and prophylactic physiotherapy treatment in volleyball sport (figure 1).

An evaluation of the results of responses to the treatment of the application of preventive measures and prophylactic physiotherapy treatment was carried out, distributed in the following categories:

- Excellent: application of preventive measures and prophylactic physiotherapy treatment, no appearance of injury due to trauma.
- Good: application of preventive measures, appearance of trauma injury but with satisfactory healing of the injury to the application of prophylactic physiotherapy treatment.
- Regular: application of preventive measures, presence of trauma injury, with little improvement of the injury to prophylactic physiotherapy treatment plus comprehensive physiotherapy treatment.
- Bad: application of preventive measures, presence of trauma injury, application of prophylactic physiotherapy treatment plus comprehensive physiotherapy treatment with worsening evolution and disabling sequel to sport.

The application of preventive measures and prophylactic physiotherapy treatment was considered effective if, after applying them, at least more than 50% of the athletes met the criteria of excellent or good responses (Mickel et al., 2006; MacKay et al., 2004). The results were shown in tables and graphs of distribution and frequencies of one and double entry (table 1), (table 2) and (figure 3) for better understanding and demonstration. Table 1 shows the distribution of patients according to the generality of trauma cases in volleyball sports and the relationship with the relative frequency of occurrence of the injuries. No. 12. Of the 12 athletes of the population investigated according to the generality of the most frequent traumas in appearance, all developed injuries, of which, the group of other injuries prevailed with low back pain for 50%, then there were distentions and ligament ruptures with 25% compared to the rest of the traumatic injuries found.

Table 1
Distribution of generality of trauma cases and the relative frequency of appearance of occurrence of injuries. No. 12

	Total	
	no	Traumas%
Contusions	1	8.3
Strains and ligament rupture		March 25
and rupture Strains muscle	0	0
strain sand tendon rupture	1	8.3
Chafing	0	0
Wounds	0	0

Fractures	0	0
Dislocations	0	0
Meniscus lesions	0	0
Injury of bursas Fibrocartilage	1	8.3
lesions	0	0
Others (low back pain)	6	50
No lesion	0	0
TOTAL	12	100

Source: data collection sheets

Authors such as Moral & Redondo (2008); Rodríguez (2008); Vitón (2012); Villanueva (2021), state that in this sport injuries can appear in both the lower and upper limbs or in the spine, being the most frequent cause of limb injuries. lower ligament injury, either at the knee or ankle level due to sprains, the reason is usually falling in a bad position, after jumping, since jumping is the main component of this sporting activity; for upper limbs suggest that the most frequent injuries in the upper limb are tendinitis of the shoulder and biceps, due to the repeated movements above the head that are made in this sport, as occurs in the serve or in the spikes, which during performing a "mate", an external rotation of the humerus occurs, producing a separation of the arm from the trunk and turning the hand outwards, when making movements in a path beyond the usual, where the ligaments and joint capsule are greatly elongated, the shoulder may develop instability; These authors report that gestures such as the ball bounce or mate can cause low back pain or back pain due to excessive arching of the spine and trauma when falling or jumping to prevent the ball from touching the ground. The frequency of these lesions in our results coincides with those proposed by the authors (Malliaras et al., 2006; Malousaris et al., 2008).

Table 2 shows the distribution of the appearance of traumas and the relationship with the variability of the affected regions. No.12. It is observed that, of the regions, the lumbar trunk was the most affected with low back pain injuries for 33%, followed by the upper, lower extremities and the trunk with strain injuries and ligament ruptures for 8.3% by the same for each region (Putri et al., 2022; Batsunov, 2021).

Table 2
Distribution of the appearance of traumas and relationship with the variability of affected regions. No.12

Trauma	Upper		Extremity Lower Extremity		Trunk		Total	
	no	%	no	%	no	%	no	%
Contusions	1	8.3	0	0	0	0	1	8.3
Ligament strains and ruptures	1	8.3	1	8.3	1	8.3	3	25
Muscle strains and ruptures	0	0	0	0	0	0	0	0
Strains and tendon rupture	0	0	1	8.3	0	0	1	8.3
Chafing	0	0	0	0	0	0	0	0

Wounds	0	0	0	0	0	0	0	0
Fractures	0	0	0	0	0	0	0	0
Dislocations	0	0	0	0	0	0	0	0
Injuries of meniscus	0	0	0	0	0	0	0	0
Bursa injuries	0	0	1	8.3	0	0	1	8.3
Fibrocartilage injuries	0	0	0	0	0	0	0	0
Other lumbar (low back pain)	1	8.3	1	8.3	4	33.3	6	50
TOTAL	3	8.3	4	33.3	5	41.6	12	100

Source: data collection sheets

In revised literature (Moral & Redondo, 2008; Rodríguez, 2008; Vitón, 2012; Villanueva, 2021). It was found that sports injuries and their relationship with the affected regions are given according to the demands of each sport or sports practice where the most affected regions will be. in volleyball In the most frequent order of affectation, the authors refer to the extremities, of which the knees and ankles are in lower extremity; and shoulders, wrists and fingers in the upper extremity, the reasons why it occurs in the knees, ankles and shoulders already explained above; on the fingers, expose that In all sports in which the ball is played with the hands, the typical gesture that causes the injury is usually hitting the ball directly against the tip of the finger, while the finger is extended. This will cause trauma to the joint closest to the fingertip (distal interphalangeal joint) which can cause a fracture or tearing of the finger extensor tendon. The consequence is a "hammer toe" in which the tip of the finger is "fallen" or "bent" with respect to the tips of the other fingers. In our study, the involvement of the lower limbs with strain injuries and ruptures, are the ones that were in second place of frequency of appearance relatively coinciding with the results of the authors, also the trunk they were predominant (Vocroix, 2021; Widana et al., 2020).

Figure 3 shows the evaluation of the behavior of preventive measures and prophylactic physiotherapy treatment applied to the athletes treated. in volleyball sport. No.12. After the application of the preventive measures described results of the non-appearance of traumatic injuries were expected, the injuries being present in all the 60 patients in the study, but despite this, the graph shows the majority of the population treated with good response results represented by 81.7% after the applications of prophylactic physiotherapy treatment, which represented the satisfactory cure of these injuries. The regular response resulted in 18.4% being the percentage that manifested injuries and were at the same time those of little improvement to the response of the physiotherapy treatment together with other applications of integral physiotherapy treatment. No excellent or poor results were obtained. responses in none of the treated athletes (Peter, 2015; Caurel, 2020).

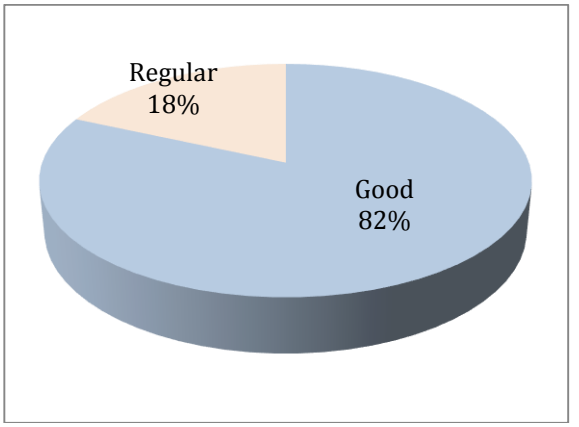

Figure 3. Behavior of prevention measures and prophylactic physiotherapy treatment in sports trauma. No.12.
Source: data collection sheets

Regarding the preventive measures that were carried out in the study, they coincide with researchers such as Reeser & Roald (2011), who describe 7 principles of injury prevention, among which the following stand out: 1. Follow a sport-specific strength training and conditioning program; 2. Avoid overtraining; 3. Pay attention to practice and proper technique; 4. Train and maintain stability. 5. Maintain adequate nutrition and hydration. 6. Rehabilitate injuries correctly, and 7. Avoid early sport and position specialization. Regarding the application of the PRICE principle that was used as physiatry prophylactic treatment procedures applied in the research, it was carried out with the objective of obtaining the known effective results that they provide in immediate applications of injuries or trauma suffered by these athletes.

The protection allowed the period of immobilization that conditions rest of the injured areas, the restriction of activity or weight bearing made it possible to start the healing process to complete the different phases of recovery or healing of injuries, avoid traction of muscles involved in the injured joint subjected structures to pressure and tension, protected the injured area against exposure to further injury from anatomical structure. The use of ice derived from local vasoconstriction, helped control hemorrhages, edema, decreased metabolic rate reducing the need for oxygen and nutrients, analgesia in the region, decreased reflex muscle spasm due to decreased nerve conduction velocity and action on skin receptors.

The compression allowed the control of local inflammation, reduction of the expansion of the edema, avoiding the accumulation of fluid in the intercellular space (swelling), in addition to facilitating the migration of the epithelium more quickly without the formation of clots and allowed restoration of the range motion normal. The elevation made it possible to nullify the effect of gravity and thus the accumulation of blood in the distal area of the extremities, in addition to favoring venous drainage and the elimination of proinflammatory substances at the site of the injury.

Conclusion

The application of preventive measures and prophylactic physiotherapy treatment, even though they did not prevent the appearance of injuries in the athletes studied, were effective, achieving a good response in 82 %. It is also highlighted that the worsening of the injuries and the disabling sequelae for the sport could be stopped, for these reasons the usefulness of the implemented procedure is demonstrated.

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