

Rehabilitation and Prevention of Surfing Injuries: Literature Review

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Citation: Silva, J.R., Oliveira, M.D., (2023). Rehabilitation and Prevention of Surfing Injuries: Literature Review. *Adv Yoga Physical Ther (AYPT)*, 1(1), 26-30.**Abstract****Introduction:** Surfing a wave requires the practitioner [surfer] to be in good physical condition and have sensory motor skills, as well as knowledge of weather and ocean conditions. Knowing which the most frequent injuries in sports practice are is fundamental for the rehabilitation and prevention of injuries.**Objective:** To research and analyze studies with good scientific evidence that investigated the incidence of injuries caused during surfing, correlating with clinical practice for a better understanding of injury mechanisms.**Methods:** A search was performed on the PUBMED database on June 18, 2023, using the following search strategy [[surf] OR [surfing]] AND [[injuries] OR [acute pain] OR [chronic pain]].**Results:** Of a total of 598 studies, only 2 studies were eligible by the inclusion criteria.**Conclusion:** The spine, shoulders, and lower limbs are the places with the highest incidence of injuries in surfing.**Keywords:** Surf, Surfing, Surf Injuries, Injury Prevention, Physiotherapy, Sports Physiotherapy, Preventive Training, Performance**1. Introduction**

Surfing is a water sport that uses a floating surface [board] to practice sports [1]. It is usually carried out at sea or in artificial pools, with reports of the practice in other environments such as rivers [2].

Surfing a wave requires the practitioner [surfer] to be in good physical condition, and have sensory motor skills, as well as knowledge of weather and ocean conditions [3]. With the evolution of the sport, we can use different equipment and accessories for surfing, as well as different modalities [4].

Due to the professional development of sports, many people are starting to practice sports, which led to the inclusion of sports in the Olympic Games [2].

The modality to be practiced in the Olympics is a surfboard, characterized by the sportive gesture of paddling where the surfer lies face down on the board, extending the spine, and uses the upper limbs to move in the water, performing the movement similar to crawl swimming where studies demonstrate the same muscle activity [5].

1.1 Propulsive

Pull Phase: Activation of the Paraspinal, Anterior Deltoid, Pectoralis major, and Triceps brachii muscles [5].

Push phase: Latissimus dorsi, Middle trapezius, Subscapularis [5].

1.2 Recover Phase

Activation of the Deltoid muscle in its three portions, Supra Spinal and the Rotator Cuff for stabilization of the glenohumeral joint [5].

The paddling can be performed at different levels of intensity, and to enter the wave it is necessary to perform maximum muscle power for an acceleration of the board ^{5,6}.

The sporty gesture of surfing is performed with the surfer standing with feet apart where each surfer has their surfing base, it can be classified as regular when the back foot is the right and goofy when the inversion of the back leg is [6].

However, there is a movement of the lower limbs during surfing and even inversion of the bases during maneuver [7].

The maneuver is a sporting gesture in which the surfer performs to surf the wave, and can be performed at different levels of difficulty, with the evolution of the sport the maneuvers have become increasingly challenging, increasing the overload and impact caused between the surfer, equipment, and wave [7].

Knowing which are the most frequent injuries in sports practice is essential for rehabilitation and injury prevention, but several authors have reported the scarcity of studies in the literature, requiring further studies addressing injuries in surfing practice [2-7].

1.3 Objective

Research and analyze studies with good scientific evidence that investigated the incidence of injuries caused during surfing, correlating with clinical practice for a better understanding of injury mechanisms.

2. Methods

This is a study conducted through secondary sources a literature review, with the aim of bringing together the existing content in the literature associated with the clinical practice of the researcher, to update and disseminate knowledge to professionals and practitioners of the sport.

The study was conducted by a researcher with more than 10 years of experience in surfing, as well as in providing services to professional and recreational athletes, working in several municipal championships such as Ubatuba Pro surf one of the largest municipal championships in the world due to the number of athletes. and categories, state events Paulista Pro [championship in the state of São Paulo] and Catarinense Professional [championship in the state of Santa Catarina], Brazilian Surf Championship, and international events promoted by the world organization WSL.

To elaborate the literature review, the PICO method was used to elaborate the search strategy and the guiding question of the study.

Being P [Surf practitioners], I [epidemiology of injuries in sports practice], C [healthy individuals], and O [studies that observed the incidence of injuries].

The study question was:

What are the most frequent injuries in surfing?

A search was performed in the PUBMED database on June 18, 2023, using the following search strategy [[surf] OR [surfing]] AND [[injuries] OR [acute pain] OR [chronic pain]].

Only systematic reviews that had the incidence of musculoskeletal and acute injuries in the practice of surfing were included.

Studies that did not have treatment or epidemiology of surfing injuries as an outcome, or were not available for reading.

Chronic musculoskeletal injuries and acute injuries were determined as the clinical outcome for data stratification.

The selected studies were classified according to the EBP being level I of clinical evidence, and systematic reviews, thus minimizing the risk of bias.

The statistical analysis used was descriptive through the sum of the results and the average between them.

3. Results

After searching the PUBMED database, a total of 598 studies were observed, and only 4 studies were eligible according to the inclusion criteria. One study was excluded due to not being available for reading 8, another study due to lack of data such as age, gender, and risk of bias analysis 5, and the final sample of the present study consisted of 2 studies.

Title	Author, place and year.	Kind of study	Participants	Results
Epidemiology of Acute Injuries in Surfing: Type, Location, Mechanism, Severity, and Incidence: A Systematic Review 9	Katherine McArthur, Australia 2020.	Systematic review	8,736 individuals of both genders, the majority being male (approximately 6861 individuals) aged between 20 and 35 years.	Of the 19 articles included, two were classified as 'fair' quality and nine were classified as 'good' quality, the average quality assessment was 71.5% (SD ± 11%) and ranged from 54.2% to 95, 8%.
Chronic and Gradual-Onset Injuries and Conditions in the Sport of Surfing: A Systematic Review 10	Samuel Hanchard, Australia, 2021.	Systematic review	8,283 individuals, the mean age ranged between 19 and 35.5 years, approximately 5660 were male and approximately 1044 were female.	Of the 20 articles included, eleven were classified as 'Good' quality, six were classified as 'Fair' quality, and three were classified as 'Poor' quality, with a mean of 69.9% (SD ± 11.27%) and variations between 45.8% and 84.0%.

Table 1 Final result of the search in the PUBMED database is presented chronologically.

3.1. Study Characteristics

This review presented studies published between 2021 and 2022, being the first systematic review to evaluate previously published studies on the incidence of injuries [9-10].

The total sample of individuals analyzed between the two studies was approximately 17,019 individuals with a mean age of 27.5 years, most individuals are male, approximately 73% [9-10].

A total of 39 studies were analyzed, with approximately 50% of the studies being classified as good methodological quality and low risk of bias, 40% of fair quality, and 10% of poor quality [9-10].

Title	Injuries	Region	Injury Mechanism
Epidemiology of Acute Injuries in Surfing: Type, Location, Mechanism, Severity, and Incidence: A Systematic Review 9	The most common type of injury was on the skin, representing 46% of all injuries, followed by soft tissue injuries (22.6%) and bone injuries (9.6%).	The most affected body region was the face, head and neck (33.8%) followed closely by the lower limbs (33.0%).	Being hit by your own board is the most common cause of injury (38.5%), followed by approaching a wave or performing a maneuver while surfing (20.3%) and hitting the bottom or surface of the sea (18.4%).
Chronic and Gradual-Onset Injuries and Conditions in the Sport of Surfing: A Systematic Review 10	There were 4499 cases of musculoskeletal and non musculoskeletal injuries and conditions documented in the data. Of these cases, 1941 were non-musculoskeletal in origin and the remaining 2558 cases were musculoskeletal. The specific diagnosis of musculoskeletal injuries was not specified.	The spine/back and shoulder were consistently cited as the most common injury sites, accounting for 29.3% and 22.9% of reported injuries, respectively. Head/face/neck (17.5%) and knee (10.4%) followed.	The most common mechanism reported in the literature was paddling (37.1%) followed by injuries associated with the wave (15.9%). Other mechanisms reported in studies include maneuvers/air (11.8%), joint overuse (11.7%) and unknown (10.1%).

Table 2 Presentation of injuries, most affected sites, and injury mechanisms.

According to the type of study and we can separate the injuries between acute and chronic musculoskeletal.

3.2. Acute Injuries

The classification for acute injuries was all injuries that occurred in a period prior to 3 months [9-10].

Among acute injuries, skin injuries were the most frequent, accounting for 46% of the injuries, followed by soft tissue injuries [muscles, tendons, and joints] 22.6% and bone injuries accounting for 9.6% [9].

The face, head, and neck region were the most affected 33.8% as well as the lower limbs 33% [9].

Being hit by your own board was the main injury mechanism at 38.5%, followed by approaching a wave while performing a maneuver [contact with the critical part of the wave] at 20.3% and hitting the bottom or surface of the sea 18, 4%. Statistical data was taken from the study itself, where only the most relevant data was shown [9].

3.3. Chronic Musculoskeletal Injuries

Injuries were classified as chronic musculoskeletal injuries being persistent for more than 3 months 10.

Musculoskeletal injuries represented 43.1% of the chronic injuries, with the Spine/Back and Shoulders being the most affected regions, the Spine/Back represented 29.3% of the injuries, the Shoulders 22.9%, head/face/neck [17.5%] and knee [10.4%] 10.

The main mechanism of injury was paddling at 31.1%, injuries associated with the wave [surfing the wave] at 15.9%, while performing a maneuver was 11.8%, and 10.1% of injuries due to unknown factors, statistical data taken from the study itself 10.

3.4 Analysis of the Studies Selected for Research Elaboration

The two selected studies were classified with level I of evidence according to EBP, both studies met the criteria for analysis of risk of bias and were elaborated following criteria of the PRISMA

method for the elaboration of systematic reviews [9, 10].

Allowing a better critical analysis of the studies presented and a safe source for the realization of this content.

3.5 Consideration for Clinical Practice Acute Injuries

In clinical practice, professionals working at sporting events or accompanying these individuals should consider the high incidence of acute skin injuries during sports practice, these may be associated with different sizes of injuries, with lacerations and cuts occurring mainly in the face region., head, neck, and lower limbs [2-9].

Among the soft tissue injuries that would be the muscles, tendons, ligaments, and joint structure, it was not possible to observe the diagnosis of the injuries, which is extremely important in clinical practice, so we must emphasize that adequate knowledge is necessary to evaluate the possible injuries, which is essential for adequate and effective treatment [2-9].

The main mechanisms of acute injuries were very evident, where practitioners and professionals should obtain and disseminate information for greater care with their equipment while surfing [8-9].

Among the other injury mechanisms, contact with the bottom of the sea and the wave are unpredictable factors, but conversations with local populations and more experienced athletes about the place to practice surfing can help to minimize the risk of injuries [2-9].

Currently, there is a tendency to create artificial pools for surfing, new studies are needed to find out if there is a difference between the incidence of injuries between them and the sea during sports practice [2-4].

Treatment for acute injuries will depend on the severity of the injury and its diagnosis, but acute pain control is necessary [11-13].

The professional who will provide assistance to surfers must be prepared to act in the control of acute pain where we have references in the literature resources such as cryotherapy, transcutaneous electrical stimulation [TENS], manual therapy, and stabilization exercises [11-13].

An initial assessment is extremely important to identify the best resources to be used, adequate guidance regarding treatment, and referral to the medical service whenever necessary or even temporary withdrawal from sport [11-13].

Adequate dysfunctional diagnosis will provide a better understanding of the severity of the injury, reducing the anxiety and stress levels of the athlete as well as the sportsman, factors that are strongly linked to the increase in the intensity of Pain [11].

It is important to emphasize that during the competitive event, the environment and the competition can limit the use of therapeutic resources, where the time for care and structure can interfere with the professional's decision-making.

3.5 Chronic Musculoskeletal Injuries

The high incidence of injuries in the spine and shoulders can lead us to measures to prevent injuries in sports, followed by the region of the head and face, which were mostly non-musculoskeletal injuries, and the knees, not ruling out the possibility of injury to other regions but with lower incidence [10].

The sporting gesture of paddling was associated with a risk factor for chronic musculoskeletal injuries, and the literature shows that while practicing the sport, individuals spend most of their time paddling [2-10].

But it is not possible to know if the report described in the studies is due to an increase in symptoms where the individual may feel pain in these places, or if this really was the initial injury mechanism [2-10].

Knowing that the history of previous injuries, the lack of adequate treatment of the injury, as well as several psychosocial factors, are associated with the cornification of the injury [14].

Therefore, all these factors must be considered when carrying out treatment with this specific population, and a greater focus on returning to sports, optimizing the sporting gesture of rowing [3-14].

With a lower incidence, the most prevalent injuries would be in the sport of surfing the wave and performing maneuvers, which was associated with the mechanism of chronic musculoskeletal injuries [2-7].

To maneuver his board, the surfer uses an acceleration and deceleration force performed in different planes of movement, with a synergism between the lower limbs, pelvis, spine, and upper limbs [7].

Each surfer can present a way of surfing [style] but in general, they use a standing posture on the board with flexion of the ankles, knees, and hips, using trunk movements with the help of the lower limbs to direct their board [7].

Which requires good mobility and joint stability, we can highlight the spine and the positions of the iliacus where one must be in flexion and the other in extension, the knees perform high degrees of flexion, and dynamic valgus and dynamic valgus are commonly used during the sporting gesture [3-7].

In clinical practice, biomechanical changes are common among complaints of chronic musculoskeletal pain, such as loss of mobility of the thoracic vertebrae, a deficit of external rotation of the shoulders, muscle imbalances, and loss of mobility of the hip, thoracic rotation, and ankle flexion, which was also observed by other authors in the literature [2-16].

Regarding the incidence of lower limb injuries, it is important to emphasize the landing and completion of maneuvers that may be associated with landing from a jump on an irregular and unstable surface, on the reaction force of the waves [7].

Where a plyometric work seeking to optimize this sporting gesture can minimize the risk of injuries as well as the need for good muscle balance and mobility of the lower limbs, sensorimotor training being essential for these individuals [7].

It is extremely important for athletes and coaches to know that injuries can occur due to unpredictability, but also due to errors in technique when executing a maneuver 7.

Overuse was responsible for 10.1% of chronic musculoskeletal injuries, adequate guidance regarding practice time, previous conditioning, and the need to recover can be a preventive measure for this injury mechanism [3-18].

Individuals with chronic pain have motor control deficits that must be considered during the assessment [5-19].

During competitive events and in clinical practice, we can observe the clinical improvement of these individuals using manual therapy and segmental stabilization techniques, combined with guidance and education about pain to carry out a more effective treatment, referring whenever possible to a multidisciplinary treatment [19-20].

3.6. Study limitations

The present study does not cover a world population of surfers, being concentrated only in the great economic poles of the surf market, however, it showed a good sample in the number of participants.

The data presented in the present study do not reflect the female gender, due to the high concentration of male individuals, requiring further studies with this specific population.

The total sample of studies included in this review can be considered good to regular, with half of the studies having good methodological quality. Information such as gender and age.

It was not possible to observe the diagnosis of possible injuries, due to the lack of data in the analyzed studies, requiring further studies with more specific data collection.

The literature is still scarce on epidemiological research related to injuries resulting from surfing, as well as the need to carry out better quality studies.

4. Conclusion

The spine, shoulders, and lower limbs are the places with the highest incidence of injury in surfing.

Acute injuries showed a high prevalence during surfing, with skin injuries being the most frequent followed by musculoskeletal injuries, due to the lack of data in the literature we cannot say which types of injuries are more prevalent.

Chronic musculoskeletal injuries were also observed among surfers, which may be associated with biomechanical factors and the carbonification of previous injuries.

Despite the scarcity of studies in the literature, two studies with a good level of evidence were addressed, associating the researcher's experience with these data can contribute to better clinical decision-making until new studies of better quality and level of evidence are published.

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