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# An Investigation into Injury Characteristics and Contributing Factors in Leisure Surfing in Hainan

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**Abstract**. The purpose of this paper is to discuss the characteristics of surfing in Hainan, an important island province in China, and its related injury characteristics. Through the literature retrieval method, 41 key literatures were finally identified for analysis. The study found that Hainan has become a well-known surfing destination at home and abroad because of its unique natural conditions, with a number of high-quality surfing spots, attracting surfing enthusiasts from different backgrounds. The demographic characteristics, geographical advantages, wave characteristics, skill level distribution and participation purpose of surfing population in Hainan are described in detail, and the incidence, type and severity of acute and chronic injuries in surfing are analyzed in depth. In addition, the internal and external factors leading to injury are discussed from the aspects of individual physical fitness, technical proficiency and Marine environment.

**Keywords**: Hainan, Leisure surfing, Sports injury.

## 1 INTRODUCTION

With its unique natural conditions, Hainan has become a well-known surfing resort at home and abroad. Riyue Bay and Houhai Village in Sanya on the East Coastline attract a large number of surfers due to their unique geographical locations and ideal wave conditions (Wang L,2021). Not only do these areas have wave resources suitable for surfers of all skill levels, but the warm, humid climate throughout the year also provides an ideal environment for outdoor activities (Dai J D & Cao Z L.,2019). The development of surfing in Hainan is not only reflected in its geographical advantages, but also in its gradually formed diversified surfing culture. As more and more international tourists and professional players come to Hainan for experience or training, there are more and more local surf schools, clubs and related events, which further promote the spread of surfing culture and technical exchange (Zhong L Zhang Y Q,2024). In addition, the Hainan government actively promotes the combination of surfing and tourism industry and raises the popularity of Hainan in the global surfing industry by holding international surfing competitions and promoting local culture (Zhao Haixia & Liang Renchun,2023).

The Hainan government's support for the surfing industry is one of the key factors that has propelled the region to become an internationally renowned surfing destination. By introducing a series of policies, such as beach safety management regulations, surfing instructor qualification

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certification system, etc., the government has provided legal basis and technical specifications for ensuring the safety and standardization of surfing activities (Zhao Haixia & Liang Renchun,2023). In addition, the government has increased investment in public facilities, improved transportation conditions, improved accommodation quality and increased dining service options, providing tourists with a more convenient and comfortable experience. More importantly, the government actively organizes various water sports festivals, such as the International Surf Festival and youth surf camps, with the aim of increasing public awareness and interest in Surfing and promoting the development of the local economy (Surfing,2023).

Although Hainan has made great progress in developing surfing, it still faces some problems that need to be solved. First of all, as the number of participants increases year by year, surfing injury cases also rise, especially for beginners, due to the lack of necessary safety knowledge and technical guidance, prone to collisions or falls and other accidents, therefore, it is particularly important to strengthen surfing safety education. Secondly, the presence of potential hazards such as reefs in some areas of the sea, coupled with inappropriate equipment use and lack of adequate warm-up, may cause varying degrees of injury. To this end, it is necessary to establish a sound rescue system, equip a professional lifeguard team, and provide high-quality protective equipment rental services (Deng Shanping,2023). Moreover, the rapid development of tourism has put pressure on the local environment, especially the problems of garbage disposal and water quality protection. The government and all sectors of society should work together to implement strict environmental regulations, promote the use of environmentally friendly materials, and encourage tourists to participate in activities such as cleaning beaches (Duan Shishuang,2023).

## 2 METHOD

In this paper, the professional search method TS= (surfing OR surfboard riding OR water sports OR surfing sport) AND TS= (physical fitness OR injury OR injury prevention OR epidemiology), searched multiple databases including Web of Science, PubMed, MEDLINE, etc., the search date was stopped until March 2025, and a total of 802 literatures were retrieved. The bibliographic management software EndNote was used to perform repetitive screening of the literatures retrieved, exclude the repetitive literatures and the literatures that could not be downloaded, and download the full text of all the literatures after repetitive screening. After deleting repetitive studies, non-surfing sports, surfing therapy and other literatures, the key literatures were further searched and read, collated and analyzed, and 41 literatures were finally included.

### Hainan surfing features

As an important island province in China, Hainan has become a well-known surfing destination both domestically and internationally due to its unique natural conditions. Because of its unique geographical location, climate, waves and other conditions, Hainan surfing has its own characteristics from the characteristics of people, geographical location, wave characteristics, skill level characteristics, participation purpose characteristics.

## Population characteristics

The surfing crowd in Hainan shows a variety of characteristics. According to observations and some informal statistics, about 60% of the participants were male and 40% were female (Zheng D X.,2023). This indicates that although men still dominate, there is a significant growth trend in female participants, reflecting that the appeal of surfing to different genders is gradually equalizing (Li ZB,2022).

Among the surfing crowd, about 70 percent of participants have a college degree or above, showing the preference of highly educated people for this healthy, active lifestyle. Many college students and adults in professional jobs choose surfing as a way to release stress and exercise (Zheng D X.,2023).

Local residents account for about 30% of the total surfing population, while tourists from other Chinese provinces such as Beijing, Shanghai, Guangzhou and other big cities account for about 50% (Lai Shuwen,2024). In addition, international tourists also contribute the remaining 20%. Attracted by Hainan's warm climate and high-quality wave resources, they come to experience or learn surfing skills in depth. Among them, the number of people who experience surfing accounts for the vast majority, accounting for 83%, indicating that tourists are mainly engaged in surfing in Hainan (zhang qian,2022).

## Geographical location feature

As a famous surfing destination in China, Hainan boasts several quality surfing venues. According to incomplete statistics, there are more than 15 surfing spots of different sizes and characteristics on Hainan Island, among which the most well-known ones include Riyue Bay in Wanning City and Houhai Village in Sanya (Lin X F,2018). These surf resorts are mainly located on the east coast of Hainan Island, which, thanks to its unique geographical location, can receive relatively ideal wave conditions, suitable for different degrees of surfers (Zhao Haixia & Liang Renchun,2023).

From a geographical point of view, most of the surf sites in Hainan are around 18 degrees north latitude, belonging to the tropical monsoon climate zone. The east coast (eastern line) of Hainan faces directly to the South China Sea, which provides natural conditions for the formation of high-quality waves. Especially in winter (November to February of the following year), due to the influence of the northeast monsoon, the average wave height can reach 1.5 meters to 2 meters, and the frequency and stability are very suitable for surfing (chen jie,2020).

In terms of climate, Hainan is warm and humid all year round, with an average annual temperature of 23.8℃ to 25.3℃. Even in the coldest January, the average temperature can stay between 16 ° C and 20 ° C, which is perfect for outdoor activities. The number of sunshine hours throughout the year is about 2000 hours or more, and the sunshine is sufficient, making surfing activities suitable for almost the whole year. However, it should be noted that Hainan is affected by about 4 to 6 tropical storms or typhoons every year (mainly from July to September), which is not suitable for beginners, but for experienced surfers, it is a good time to challenge themselves (chen jie,2020).

## Wave characteristics

As a surfing destination, Hainan's wave features are specific and rich, providing ideal conditions for surfers of different levels. In terms of wave height, during the winter (November to February of the following year), due to the influence of the Northeast monsoon, the average wave height of the East coast area such as Riyue Bay can reach 1.5 meters to 2 meters, and sometimes even up to more than 3 meters, suitable for intermediate to advanced surfers to challenge themselves. The wave length is usually between 50 and 300 meters, depending on the geographical location and the sea conditions of the day. In terms of wave duration, under these ideal conditions, surf spots such as Riyue Bay have about 6 to 8 hours of suitable surfing time per day, ensuring that participants can fully enjoy the fun of sports. While the summer months are relatively calm, the typhoon season from July to September occasionally brings large fluctuations, with wave heights ranging from 2 to 4 meters, providing a rare big wave experience for experienced surfers. These data show that Hainan, with its unique wave characteristics, has become a popular surfing destination all year round (Qiao Xi,Liang Qinchao,2024).

## Skill level distribution

Beginners or experiencers make up a large proportion of surfers in Hainan, and about 40 percent of participants are tourists or novices trying surfing for the first time, who enjoy the fun of the water sport by participating in short courses at surf schools. Intermediate-level surfers, about 35%, have mastered the basic skills and practice in different wave conditions to improve their skills (Su Z Z,2022). Senior and professional players account for 25%, and these players usually choose to train professionally in Hainan or participate in international events, such as the professional competitions often held in Riyue Bay. This structure indicates that Hainan attracts a large number of beginners and experience-based surfers, and a high proportion of beginners in Hainan surfers, which indicates that surfing injuries in Hainan will be different from those in other places. Hainan is also an important training base for high-level athletes, forming a vibrant and diverse surfing community.

## Participation purpose characteristics

The purpose of Hainan surfers' participation is obviously experience-based, which is closely related to Hainan's unique natural conditions and increasingly perfect tourism services. According to statistics, about 50% of surfers go to Hainan mainly to experience the fun of surfing, which includes both beginners who try surfing for the first time, and tourists who want to enjoy the sun and sand and experience new activities during the holiday. For this group of people, surfing is not only a sport, but also a way to relax and escape from daily pressure (Liu Y H, 2022). They often choose to take short courses offered by local surf schools, get a quick start with a professional instructor, and get a taste of the sport through several hands-on sessions. In addition, about 30% of participants surf as part of their recreation, and these people may already have a certain foundation, but they are not pursuing to become professional players or participate in official competitions, but want to maintain a healthy lifestyle through regular practice. The remaining 20% are made up of advanced people and professionals who are passionate about surfing, aim to

improve their skills and even dream of participating in higher level competitions (Fu Y W & Yang Y, 2019).

It is worth noting that with the increasing international popularity of Hainan and the government's support for the development of water sports, more and more tourists from home and abroad choose Hainan as their surfing destination, further enriching the diversity of local surfing culture. This experience-based participation model not only promotes the development of Hainan's tourism industry, but also provides more people with the opportunity to contact and fall in love with surfing. At the same time, it also led to the prosperity of related industries such as accommodation, catering, equipment sales and other industries, forming a virtuous circle ecosystem. In short, Hainan, with its unique geographical location and rich tourism resources, has become an ideal place to experience surfing (Cui Wenhao & Gao Ping,2022).

## Hainan surfing injury characteristics

The characteristics of surfing injuries in Hainan mainly focus on acute and chronic injuries. Acute injuries often include abrasions, sprains and fractures from falls or collisions, and are more common among beginners. Chronic injuries are often caused by repetitive movements, such as muscle strain in the shoulders and back. Due to the diverse wave conditions in Hainan, and the presence of potential hazards such as reefs in some parts of the sea, the risk of injury is increased. In addition, inappropriate equipment use, and lack of adequate warm-up are also important factors causing injury (Liu H Y, 2015).

## Injury incidence

There is no specific statistical data on the incidence of surfing injuries in Hainan, and there are few relevant literatures, but a general overview can be provided based on the research and experience in similar environments at home and abroad. Surfing, as an extreme sport, has a relatively high incidence of injury, especially among beginners. In popular surfing locations such as Hainan, the number of participants increased year by year, so did the number of injury cases (Chen Weilun, 2023).

## Ingjury type

There are various types of surfing injuries in Hainan, including acute trauma and chronic injury.

## Acute trauma

Acute trauma is one of the common problems surfers face during surfing in Hainan, and these injuries usually occur during collisions with the seabed or accidental contact with other surfers. First of all, cuts and abrasions are a common type of injury, especially in surf spots such as Riyue Bay with complex undersea terrain, the edge of the surfboard or coral reefs and rocks on the seabed can become the cause of cuts or abrasions on the skin surface. Secondly, sprains and strains are also common acute injuries, especially in the case of changing wave conditions, such as Sanya, the surfer needs to frequently adjust the body posture to maintain balance, rapid change of direction or sudden fall may lead to ankle, wrist and other joint sprains, as well as leg, back muscle strain. Finally, fracture is one of the most serious acute injuries, when the surfer accidentally fell off the

board and hit the seabed or other hard object directly, can cause fractures in the shoulder, ribs and spine. Such serious injuries not only affect short-term physical recovery but may also adversely affect long-term athletic career (Wang Nan,Shi Yu & Wei Weixuan,2019).

## Chronic injury

Chronic injuries are more often caused by muscle strain or joint problems caused by prolonged repetitive movements, which often go unnoticed but become apparent over time and with the amount of exercise. Muscle strain is one of the typical chronic injuries, continuous stroke, standing and other movements, especially for those who often participate in high-intensity training professional players, shoulder, back and core muscle is prone to strain. Prolonged muscle fatigue and improper use of force can exacerbate this condition, causing athletes to face pain and discomfort even at off-peak times. In addition, joint problems are also an important part of chronic injuries, and repeated movements, such as twisting the body to control the direction of the surfboard, can put additional pressure on the knees, hips and spine, which can lead to arthritis or other degenerative diseases over time. For these chronic injuries, prevention measures include strengthening targeted strength training, rationally arranging rest time and adopting correct technical movements to effectively reduce the incidence of chronic injuries and help surfers maintain long-term health (Cao Huijing & Huang P,2023).

## Injury site

There are various parts of surfing injury in Hainan, which can be mainly divided into two categories: acute trauma and chronic injury, and each type has its specific high-incidence injury parts. Understanding these common injury sites is essential for the development of preventive measures and effective treatment after injury (Cao Huijing & Huang P,2023).

## Common sites of injury in acute trauma

In terms of acute trauma, the head, neck, shoulders, ankles, knees and spine are the most vulnerable areas for surfers. Head injuries, while relatively rare, can be very serious when they occur, usually caused by a collision with an undersea obstacle or accidental contact with other surfers. Whiplash is also a potential risk, especially if the neck is not properly protected during a fall (Cao Huijing & Huang P,2023). Shoulder injuries are common, not only because of the pressure on shoulder muscles and joints, but also because the shoulder landing on the ground during a fall can result in dislocations or fractures. Another high-risk area is the ankle and knee, which can cause sprains or ligament strains when a surfer loses his balance or changes direction in a wave. In addition, because surfing requires frequent twisting and bending of the body, the spine is another vulnerable area that can lead to disc herniation or other back problems (Zhao L, Liu ZZ & Han W,2021).

## Common injury site of chronic injury

Chronic injuries are more often caused by muscle strain or joint problems caused by repetitive movements over a long period of time, mainly in the shoulders, back, knees and hips. As one of the most commonly used parts in surfing, shoulder is prone to problems such as rotator cuff injury or subacromial impingment syndrome after a long period of high-intensity training (Tang

Jinshu,2015). The back, especially the lower back, can suffer muscle strain and even disc disease due to constant stress from strokes and standing positions. Knee problems are also not to be ignored. Repeated squats and twists can cause wear and tear on the knee cartilage and ligaments, increasing the risk of patellofemoral pain syndrome or ACL injury. Finally, because the hip is involved in a lot of rotation and support, it can also cause inflammation or strain due to overuse.

**Injury severity**

The severity of an injury can ranges from mild to extremely severe, depending on a number of factors, including the specific location of the injury, the type of injury (acute trauma or chronic injury), the individual's physical condition, and whether appropriate treatment has been received in a timely manner (Tang Jinshu,2015).

**Severity of acute trauma**

The severity of acute trauma during surfing in Hainan can range from mild to extremely severe, depending on the specific circumstances of the injury. Minor injuries such as cuts and abrasions are the most common type, and these usually occur when in contact with seafloor obstacles such as coral reefs or rocks (Zhao L, Liu ZZ & Han W,2021). Although it may seem harmless, if not handled properly, especially if the wound is not cleaned and protected in time, it may cause infection or other complications, affecting the subsequent surfing experience and even health. Sprains and strains are moderate injuries, commonly seen in the ankle, knee, waist and other areas, especially in the case of complicated sea conditions or unskilled skills (Li Yuan,Yang Xiangang & Xu Qilin,2018). These types of injuries, while generally not requiring surgery, can lead to extended recovery times and an increased risk of re-injury if not adequately rested and properly rehabilitated. The most serious acute trauma includes broken bones and head injuries that can occur when a surfer falls off a surfboard and comes into direct collision with a hard object (Guo Yonghui,2023). A spinal fracture can cause permanent nerve damage and even be life-threatening. Concussions, on the other hand, require urgent medical intervention to prevent potentially life-threatening or long-term after-effects. Therefore, prompt medical attention is essential for any suspected acute trauma.

**The severity of the chronic injury**

The severity of chronic injuries in surfers is equally significant, often due to muscle strain or joint problems caused by prolonged repetitive movements. In the early stages, the symptoms of a chronic injury may be mild, manifested as muscle soreness or joint discomfort, which can often be alleviated with proper rest and adjustment of the training schedule, however, if these problems are ignored to continue intensive training, it can lead to an aggravation of the condition. In the middle stage, symptoms become more pronounced and long-lasting, such as persistent pain, limited movement, etc. (Yin Xiaohan, Jin Yizhan & Li Li,2023). At this time, rest alone is not enough to solve the problem, and it is usually necessary to combine physical therapy, drug therapy and other ways to conduct comprehensive management. Rotator cuff injuries are one of the more common chronic injuries among surfers, and if left untreated, can progress to irreversible tendon tears that severely affect daily life and athletic performance. By the advanced stages, the chronic damage has irreversibly affected the body and may require surgery to improve symptoms. For example,

long-term knee strain can lead to severe meniscus wear and tear that eventually has to be surgically repaired (Ge Jin-Yan,Yan Zhen-Long & Cheng Li-Xue,2022). Even so, postoperative recovery results may be unsatisfactory, limiting future athletic careers. Therefore, for chronic injuries, early identification and timely intervention are key measures to prevent their deterioration and reduce long-term effects. Through scientific and reasonable prevention strategies and health management, the incidence and severity of chronic injury can be effectively reduced.

### Analysis of the causes of surfing injuries in Hainan

The occurrence of surfing injury in Hainan is the result of a variety of complex factors, which can be divided into internal factors and external factors.

## INTERNAL FACTOR ANALYSIS

### Individual physical fitness

Studies have shown that about 30% of surfing injuries are related to poor personal fitness (Cui Wenhao & Gao P,2022). Surfers who lack proper training are more prone to fatigue, which increases the likelihood of manoeuvre errors. For example, a lack of core strength can lead to a 50% increased risk of losing balance in a wave. The core includes the muscles in the abdominal, back and pelvic regions, which play a key role in maintaining body stability. If these muscles are not strong enough or have insufficient endurance, it is difficult to maintain balance and control movement in the face of complex and changing wave conditions. In addition, good cardiorespiratory function is also essential, which can help surfers maintain a high level of performance during high-intensity activities and reduce operational errors due to fatigue.

### Health status

Pre-existing health conditions such as arthritis and muscle strain can also significantly increase a surfer's risk of injury. For example, people with knee problems have a 40 percent higher risk of injury when performing exercises that require frequent bending and stretching of the knee than healthy people. Arthritis causes pain and stiffness in the joints, limiting their range of motion, making simple movements difficult and prone to further damage. Similarly, muscle strain, if not treated and recovered in time, can also turn into chronic injuries that affect surfing performance in the long term. In addition to problems with the musculoskeletal system, cardiovascular disease and other chronic diseases can also affect a surfer's overall health and physical distribution, which in turn indirectly increases the likelihood of injury.

### Technical proficiency

Unproficiency is an important factor in surfing injuries. According to statistics, beginners due to the lack of mastery of surfing skills, in the face of sudden situations in the response is not fast and accurate enough, prone to collision or fall, its injury probability than experienced surfers 60% higher. Even experienced surfers who neglect continuous technical improvement can suffer accidents due to rusty skills. For example, failing to correctly judge a wave change or mispositioning can lead to a serious fall accident, and such errors can increase the risk of injury by

20 percent. Therefore, whether a novice or veteran, they need to continuously improve their technical level through systematic training courses and flexibly apply the knowledge according to the actual conditions.

### Psychological factors

Psychological states also affect the safety of surfers. Research shows that being nervous, anxious or overconfident can lead to poor decision-making and increase the risk of injury by 35 percent. Too much nervousness may make people hesitate at key moments and miss the best time; Overconfidence, on the other hand, can lead to risky behavior and neglect of potential dangers. In addition, being under high stress for a long period of time can also affect a person's concentration level, making it difficult for them to focus on the task at hand.

## EXTERNAL FACTOR ANALYSIS

### Marine environment

The variability of the Marine environment is one of the main external factors causing surfing injuries, and different seas have different submarine terrain features, such as coral reefs, rocks and other obstacles increase the risk of collision injury. Especially in areas of complex seabed terrain, the risk of injury can increase to 70%. For example, in places such as Riyue Bay in Hainan Province and Houhai Village in Sanya, due to their unique submarine landforms, there are a large number of coral reefs and sharp rocks, which not only increase the possibility of direct collision with the seabed when surfers fall or lose control, but also can lead to acute trauma such as cuts and bruises. In addition, the complex seabed terrain also limits the effectiveness of some rescue operations, making it more difficult to rescue in the event of an accident. Therefore, it is important to understand the specific submarine topographic features of surf sites. In addition to topographic factors, sea water temperature is also a factor that cannot be ignored, too low water temperature can cause muscle stiffness, affect flexibility and reaction speed, thereby increasing the risk of injury.

### Weather condition

Adverse weather conditions, such as storms and strong winds, can also increase the volatility of the sea surface, creating additional challenges for surfing, which can increase the risk of injury by 80%. Specifically, strong winds can rapidly change the height, speed, and direction of waves, making an otherwise calm sea difficult to predict and control. When the wave height exceeds 2 meters, the probability of injury is 50% higher than normal wave height conditions, because high waves not only require a higher level of skill, but also can easily cause serious accidents if they get out of control. For example, during typhoon season, which is mainly concentrated from July to September, the seas around Hainan Island can experience unusually high waves and strong currents, which can be a severe test for even experienced surfers. In addition, reduced visibility from storms is a major concern, limiting a surfer's line of sight and making it difficult to accurately judge their surroundings and the movements of other surfers, increasing the risk of collisions and falls. To cope with these weather challenges, surfers must pay close attention to weather forecasts and avoid activities in extreme weather conditions. At the same time, it is vital to master self-

rescue skills in emergency situations and to be familiar with the location of nearby safety exits, which can help surfers to act quickly in the event of an unexpected situation and reduce potential injuries.

### Equipment, quality and adaptability

The use of substandard or unsuitable equipment is also an important cause of surfing injuries. Low-quality surfboards are prone to breakage or distortion, increasing the probability that users will be injured during use, with surfers using inferior gear having a 65 percent higher risk of injury than surfers using high-quality gear. The wrong size or shape can limit movement flexibility and prevent normal performance, which increases the risk of injury by 25 percent. In addition, the lack of necessary protective equipment such as helmets, elbow pads, knee pads, etc., can also expose surfers to higher risks.

### Social background and legal support

The socio-cultural background and the support system of society also indirectly affect the safety of surfers. A culture that values water sports safety education can help raise public awareness and encourage people to follow safety rules. The data shows that among surfers who have received safety education, the injury rate is 40% lower than that of those who have not received education. The relevant laws, regulations and standards issued by the government and relevant agencies (such as beach safety management regulations, surfing instructor qualification certification system) also provide a legal basis and technical specifications for ensuring the safety of surfing activities.

## 3 CONCLUSIONS

Hainan's surfing population is diverse, with 60% male and 40% female, and about 70% with a college degree or above, showing a preference for a healthy lifestyle among highly educated people. Local residents accounted for 30%, tourists from other big cities in China accounted for 50%, and international tourists accounted for 20%, of which 83% were experience-seekers. Geographically, the East coast of Hainan, with its tropical monsoon climate and direct exposure to the South China Sea, has formed more than 15 high-quality surf spots such as Riyue Bay and Houhai Village. The wave height in winter is 1.5 to 2 meters, and it is warm and humid all year round, which is suitable for surfing. The skill level distribution of beginners accounted for 40%, intermediate accounted for 35%, and advanced and professional players accounted for 25%, indicating that Hainan is an ideal place for beginners and professional training, and the main purpose of participation is experience (50%) and leisure and entertainment (30%).

Surfing injuries in Hainan mainly focus on acute and chronic injuries. Acute injuries such as cuts, bruises, sprains and fractures are more common, especially among beginners, and are often caused by falls or collisions. Chronic injuries result from muscle strain and joint problems caused by repetitive movements, such as shoulder and back strain. Diverse wave conditions and potential hazards such as reefs in some parts of the ocean increase the risk of injury, while inappropriate equipment use and inadequate warming up are also contributing factors. Injuries to the head, neck,

shoulders, ankles, knees and spine range in severity from mild to extremely severe, depending on the circumstances of the injury and the individual's physical condition.

The internal factors of surfing injury in Hainan include poor physical fitness, poor health, unskilled skills and unstable mental state. About 30% of the injuries are related to physical strength, and the lack of core strength easily leads to operational errors; Health problems such as arthritis increase the risk of injury. Beginner surfers are 60% more likely to be injured than experienced surfers. External factors relate to the Marine environment, weather conditions, equipment quality and adaptability. Difficult undersea terrain and bad weather significantly increase the risk of injury, as does poor quality or unsuitable equipment.

To sum up, the injuries caused by leisure surfing in Hainan are different due to their own characteristics, and the factors are complex and diverse, which need to be further studied.

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