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Article

Analysis and prevention and treatment of ankle joint injury factors in basketball players based on data mining

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Abstract: Basketball, as a highly popular ball game, has become increasingly exciting in both time and space. Therefore, basketball players must have good physical fitness. They need to adapt to changing environments and master corresponding technical actions. In sports, it is usually necessary to break away from the opponent's defense by moving quickly and stopping quickly. Defensive players must make accurate predictions based on the enemy's technical movements, which are often accompanied by intense physical confrontation. The purpose of this study is to analyze the causes and characteristics of ankle joint injuries in basketball players, propose treatment suggestions and preventive measures, and prevent ankle joint injuries. Firstly, the reasons for ankle joint injuries were explained, and a brief analysis was made of the characteristics of ankle joint injuries in the project and the technical actions that can easily cause ankle joint injuries. Next, this article considers preventive measures to avoid ankle joint injuries and proposes methods for preventing and treating ankle joint injuries during exercise. Afterwards, data mining methods were used to study the research mechanism of ankle joint injury, in order to promote the research mechanism of ankle joint injury. Through experiments and analysis, RBF neural network algorithm was introduced into the ankle joint injury research mechanism, and the new ankle joint injury research mechanism could enhance the therapeutic effect by 10.7%.

Keywords: ankle injury factors; joint injury prevention and treatment; data mining; healthcare strategy

1. Introduction

Basketball is a popular sport. Due to its high-intensity and highly confrontational characteristics, various injuries, especially ankle injuries, can easily occur during competition. According to statistics, more than 70% of players have experienced ankle sprains, and the incidence of this injury has reached 80%. This kind of injury will not only affect the competitive level of athletes, but also cause athletes to retire prematurely. Different athletes have different types of injuries, and the injuries caused are also different. Moderate injuries are the most common in basketball, accounting for 58.72% of the total number of people. Although serious injuries only account for 3.83%, injuries to athletes are long-term, and it often takes months or more to recover. Data mining is a powerful tool for deep mining of big data. Using data mining technology to study ankle injuries of basketball players, it can be comprehensively analyzed from multiple angles such as technical movement, intensity, preparation activities, physical fitness and safety awareness. At the same time, through big data analysis, the distribution characteristics of different disaster types and disaster levels are revealed, laying the foundation for targeted disaster prevention and mitigation work. Based on this, this paper adopts the method of data mining to study the relevant factors affecting ankle injuries of basketball players and provide a new theoretical

basis for their prevention and treatment. This paper reviews relevant research at home and abroad and analyzes it using data mining technology in order to reveal its pathogenesis and laws, so as to better promote the healthy development of basketball.

Athletic ankle injury is a common sports injury, which seriously affects the performance of athletes, and improper treatment would also affect the sports life of athletes. In order to meet the needs of accurate diagnosis of traumatic fractures, compensate for the shortcomings of traditional treatment cycles, and improve the recovery speed of patients, Zhao has proven through practice that using multi row spiral CT and 3D imaging reconstruction technology to examine ankle sprains under a microscope is feasible, which can solve the diagnosis of the cause of fractures, compensate for the shortcomings of X-ray, and have a high clinical rate [1]. In order to evaluate the risk factors for injury in end-stage ankle arthritis with different etiologies, van den Heuvel et al. provided a good treatment effect for end-stage ankle arthritis through experimental analysis using intramedullary nails, with a high healing rate and low incidence of complications [2]. Neuromuscular training is effective in reducing ankle joint injuries in football. Rommers et al. uses neuromuscular training in adult amateur football to prevent anterior cruciate ligament injuries and lateral ankle sprains, and identifies obstacles to using neuromuscular training [3]. van Dyk et al. studied how to better understand how to prevent hamstring injuries. However, the research on risk factors reported contradictory results, which led to the unclear conclusion that flexibility is a risk factor for hamstring injury [4]. The purpose of Yao et al.'s study was to prospectively determine the anatomical and functional internal risk factors of lateral ankle sprain of young athletes participating in group sports. The data of this study can help therapists and trainers identify people with high risk of ankle sprain [5]. Vaulerin et al. studied whether the internal physical risk factors and work-related environment can predict the ankle sprain of firefighters during physical exercise on duty, and provided evidence that the internal factors mainly lead to ankle sprain [6]. Jauhiainen et al. introduced how to use predictive machine learning methods to detect sports injury risk factors in a data-driven way [7]. The above researches are more specific for the analysis of ankle injury factors, but they are not related to the prevention and treatment of ankle injury.

The strength training of the ankle joint should be strengthened to enhance the strength, elasticity and extensibility of the muscles and ligaments around the ankle joint, which plays a certain role in preventing ankle joint injuries. Whittaker and Roos studied delayed surgical intervention instead of exercise therapy to optimize muscle strength and neuromuscular control. At the same time, it can solve the fear of sports to ensure the recovery of physical activity and rehabilitation before sports, and promote the education of realistic expectations and self-management [8]. Emery and Pasanen investigated the positive impact of participating in sports and recreational activities on public health throughout the life cycle [9]. Omi et al.'s survey found that there were few plans to prevent female basketball players from anterior cruciate ligament injury. In addition, injury prevention training focusing on hip joint function has not been reported [10]. Vlachas and Paraskevopoulos believed that football is a contact sport and would increase the risk of injury. To reduce injuries, a warm-up program was created to prevent injuries [11]. Close et al. designed to examine the psychometric characteristics of the Health Belief Model Scale and the Theory of

Planned Behavior Scale, and determined the construct validity by evaluating which subscales were most relevant to the intentions of adults participating in sports related injury prevention programs [12]. Bulat et al. summarized the injury mechanisms and risk factors of some of the most common lower limb musculoskeletal injuries from a biomechanical perspective, including anterior cruciate ligament, patellofemoral and hamstring injuries. The effectiveness of musculoskeletal modeling and dynamic simulation tools in helping people understand these injury mechanisms was also discussed [13]. Huang et al. believed that the anterior cruciate ligament injury prevention plan is generally considered valuable to reduce the risk of injury [14]. The above researches were more profound in the prevention and treatment of ankle injury, but they did not link the factors of ankle injury among them.

In the process of training, athletes should pay more attention to the ankle joint and improve the level of self-protection. Athletes should adhere to correct techniques and scientific order of exertion and make preparations before training. It is necessary to pay attention to the body regulation strategy after fatigue and the normalization of training places and equipment. In case of ankle joint injury, attention must be paid and timely treatment must be carried out to recover slowly without anxiety.

2. Causes of ankle joint injury

(1) Inadequate preparation before competition or training

It is very important to be ready for the game or training. 1) Training must be adequate. In particular, in winter, it is necessary to mobilize various functions of the body to carry out activities. 2) The preparation must be adequate. Too much or too little exercise is not appropriate. Too little preparation would not produce results, and too much preparation would affect normal games and exercise. 3) The preparation activities must be targeted. Generally speaking, after the comprehensive preparatory activities are completed within a period of time, special preparatory activities should be added according to the specific conditions of the specific project. 4) If there is a long rest period between competitions or training, athletes must re prepare before exercising. In this case, if the athletes do not follow the rules or even make rough movements during the competition or training, it is very easy to cause ankle injury.

(2) Characteristics of ankle joint injuries in the project

Take off, emergency stop, emergency start and other technical movements are widely used in sports, which are often accompanied by serious body collision, resulting in ankle injury [15,16]. Under the condition of good physical strength and physical condition, the risk of ankle injury in sports is very low. Under the general condition of physical strength and physical state, the transmission of human nervous system is slow; muscle elasticity decreases and coordination is damaged. In this case, it is easy to hurt the ankle joint if the athletes persist in sports, change direction, swing and other movements. If the objective conditions of the sports field are insufficient, such as insufficient space and uneven surface, wet and slippery is the potential factor causing ankle injury. In the process of sports, it is easy to cause ankle joint injury to make unreasonable actions due to misjudgment when doing corresponding actions. The temperature is low in winter, so the body function is relatively low and the muscle strength is insufficient, which makes the coordination between the muscle and the

nervous system relatively low. The characteristics of ankle joint injury are shown in **Figure 1**. In addition, the team members' emotions during exercise are also potential influencing factors.

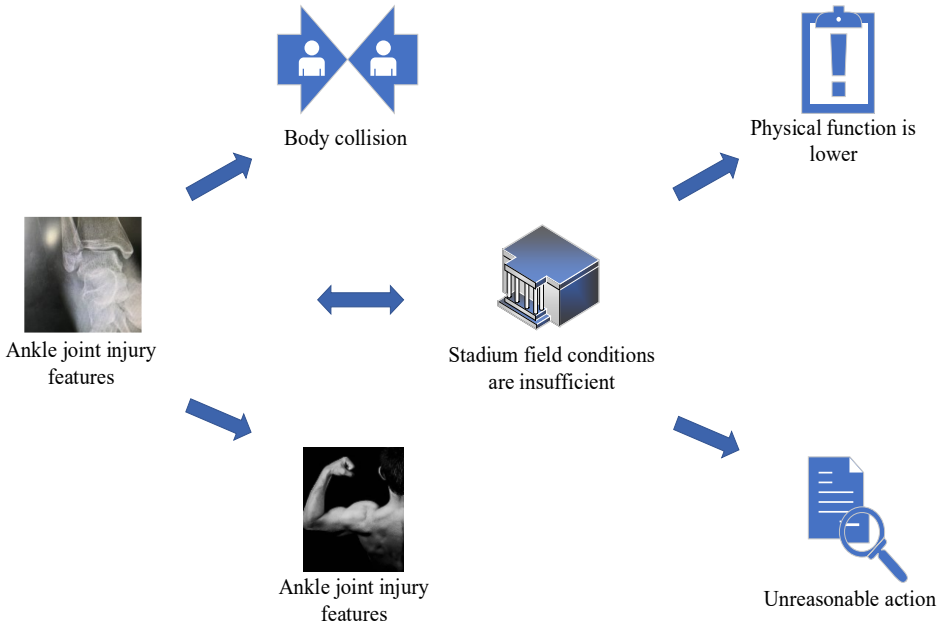

Figure 1. Characteristics of the ankle joint injury in the project.

(3) Technical actions that are easy to cause ankle injury

On the playground, players often use defensive and offensive actions. In the process of training, athletes often do squat, frog jumping and other exercises. If the movement is more complex, the ankle joint injury is very serious. In particular, in basketball games, when taking off and landing, it would cause huge impact on the ankle joint. When the center of gravity is unstable or accidentally step on the feet of other athletes, it would cause damage to the foot ligaments. Flexible feet are the basis of attack, especially in defense. In order to adapt to the rapid changes of defense and occupy a more favorable position, athletes usually need to move faster.

3. Preventive measures to avoid ankle injury

(1) Fully prepare for activities

The main physiological mechanism of preparation activity leaves traces of muscle activity in the corresponding parts of the nerve center, which enhances the excitation and regulation functions of the central nervous system, thus overcoming the functional inertia of internal organs and accelerating biochemical reactions. In sports, the first thing to do is to prepare for sports, especially for the ankles and other fragile parts. Preparing for activities can not only improve the efficiency of sports training, but also become an effective means of preventing ankle injury.

(2) Increase ankle strength exercises to prevent fatigue training and overwork

Ankle strength training is particularly important, and it is an effective means to prevent ankle injury. In practice, athletes can use different methods to increase the strength of the ankle joint, such as walking outside the foot, walking inside the foot, walking toe, straight leg jumping, etc. In addition, it can also provide necessary

protective measures for people who are often injured, such as using bandages to protect their ankles. These measures also apply to athletes who have just participated in sports activities. Therefore, the improvement of athletes' ability to resist external injury factors is an important means to reduce the damage to sports. Fatigue training and overwork are taboos in sports, which can not only not improve the performance of athletes, but also cause harm. Exercise fatigue is a temporary decline in exercise ability and physical function caused by exercise. Training must be adjusted after a period of time to restore the strength before training. The process of rehabilitation and exercise is two aspects of improving body quality. Nutrients taken during exercise should be added during the recovery period after exercise to improve body function. If the athletes do not fully recover and continue to exercise, it would not only accumulate fatigue and reduce the physical exercise ability, but also lead to disease and injury. Therefore, it is very important to use scientific methods to accelerate the recovery process of the body after exercise, which is shown in **Figure 2**. It turns out that when people feel tired and inattentive, the risk of injury increases significantly. Therefore, when athletes are weak and lack of attention, they must be reminded to pay attention to safety. By properly controlling the amount of exercise, injuries can be prevented.

Figure 2. Increase the ankle strength practice to prevent fatigue training and overwork.

(3) Grasp reasonable sports techniques and strengthen the management of field equipment

The correct and reasonable sports techniques and sports skills are not only the necessary means to prevent injuries, but also the necessary conditions to improve sports performance. In order to achieve the improvement of sports performance, the improvement of physical condition, and the maintenance of physical health, it must be

achieved through sports. In addition, proper landing technique is also an important means to prevent ankle injury. The outer ankle is about 1 cm longer than the inner ankle, which is located behind the inner ankle, so the middle band is stronger than the lateral ligament. Therefore, when jumping to the floor, in order to avoid ankle injury, athletes should carefully extend their legs backward. Teachers and managers must strengthen standardized management in the field and respond to security threats in a timely manner.

4. Prevention and treatment of ankle joint injury in basketball

(1) Preventive measures

Proper preparation activities should be sufficient, especially in cold seasons, full warm-up exercises should be carried out, and the body should feel slightly sweaty. The preparation activities are carried out according to the characteristics of the project. Generally speaking, after the preparation work is completed, specific training would be carried out. If the interval between two exercises is long, it should be rearranged before the exercise starts. Practice shows that poor physical quality and nonstandard movement skills are important factors leading to sports injuries. If there is no continuous training, even if the athletes have trained for many years, they should also receive retraining before formal training or competition. In order to prevent ankle injury, athletes must first take the correct landing posture. When landing, the knee must be slightly bent and the center of gravity must be stable, especially in the process of flying, so that the body does not lose balance. Preventive measures are shown in **Figure 3**. According to the actual situation, proper arrangement of exercise load can improve sports performance and prevent sports injuries.

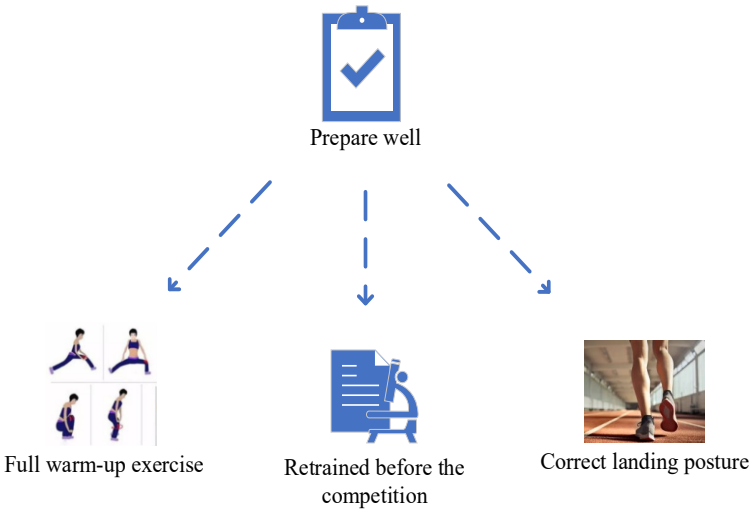

Figure 3. Preventive measures.

(2) Treatment

The ankle joint should be avoided as much as possible during exercise. After injury, the training should be stopped immediately and a preliminary decision should be made. In case of moderate to mild sprain, athletes should immediately use cold compress. When the injury is serious, the wound must be treated immediately. Generally, within 24–48 h, due to inflammation such as soft tissue rupture and

swelling, ankle movement should be minimized and appropriate drugs should be taken. After 48 h, the acute inflammation gradually disappears, but usually accompanied by congestion and swelling. At this stage, physical therapy, massage and external painkillers should be tried according to the medical data provided in machine learning to promote blood circulation and eliminate swelling problems [17,18]. In addition, athletes should pay attention to strengthening recovery training after injury, especially in ankle movement and increasing the stability of ankle joint, including ankle muscle jumping.

(3) Application of medical care strategy after ankle injury

Generally speaking, medical means such as cold compress and acupuncture would reduce ankle tissue edema and other problems. Therefore, it is necessary to timely ensure the ankle safety of athletes according to medical care strategies [19,20]. The treatment principle is to promote ankle joint tissue metabolism by improving the blood circulation of the injured part, so as to quickly absorb exudates [21,22]. During the treatment, muscle and joint functions are strengthened and recovered, and ankle strength was enhanced. In practice, treatment should promote the rapid recovery of patients' blood circulation, regeneration and functional recovery [23,24]. At the same time, the initial treatment of injury is mainly rest. The focus is to restore the function of the ankle joint in sports, and then to expand the strength of the ankle joint [25,26]. The coach can adjust the direction of ankle strength according to the development of ankle joint. By simulating the ankle joint state in different sprain directions, the ankle joint load is increased. The application of medical strategies after ankle injury is shown in **Figure 4**. The ankle extension movement mainly reflects that when the ankle is supported by the other side, it can improve the ability to react quickly in different directions and senses, and improve the ankle sensitivity.

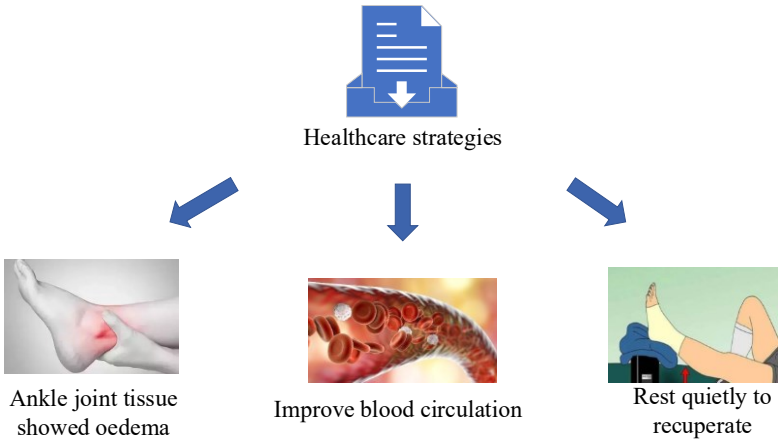

Figure 4. Application of healthcare strategies after ankle injury.

5. Exploration of ankle joint injury assessment mechanism based on data mining

Data mining involves extracting valuable insights from large datasets that are not immediately apparent [27,28]. Data mining is the interdisciplinary fusion of machine learning, pattern recognition, statistics, intelligent databases, knowledge acquisition, data visualization, high-performance computing, expert systems, and other disciplines,

aimed at mining hidden, new, and meaningful connections and patterns from massive data [29,30]. It is not only a simple search, query, and call for a specific database, but also requires statistical analysis, synthesis, and inference of data at the micro, meso, and even macro levels, in order to guide the solution of practical problems, reveal the internal connections between events, and predict future behavior through existing data.

In sports medicine and training, data mining can be used to predict the risk of ankle injury for athletes or individual patients. By analyzing historical data, such as athletes' exercise patterns, body parameters, and injury history, data mining algorithms can identify key factors related to ankle injury and establish predictive models. These models can be used to identify which athletes or individual patients have a higher risk of ankle injury, in order to take targeted preventive measures. Data mining technology can also be used for the diagnosis and classification of ankle joint injuries. By conducting in-depth mining on a large amount of data such as hospital medical records, patient symptoms, and examination results, a damage diagnosis model can be established. These models can use machine learning algorithms to automatically identify and classify different types of ankle joint injuries, improving the accuracy and efficiency of diagnosis. Data mining can also provide personalized treatment method recommendations for doctors. Based on the specific situation of the patient, such as injury type, severity, personal medical history, etc., data mining algorithms can analyze the optimal treatment strategy. By comparing different treatment effects, the optimal treatment plan and recommendations can be provided for patients. In the rehabilitation process of ankle injury, data mining can help develop more effective rehabilitation plans. By collecting and analyzing data on patients' rehabilitation progress, functional recovery, quality of life, and other aspects, key factors related to rehabilitation outcomes can be identified, and rehabilitation plans can be optimized based on these factors, enabling patients to recover their health more quickly and effectively. Data mining can be used to evaluate the efficacy of ankle injury treatment and predict patient recovery. By analyzing data on the patient's treatment process, recovery progress, and functional improvement, an evaluation model can be established to objectively evaluate the treatment effect. In addition, these models can also predict the future recovery of patients and provide reference for doctors. In summary, the application of data mining in ankle injury has broad prospects and practical significance, which can help improve diagnostic accuracy, optimize treatment methods, shorten rehabilitation time, and improve patients' quality of life.

Traditionally, the risk factors related to sports injury are divided into two categories: internal factors and external factors. However, the traditional categorization of internal and external factors does not fully account for the complexity of mechanisms behind sports injuries, suggesting a need for a more nuanced approach. In order to establish a complete model of the research mechanism of ankle joint injury caused by exercise, the interaction of various factors and the influence of injury must also be considered.

Traditionally, the risk factors for sports injuries have been divided into two types: internal and external. However, whether it is an internal or an external cause, it cannot fully explain the occurrence of sports injuries. On this basis, only by comprehensively analyzing the interaction and injury effects of multiple factors can a comprehensive model of the mechanism of ankle sports injury be constructed. In the process of

studying ankle injuries in basketball players, sampling is a very important step. In order to ensure the accuracy and reliability of the research results, the research in this paper adopts a multi-level sampling method. This ensures that the sampling at all levels is sufficiently representative to better reflect the overall situation. The source of information for this study is the competition records, training records and medical records of basketball players. Organize and integrate the original data obtained to obtain samples for this study.

In terms of the representativeness of the sample, we have guaranteed the coverage of the sample, including age, gender and exercise level, so that it can better reflect the ankle injuries of different types of players. At the same time, strict quality control of the samples is also carried out to ensure the accuracy and reliability of the results. In data mining, advanced algorithms are used to analyze sample data. The algorithm automatically recognizes the data and associates it with the data to discover the main factors affecting ankle injury. For example, through correlation analysis, we found that there is a close relationship between some special technical movements and exercise intensity and ankle injury. The results of this study will strongly support us to take targeted preventive measures. The various data sources used in the research of this paper, through data mining methods, study different types of ankle injuries of basketball players, with a view to conducting a comprehensive and systematic study of their pathogenesis, and provide a theoretical basis for future prevention and treatment.

In terms of data analysis, this article first preprocesses the data. In terms of noise reduction, this paper uses limiting filtering and median filtering methods to effectively suppress the effects of abnormal waveforms and noise. After that, through the linear normalization method, the mapping of data on the same scale is realized, thereby improving the convergence and stability of the algorithm. In terms of feature selection, this paper uses an evaluation method based on feature importance. On this basis, by calculating the correlation or amount of information between each characteristic and the target variable, a subset of features that have a greater impact on the performance of the model is selected.

In terms of parameter setting of the algorithm, this paper uses 3 hidden layers, with 50 nodes in each network. This setting ensures the complexity of modeling while also avoiding the danger of overfitting. For the excitation function, the ReLU function is selected in this paper because it can solve the problem of gradient loss well and can improve the nonlinear performance of the model. This paper conducts research on data preprocessing, feature selection, and algorithm parameter selection, laying a good foundation for further modeling and analysis.

By using RBF neural network to carry out early warning of athletes' risk of injury in sports, athletes are divided into three categories by information input. The main changes include the selection of radial basis function, implicit design, weight and width of radial basis function. The longitude method is used to determine the center and width of the hidden layer of the neural network, and the value between the hidden layer and the output layer.

Gaussian function is selected as the activation function of hidden layer unit:

$$F_i(x) = h - \frac{|x-h|^2}{2\alpha_i^2} \tag{1}$$

Among them, $F_i(x)$ is the output of the i-th hidden node, and x is the n-dimension input vector of the network. The output is defined as:

$$y_i = \sum_{i=1}^{k} w_{ij} f_i(x) \tag{2}$$

Among them, $i = 1,2,\ldots,m; y_i$ is the output of the i output layer node, and w_{ij} is the connection weight value from the j hidden layer node to the i output layer node.

It is supposed that there are N sample inputs. For all input samples, the error function is defined as:

$$\partial = \frac{1}{2}\sum_{q=1}^{n} f_q^2 \tag{3}$$

Among, them, f_q^2 is the error, which is defined as:

$$f_q = d_q - y(x_q) = d_q - \sum_{j=1}^{3} w_{1j} f_j(x_q) \tag{4}$$

$$f_q = d_q - y(x_q) = d_q - \sum_{j=1}^{3} w_{1j} f^{-\frac{|x_q - f_j|^2}{2r_j^2}} \tag{5}$$

The iteration process of each free parameter is as follows:

$$\frac{\partial\delta(n)}{\partial w_{ij}(n)} = -\sum_{q=1}^{n} f_q(n)\, h_j(x_q) = --\sum_{q=1}^{n} f_q h^{-\frac{|x_q - h_j|^2}{2\alpha_j^2}} \tag{6}$$

$$w_{ij}(n+1) = w_{ij}(n) - \partial_1 \frac{\partial\delta(n)}{\partial w_{ij}} \tag{7}$$

Among them, n represents the value of the current variable, and $n+1$ represents the value after iterative correction.

Hidden unit center:

$$\frac{\partial\delta(n)}{\partial w_{ij}(n)} = -\sum_{q=1}^{n} f_q(n)\, h_j(x_q) = --\sum_{q=1}^{n} f_q \frac{w_{ij}(n)}{\alpha_j^2} h^{-\frac{|x_q - h_j(n)|^2}{2\alpha_j^2}} (x_q - c_i(n)) \tag{8}$$

$$c_i(n+1) = c_i(n) - \delta_2 \frac{\partial\delta(n)}{\partial c_j} \tag{9}$$

Among them, c_i is the kernel function center vector of the i hidden layer node.

The function width is:

$$\frac{\partial\delta(n)}{\partial w_{ij}(n)} = -\sum_{q=1}^{n} f_q(n) \frac{w_{ij}(n)}{\partial_i^2(n)} \left\|x_q - c_i\right\|^2 h_i(x_q) \tag{10}$$

$$\partial_i(n+1) = \partial_i(n) - \delta_3 \frac{\partial\delta(n)}{\partial c_j\ （n）} \tag{11}$$

Taking into account the interaction and injury effects of the above factors, it is necessary to clearly define the purpose and method of modeling in order to establish a mechanism model for ankle joint sports injury based on data mining. Generally speaking, this model aims to identify the relevant factors and risk patterns of ankle joint sports injuries, providing decision support for preventing and reducing ankle joint injuries. The following are the steps to construct a model for ankle joint sports injury mechanism based on data mining: Firstly, collect all relevant data that may affect ankle joint injury, such as athlete's personal information (age, gender, physical state, etc.), type and method of exercise, sports environment conditions, pre exercise warm-up and stretching activities, etc. Then, the collected raw data is cleaned, transformed, and standardized to ensure the quality and reliability of the data. Afterwards, based on the

characteristics of the data and the analysis objectives, a suitable modeling algorithm is selected. This article selects RBF neural network. Then input the processed data into the selected modeling algorithm, train the model and optimize its parameters, and evaluate the model to ensure that its performance meets expectations. Finally, the trained model is applied to actual data to identify populations at risk of ankle joint sports injury and provide corresponding prevention suggestions. The establishment of this model is not a one-time process, but a process that requires continuous iteration and optimization. By continuously adjusting and improving the model, it is possible to better understand the mechanism of ankle joint sports injury and provide more accurate and personalized decision support.

Finally, this article also trains and tests the model. During the model training process, the data set is prepared first, and the data set is divided according to the proportion of 80% of the training set and 20% of the test set. During the training phase, the data propagates forward through the model, calculates the loss, and optimizes the model parameters through back propagation. Re-evaluate the performance of the model, calculate the accuracy (94.56%), sensitivity (93.28%), specificity and other indicators (94.79%), and draw the ROC curve. Regarding the ROC curve, as shown in **Figure 5**.

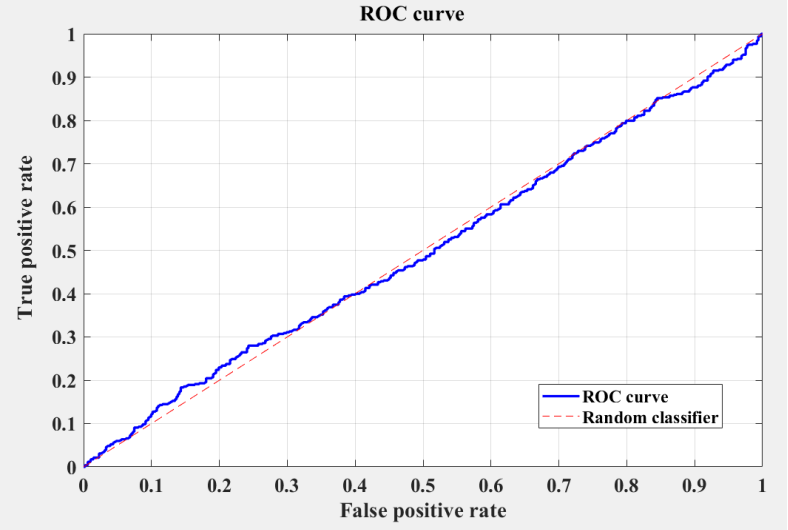

Figure 5. ROC curve result diagram.

As can be seen from **Figure 5**, the AUC value of the ROC curve is 0.49889, from which it can be seen that the generalization ability of the model is strong, the performance is relatively stable, and the overall effect of the model is better.

6. Evaluation of RBF neural network algorithm and experimental investigation results

In order to investigate the main causes of ankle injury in sports in more detail, a questionnaire survey was conducted among the patients with ankle injury in a university hospital of physical education in recent six months. There were 180 cases of ankle injuries, 105 boys and 75 girls. The specific damage causes are shown in **Table 1**.

Table 1. The main cause of ankle injury during exercise.

	Number of people	Proportion
Impaired concentration	23	12.78%
Lack of preparation activities	34	18.88%
Site reasons	11	6.11%
Unstable landing	55	30.56%
Excessive fatigue	30	16.67%
Other reasons	27	15%

It can be seen from **Table 1** that among 180 ankle injured students surveyed, 12.78% were injured due to inattention, and 18.88% were lack of preparation; 6.11% were caused by the site, and 30.56% were caused by unstable landing; physical fatigue accounted for 16.67%, and other causes accounted for 15%. The main cause of injury is unstable landing, which is related to the anatomical and physiological characteristics of the ankle joint. When athletes fall unsteadily or perform poorly, it is easy to make the ankle ligament bear too much weight, thus causing ankle ligament damage or fracture.

A comprehensive investigation was made on the treatment methods for ankle injuries of athletes. A sports college was selected to investigate the treatment methods for ankle injuries in this sports college. A total of 300 students were investigated, including three grades of ankle injuries, which were set as A, B and C. The investigation is shown in **Figure 6**.

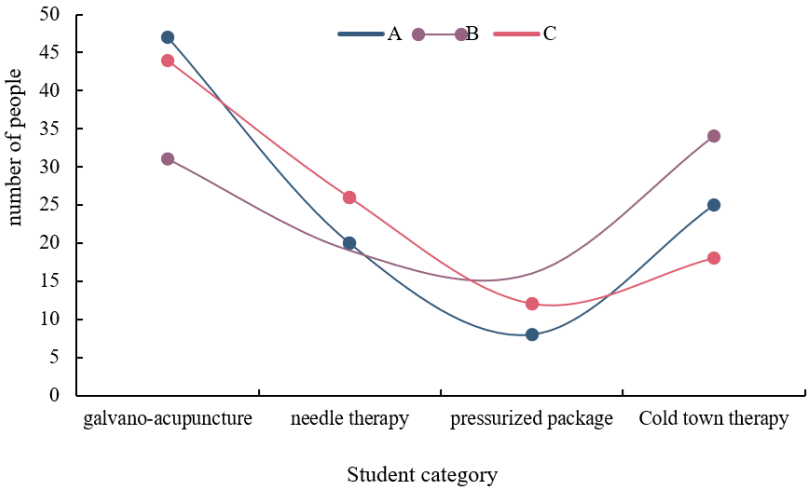

Figure 6. Treatment of ankle joint injury in sports colleges.

It can be seen from **Figure 6** that the school has four ways to treat ankle injuries of athletes: Galvano-acupuncture therapy, needle therapy, pressurized package and cold town therapy. Among the 300 athletes with ankle injuries, 122 were treated with Galvano-acupuncture therapy and 65 were treated with needle therapy; 36 people were treated with pressurized package and 77 people were treated with cold town therapy.

In order to investigate the effect of the current ankle injury research mechanism on the prevention and treatment of athletes' ankles, this paper used a new ankle injury research mechanism for ankle injury patients in a sports college to strengthen the

treatment of ankle injury. 100 patients with ankle injury were investigated. The therapeutic effects of the current ankle injury research mechanism on internal ankle fractures, external ankle fractures, posterior ankle fractures, ankle dislocations, ligament strains, etc. were investigated. The treatment effect can be divided into three types: good, general and poor. The specific effect is shown in **Figure 7**.

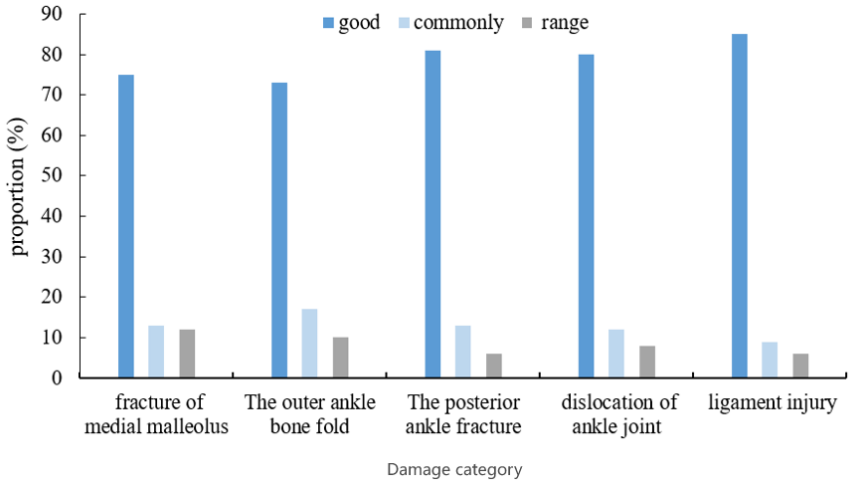

Figure 7. The effectiveness of the current ankle joint injury research mechanism on the ankle joint prevention and treatment in athletes.

As shown in **Figure 7**, among the 100 patients with ankle injuries investigated, 75% of the current ankle injury research mechanisms had good treatment effects on medial ankle fractures and 73% of the lateral ankle fractures; 81% of posterior malleolar fractures and 80% of ankle dislocations had good results; 85% of the patients had good results in the treatment of ligament strain.

In order to strengthen the effect of ankle joint prevention and treatment, RBF neural network algorithm was introduced into the ankle joint injury research mechanism to enhance the effect of ankle joint injury treatment. In order to detect the effect of the new ankle joint injury research mechanism constructed by RBF neural network algorithm, this paper used the new ankle joint injury research mechanism for the ankle joint injury patients and athletes in a sports college, so as to strengthen the treatment of ankle joint injury and improve the athletes' attention to ankle joint protection. 150 patients with ankle injury were treated with a new ankle injury research mechanism and targeted treatment for medial ankle fracture, lateral ankle fracture, posterior ankle fracture, ankle dislocation and ligament strain. The treatment effect can be divided into three types: good, general and poor. The specific effect is shown in **Figure 8**.

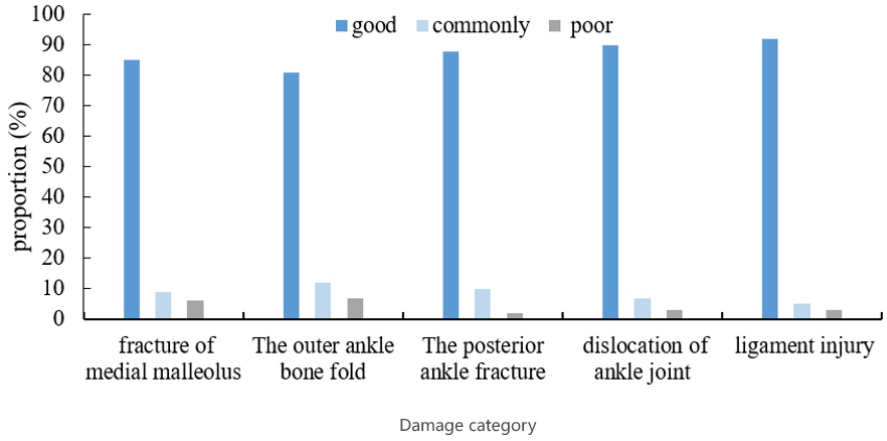

Figure 8. The mechanism effect of novel ankle injury constructed by RBF neural network algorithm.

According to **Figure 8**, among 150 cases of ankle injury investigated, 85% of the patients had good treatment effect on medial ankle fracture by using the new ankle injury research mechanism, and 81% of the patients had good treatment effect on lateral ankle fracture; 88% of posterior malleolar fractures and 90% of ankle dislocations had good results; 92% of the patients had good results in the treatment of ligament strain. The experimental and analytical results show that the new ankle injury research mechanism constructed by introducing RBF neural network algorithm into the ankle injury research mechanism can enhance the therapeutic effect by 10.7%.

7. Conclusions

With the gradual penetration of the current concept of sports and health into people's hearts, basketball, the most widely accepted sport, has also attracted attention from many people due to its sports injuries. Among them, ankle injury is the most common sports injury in basketball. The factors that cause ankle injury during exercise usually depend on subjective and objective factors. Subjective factors mainly include insufficient training, poor physical quality, irregular technical movements, fierce confrontation, etc. Objective factors mainly include venue factors, climate factors, etc. Ankle joint injuries mainly include varus and lateral collateral ligament strain. Basketball players must be fully prepared during training. In summary, the main reasons for ankle injury in basketball players are insufficient training, low motor skills, weak ankle resistance, lack of concentration, low awareness of prevention, posture problems, and corresponding preventive measures. It is hoped that basketball players can effectively avoid the risk of ankle injury during training and competition. This requires teachers to use scientific and accurate teaching methods and actively do a good job in daily prevention of basketball sports injuries. To reduce the injuries of basketball players, improve basketball performance, and thus enhance the level of basketball competition. In follow-up research, combining data mining with neural networks to analyze factors related to ankle injury in football players, and to prevent and treat them is a promising method. The specific process includes: data acquisition, preprocessing, feature extraction, model training, and application verification. The required instruments include high-performance computers, data processing software

and dedicated data acquisition devices. In terms of technical support, it mainly includes data mining algorithms and the establishment and optimization of neural network models. However, the privacy and security of data cannot be ignored. Relevant data protection regulations must be strictly implemented to protect the personal data of contestants. In order to ensure the security of data during storage, processing and use, measures such as data desensitization, access control, and encrypted transmission have been taken. In the face of massive amounts of data, it is also necessary to pay attention to data quality and compliance issues, and adopt data cleaning and verification methods to improve the accuracy and reliability of data mining results. Through the comprehensive application of these technologies and methods, it provides strong support for the prevention and treatment of ankle injuries in athletes.

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