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Prevention and Evaluation of Ankle Injury in High-intensity Track and Field Training Based on Fuzzy Comprehensive Evaluation Method

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Abstract: In order to cultivate a socialist successor with all-round development of moral, intellectual, and artistic work, many college sports teams have carried out track and field training programs to achieve good habits for helping students to keep fit and to train students to participate in sports. In the course of track and field, the ankle joint is an important part of the human body and the most vulnerable part. In training, the ankle joint is the largest part of the point of force, which is very easy to damage. Running and jumping in track and field is essential, which can easily lead to injury in sports training. It is difficult to prevent. In track and field training, ankle joint injury is the highest proportion of injured parts, accounting for about 30% of sports injuries. In order to reduce or avoid the occurrence of ankle joint injury during the training process, and take effective preventive measures, an effective method should be selected for evaluation. According to the influencing factors of ankle joint injury in track and field training, this paper based on fuzzy comprehensive evaluation method, the evaluation model of ankle injury prevention measures in high-intensity track and field training, find out the problems existing in training, and put forward effective preventive measures. According to the constructed evaluation model, the final calculation result is: B=0.74, which indicates that the track and field team generally prevents the athletes from developing ankle injury during the exercise training, and needs further improvement to reduce the athlete's ankle injury during the training. The evaluation index system of ankle joint injury prevention measures is analyzed. The results show that the fuzzy comprehensive evaluation method can effectively obtain the current preventive measures for track and field sports training.

1. Introduction

Nowadays, sports are getting more and more attention both at home and in the world. As sports

performance continues to improve, the game load and training intensity are also increasing, and sports injuries are more likely to occur. Sports injuries are often closely related to sports items, techniques, equipment, environment, and training, so that athletes' physical, psychological, and normal training levels are more demanding [1-3]. With the emergence of sports injuries, experts, scholars, coaches and athletes from all over the world have gradually increased their research on sports injuries, and they have become more specialized, scientific and systematic, including: clinical manifestations and morbidity of sports injuries; research on how to prevent sports injuries; research on methods of treating sports injuries; basic research related to sports injuries in physiological anatomy; human biomechanics, psychology, epidemiology, research related to sports injuries, and many other aspects [4-6]. Sports injuries have become an important factor restricting athletes' sports performance, and sports injuries occur in every track and field student. It is often the case that some track and field students have sports injuries due to fatigue, ideological disregard, training, etc., so research and solve sports injuries have become an urgent issue. However, domestic research methods for sports injuries are relatively simple. Generally, the relevant cases of sports injuries in the emergency department are analyzed, studied and counted in a certain period of time, and the causes of sports injuries are classified, and corresponding prevention methods are formulated [7-9].

Modern track and field competitions are moving toward higher, faster and stronger directions. If track and field athletes want to achieve excellent results in the fierce competition, they must strengthen the training of track and field specialties: physical fitness, special skills, etc. What is important is how to prevent the occurrence of sports injuries. Only by effectively preventing the occurrence of sports injuries, athletes' performance in training can be better displayed in the game. The main causes of sports injuries in track and field specialties are ideologically insufficient attention, site problems, training arrangements, etc. The occurrence of sports injuries is closely related to sports items, training arrangements, sports environment, athletes' own conditions and technical movements [10]. Track and field sports damage is different from the damage formed in normal life. It is closely related to the characteristics and technical requirements of the track and field project. As a special sports group, the track and field students in colleges and universities must constantly improve their own quality and master good sports skills through long-term training, which is more likely to cause sports injuries. In the event of sports injuries, not only will the athlete's learning and life be affected, but the athlete's competition level will be seriously affected [11]. In addition, athletes will be affected by many external uncertain factors when exercising under high-intensity exercise, which increases the risk of sports injuries, increases the incidence of sports injuries, and seriously affects the athlete's exercise state. How to effectively determine the main risk factors of exercise under high-intensity exercise has become an urgent problem to be solved in the field of sports medicine. The athlete risk assessment model under high-intensity exercise can identify and evaluate various sports injury risk factors under high-intensity exercise, and conduct in-depth study on the causes and effects of sports injuries of track and field specialties, and the sports injuries in track and field events. Conduct investigations, analysis, statistics, and research to provide a basis for prevention of sports injuries. Using fuzzy comprehensive evaluation method to evaluate the prevention of ankle injury in high-intensity track and field training will help track and field athletes effectively avoid ankle injury during training [12].

The causes of ankle injury in track and field training are more complicated. We should choose an effective method to evaluate. The fuzzy comprehensive evaluation method has a very good evaluation effect in dealing with the problems involving fuzzy factors. Therefore, this paper will use fuzzy comprehensive evaluation method. It is applied to the evaluation of ankle joint loss in high-intensity track and field training. The evaluation index system of ankle joint injury prevention

measures is constructed. The results show that the fuzzy comprehensive evaluation method can effectively obtain the current preventive measures for track and field sports training.

In the first part, the paper first introduces the current development status of sports and the state of sports injuries, and explains the necessity of using fuzzy comprehensive evaluation method to prevent sports injuries. Secondly, in the second part, some predecessors are introduced in fuzzy comprehensive evaluation. Some research results and application examples in the law, and introduce the principle of fuzzy comprehensive evaluation method and general application model. In the third part, the experimental object and data source are explained, and the fuzzy comprehensive evaluation model is constructed to analyze the college sports team. In the fourth part, the paper analyzes the sports injury rate and the causes of injury in college sports teams, and uses fuzzy comprehensive evaluation method to analyze the sports team athletes in colleges and universities. Finally, the track and field team prevents athletes from developing ankle injury during sports training. The measures generally require further improvement to reduce the probability of an athlete's ankle injury during training.

2. Proposed Method

2.1. Related Work

Riva D has proposed the design and implementation of a wearable wireless device that is connected to a smart phone to monitor and prevent repetitive ankle sprains caused by chronic ankle instability (CAI). This device prevents this common foot injury by electrical stimulation of the diaphragm by causing dorsiflexion of the foot muscles with electrodes. This is done after measuring the ankle kinematics using an inertial motion sensor and predicting an ankle sprain. The prototype implemented here has a fast response time of 7 milliseconds, which prevents an ankle sprain before ligament injury occurs. In addition to small size, low cost, and low power consumption, the wireless communication between the various components of the device makes it unobtrusive, wearable, and does not interfere with normal activities. The device connects to an android smart phone app via Bluetooth for continuous data logging and reporting to track the incidence of possible ankle sprains and corrections. This is an important feature of the device because it can monitor and quantify CAI patients [13-14]. For the false feedback of spectrum information in cognitive radio networks and the malicious behavior of forcing spectrum resources, Zhang G has proposed a model of trusted spectrum sensing and allocation based on fuzzy theory. Spectrum-aware behavior and spectrum utilization behavior were used as two evaluation factors. Based on the subjectivity and uncertainty of trust, Zhang G used the fuzzy comprehensive evaluation method to construct the node trust evaluation model. In collaborative spectrum sensing, comprehensive evaluation results can be used to identify malicious nodes and eliminate false feedback. In the spectrum allocation, the difference between the actual comprehensive evaluation set and the ideal comprehensive evaluation set is defined and calculated by using the lattice closeness between the fuzzy sets. The multi-objective optimization algorithm is used to quantify the credibility of non-malicious nodes by calculating the difference, and to determine the allocation of spectrum resources to the nodes. These techniques can control the malicious behavior of nodes and encourage collaborative behavior between nodes. A joint design of spectrum sensing at the physical layer and spectrum allocation at the media access control layer is implemented. The simulation results and analysis show that under the malicious attack, the proposed model has good performance in system perception, throughput and fair spectrum allocation compared with the existing model [15-16]. In order to improve the accuracy of English teaching quality evaluation and improve the quality of English teaching, Meng R F

proposed a method of English teaching quality evaluation based on fuzzy comprehensive evaluation, and constructed an English teaching quality evaluation index system model, which was constructed by decision tree model. In the English teaching quality index model, the objective function of English teaching quality evaluation is constructed based on fuzzy decision model. The conjugate function analysis method is used to optimize the decision function and extract the attributes that can reflect the quality of English teaching. Accurate evaluation and prediction of the quality of English teaching has been achieved. The simulation results show that the evaluation method is reliable, the reliability is high, and the evaluation results are accurate [17-18]. With the continual occurrence of sea accidents and high-level requirements and the modernization of naval warfare, the concept of ship environmental adaptability has become increasingly important. Therefore, it is of great significance to establish a ship environmental adaptability evaluation system that is conducive to ship design and to ship classification. Yang W once established a comprehensive evaluation system for ship environmental adaptability based on fuzzy mathematics theory. First, Years I R has summarized the ship environmental adaptability evaluation index system in detail, and then uses the analytic hierarchy process and the entropy weight method to comprehensively evaluate the criteria weights of each criterion and corresponding sub-criteria. Secondly, Yang W uses the multi-level fuzzy comprehensive evaluation method to evaluate the comprehensive environmental adaptability of ships. Finally, in order to verify the effectiveness of the method, Yang W used an example to optimize and evaluate the five ship programs [19-20].

2.2. Fuzzy Comprehensive Evaluation

(1) Principle of fuzzy comprehensive evaluation method

The essence of the fuzzy evaluation analysis method is to empirically analyze the evaluated object according to the evaluation index system, and then draw a conclusion on which level the evaluation object belongs to. It can evaluate multiple subjects or a specific object (called "single factor evaluation"). The determination of the weight is the more important part of the use of the method. It measures the relative importance of indicators in the overall evaluation. For the whole, each indicator is important in the system, but the importance determines the impact on the system. Therefore, the weight of the rational allocation of indicators is very important in the comprehensive evaluation. The fuzzy comprehensive evaluation method is a kind of quantitative analysis. It is a method of combining fuzzy theory with mathematics and quantity. It combines quantitative and qualitative indicators. The conclusion is drawn based on the principle of maximum membership in the calculation process. It also has the advantage that those complex, information-asymmetric objects are also used.

(2) Steps of using fuzzy comprehensive evaluation method

1) Construct a fuzzy comprehensive evaluation index

The basis for comprehensive evaluation is to construct a fuzzy comprehensive evaluation index system. In the process of system construction, the appropriateness of the selected evaluation indicators and the evaluation objects will have a direct impact on the accuracy of the evaluation. Therefore, when selecting the evaluation indicators and constructing the evaluation index system, it is necessary to pay extensive attention to the information of the industry in which the evaluation indicators are evaluated and the relevant laws and regulations of the industry.

2) Using AHP to construct corresponding judgment matrix based on fuzzy comprehensive evaluation index

The key to the development of tomographic analysis is to determine the importance of each

factor based on the judgment matrix. The analytic hierarchy process assumes that the number of objects is n, and the weight of each object is $w_1, w_2, w_3, ..., w_n$ respectively. , formula $a_{ij=w_i/w_j}$, represents the proportional relationship between the weight of the i object and the j object, such a $n \times n$ n-order matrix is established, we call it a pairwise comparison matrix;

$$A = \begin{bmatrix} a_{11} & a_{12} & \Lambda & a_{n1} \\ a_{21} & a_{22} & \Lambda & a_{2n} \\ \mathrm{M} & \mathrm{M} & \mathrm{M} & \mathrm{M} \\ a_{n1} & a_{n2} & \Lambda & a_{nn} \end{bmatrix} = \begin{bmatrix} w_1/w_1 & w_1/w_2 & \Lambda & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \Lambda & w_2/w_n \\ \mathrm{M} & \mathrm{M} & \mathrm{M} & \mathrm{M} \\ w_n/w_1 & w_n/w_2 & \Lambda & w_n/w_n \end{bmatrix} \tag{1}$$

The matrix A features are as follows: the values of all elements a_{ij} are higher than 0, the values of the elements a_{ij} in the diagonal are all 1, and the main diagonal is symmetrical, and the corresponding element values are reciprocal of each other (ie $a_{ij} = 1/a_{ij}$). The weight ratios of the two objects i, j, k in the matrix A are in accordance with the formula: $a_{ij} = a_{ik} \times a_{kj}$. The matrix corresponding to the above features is the judgment matrix.

$$AW = \begin{bmatrix} w_1/w_2 & w_1/w_2 & \Lambda & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \Lambda & w_2/w_n \\ \mathrm{M} & \mathrm{M} & \mathrm{M} & \mathrm{M} \\ w_n/w_1 & w_n/w_2 & \Lambda & w_n/w_n \end{bmatrix} \bullet \begin{bmatrix} w_1 \\ w_2 \\ \mathrm{M} \\ w_n \end{bmatrix} = \begin{bmatrix} \lambda w_1 \\ \lambda w_2 \\ \mathrm{M} \\ \lambda w_n \end{bmatrix} = \lambda \begin{bmatrix} w_1 \\ w_2 \\ \mathrm{M} \\ w_n \end{bmatrix} = \lambda W \tag{2}$$

In the case where the weight of an object is unknown and the known conditions are only two or two comparison matrices, the weight of the object can be obtained. Conditional assumption: the matrix eigenvector is consistent with the eigen root of the matrix corresponding to the eigenvector, then $AW = \lambda W$. In the matrix A, we know that the weight formula $W = [w_1, w_2, \mathrm{K}, w_n]^T$ of n an object conforms to the following equation:

Based on the matrix feature vector and the eigenvalue definition, the weight vector $W = [w_1, w_2, \mathrm{K}, w_n]^T$ of the n objects is one of the matrix A feature vectors, and λ is the eigen root of the corresponding feature vector W. Based on the eigenvectors and the eigenvalue theorem under the positive reciprocal matrix, the eigenvalues and corresponding positive eigenvectors of the matrix A have a unique maximum. Thus, according to the two-two comparison matrix composed of the weights of n objects, the weight of each object can be obtained by calculation of the matrix feature vectors.

Similarly, it can be known that the principle of the judgment matrix can be used to calculate the degree of influence of the n factor affecting a certain thing on the thing. Firstly, based on experience, the important numerical values of the two pairs are compared, and the n order

judgment matrix is established. According to the eigenvector calculation method of linear algebra, the unique maximum positive eigenvector value of the matrix is obtained. The result is an intuitive value reflecting the importance of n factors. The above is the basic principle of the operation of the analytic hierarchy process. Special attention should be paid to the consistency of the importance of the influencing factors and the judgment matrix. The premise that the judgment matrix satisfies complete consistency is that all elements in the matrix can be substituted into the formula $a_{ij} = a_{ik} \times a_{kj}$ and made true. The complete consistency feature of the judgment matrix of the weight of the object described above is very clear. However, because the influencing factors are compared in terms of pairwise comparison, the exact value is obtained by quantifying the ambiguous feeling on the basis of experience. Therefore, it is impossible to guarantee the consistency between all factors, and the quantitative relationship may be inconsistent. For example, A is twice as important as B. B is twice as important as C, but A is four times more important than C. Even the contradiction is more exaggerated. It can be seen that to ensure the accuracy of the results, it is necessary to verify the consistency with the judgment matrix.

3) Determine the evaluation index membership matrix

Create a comment set $V = \{v_1, v_2, v_3, \mathrm{K}, v_n\}$ with any element set to $V_j (j = 1,2\mathrm{K}\ n)$. Suppose that the rating indicators of each level are set to five levels, which are respectively "very good", "better", "general", "poor", "very poor", corresponding to the V of the comment collection $n = 5$, V_1, V_2, V_3, V_4, V_5 one-to-one correspondence "very good", "better", "general", "poor", "very poor".

4) Perform fuzzy comprehensive evaluation

The fuzzy evaluation matrix is constructed by using the index score. The weight of the fuzzy evaluation matrix is multiplied by the weight of the index to obtain the single factor evaluation, and the total score is obtained by reverse calculation. The purpose of the comprehensive evaluation is to sort several objects according to a certain meaning, and pick the last or worst objects for analysis. Therefore, the scores of each indicator are compared with the total score of the evaluation, and the reason why the scores of the scores are significantly lower is analyzed to find the lower scores, so as to obtain a solution, so that the evaluation objectives and objectives can be achieved.

3. Experiments

3.1. Research Objects and Data Sources

This paper selects 120 students of track and field athletes from a college sports team as the research object. In order to study the current situation, characteristics, causes of injury and preventive measures of sports injuries of college sports teams, a questionnaire was distributed to 120 students of the sports team. The questionnaire was distributed face-to-face and recycled. A total of 120 questionnaires were distributed and 120 questionnaires were successfully collected. The total recovery rate was 100%, of which 120 were valid questionnaires, and the effective rate was 100%.

3.2. Mathematical Model of Fuzzy Comprehensive Evaluation Method

In this paper, the method of using fuzzy comprehensive evaluation method is introduced. For the degree of ankle joint injury in high-intensity track and field training, the mathematical model is established by fuzzy comprehensive evaluation method.

(1) Construction of evaluation sets: $C = (c_1, c_2, \mathrm{K}, c_n), c_i = (i = 1,2,\mathrm{K}, n)$ indicates the degree of

evaluation, sorted from high to low.

(2) Construction of indicator sets: The indicator sets are based on different evaluation indicators. The index set definition $I=(i_1,i_2,\mathrm{K},i_m,),i_i(i=1,2,\mathrm{K},n)$ of the evaluation target is the i evaluation index. The weight set of the indicator set is defined as $W=(w_1,w_2,\mathrm{K}\ w_n),w_i(i=1,2,\mathrm{K},n)$ indicating the proportion of the index i_i in the I, and the conditions are satisfied:

$$\sum_{i=1}^{n} w_i = 1 \tag{3}$$

For multi-level indicators, the indicator set and weight set of the evaluation factors are the same as the single-level indicators.

The standard set is defined as $I_k=(i_{k1},i_{k2},\mathrm{K},i_{kl}),i_{ki}(i=1,2,\mathrm{K},l)$ indicating the i evaluation index of the k second-level indicator, and the weight set is defined as $W_k=(w_{k1},w_{k2},\mathrm{K},w_{kn}),W_{ki}(i=1,2,\mathrm{K},n)$ indicating the proportion of the index i_{ki} in the I_k, and the condition is satisfied:

$$\sum_{i=1}^{l} W_{ki} = 1 \tag{4}$$

(3) Determine the membership matrix of the single indicator: After determining the evaluation set and the indicator set, the fuzzy mapping from the arrival can be determined, and the corresponding expression is:

$$f: I \to F(C), \forall i_i \in 1 \tag{5}$$

$$u_i \to f(i_i) = \frac{r_{i1}}{v_1} + \frac{r_{i2}}{v_2} + \Lambda + \frac{r_{in}}{vn} \tag{6}$$

In the formula, $0 < r_{ij} < 1, 0 < i < n, 0 < j < m$.

The membership function of the i evaluation index can be calculated according to equations (7) and (8):

$$r_{ij} = \begin{cases} 0, x_i \geq S_{i(j+1)} \\ \dfrac{S_{i(j+1)} - x_i}{S_{i(j+1)} - S_{ij}}, S_{ij} \leq x_i \leq S_{i(j+1)}, j = 1 \\ 1, x_i \leq S_{ij} \end{cases} \tag{7}$$

$$r_{ij} = \begin{cases} 0, x_i \geq S_{i(j-1)} \\ \dfrac{x_i - S_{i(j-1)}}{S_{ij} - S_{i(j-1)}}, S_{i(j-1)} \leq x_i \leq S_{ij}, j = 2,3,\mathrm{K},n-1 \\ \dfrac{S_{i(j+1)} - x_i}{S_{i(j+1)} - S_{ij}}, S_{ij} \leq x_i \leq S_{i(j-1)} \end{cases} \tag{8}$$

Where $r_{ij}(i=1,2,\Lambda\ m,\ j=1,2,\Lambda\ n)$ represents the membership of the j level of the evaluation set c_j to the i evaluation index. For the multilevel model, the membership of the k secondary factors is:

$$R_k=\begin{bmatrix} r_{11} & r_{12} & \Lambda & r_{1n} \\ r_{21} & r_{22} & \Lambda & r_{2n} \\ \mathrm{M} & \mathrm{M} & \mathrm{O} & \mathrm{M} \\ r_{l1} & r_{l2} & \Lambda & r_{\ln} \end{bmatrix} \tag{10}$$

In the formula, $r_{ij}(i=1,2,\Lambda\ l,\ j=1,2,\Lambda\ n)$ represents the membership degree of the j level evaluation set c_j to the i evaluation index i_{ki}.

(4) Determining the weight set: The weight set $W=(w_1,w_2,\mathrm{K}\ w_n)$ can be obtained by orthogonalizing different evaluation indicators. (5) The calculation result of the fuzzy comprehensive evaluation matrix: the complex operation of the fuzzy matrix is applied to the membership degree and weight set, and the fuzzy comprehensive evaluation matrix can be calculated by equation (11):

$$B=W\bullet R=(b_1,b_2,\mathrm{K}\ ,b_n) \tag{11}$$

In the formula, W indicates the influence weight of high-intensity track and field training on ankle joint injury, R indicates the influence degree of high-intensity track and field training on ankle joint injury, and B indicates the fuzzy comprehensive evaluation result. The b_i of fuzzy evaluation matrix B can be calculated by equation (10):

$$b_i=\bigvee_{i=1}^{n}(a_i\wedge r_{ij}) \tag{12}$$

Where $\wedge$ represents the minimum value in the calculated value and $\vee$ represents the maximum value in the calculation result.

The orthogonality processing is performed on the fuzzy evaluation matrix, and the corresponding calculation expression is:

$$b_i'=\frac{b_i}{\sum_{j=1}^{m}b_j} \tag{13}$$

In the formula, b_i' represents the orthogonalization value of the i element of the fuzzy comprehensive evaluation matrix. According to the calculation result, the degree of influence of the high-intensity track and field training on the ankle joint can be determined according to the principle of maximum membership degree.

4. Discussion

4.1. Discussion and Analysis of Ankle Joint Injury in High-Intensity Track and Field Training Based on Fuzzy Comprehensive Evaluation Method

(1)Statistical Analysis of Sports Injury Rate Based on Fuzzy Comprehensive Evaluation Method

The main function of the ankle joint is to achieve flexion and extension of the coronal axis. Normally, the calf is perpendicular to the back of the foot. When the calf is not perpendicular to the instep, or when the ankle is in the shaft, the ligament, tendon and muscle, the stability of the ankle joint is relatively weak, and in this case, the possibility of ankle injury is very high. Through the questionnaire survey of 120 track and field athletes of college sports teams, it is found that many of the 120 college sports team athletes and athletes surveyed have different degrees of damage, and the sports injuries of track and field athletes combined with fuzzy comprehensive evaluation method statistical analysis, the results are shown in Figure 1.

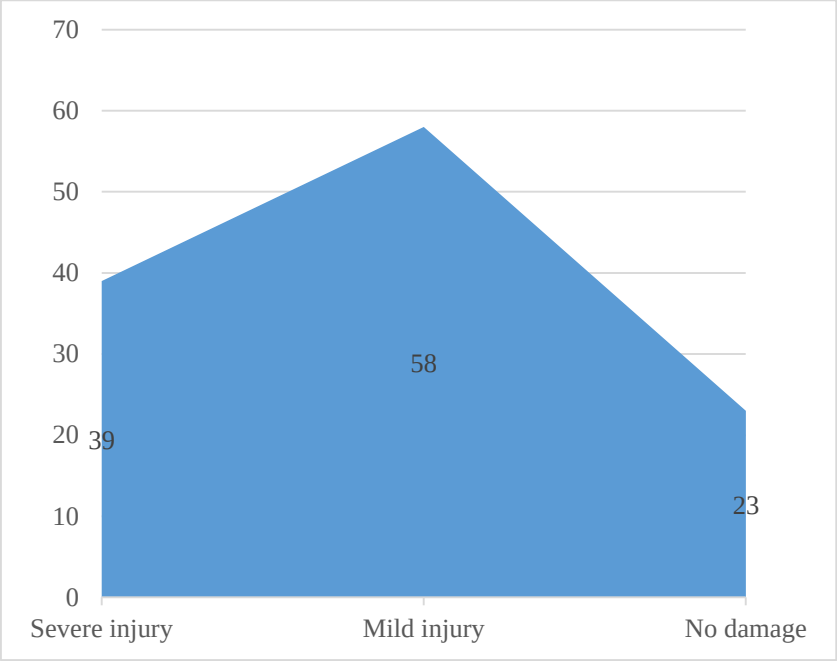

Figure 1. Athlete injury statistics

The injuries suffered by track and field athletes are divided into three levels, namely severe damage, mild damage and no damage. As can be seen from Figure 1, a total of 97 people have different degrees of sports injuries, and only 23 students have not had exercise. The damage rate is as high as 80.8%, which is enough to show that sports injury has become an important issue in track and field training. Among the injured athletes, 39 athletes were seriously injured, accounting for 67.2% of the injured, and 58 athletes were slightly injured, accounting for 59.8% of the injured.

(2) Factor analysis of ankle injury based on fuzzy comprehensive evaluation

The main function of ankle joint is to realize the flexion and extension of coronary axis. Generally speaking, the lower leg is perpendicular to the instep. When the lower leg is not perpendicular to the instep, the ankle joint will be relatively fragile. In this case, ankle injury is very likely. Select university sports team athletes and 120 ankle injury athletes for statistical analysis, the results are shown in Figure 2.

From Figure 2 we can see that the factors of ankle injury in high-intensity track and field training can be divided into six reasons, namely, preparation activities are not in place, training arrangements are unreasonable, training venues, athlete fatigue, injury training and other reasons. In the statistics of Figure 11, I can see that among the 120 samples sampled, there were 35 people who suffered from ankle injury because the preparation activities were not in place, accounting for

29.2%, because the training arrangement was unreasonable. There were 27 people with ankle injury, accounting for 22.5%. There were 22 people who suffered ankle injury because of the training ground, accounting for 18.3%. There were 16 people who suffered from ankle injury due to athlete fatigue. The proportion was 13.3%. There were 12 people who suffered from ankle injury due to injury training, accounting for 10%. Because of injury training, there were 8 people with ankle injury, accounting for 6.7%. In view of this, the preparation of activities and the unreasonable training arrangements are the main causes of ankle injury in high-intensity track and field training.

Figure 2. Causes of ankle injury in high-intensity track and field training

4.2. Analysis and Discussion of Fuzzy Comprehensive Evaluation Method

In order to verify the validity of the constructed evaluation model, according to the situation of college sports team track and field team in the process of sports training, the effect of avoiding ankle injury measures was adopted, and the evaluation index system and the evaluation index of sports training to prevent ankle injury measures were constructed. The system is shown in Table 1.

It can be seen from Table 1 that in the set evaluation system, the first level indicators are: avoiding ankle injury during athletic training.

The effectiveness of preventive measures; the second level indicators are: preparation activities, sports training arrangements, training places and facilities and medical supervision; third-level indicators are: the content of preparation activities, the amount of exercise to prepare activities, the time to prepare activities, exercise training, exercise volume arrangement, application of training principles, construction of sports training venues, regular inspection of sports equipment, regular maintenance of sports equipment, regular physical examination of track and field athletes, and education of ankle injury prevention.

The evaluation set can be divided into 5 levels, which are particularly excellent (I level: 0.9~1), good (II level: 0.8~0.9), general (III level: 0.7~0.8), and poor (IV level: 0.6~0.7) and very poor (V grade: 0~0.6). 35 experts were selected to evaluate different indicators.

The weight of the second level indicator in the evaluation result is shown in Figure 3.

Table 1. Evaluation index system for sports training to prevent ankle injury measures

Level 1 indicator	Second-level index	Third level indicator
Preventive measures to avoid ankle injury in track and Field training(V)	Warming-up (V1)	Preparation of the content of the event(V11)
		The amount of exercise in preparation.(V12)
		Time to prepare for activities(V13)
	Sports training arrangement(V2)	Exercise homework(V21)
		The amount of exercise scheduled for training(V22)
		Application of training principles(V23)
	Training places and facilities(V3)	Construction of sports training ground(V31)
		Periodic inspection of sports equipment(V32)
	Medical control(V4)	Regular maintenance of sports equipment(V33)
		Regular physical examination of track and field athletes(V41)
		Education on prevention of ankle injury(V42)

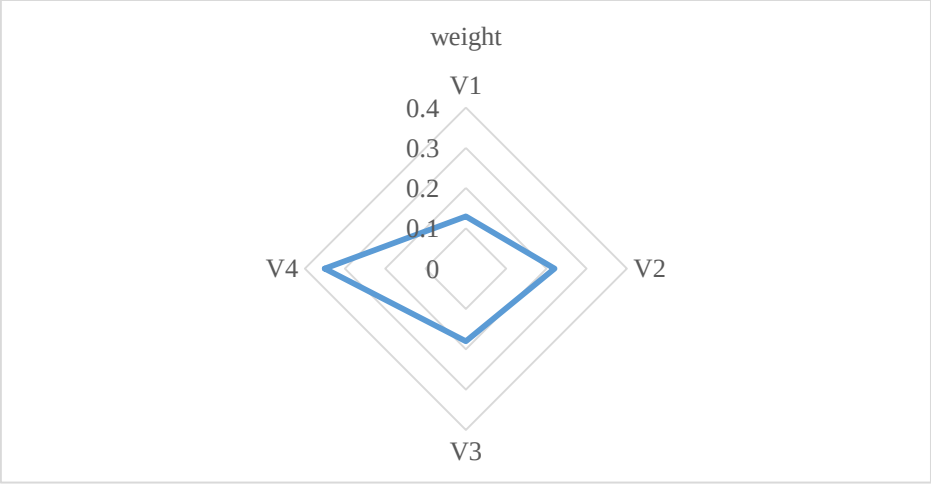

Figure 3. The weight of the second level indicator

From Figure 3, we can see the weights of the second-level indicators, that is, the weight of the preparation activity is 0.13, the weight of the exercise training arrangement is 0.22, the weight of the training place is 0.18, and the weight of the facility and medical supervision is 0.35.

The third pole index weight of the fuzzy comprehensive evaluation method evaluation model is shown in Figure 4.

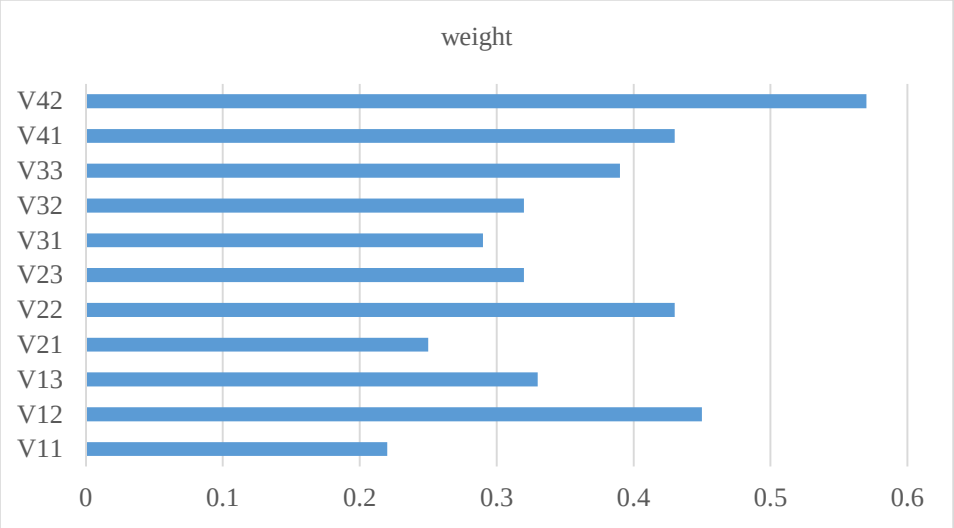

Figure 4. The weight of the third pole indicator

From Figure 4, we can see the weights of the third-level indicators. The weight of the content of the preparation activity is 0.22, the weight of the exercise activity of the preparation activity is 0.45, the weight of the time for preparing the activity is 0.33, and the weight of the exercise training is 0.25. The weight of the arrangement is 0.43, the weight of the application of the training principle is 0.32, the weight of the construction of the sports training venue is 0.29, the weight of the regular inspection of the sports equipment is 0.32, and the weight of the regular maintenance of the sports equipment is 0.39. The quality of regular physical examination education for sports athletes is 0.43, and the weight of the education for ankle injury prevention is 0.57.

According to the constructed evaluation model, the final calculation result is: B=0.74, which indicates that the track and field team generally prevents the athletes from developing ankle injury during the exercise training. However, further improvement is still needed to reduce the possibility of ankle injury.

5. Conclusion

In track and field training, the damage and track and field athletes and coaches have a great understanding of sports injuries. Only by thoroughly understanding the knowledge of sports injuries, track and field specialists can prevent and avoid damage. Ankle injury is an accident that is very easy to occur in track and field training of college sports teams. It is often due to students' inadequate preparation activities before training, unreasonable training arrangements, training venues, athlete fatigue, injury training and other objective reasons. Occurrence, these accidents not only have a great impact on college sports teams, but also very unfavorable to students' physical and mental health. Therefore, college sports teams should not only pay attention to the teaching and training of athletes' athletics skills in ordinary track and field training. It is also necessary to pay attention to the safety of students in the training process, to strengthen the supervision and responsibility of track and field coaches, to increase the safety awareness of students, and to prepare for pre-training and other effective preventive measures, so as to effectively avoid ankle injury accidents. It promotes the competitive development of college sports teams and the healthy development of students.

In this paper, the ankle joint injury evaluation model in high-intensity track and field training based on fuzzy comprehensive evaluation method is constructed for the situation that the ankle joint is vulnerable to injury during track and field training. The constructed evaluation index system and simulation analysis show that the fuzzy comprehensive evaluation method can accurately evaluate the effectiveness of the track and field team in preventing ankle joint injury in sports training. According to the results of the fuzzy comprehensive evaluation model, it is shown that the track and field team generally prevents the athletes from developing ankle injury during the exercise training, and needs further improvement to reduce the probability of athletes suffering ankle injury during training.

Through the research, this paper finds that the injury rate of college sports teams is relatively high, up to 80.8%. There are many reasons for the damage. It can be divided into preparation activities not in place, unreasonable training arrangements, training venues, athlete fatigue, injury training and other reasons. According to the evaluation of the model, the college sports team still needs to improve some training methods and need to repair the training ground in time. Only when the training is proper, the field conditions are better for the track and field athletes to train better and get better results.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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