

Research Article

Ankle Ligament Injuries Based on Medical Images of Hip-Hop Training and Research on Training Techniques

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Ligament loss of the ankle joints is common. If it is not handled properly, it is easy to cause repeated sprains of the ankle joints. Usually, medical image examination will be the first choice for the diagnosis of ligament injury. This paper analyzes the ankle ligament injury of hip-hop training based on medical images and studies the hip-hop training skills, to explore the application method of medical images in ankle injury, and can provide some theoretical and practical references for other sports injuries. In this paper, several medical image-related technologies such as texture feature extraction, main visual feature SAR method, and edge detection method are proposed. These technologies are applied to the study of ankle ligament injury, and an effective medical training therapy is determined by setting up the control group and the treatment group to observe the medical image display of each part of the ankle. Through the statistics of the clinical efficacy judgment standard results of patients in the treatment group and patients in the control group after two weeks of injury, it is found that the experimental results show that the cure rate, significant efficiency, and total effective rate of patients in the treatment group after two weeks are higher than those in the control group, and the total effective rate of the treatment group has reached 92.20%.

1. Introduction

1.1. Background. Street dance, also known as hip-hop, originated from black street dance. It is loved by young people for its simple, free personality, and full of youthful vitality. At present, there are two main forms of street dance communication in colleges and universities, namely, street dance classes and street dance clubs. These two forms complement each other, and each has their own characteristics. Among them, the Street Dance Club, also known as the Street Dance Association, is a spontaneous student organization. It is based on the interests of students, it does not require high technical level, it has a large audience, and it can be exciting. As the main form of activity for hip-hop academy fans, the hip-hop club provides a platform for communication among hip-hop academies. With the rapid development of street dance in our country, street dance competitions and street dance steadily increase, dance moves tend to be increasingly highly specialized and explosive personal technical moves

and differentiated action sets, and dancers participating in street dance will be injured. This possibility is gradually increasing, and the ratio of injuries to sports injuries in daily practice and official games is also gradually increasing. The occurrence of sports injuries will destroy the continuity of training, reduce the possibility of achieving excellent results in the game, and reduce the effectiveness of training and combat. Sports injuries affect dancers in many ways, whether psychologically or physically, they will cause great pain, which will affect the dancers' study and life, so how to reduce their losses is a problem worthy of our attention and research.

1.2. Significance. Hip-hop does not have special movements like gymnastics, but it allows dancers to play, expand the expression space for entertainment, fully demonstrate their own style, and make the characteristics of hip-hop come alive. Street dance can achieve the effect of regulating and relieving psychological pressure. What is interesting is that the richness and randomness of street dance enable dancers

to improve their cardiopulmonary function during aerial exercises, relax their depressive nerves, and coexist in their bodies. Hip-hop music has the function of coordinating the muscles of different parts of the human body and forming the body to improve artistic achievement, cultivate one's own expression ability, and cultivate an optimistic attitude. Hip-hop also helps to improve the coordination and flexibility of the body, making the proportions of the body more logical. In hip-hop training, the importance of ankle joint loss lies in the development of safe medical methods to reduce the rate of ankle joint injuries.

1.3. Related Work. Since the 21st century, people's ideas have gradually opened up, they no longer follow the rules and begin to pay attention to their own personal expression, and street dance has attracted the attention of many people. Kalirathinam et al. proposed that the effectiveness of neuromuscular training exercises to improve functional performance and neuromuscular control is controversial, mainly by evaluating the effectiveness of training interventions in the existing literature in enhancing neuromuscular control and functional performance and through further intervention studies to reduce the incidence and severity of this common injury [1]. Sharma et al. proposed that the foot and ankle injuries of elite athletes can lead to decreased performance, absenteeism, and long-term illness. They reported on the incidence of foot and ankle injuries during the Olympic Games (summer, winter, and youth Olympics) and concluded that foot and ankle injuries are an important cause of the incidence of Olympic athletes [2]. Song et al. mainly want to analyze the causes of vascular injury in the treatment of lumbar degenerative diseases with oblique lateral interbody fusion. The method used was to analyze 235 patients who underwent oblique lateral interbody fusion with or without posterior pedicle screw fixation in 5 hospitals from October 2014 to May 2017. The conclusion is that the oblique lateral interbody fusion technology provides a new method for lumbar internal fixation and minimally invasive fusion [3]. Devgan et al. mainly want to determine the risk factors of ACL injury by comparing the anatomical characteristics of the lower extremity, ACL size, and body mass index (BMI) of ACL defects and ACL intact knee. The method used is to use X-rays to compare the deviation of the mechanical axis and the vertical axis, tibiofemoral angle, hip neck axis angle, posterior tibia inclination, and incision width index and measure the BMI and ultrasound (USG) diameter of the ACL. The conclusion is that in the deviation between the mechanical axis of the anatomical lower limb parameters and the vertical axis, the hip neck axis angle and tibiofemoral angle show no significant difference (P value > 0.05), while the femoral notch width index ($P = 0.014$) has significant differences in the back [4]. The purpose of Xie et al. is to analyze the current status, themes, and characteristics of biomechanical research on anterior cruciate ligament (ACL) injury prevention. The method used is statistical analysis based on Web of Science, CNKI database, and biomechanical research on ACL injury prevention using scientometric methods. The conclusion is that the cumulative number of publications of ACL injury

prevention biomechanics research papers generally conforms to the exponential growth law [5]. Gunstra et al. is mainly used to reduce and stabilize the prosthetic ligament placement of medial or dorsomedial tarsometatarsal joint dislocation in dogs and cats and to report the complications and postoperative results of patients undergoing the operation. By searching the electronic database of referral operation practice, the records of dogs and cats with tarsometatarsal joint dislocation undergoing prosthetic ligament placement from January 2004 to March 2017 were identified. The conclusion is that prosthetic ligament placement is a simple operation, which can achieve satisfactory long-term stability of the tarsometatarsal joint in small animal patients with medial or dorsomedial dislocation [6]. Although the theories and conclusions put forward by these scholars are worthy of recognition, there are still some problems in the research process.

1.4. Innovation. The innovation of this article is as follows. (1) First of all is the innovation of the topic selection angle. This article is a new perspective from the perspective of topic selection. At present, there are not many researches that integrate medical images, hip-hop training, ankle joint, ligament injury, and training skills. It is of exploratory significance. (2) The second is the innovation of research methods. This paper proposes the extraction of texture features, the method of main visual feature special zone, and the edge detection method of several medical image-related technologies, which have high theoretical value and exploratory significance [7]. (3) In addition, it is the innovation of project practice. The results of the project also help to improve physical coordination and flexibility, which can make the proportion of the human body more reasonable and reduce the rate of ankle joint injuries.

2. Related Technologies of Medical Images

2.1. Extraction of Texture Features. Texture is a commonly used concept in image analysis and recognition and an important feature of an image. For medical images, texture features are an important feature. However, it cannot be obtained directly from medical data, and certain image texture analysis methods are required to obtain the texture characteristics of medical images [8]. The image texture describes the spatial color distribution and light intensity distribution of the image or its small areas. Texture feature extraction is divided into structure-based methods and statistical data-based methods. A structure-based texture feature extraction method is to model the texture to be detected and search for repeated patterns in the image.

As the feature amount of texture analysis, the calculated gray-level coincidence matrix is usually not directly used as a feature, but the texture feature amount is passed through the gray-level coincidence matrix, which is also called secondary statistics. Kai and Lukas [9] obtained 14 quantities describing texture features through the gray-level cooccurrence matrix a long time ago. However, the calculation of eigenvalues through the gray-level cooccurrence matrix requires cumbersome calculations [10]. Under the condition of

pursuing a simple operation and ensuring the extraction of effective features, this paper uses the following six typical features to extract the texture features of the image.

- (1) A texture feature type of the gray-level cooccurrence matrix GLCM, also known as the second angular moment. Angle second moment A_1 :

$$A_1 = \sum_{n=0}^{S-1} \sum_{c=0}^{S-1} [W(n, c; d, \theta)]^2. \quad (1)$$

- (2) Contrast A_2 :

$$A_2 = \sum_{n=0}^{L-1} \sum_{c=0}^{L-1} (k-x)^2 W(i, j; x, \theta). \quad (2)$$

It is used to evaluate the visual attributes of the components of pure color in the whole color vision (including achromatic color). It is related to (or approximately related) in the physical and psychological aspect of the purity of color. It depends on the number of white lights mixed in the color light. The more pure the spectral color content, the higher it is. The amount of local gray scale change in the image [11] is what we call the definition of the image texture, which is expressed by this formula.

- (3) Relevance A_3 :

$$A_3 = -\frac{1}{\alpha_x \alpha_y} \sum_{n=0}^{S-1} \sum_{c=0}^{S-1} (h - \eta_c)(v - \eta_c) W(n, c; d, \theta). \quad (3)$$

In

$$\alpha_x = \sum_{n=0}^{S-1} \sum_{c=0}^{S-1} W(n, n; d, \theta), \quad (4)$$

$$\alpha_n^2 = \sum_{i=0}^{S-1} (i - \partial_n)^2 \sum_{n=0}^{S-1} W(n, c; d, \theta). \quad (5)$$

Since the cooccurrence matrix is defined by a combination of direction and step size, one factor that determines the frequency is the number of pixels that contribute to the matrix, and this number is less than the total number and decreases as the step size increases. The amount of similarity of gray-level cooccurrence matrix elements is correlation [12], which reflects the consistency.

- (4) Differential moment A_4 :

$$A_4 = \sum_{n=0}^{S-1} \sum_{c=0}^{S-1} (n - \alpha)^2 W(n, c; d, \theta). \quad (6)$$

Among them, α is the mean value of $W(n, c)$.

- (5) Inverse difference moment A_5 :

$$A_5 = \sum_{n=0}^{S-1} \sum_{c=0}^{S-1} \left[\frac{W(n, c; d, \theta)}{1 + (n - c)^2} \right]. \quad (7)$$

The quantity describing the degree of texture regularity is the inverse difference moment [13], which usually represents the change.

- (6) Moisture A_6 :

$$A_6 = \sum_{n=0}^{S-1} \sum_{c=0}^{S-1} W(n, c; d, \theta) \log W(n, c; d, \theta). \quad (8)$$

The entropy of the degree cooccurrence matrix [14] is the quantity that describes the nonuniformity of the texture [15].

2.2. SAR Method for Main Visual Features. In the early days, text-based image retrieval played a great role, but limited manual annotation could not fully describe the rich connotation of the image, and it was difficult to retrieve the image according to the content of the image. In content-based image retrieval, images are represented by high-dimensional vectors, and its similarity measurement is more difficult. At the same time, it also faces the problem of semantic gap. The key of content-based approximate image detection is how to judge whether the images are similar. However, the information contained in the image is rich and diverse; in addition to the underlying features, it also includes semantic information. The expression methods of image approximation [16] are diverse, and different description perspectives can be achieved through different algorithm descriptions. The most commonly used and influential extraction methods in this regard are as follows.

2.2.1. Moment Invariants. It is more common to use moment invariants to describe local contours. Find the $K + V$ moment of the binary image T as follows:

$$\beta_{k,v} = \sum_{(n,m)} (n - m_n)^k (n - m_c)^v, \quad (9)$$

where $(n_v - m_v)$ is the center of the object. When the center distance is standardized, the scaling independence can be successfully obtained [17]. The standard operation is

$$\alpha_{c,v} = \frac{\lambda_{c,v}}{\lambda_{1,1}^k} + \frac{c + v + 2}{2}. \quad (10)$$

2.2.2. Fourier Expression. The Fourier operator initially

completes the abstraction of the shape signal through the curvature function [18], the complex coordinate function [19], or the centroid distance [20]. The curvature of the curve is defined by the derivative of the rotation rate of the tangent direction angle of a certain point on the curve to the arc length, indicating the degree of deviation of the curve from a straight line. Mathematically, a numerical value indicates the degree of curvature of a curve at a certain point; the curvature function, complex coordinate function, or centroid distance is all expressed by three shapes derived from the boundary points of the curve. After that, the Fourier operator completes the fast transformation. The commonly used shape descriptor comes from the coefficient of variation here, and the expression of the curvature function is as follows:

$$K(v) = \frac{n}{ns} \theta(s) + \sum_{c=0}^{S-1} \sum_{v=0}^{S-1} (c-v)^2 W(c, v | n, k, r, \theta). \quad (11)$$

The centroid distance is the distance from the object boundary point [21] to the object center $(n_v - m_v)$, and it is described as

$$F(s) = \sqrt{(n_c - n_v)^2 + b(m_c - m_v)^2}. \quad (12)$$

The complex coordinate function represents the coordinates of the complex pixel [22]:

$$T(s) = \sum_{1=s-2^{1-1}}^{c+2^{1-1}-1} \sum_{v=z-2^{1-1}}^{v+2^{1-1}-1} + \frac{d(z, n)}{2^{2d}}. \quad (13)$$

2.2.3. Grayscale Cooccurrence Matrix. Gray-level cooccurrence matrix [23], as one of the texture analysis methods, reflects the relative position relationship of different pixel spaces [24], to reflect the comprehensive information of the image gray level on the direction, range of change, and adjacent distance and meet the requirements of the simultaneous spatial gray level. The generated matrix can analyze the local image mode and arrangement order rules:

$$W(n, m) = \frac{\#\{(n_1, m_1), (n_2, m_2)\} \in W | h(n_1, m_1) = g \& h(n_2, m_2)\}}{\#d}. \quad (14)$$

2.2.4. Gabor Texture Features. Its essence is the operation of signal windowing [25] on the Fourier transform. The two-dimensional Gabor [26] uses the following formula to describe the kernel function:

$$d(n, m) = \frac{1}{2\pi\alpha_n\alpha_m} \exp \left[-\frac{1}{2} \left(\frac{c^2}{\alpha_n^2} + \frac{v^2}{\alpha_n^2} \right) + b2\pi(Uc + Nx) \right]. \quad (15)$$

Its Fourier transforms

$$f(u, v) = \exp \left[-\frac{1}{2} \left(\frac{(c-C)^2}{\partial_x^2} + \frac{(u-U)^2}{\partial_x^2} \right) \right]. \quad (16)$$

2.2.5. Wavelet Transforms. As one of the basic analysis methods of texture shape, wavelet transform is widely used in feature extraction. Wavelet analysis for signal and image compression is an important aspect of wavelet analysis applications. Waves are also widely used in signal analysis. It can be used for boundary processing and filtering, time-frequency analysis, signal-to-noise separation and weak signal extraction, fractal index, signal identification and diagnosis, and multiscale edge detection. There are applications in engineering technology and other aspects, including computer vision, computer graphics, curve design, turbulence, long-distance universe research, and biomedicine. It is the basic function $\mathfrak{R}_{cv}(n)$ obtained after decomposing and deforming the signal:

$$\mathfrak{R}_{cv}(n) = 2^{-n/2} \mathfrak{R}(2^{-m}a - n). \quad (17)$$

2.3. Edge Detection Method. The edge detection method is a detection method based on the discontinuity or sudden change of the gray value of the pixel on the edge of the area. It is mainly divided into two types: serial edge detection and parallel edge detection. The basic concept of the parallel detection method is to calculate the local differential operator. The commonly used differential operators include tilt operator, Roberts' operator, preposition operator, Laplacian operator, and Kirsch operator. Roberts' operator uses the difference between two adjacent pixels in the diagonal direction to approximate the gradient amplitude to detect edges. The effect of detecting vertical edges is better than that of oblique edges, the positioning accuracy is high, and it is sensitive to noise and cannot suppress the influence of noise. The Laplacian operator is more sensitive to noise, so the image is generally smoothed first and is isotropic, that is, it has nothing to do with the direction of the coordinate axis, and the gradient result does not change after the coordinate axis is rotated. The Kirsch operator uses 8 templates to convolve each pixel on the image to obtain the derivative. These 8 templates represent 8 directions and make the maximum response to 8 specific edge directions on the image. The maximum value is taken as the image in the operation.

For the gradient operator method, the gradient of image $q(c, v)$ at (c, v) can be defined by the two-dimensional column vector as in

$$\nabla s(a, n) = \begin{pmatrix} R_n \\ R_m \end{pmatrix} = \begin{pmatrix} \frac{\partial d}{\partial c} \\ \frac{\partial d}{\partial b} \end{pmatrix}, \quad (18)$$

in

$$\begin{cases} \frac{\partial d}{\partial c} \approx q(c, v)^2 - q(c-1, v)^2, \\ \frac{\partial d}{\partial b} \approx q(c, v)^2 - q(c, v-1)^2. \end{cases} \quad (19)$$

The Roberts' tilt operator method is a 4-point difference method that uses pixel difference tilt in two diagonal directions. The horizontal and vertical tilt is defined as follows:

$$\begin{cases} W_v = q(g, k) - q(g-1, k-1), \\ W_c = q(g, k-1) - q(g-1, k). \end{cases} \quad (20)$$

Graphics processing unit (GPU), professional graphics display equipment, is now widely used in PCs, workstations, and large servers. Figure 1(a) shows the internal architecture diagram of the traditional general-purpose GPU and Figure 1(b) is the internal architecture diagram of the CUDA-based programmable GPU. It can be compared that the programmable GPU has better controllability, as shown in Figure 1.

3. Sports Injuries of Hip-Hop Training

3.1. Investigation of Injuries in Street Dance Training. In the valid questionnaire surveyed, there were 39 freshman members, accounting for 19.2% of the total; 62 sophomore members, accounting for 30.9% of the total; junior members totaling 45, accounting for 22.3% of the total number of senior members; 49 senior members, accounting for 22.3% of the total; 5 members of Yanyi, accounting for 3% of the total; and 18 members of Yanji, accounting for 8.2% of the total. Hip-hop training requires a lot of foot movements, so ligament injuries are common. The injury rate can reflect the problems in sports training. Injuries will inevitably occur in sports, and a number of injuries will inevitably occur. It is also uncontrolled. Once an injury occurs, it will inevitably bring pain to the athlete's body and mind. The number of injured patients in hip-hop clubs is shown in Table 1.

It can be seen from the table that among 169 students, the injury rate has reached 66.27%, and the probability of injury has exceeded more than half. This shows to a certain extent that hip-hop dance has problems related to injuries and needs more attention. The number of injuries is shown in Table 2.

Judging from the overall damage situation of each dance type, the probability of damage is higher, exceeding 50%, and the number of damages varies from one to multiple times. Therefore, it is easy to cause sports injuries during street dance. Participating in hip-hop activities will draw conclusions about injuries, and the number of injuries is still unknown. One-time injuries can be said to be incidental, but if there are many injuries, there are several factors that need to occur. Therefore, further research on hip-hop sports is needed.

In the analysis of hip-hop breaking, popping, jazz, locking, student gender and injury, injury rate, and training times, the details are as shown in Table 3.

The injury rate and training times of the students of these four dance types are shown in Table 4.

To sum up, compare the injury rate of the five dance types: hip-hop, breaking, popping, jazz, and locking. The injury rate is the highest. The type of dance is breaking (break dance), followed by locking (lock dance), the third is hip-hop (hip-hop dance), the fourth is jazz (jazz dance), and the fifth is popping (mechanical dance). Hip-hop (hip-hop), popping (mechanical dance), and jazz (jazz dance) have the largest number of students who have been injured in 1 or 2 training sessions per week. Breaking (break dance) and locking (lock dance) students are injured. The number of people training 3~5 times a week option is the largest. Every dance type will have sports injuries, and the research on hip-hop sports injuries is urgent.

Combined with the investigation of the overall sports injury period of the members of the hip-hop club, a detailed analysis of the injury period of the students of various dance types is shown in Table 5.

It can be seen from the table that, compared with the five dance types, hip-hop is the most prone to damage during complete movement training, and breaking, popping, jazz, and locking are the most prone to damage during difficult movement training. No matter at which training period, the injury is worthy of attention.

3.2. Medical Image Display of Ligaments. In the natural stage, at the level of the coronary artery and the complete corneal curvature, the most obvious result in the image is the anterior thalamic connection, but the result between the two is not very obvious. The appearance of the body posture and the total spine tilt between the coronary artery levels. There was no significant difference in the physical position and cross section of the intact dorsal arch, as well as the coronal position of the intact dorsal arch and the intact vegetal arch between the other two groups and the full implant transverse incision. The magnetic imaging effect is significantly different and statistically significant, as shown in Figure 2.

Posterior annulus fibrosus (PTFL) performs better in the full section of the spine. The same cross section at different positions, such as physical position and full dorsal crown, was tested between physically and fully inclined curved sections. The difference in appearance effect is not significant, and the difference in appearance effect between the other two groups is significant and statistically significant, as shown in Figure 3.

Sport vascular coupling (NTL) has the best effect on the full-sectional magnetic imaging of the spine and foot. The cornea is bent horizontally. The test between the back and the corneal level showed that there was no statistical difference between the two groups; the other two groups were statistically significant, as shown in Figure 4.

The magnetic imaging of the calf joint at the full radius of the spine and the physical incision shows relatively good image effects. The results of one event are significantly different and statistically significant, as shown in Figure 5.

It can be seen from the above figures that when the anterior tibiotalar ligament is in the section of the complete

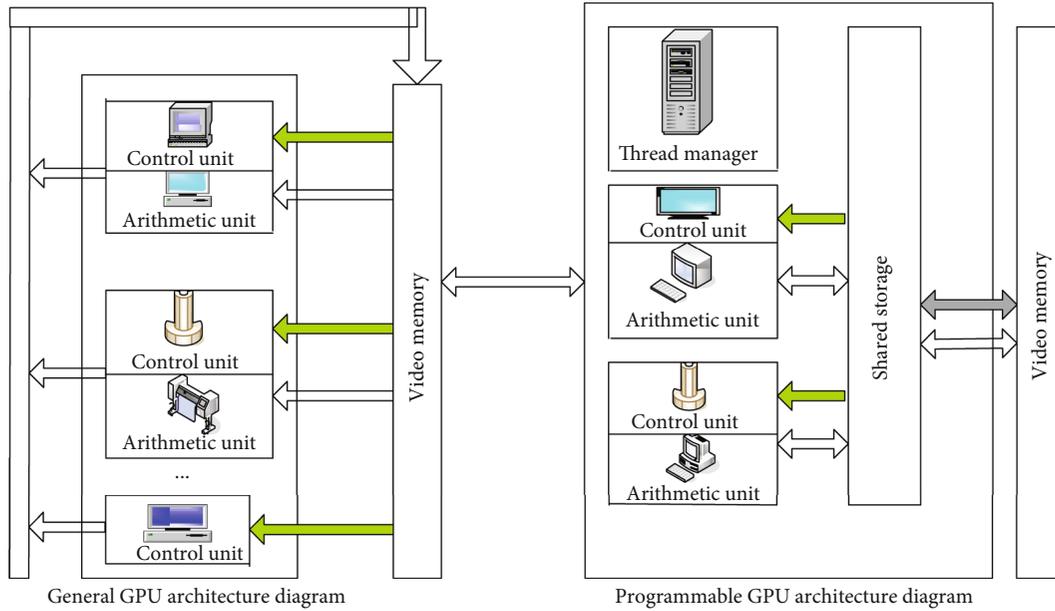


FIGURE 1: Comparison of traditional and programmable GPU architectures.

TABLE 1: The number of injured members of street dance clubs learning street dance ($N = 169$).

Damage	Number of people (people)	Percentage (%)
Damaged	112	66.27
No damage	57	33.73
Total	169	100.00

TABLE 2: Participation in hip-hop-related training and the number of competition injuries.

Number of damages	Frequency (person)	Percentage (%)
1 time	32	28.07
2 times	29	25.44
3 times	16	14.04
4 times	8	7.02
5 times	6	5.26
Other	23	20.18
Total	114	100.00

plantar flexion coronal plane and natural posture coronal plane, the medical scanning image is clear and the effect is the best. When the posterior tibial ligament is completely tilted, the medical scan shows the best results. When the kinematic link is in the complete pelvic corneal position, the medical scan shows clear images and the best results. As a complete transverse spine monitor, the effect is relatively low. Tibial stone connection showed clear results in coronary artery medical scanning, and the complete image of the spinal cross section was relatively poor.

3.3. Treatment of Ankle Ligaments. These ligaments play an essential role in the movement of the ankle joint. (1) The ligaments govern the various forms of movement of the

TABLE 3: Gender and injury status of students in various dance styles.

Dance	Gender	Damaged	No damage	Total
Hip-hop	Male	9	6	15
	Female	22	20	42
Break dance	Male	30	3	33
	Female	9	0	9
Mechanical dance	Male	20	23	43
	Female	3	9	12
Jazz	Male	5	7	12
	Female	17	21	38
Lock dance	Male	8	4	12
	Female	5	4	9
Other	Male	3	2	5
	Female	1	0	1
Total		132	99	231

ankle joint, such as walking, running, and jumping, and can prevent excessive movement of the ankle joint to maintain its stability and avoid damage. When the ankle joint is transferred from the spine to the pelvis, the influence of ligaments on joint stability gradually increases, while the influence of bone structure gradually decreases. (2) Since the joint capsules and ligaments and ends of many owners are strongly stimulated, they may provide proprietary information about joint function. (3) It provides the direction of moving the ankle joint; the joint structure is shown in Figure 6.

The main steps of ligament surgical repair are as follows: sequential inspection of the knee joint cavity below the joint

TABLE 4: Injury rate and training times of students of various dance styles.

Dance	Number of training sessions per week	Damaged	No damage	Total
Hip-hop	1-2 times/week	17	19	36
	3-5 times/week	12	6	18
	6-7 times/week	3	0	3
	Other times/week	0	2	2
Break dance	1-2 times/week	16	3	19
	3-5 times/week	20	2	22
	6-7 times/week	9	2	11
	Other times/week	4	0	4
Mechanical dance	1-2 times/week	12	22	34
	3-5 times/week	8	10	18
	6-7 times/week	6	12	18
	Other times/week	0	0	0
Jazz	1-2 times/week	10	0	10
	3-5 times/week	10	2	12
	6-7 times/week	0	2	2
	Other times/week	6	1	7
Lock dance	1-2 times/week	2	6	8
	3-5 times/week	2	0	2
	6-7 times/week	0	0	0
	Other times/week	0	2	2
Other	1-2 times/week	6	3	9
	3-5 times/week	6	0	6
Total		159	92	251

to determine the degree of frontal lobe injury, obtain independent tendons or artificial tendons, and determine the equidistant point of the anterior frenulum, the choice of tibial tunnel bone drill, and insertion and attachment of frontal joint grafts. The most classic method of using the Blumensaat line to determine the equidistant point of the anterior laceration repair is the fourth Harner method, which can determine the correct position of the X-ray isometric point: the Blumensaat line can be divided into four equal parts, specify the femoral tunnel, etc. The longitudinal position should be located at the rear quarter of the Blumensaat line, and the tibial equidistant point should be located at the second quarter of the plateau along the tibial articular surface. At the same time, the measurement method means that the median of the medial knee is enlarged for accurate placement. After surgery, X-ray films can be used for evaluation and analysis. The points that need to be paid attention to during the operation are shown in Figure 7.

4. Experimental Results and Analysis

4.1. Experimental Results. The average fracture healing time was 11.8 weeks (9-15 weeks), and there was no delayed union. All patients' incisions were healed with grade A, no

incision, infection, no screw loosening, no pain on the inside of the ankle joint, no foot valgus, no vascular nerve injury, osteomyelitis, and other complications. Among them, one patient felt tightness in the medial malleolus during the 1-year follow-up, but it did not affect the patient's normal ankle joint movement, except for the fact that the anchor tail line was too tight during the operation and the ligament was shortened. The comparative analysis of the observation indicators is as follows: the preoperative medial malleolus gap of the affected side is 5.21 ± 0.26 (mm), compared with the postoperative medial malleolus gap 3.29 ± 0.23 mm, $P < 0.05$, and the difference is statistically significant, 1 year after the operation, the medial malleolus of the affected side. The gap is 2.78 ± 0.26 (mm), compared with 2.61 ± 0.23 (mm) on the healthy side, $P > 0.05$, suggesting that there is no statistically significant difference between the medial malleolus gap on the affected side and the healthy side; the last follow-up AOFAS ankle-hindfoot score: 93 points (74-97 points), the excellent and good rate is 95%. The VAS score at the last follow-up was 0-3 points, with an average of 1.5 points, suggesting that the patient's sensitivity to pain in the affected area was significantly reduced. One of these patients felt that the medial malleolus was tight during one-year follow-up after the operation, but it did not affect the normal ankle movement of the patient. The X-ray film of gravity stress level measured at one-year follow-up after operation showed that the medial malleolus space was slightly smaller than the healthy side, and it is expected that the ligament was shortened due to too tight knot of the anchor tail line during operation.

4.2. Medical Safety Training Therapy. Statistics of the results of the clinical efficacy criteria after two weeks of injury in the treatment group and the control group showed that the recovery rate, apparent rate, and total effective rate of the treatment group after two weeks were higher than those of the control group. And the total effective rate of the treatment group reached 92.20%, indicating that the treatment effect of the treatment group was significantly better than that of the control group, and the difference between the two was statistically significant. The detailed data is shown in Figure 8.

Since there is very little research on medical training therapy in China and there is no case report on the use of MTT treatment for sports injuries, the safety of MTT treatment needs to be observed. This experiment is specifically designed for the safety of MTT treatment of lateral ankle ligament injuries. The observation indicators are mainly clinical efficacy criteria (mainly four indicators of pain, tenderness, swelling, and functional activity) and patient X-ray reexamination. Through observation and comparison of the clinical efficacy criteria (mainly four indicators of pain, tenderness, swelling, and functional activity) of the case, it was found that during the MTT intervention treatment, the patient's pain, tenderness, and swelling gradually alleviated, and the functional activity gradually increased. It was also found through statistics that the treatment effect of the MTT treatment group was better than that of the control group, and the difference between the two was statistically

TABLE 5: Injury situation of students in various dance styles.

Damage period	Hip-hop	Break dance	Mechanical dance	Jazz	Lock dance	Other	Total
Warm-up	4	7	2	2	0	0	15
Training package	10	7	2	6	0	3	25
Strength training	6	5	6	3	0	2	22
Difficult action	6	26	12	8	5	1	58
Train	5	2	2	6	3	0	18
Flexibility training	3	1	3	2	0	0	9
In the game	3	0	0	3	1	0	7
Other	4	0	0	0	2	0	6
Total	41	48	27	27	11	6	160

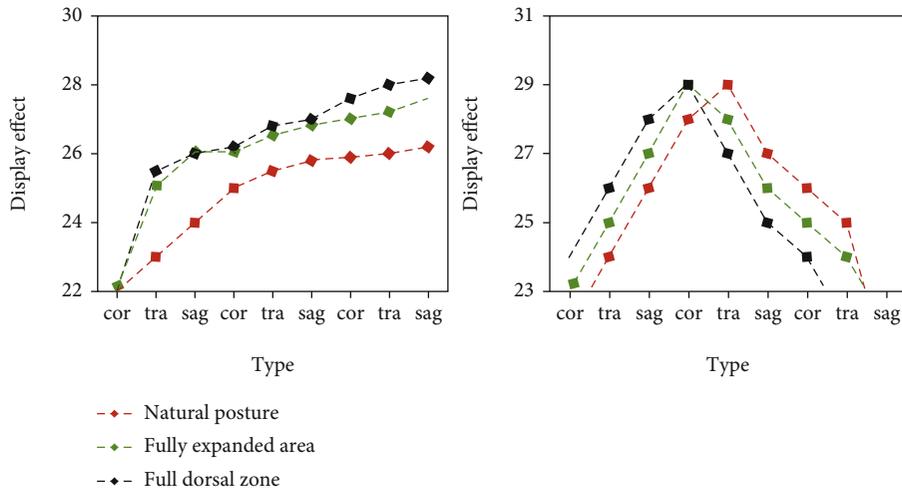


FIGURE 2: Medical image display of the anterior tibiotalar ligament in different positions.

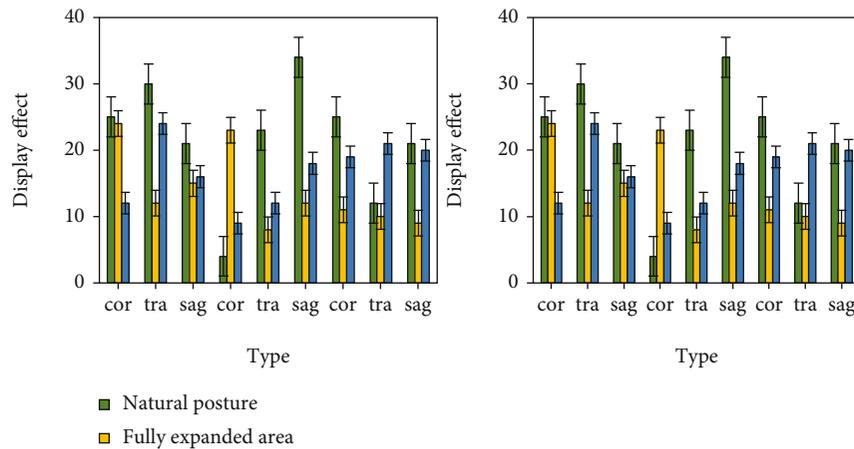


FIGURE 3: The posterior tibiotalar ligament is shown on medical images in different positions.

significant. By comparing the X-rays before and after the treatment of the patients in the control group and the treatment group, it was found that there were no obvious imaging changes in the bones, joints, and bone spaces of the patients. In summary, the medical training therapy described above is safe and reliable when applied to the

treatment of lateral ankle ligament injury. The comparison of X-rays before and after treatment is shown in Figure 9.

4.3. *Treatment Effect.* The total effective rate represents the 5 included studies. In the surgical group, two intervention measures were surgical anchor fixation and suture fixation

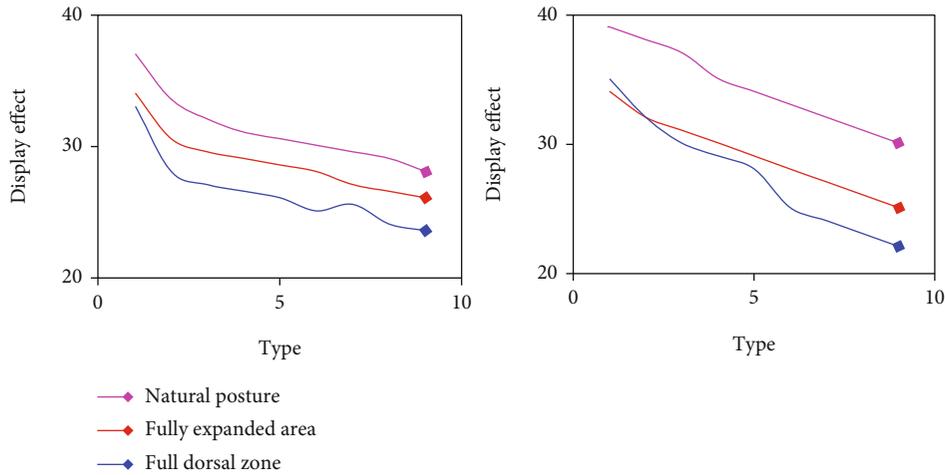


FIGURE 4: The tibioscapoid ligament displayed on medical images in different positions.

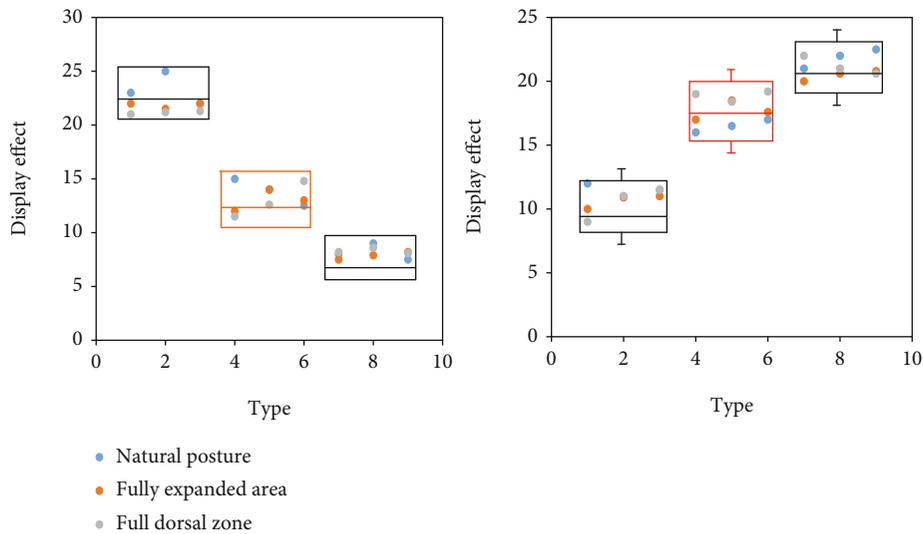


FIGURE 5: Transverse tibiofibular ligament displayed on medical images in different positions.

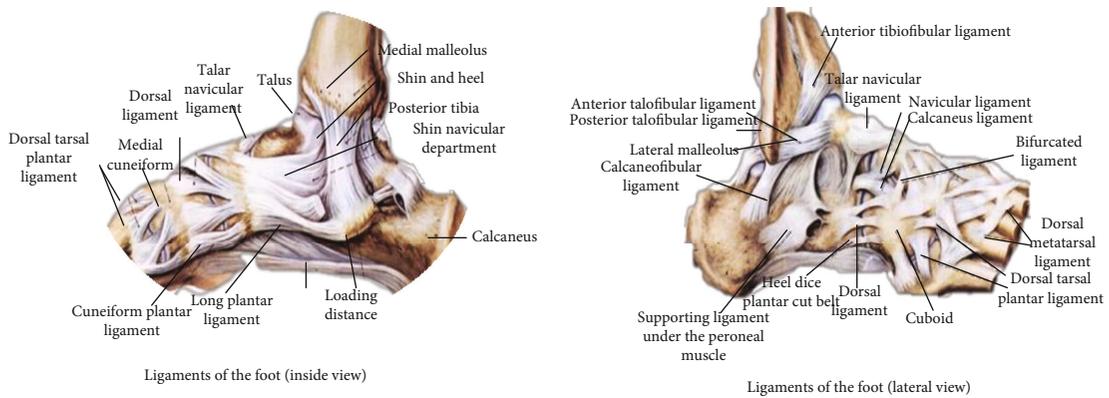


FIGURE 6: A view of the ligaments of the foot.

and postoperative plaster fixation; 3 researched surgical anchor fixation and suture fixation, and plaster fixation was not mentioned. Compared with the nonsurgical group,

the treatment method is not to repair the deltoid ligament. The analysis results show that surgical repair of the deltoid ligament is more effective than nonsurgical treatment. The

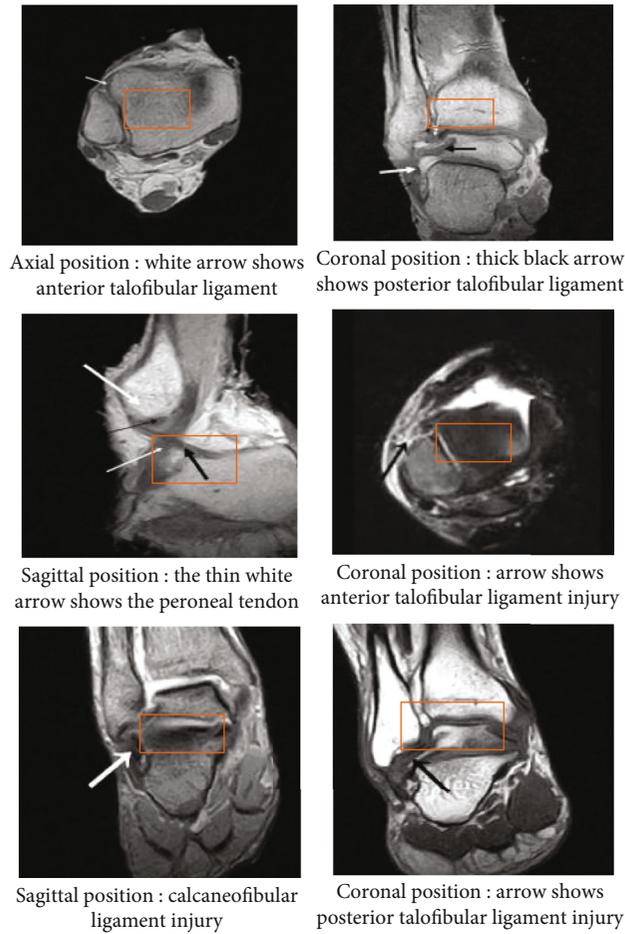


FIGURE 7: Sagittal and coronal position.

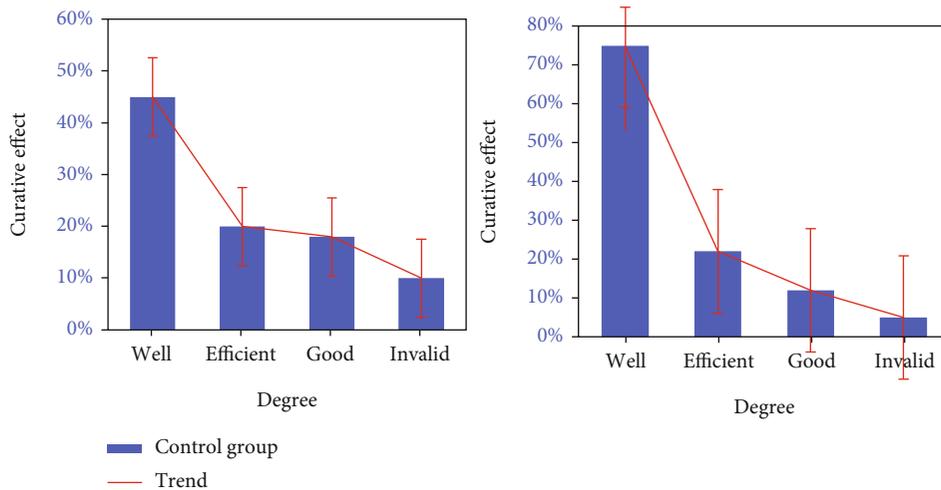


FIGURE 8: Histogram of the clinical efficacy percentages of the treatment pair and the control group.

ankle function score indicates that, according to the inclusion and exclusion criteria, there are 6 studies involving the ankle function score, but only the data of the two studies can be analyzed. The study was tested for heterogeneity, and $\chi^2 = 22.27$, $P < 0.00001$, $I^2 = 96\%$, indicating that the data

of each study is highly heterogeneous, and the random effects model was used to combine the effect size MD. The results showed that $MD = 6.91$, and its 95% CI was $-1.80, 15.63$. The combined effect size was tested by Z, and $P = 0.12 > 0.05$, indicating that the difference between the two



FIGURE 9: X-ray comparison of patients before and after treatment ((a) and (b) are the control group, and (c) and (d) are the treatment group).

groups was not statistically significant. Further reading and research of the literature found that there is a significant difference between the treatment method of the nonsurgical group in Wu's study and the treatment method of the nonsurgical group in Zhang's study. In Wu's study, the tibiofibular syndesmosis screw was used to fix the tibiofibular syndesmosis (without repairing the deltoid ligament), while Zhang used plaster fixation as a control treatment. The treatment methods of the two study surgical groups were the same. Therefore, it cannot be said which method is more effective to repair the deltoid ligament surgically or nonsurgically. Complications indicate that the study of complications of the ankle deltoid ligament includes pain, limited mobility, maximum walking distance, and stability of the ankle and hindfoot. According to the inclusion and exclusion criteria, 6 studies were included to compare complications. The analysis results show that surgical repair of ankle deltoid ligament injury is more effective than nonsurgical treatment in reducing posttreatment complications. Fracture healing indicates that fracture healing is of great significance to determine whether the treatment is effective in clinical practice. Four of these studies compared fracture healing. The study was tested for heterogeneity, and $\chi^2 = 2.41$, $P = 0.49 > 0.1$, $I^2 = 0\%$, indicating that the data of each

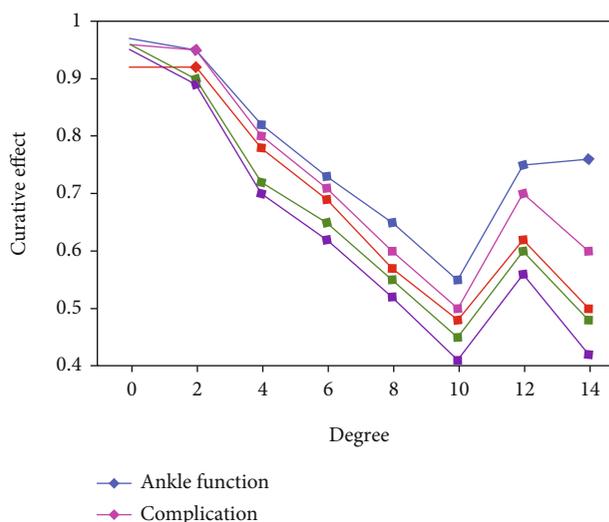


FIGURE 10: Analysis of treatment effect.

study is of good homogeneity, and the fixed-effects model is used to combine the effect size RD. The results showed that $RD = 0.03$, and its 95% CI was $-0.03, 0.09$. The Z test was performed on the combined effect size, and $P = 0.32 > 0.05$, indicating that the difference between the two groups was

not statistically significant. Therefore, it is not clear which method is more effective in fracture healing with surgical repair of the deltoid ligament or nonsurgical treatment. The inclination angle of the talus indicates that the inclination angle of the talus is an important indicator for judging whether the ankle joint is stable. The study compares the inclination angle of the talus after surgery and nonsurgical treatment of ankle deltoid ligament injury. There are two research data that can be included in the analysis. The analysis results show that surgical repair of the ankle deltoid ligament injury is more effective than nonsurgical treatment in improving the inclination angle of the talus. The specific data is shown in Figure 10.

5. Conclusions

In terms of clinical scores, ankle joint replacement and ankle joint fusion have roughly the same effect, but ankle joint replacement is better than ankle joint fusion in terms of quality of life, daily activities, and sports functions: there is no significant difference in patient satisfaction between ankle joint replacement and ankle joint fusion. However, the reoperation and complication rate of ankle joint replacement is higher than that of ankle joint fusion. Due to the limited number of original studies included, the small sample size of individual studies, the lack of randomized controlled studies, and the lack of long-term follow-up, we should be cautious about the current conclusions and require more high-quality, large-sample multicenter randomized controlled trials for long-term follow-up to further verify the conclusions and conduct a more comprehensive systematic review and meta-analysis. Due to the special anatomical structure of the ankle joint, combined with walking and strenuous activities in daily life, ankle joint injuries have a higher incidence of sports injuries. If the deltoid ligament injury is not treated well, the following complications are prone to occur: bruising, pain, restricted ankle mobility, and maximum walking distance. For ankle instability or complete ligament rupture, surgery should be performed. However, there are few domestic related researches and related reports. With the development of the information age, we should continue to learn advanced foreign technology and improve clinical methods. It is believed that there will be greater development in the treatment of ankle band injuries in the future.

Data Availability

The data underlying the results presented in the study are available within the manuscript.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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