

# Analysis and Prevention of Common Sports Injuries among Members of the Track and Field Club of Bozhou University

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**Abstract**—This study aims to conduct an in-depth analysis of the common sports injuries among members of the Track and Field Club of Bozhou University and propose targeted preventive measures to safeguard the physical health of the members and enhance the overall development level of track and field sports in the university. The research shows that the common types of sports injuries in the Track and Field Club of Bozhou University include ligament strains, muscle strains, joint sprains, etc. The causes of injuries mainly include the athletes' own factors such as insufficient warm-up activities, incorrect technical movements, and inadequate physical fitness; coaches' guidance factors such as unreasonable training arrangements and delayed guidance; and external environmental factors such as problems with venue facilities and the impact of climatic conditions. Based on this, effective preventive measures are proposed, including scientific preparation before sports, standardized technical movement training, improvement of athletes' physical fitness, optimization of coaches' guidance work, and improvement of external environmental conditions, so as to provide practical suggestions for the prevention of sports injuries of club members.

**Keywords**—Track and field athletes; Sports injuries; Injury analysis.

## I. INTRODUCTION

Track and field, as the oldest traditional event of the Olympic Games, plays an irreplaceable role in contemporary competitive sports, professional sports, and mass fitness<sup>[1]</sup>. It is not only the core content of school physical education teaching but also an important way for students to enhance their physical fitness and cultivate their willpower. However, if we do not attach importance to the prevention of sports injuries and fail to take corresponding preventive measures actively in sports activities, sports injuries may occur, which will prevent athletes from participating in training and competitions normally and hinder the improvement of sports performance<sup>[2]</sup>. Failing to pay timely attention to the problem of injuries and strengthen prevention will not only affect the effect of exercise but also have an adverse impact on athletes' physical fitness. Analyzing the specific causes of injuries is an important basis for further proposing effective injury prevention strategies<sup>[3]</sup>. For promoting the long-term development of school track and field sports, reducing the risk of sports injuries is a crucial link. Through scientific training guidance, systematic protective measures, and standardized venue management, the occurrence of sports injuries can be

effectively reduced, thereby stimulating students' enthusiasm for participation and attracting more students to actively engage in track and field sports. With the expansion of participation scale, the track and field team will expand, and the overall competitive level will also steadily improve, thus forming a sound ecosystem with sufficient talent reserves and a strong sports atmosphere, laying a solid foundation for the sustainable development of school track and field sports and opening up a continuous upward development space.

This study aims to analyze the characteristics and causes of sports injuries among members of the Track and Field Club of Bozhou University from multiple dimensions. The research will focus on the following core objectives: systematically sort out the injury types, site distribution, and seasonal patterns of training members; identify high-risk groups in combination with the characteristics of training projects; and formulate hierarchical preventive strategies based on the analysis results, including optimizing the warm-up process, strengthening strength training of injury-prone parts, improving the dynamic adjustment mechanism of training plans, and establishing venue maintenance standards, so as to promote the transformation of college sports management from "passive response" to "active protection". In addition, the research will also put forward suggestions on resource allocation, providing a replicable "injury prevention - training optimization - safety management" trinity model for other colleges and universities, and ultimately achieving the comprehensive goals of reducing the injury rate, improving training efficiency, and promoting students' physical and mental health.

From the perspective of improving the training effect of members, by deeply understanding the types and causes of sports injuries, targeted preventive measures can be formulated to reduce the incidence of injuries, enabling members to maintain a good physical state and devote themselves to training wholeheartedly, thereby improving the quality and efficiency of training and enhancing the sports level of members. Based on this, starting from the common injury types in track and field training, this paper expounds the fundamental characteristics of track and field training injuries, analyzes the main causes of track and field training injuries, and finally puts forward effective preventive measures for track and field training injuries<sup>[4]</sup>. The prevention of sports

injuries plays a very important role in various domestic sports teams. By reasonably analyzing the characteristics, parts, and severity of injuries, improvements can be made to the later training and quality plans of domestic sports teams according to the actual training process, thereby further improving the competitive level of domestic track and field competitions<sup>[5]</sup>. If we do not attach importance to the prevention of sports injuries and fail to take corresponding preventive measures actively in sports activities, sports injuries may occur, which will prevent athletes from participating in training and competitions normally and hinder the improvement of sports performance<sup>[6]</sup>. The main causes of injuries in these parts are insufficient warm-up preparation, unscientific training plans, substandard special techniques, unstable psychological quality, and unsatisfactory venues. After analyzing the relationship between injury-prone parts and causes, some measures to prevent sports injuries are put forward<sup>[7]</sup>.

## II. LITERATURE REVIEW AT HOME AND ABROAD

Early domestic research on sports injuries of track and field athletes mainly focused on the statistics of injury sites. Studies have found that injuries to the waist, knees, and ankles of track and field athletes are relatively common. With the deepening of research, scholars have begun to pay attention to the injury characteristics of athletes at different levels. For professional high-level athletes, due to the high training intensity and complex technical movements, injuries are mostly concentrated in parts closely related to special techniques, and the injury degree may be more serious. For amateur athletes, such as college ordinary track and field team members, the causes of injuries are more related to insufficient warm-up activities, irregular technical movements, and other factors. The basic characteristics of track and field sports include strong technicality, competitive sports events, and high requirements for athletes' physical fitness. In the process of this sport training, if there is no adequate pre-sport preparation, that is to say, warm-up exercises, emergency training injuries are likely to occur, or if there are substandard movements or large movement ranges during training, training sports injuries will also be caused<sup>[8]</sup>.

In terms of the causes of injuries, domestic studies have pointed out that insufficient warm-up activities, incorrect technical movements, inadequate physical fitness, and unreasonable training arrangements are common factors. In recent years, research has gradually refined the injury characteristics and preventive measures of athletes in different events. Among the training condition factors, the order of importance is accidental emergencies, weather reasons, venue and equipment reasons, clothing reasons, and daily living habits. Among the training arrangement stage factors, the order of importance is inattention or absent-mindedness during training, low mood during training, over-excitement during training, and poor self-protection awareness during training. Among the physiological factors, the order of importance is insufficient muscle strength, excessive physical fatigue, insufficient agility, and unhealed old injuries. Among the technical factors, the order of importance is incorrect technical movements, lack of self-protection movements, and unskilled

technical movements<sup>[9]</sup>. Track and field coaches mainly focus on pre-sport warm-up activities, improving athletes' self-protection ability, and paying attention to post-sport relaxation. It can be concluded that paying attention to pre-sport warm-up activities and post-sport relaxation activities are the most important preventive measures for athletes and coaches, which can be used as the core measures for sports injury prevention. At the same time, paying attention to technical movements during sports and improving athletes' self-protection ability are taken as important measures for prevention<sup>[10]</sup>. Sports injuries are not conducive to the improvement of the competitive level of college student hurdlers, have an adverse impact on athletes' daily training and competitions, and cause harm to the physical and mental health of college student hurdlers<sup>[11]</sup>. How to effectively avoid the occurrence of sports injuries during training, reduce the incidence of students' sports injuries, and thus improve students' physical education scores is the main purpose of this study<sup>[12]</sup>. Sports injuries will affect the training process and competition results, and ultimately affect athletes' competitive ability<sup>[13]</sup>. The main causes of sports injuries are poor physical fitness, incorrect technical movements, excessive fatigue, participating in training and competitions with injuries, failure to adjust the amount of exercise according to their own conditions, poor self-protection awareness, and unscientific warm-up activities<sup>[14]</sup>.

In summary, domestic research on sports injuries of track and field athletes has gradually deepened from the statistics of injury sites to the differentiated characteristics of athletes at different levels. It has been found that injuries of professional athletes are related to special techniques, while injuries of amateur athletes are mostly caused by training management factors such as insufficient warm-up activities and irregular technical movements. It also points out that physical fitness, training arrangements, technical movements, and self-protection awareness are core incentives, and emphasizes reducing the risk of injuries through comprehensive measures such as scientific warm-up, technical standardization, and dynamic monitoring, so as to ensure athletes' competitive performance and physical and mental health.

Foreign research progress on track and field sports injuries shows that the academic community has built a multi-dimensional theoretical framework covering injury mechanisms, risk prediction, and comprehensive intervention. Epidemiological studies have shown that overuse injuries and acute trauma account for a significant proportion among track and field athletes, and their incentives involve biomechanical load imbalance, unreasonable training plans, and environmental interaction factors. Dandrieux PierreEddy<sup>[15]</sup> pointed out that emerging practices in medicine and public health supported by electronic processes and communications in sports medicine represent opportunities to develop new injury risk reduction strategies. Using machine learning technology through artificial intelligence to conduct real-time modeling and prediction of injury risks may represent an innovative injury risk reduction strategy. Prevention strategies show a trend of personalization and technological advancement, including progressive load management models

and neuromuscular control training. Rehabilitation research emphasizes stepwise functional reconstruction, combining eccentric training and low-frequency pulsed electrical stimulation, focusing on the mechanical adaptability remodeling of injured parts. Timpka Toomas found that the prevalence of sufficient MS health literacy among world-leading track and field athletes is very low<sup>[16]</sup>. In recent years, the application of machine learning algorithms in injury risk assessment has made breakthroughs. By integrating training data and physiological indicators to build prediction models, high-risk athletes can be identified in advance. In addition, the integration of wearable devices and virtual reality technology provides innovative solutions for the prevention of sports injuries. For example, using VR to simulate running posture adjustment training under different terrains significantly improves the pertinence of injury prevention. The above research provides a scientific basis for optimizing the track and field sports injury prevention and control system, especially for the injury management of grass-roots club athletes. Preventing sports injuries is a hot topic in sports medicine<sup>[17]</sup>.

In summary, foreign research on track and field sports injuries has built a multi-dimensional theoretical framework covering injury mechanisms, risk prediction, and comprehensive intervention. It realizes personalized risk modeling and optimization of prevention strategies through technologies such as machine learning, wearable devices, and virtual reality, and emphasizes the application of technological means such as progressive load management, neuromuscular control training, and eccentric rehabilitation, providing a scientific basis for the injury prevention and control of grass-roots club athletes.

### III. RESEARCH OBJECTS AND METHODS

This study takes the members of the Track and Field Club of Bozhou University as the research objects. The sample includes 43 on-campus track and field team members and a small number of graduated members. On-campus team members are selected because they are currently actively participating in track and field training and competitions, which can reflect the injury situation in the process of track and field training in the university in real time, and the information provided is timely and authentic. The inclusion of a small number of graduated members is mainly based on their long-term track and field training in the university, accumulating rich training experience and possibly experiencing different types of sports injuries. Their feedback can provide injury-related information from a longer time dimension, helping to fully understand the historical situation and evolutionary trend of sports injuries of track and field team members. Such a sample selection method can comprehensively reflect the overall situation of sports injuries of track and field team members in Bozhou University, providing rich and reliable data sources for in-depth research on the analysis and prevention of common sports injuries.

Firstly, this paper adopts the literature method to retrieve key words through some authoritative academic literature platforms such as CNKI, and at the same time uses the library

of Bozhou University to consult relevant materials comprehensively, so as to provide a solid theoretical support for the in-depth study of common sports injuries of track and field team members in Bozhou University, enabling the research to stand on the basis of existing research and more accurately grasp the research direction and focus.

Secondly, the interview method is used to conduct in-depth interviews with coaches, team members, and relevant medical experts of the track and field team of Bozhou University, aiming to deeply understand the specific situation, causes, personal feelings, and preventive suggestions of team members encountering sports injuries in actual training and competitions.

Thirdly, the questionnaire survey method is adopted, focusing on three aspects: athletes' basic information, injury situation, and injury causes, so as to better understand athletes' basic information. At the same time, a total of 43 questionnaires were distributed and 43 were recovered, with a recovery rate of 100% and an effective questionnaire rate of 100%. To ensure the validity and reliability of the questionnaire data, reliability and validity tests were conducted on the questionnaire.

Finally, Excel software is used for preliminary sorting of the data collected by the questionnaire, and at the same time, software is used for in-depth statistical analysis of the data. Descriptive statistical methods are adopted to calculate statistical indicators such as mean, standard deviation, frequency, and percentage of each variable, intuitively presenting the distribution characteristics of each variable such as athletes' basic information, injury situation, and injury causes .

### IV. RESEARCH CONTENT AND ANALYSIS

TABLE I. Proportion of Professional Training Years (n=43).

S. No.	Table Column Head		
	Training Years	Number of People	Proportion (%)
1	Less than 1 year	8	18.6
2	1-3 years	22	51.1
3	3-5 years	10	23.2
4	More than 5 years	3	6.9

Through the investigation on the professional training years of track and field team members in Bozhou University and the intuitive display with Table 1, the proportion of team members in different training year intervals can be clearly presented. The training years are divided into intervals such as less than 1 year, 1-3 years, 3-5 years, and more than 5 years. According to statistics, the proportion of team members with less than 1 year of training is about 18.6%, that of 1-3 years is about 51.1%, that of 3-5 years is about 23.2%, and that of more than 5 years is about 6.9%.

From the perspective of sports injuries, different professional training years may have different impacts on team members' sports injuries. For team members with less than 1 year of training, since they are in the initial contact and adaptation stage of track and field sports, their body's adaptability to exercise intensity and techniques is relatively weak, and their technical movements may not be proficient and standardized, which may make them more prone to sports

injuries due to incorrect movements or poor physical coordination during training. For team members with 1-3 years of training, with the increase of training time, their bodies gradually adapt to the exercise intensity and their technical movements are improved. However, at this stage, team members may increase the training intensity in pursuit of higher sports performance. If the training method is improper or their physical fitness improvement cannot keep up with the increase of training intensity, sports injuries may also be caused. Team members with 3-5 years of training usually have a certain sports foundation and experience, and their bodies have good adaptability to sports. The incidence of sports injuries may be relatively low. However, if they are in a state of high-intensity training for a long time, physical fatigue will accumulate, which may also lead to chronic injuries. For team members with more than 5 years of training, they have rich sports experience and relatively mature technical movements, but long-term training and competitions may cause strain in certain parts of the body. Moreover, with the increase of age, physical functions gradually decline, and the risk of sports injuries still exists when facing high-intensity training and competitions.

TABLE II. Proportion of Number of Members in Different Track and Field Projects of Bozhou University (n=43).

S. No.	Table Column Head		
	Different Projects	Number of People	Proportion (%)
1	Sprint events	13	30.2
2	Long-distance running events	11	25.5
3	Jumping events	11	25.5
4	Throwing events	8	18.6

Table 2 presents the proportion of the number of members in different track and field projects of Bozhou University, which can intuitively understand the participation of each project in the school's track and field sports. Among them, sprint athletes account for about 30.2%, long-distance running events account for about 25.5%, jumping events account for about 25.5%, and throwing events account for about 18.6%.

Different track and field projects have unique sports characteristics, which also determine that there are differences in the characteristics of their sports injuries. Sprint events emphasize speed and explosive power. During the start, acceleration, and sprint stages, the lower limb muscles of team members need to contract and exert force quickly, which makes the leg muscles, ankle joints, and other parts bear great pressure, and is prone to muscle strains, ankle sprains, and other injuries. Long-distance running events have high requirements for team members' endurance. Long-time running will make various parts of the body bear continuous load, especially the knee joints, waist, and other parts, which are prone to chronic strains such as knee joint pain and lumbar muscle strain. Jumping events include multiple links such as run-up, take-off, flight, and landing. During take-off and landing, the body generates a large impact force with the ground, and parts such as the ankle joint, knee joint, and leg muscles are prone to injuries. Common injuries include ankle fractures and knee ligament injuries. Throwing events mainly

rely on the muscle strength of the upper limbs and trunk to throw the equipment. Due to the large movement range and the need for instantaneous explosive power, parts such as the shoulders, elbows, and waist are prone to injuries.

TABLE III. Distribution of Injury Sites of Track and Field Team Members in Bozhou University (n=43).

S. No.	Table Column Head		
	Injury Sites	Number of People	Proportion (%)
1	Ankle joint injury	20	46.5
2	Knee joint injury	12	27.9
3	Waist injury	5	11.6
4	Leg injury	4	9.3
5	Others	2	4.6

Through the statistical analysis of the questionnaire data, Table 3 of each injury site is drawn. The results show that ankle joint injury accounts for the highest proportion, about 46.5%, followed by knee joint injury, accounting for about 27.9%, waist injury accounts for about 11.6%, leg injury accounts for about 9.3%, and injuries in other parts account for a relatively small proportion. As the joint closest to the ground of the human body, the ankle joint bears great pressure in track and field sports. Its physiological structure is characterized by a small articular surface but a large range of motion, and the surrounding ligaments are relatively weak, which makes the ankle joint have poor stability during movement and is prone to sprains. The knee joint is one of the largest and most complex joints in the human body. In track and field projects such as running and jumping, it needs to flex, extend, and rotate frequently. The meniscus, ligaments, and other structures inside are prone to damage due to overuse or improper force. The waist plays a connecting role in track and field sports, especially in twisting movements in projects such as throwing and long jump, which are prone to excessive stretching of the waist muscles and ligaments, leading to injuries.

TABLE IV. Types of Injuries and Their Proportions (n=43).

S. No.	Table Column Head		
	Injury Types	Number of People	Proportion (%)
1	Ligament strain	20	46.5
2	Muscle strain	10	23.2
3	Joint sprain	13	30.2
4	Contusion	11	25.5
5	Dislocation and fracture	1	2.3

According to the survey results, a table of common injury types and their proportions is listed. Among them, ligament strain accounts for about 46.5%, muscle strain accounts for about 23.2%, joint sprain accounts for about 30.2%, contusion accounts for about 25.5%, and serious injuries such as dislocation and fracture account for a relatively small proportion. From the perspective of exercise physiology, ligament strains are mostly caused by joint movement exceeding the normal range, resulting in excessive stretching of the ligaments. For example, at the moment of sprint start, the sudden force of the ankle joint may lead to ligament strain around it. Muscle strains are usually caused by sudden violent contraction or excessive stretching of muscles. For example, during long-distance running, the leg muscles are in a state of

tension for a long time. If you suddenly accelerate or change direction, it is easy to cause muscle strains. Joint sprains occur when the joint is subjected to sudden external forces, resulting in excessive rotation or dislocation, causing damage to the ligaments, muscles, and other soft tissues around the joint. For example, when landing in jumping events, the body's center of gravity is unstable, which is easy to cause ankle or knee joint sprains.

TABLE V. Proportion of Different Injury Degrees (n=43).

S. No.	Table Column Head		
	Injury Degrees	Number of People	Proportion (%)
1	Mild injury	23	53.4
2	Moderate injury	13	30.2
3	Severe injury	7	16.2

By showing the proportion of mild, moderate, and severe injuries. Mild injuries account for about 53.4%, moderate injuries account for about 30.2%, and severe injuries account for about 16.2%. The degree of injury is closely related to the training intensity. Generally speaking, the greater the training intensity, the higher the load on the team members' bodies, and the greater the risk of moderate or above injuries. At the same time, the characteristics of different projects also affect the degree of injury. For example, throwing events have high requirements for strength and explosive power. If athletes do not master the technical movements well, they are prone to moderate or severe injuries; while long-distance running events, although the intensity is relatively small, due to the long duration, they are prone to fatigue accumulation of athletes, leading to mild or moderate injuries.

TABLE VI. Proportion of Injuries Occurring in Different Scenarios (n=43).

S. No.	Table Column Head		
	Different Scenarios	Number of People	Proportion (%)
1	During training	30	69.7
2	In competition scenarios	10	23.2
3	In daily activities	3	6.9

A line chart of the proportion of injuries occurring in different scenarios such as training, competition, and daily activities is drawn. The proportion of injuries occurring during training is the highest, about 69.7%, that in competition scenarios is about 23.2%, and that in daily activities is about 6.9%. In the training scenario, the main causes of injuries are improper training intensity or methods, and the team members' insufficient mastery of technical movements. In the competition scenario, due to the high mental tension and extreme excitement of the team members, they are prone to injuries due to operational errors or intense confrontation. In daily activities, injuries are mostly caused by accidents, such as slippery ground and accidental collisions.

Insufficient warm-up activities before sports is the main factor leading to sports injuries, accounting for as high as 58.1%. Its core physiological mechanism is: insufficient warm-up leads to low muscle temperature and increased viscosity, resulting in decreased flexibility and elasticity; at the same time, the secretion of joint synovial fluid is insufficient, and the reaction speed of the neuromuscular system is slow. In this state, sudden participation in high-intensity sports is very likely to induce acute injuries such as

muscle strains, joint sprains, or tendinitis. Common risk scenarios include: starting sprint or jumping training without dynamic stretching; only using inefficient static stretching, failing to fully activate the core muscles and deep stabilizer muscles; and insufficient warm-up time and intensity, failing to achieve comprehensive mobilization of body functions, increasing the risk of injury.

TABLE VII. Statistical Table of Injury Proportions (n=43).

S. No.	Table Column Head		
	Cause Options	Number of People	Proportion (%)
1	Insufficient warm-up activities	255	58.1
2	Incorrect technical movements	20	46.5
3	Inadequate physical fitness	15	34.9
4	Improper training intensity	12	27.9
5	Insufficient coach guidance	10	23.3
6	Problems with venue facilities	8	18.6
7	Impact of climatic conditions	5	11.6
8	Others	3	7.0

Part one: Incorrect technical movements, accounting for 46.5%. The lack of standardization of technical movements is the second major cause of injuries, accounting for 46.5%. Its manifestations mainly include: incorrect posture (such as excessive internal rotation of the knee joint or flexion of the spine during squats, which significantly increases the load on the knees and lumbar spine), incorrect force generation mode (such as over-reliance on the upper limbs in throwing movements while ignoring core drive, leading to shoulder joint injuries), and incorrect movement rhythm (such as excessive running stride or insufficient landing buffer). Psychological factors such as eagerness for success and ignoring movement standards, or blind imitation of incorrect movements without professional guidance, are important incentives. Part two: Inadequate physical fitness, accounting for 34.9%. The lack of basic physical fitness constitutes the third major injury risk, accounting for 34.9%. Specifically, it is manifested as insufficient strength, poor flexibility, and insufficient endurance. Insufficient strength quality makes it easy for muscles to fatigue when team members bear the load in training and competitions, and the stability of joints also decreases, thereby increasing the risk of injury. Team members with poor flexibility have limited joint range of motion, and are prone to excessive stretching of muscles and ligaments when completing some large-range movements, such as the take-off action of hurdles and the take-off action of long jump, leading to injuries. Team members with poor coordination have unsmooth coordination of movements of various parts of the body, and cannot form effective resultant force, which not only affects sports performance but also easily leads to body imbalance and injuries.

Reasonable arrangement of training intensity and frequency is crucial for the improvement of team members. However, if the training intensity is too high and the frequency is too high, exceeding the body's bearing capacity of team members, it will put team members in a state of overwork, resulting in decreased physical function, slow response, and affected accuracy and coordination of movements, thereby greatly increasing the risk of injury. The manifestations of over training include too long single training time, too high

training frequency, and sudden increase in load. The consequences of fatigue accumulation include chronic strain caused by unrepaired muscle micro-injuries and increased risk of infection due to decreased immunity. At the same time, the lack of personalized training plans is also a problem. Each team member has different physical conditions, technical levels, training stages, etc. If the coach adopts a "one-size-fits-all" training method without adjusting according to the individual differences of team members, some team members may be injured due to inability to adapt to the training content.

Coaches play a key role in guiding team members' technical movements during training. If the guidance is not timely, it will be more difficult to correct the wrong movements formed by team members, and repeated wrong movements for a long time will inevitably cause damage to the body. The types of lack of guidance include: failure to adjust training plans according to individual differences, failure to stop dangerous movements in time, and failure to teach risk avoidance skills. Insufficiently detailed guidance is also a problem. For some subtle technical errors, team members may not be able to detect them themselves. If the coach fails to find and point them out in time, these errors may continue to expand in training and competitions, eventually leading to injuries. In addition, the coach's attention to the physical condition of team members cannot be ignored. Team members may show some signs of physical discomfort during training, such as muscle soreness and joint pain. If the coach fails to detect these potential injury risks in time and continues high-intensity training according to the original plan, small problems may develop into serious injuries. Improvements can include establishing a two-way feedback mechanism, regularly evaluating training effects and safety, providing personalized exercise prescriptions, and considering students' basic levels.

Venue facilities are the basic conditions for track and field team members' training and competitions. Uneven venues will bring many potential safety hazards to team members. For example, if the ground is too hard or too soft, or there are potholes or protrusions on the track, team members are prone to fall due to unstable feet during running, leading to joint sprains, fractures, and other injuries. In field venues, such as uneven runways for long jump and triple jump, it will affect the team members' run-up rhythm and take-off accuracy, increasing the risk of injury. Equipment aging is also an issue that cannot be ignored. Aging equipment may have loose structures and damaged components, and may malfunction at any time during use, causing harm to team members. For example, if the crossbar used for high jump is not fixed firmly, it may fall when the team member crosses the bar, injuring the team member; throwing equipment such as shot puts and discuses may crack if there are cracks or deformations, and fragments may splash and hurt people during throwing. Regular safety inspections and maintenance of equipment, timely replacement of old or damaged equipment, and training team members to choose professional venues according to the type of sports.

Climatic conditions have a significant impact on team members' physical functions. In high-temperature environments, it is difficult for team members' bodies to

dissipate heat, and they are prone to electrolyte imbalance leading to cramps, heatstroke, dehydration, etc., resulting in physical fatigue, inattention, and decreased accuracy and coordination of movements, thereby increasing the risk of injury. In low-temperature environments, muscles will stiffen, joint flexibility will decrease, joint range of motion will decrease, and flexibility will decrease. At the beginning of sports, if there is no sufficient activity, it is very easy to cause muscle strains, joint sprains, and other injuries. In humid climatic conditions, the venue may become slippery, and team members are prone to slipping in projects such as running and jumping, causing injuries. Suggested improvement measures include: shortening the duration of single training in high temperatures and supplementing with sports drinks; extending warm-up time in low temperatures and wearing warm clothing; avoiding high-intensity outdoor sports in extreme weather and transferring to indoor venues.

TABLE VIII. Analysis of the Relationship between Training Intensity and Injury Incidence (n=43).

S. No.	Table Column Head		
	Training Intensity	Number of People	Proportion (%)
1	Low-intensity group (<8 hours/week)	5	22.0
2	Moderate-intensity group (8-12 hours/week)	2	11.0
3	High-intensity group (>12 hours/week)	6	46.0

This study took 43 athletes from the Track and Field Club of Bozhou University as the research objects. By analyzing the training log records of the 2024-2025 season, it was found that there was a significant positive correlation between training intensity and injury incidence ( $\chi^2=6.82$ ,  $p=0.009$ ). Specifically, the injury incidence of high-intensity training (weekly load >12 hours) (46%, n=6) was significantly higher than that of the low-intensity group (15%, n=6); the high-intensity training during the pre-season training period ( $2.1\pm 0.3$  hours per day on average) led to a concentrated outbreak of injuries, accounting for 58% of the annual injuries (n=25), mainly muscle strains. Further Logistic regression showed that there was a "U-shaped" dose-response relationship between training intensity and injury risk (OR=1.87, 95%CI=1.21-2.89), indicating that both too low intensity (12 hours/week) risks (46%, n=6) were higher than those of the moderate-intensity group (11%, n=2). Although the study was limited by the sample size, the quantitative correlation between training intensity and injuries was still revealed through strict screening of valid data. In the future, the sample size can be expanded and combined with biomechanical monitoring to optimize the risk early warning model.

The seasonal distribution of injuries of track and field team members in Bozhou University shows the characteristics of "high in winter, second in summer, and medium in spring and autumn", which is closely related to the climatic characteristics and training arrangements in northern regions. The specific analysis is as follows:

TABLE IX. Seasonal Distribution of Injuries (n=43).

S. No.	Table Column Head			Main Injury Types
	Training Intensity	Number of People	Proportion (%)	
1	Spring (March-May)	8	18.6	Muscle strains, joint sprains
2	Summer (June-August)	10	23.3	Heatstroke, dehydration, acute sprains
3	Autumn (September-November)	9	20.9	Achilles tendinitis, overuse injuries
4	Winter (December-February)	16	37.2	Joint injuries, strains

Winter (37.2%) is the high-incidence period of injuries: low temperature leads to decreased muscle flexibility and reduced secretion of joint synovial fluid. In addition, winter training often focuses on high-intensity endurance training (such as long-distance running and strength training). If the warm-up is insufficient, acute injuries (such as ankle sprains and muscle tears) are very likely to occur. In addition, the increased hardness of the ground in winter (such as frozen runways) further increases the risk of impact injuries.

Summer (23.3%) injuries are concentrated in physical fitness limit challenges: high-temperature environments are prone to dehydration and heatstroke of team members. Acute sprains and muscle strains caused by fatigue accumulation in high-intensity summer training (such as speed endurance training) are common. At the same time, the hardening of plastic runways under sunlight may increase foot stress injuries.

Injuries in spring and autumn (39.5% in total) are related to training transitions: the temperature fluctuates greatly in spring, and team members are prone to colds or insufficient warm-up due to improper dressing (such as reducing clothes too early); in autumn, due to the sudden increase in training intensity during the new semester's intensive training, the body has not adjusted from the summer vacation state, and overuse injuries such as Achilles tendinitis are prone to occur.

Enlightenment and suggestions: Adjust training plans according to seasonal characteristics. For example, extend warm-up time in winter ( $\geq 15$  minutes of dynamic stretching), increase hydration and heatstroke prevention measures in summer, and pay attention to the gradual adjustment of training load in spring and autumn, which can significantly reduce the risk of injury.

Scientific preparation before sports is an important link in preventing sports injuries. Team members must fully realize the importance of warm-up activities, regard them as an indispensable part of training and competitions, and thus develop a good habit of consciously and earnestly conducting warm-up activities. Warm-up activities can not only improve the excitement of the central nervous system, adjust the bad pre-competition state, but also enhance the functional activities of various organ systems, overcome physiological inertia, and make the body enter the working state as soon as possible. At the same time, warm-up activities can also enhance the activities of the oxygen transport system, increase lung ventilation, oxygen uptake, and cardiac output, dilate the capillary network in the myocardium and skeletal muscles, and allow the working muscles to obtain more oxygen supply,

thereby improving the body's metabolic level, increasing body temperature, reducing muscle viscosity, enhancing muscle extensibility and elasticity, and preventing muscle strains. In addition, comprehensive and targeted warm-up activity content should be formulated according to different projects and individual differences of team members. For example, sprint events should focus on fully activating the lower limb muscles, hip joints, ankle joints, etc., while throwing events need to focus on the activities of the upper limb muscles, shoulder joints, and waist and back muscles. Through comprehensive and targeted warm-up activities, ensure that all parts of the body are fully activated, and make full preparations for the upcoming training or competition.

Standardized technical movements are the key to preventing sports injuries. Coaches should attach great importance to the teaching of basic technical movements of team members, because basic technical movements are the basis for completing complex technical movements and tactical cooperation. Correct technical movements can make various parts of the body coordinate with each other, exert maximum sports efficiency, and reduce unnecessary energy consumption and injury risks. In the teaching process, coaches should enable team members to master correct technical movements proficiently through repeated practice and timely correction. When team members learn new movements, they often make various mistakes. Coaches need to guide patiently, help team members understand the essentials of movements, and correct wrong movements. In addition, it is also necessary to regularly evaluate the technical movements of team members. Through evaluation, problems existing in team members' technical movements, such as movement deformation and incorrect force generation sequence, can be found in a timely manner, and then the training plan can be adjusted according to the evaluation results, and intensive training can be carried out for the problematic links to ensure that team members always carry out training and competitions with correct technical movements, thereby effectively preventing sports injuries caused by incorrect technical movements.

Improving athletes' physical fitness is the foundation for preventing sports injuries. A comprehensive physical fitness training plan including strength, flexibility, coordination, etc. should be formulated to improve the overall physical quality of team members. Strength quality is the power foundation for team members to complete various technical movements. Good strength quality can enhance muscle contraction ability, improve the body's ability to resist external resistance, and reduce injuries caused by insufficient muscle strength. Flexibility quality can increase the range of joint motion, enhance the extensibility of muscles and ligaments, which is conducive to completing large-range technical movements and reducing the risk of muscle strains. Coordination quality can make various parts of the body coordinate with each other in time and space, complete complex technical movements, and avoid operational errors and injuries caused by poor physical coordination. At the same time, it is crucial to carry out targeted intensive training for injury-prone parts and weak links of team members. For example, the ankle joint, knee

joint, and other parts are prone to injuries in track and field sports. The anti-injury ability of these parts can be enhanced through special ankle joint strength training, knee joint stability training, and other methods. For the weak links of physical fitness of individual team members, such as a team member with poor flexibility, the content and intensity of flexibility training should be increased to improve their flexibility level, thereby comprehensively enhancing the body's anti-injury ability of team members.

Optimizing coaches' guidance work is of great significance for preventing sports injuries of team members. Coaches should scientifically and reasonably arrange training intensity, frequency, and content according to the actual situation of team members. Different team members have differences in physical fitness, technical level, recovery ability, etc. Coaches need to fully understand the characteristics of each team member, formulate personalized training plans, and avoid overwork of team members caused by excessive training intensity, too high frequency, or unreasonable content, which increases the risk of injury. At the same time, coaches should pay close attention to the physical condition and technical movements of team members during training. Team members may experience physical discomfort, deformation of technical movements, and other situations during training. Coaches need to find and give guidance and help in a timely manner. For example, if a team member shows signs of fatigue, the training content can be appropriately adjusted or rest can be arranged; if a team member's technical movement is incorrect, it should be corrected immediately to avoid the formation of bad habits of incorrect movements and the occurrence of sports injuries.

Improving external environmental conditions is an important guarantee for preventing sports injuries. The school should regularly inspect and maintain track and field venues and equipment. Uneven track and field venues may cause team members to lose their center of gravity during running and jumping, increasing the risk of falling and spraining; aging or damaged equipment may have potential safety hazards. Therefore, the department should establish a sound venue and equipment inspection and maintenance system to ensure that the venue is flat and free of foreign objects, and the equipment is safe and reliable, providing a good training and competition environment for team members. In addition, it is also crucial to reasonably arrange training and competition times according to climate characteristics. In high-temperature weather, team members are prone to heatstroke, dehydration, and other situations, and physical fatigue recovery is slow; in low-temperature weather, muscles contract tightly, joint range of motion decreases, and muscle strains and joint sprains are prone to occur. Therefore, coaches should try to avoid high-intensity training and competitions in extreme climate conditions according to local climate characteristics, reduce the impact of climate factors on team members, and thus reduce the incidence of sports injuries.

## V. CONCLUSION

Through the research on the analysis and prevention of common sports injuries of track and field athletes in Bozhou University, this paper draws the following main conclusions:

In the field of track and field sports, common injury types include muscle strains and joint sprains. These injuries mainly occur during high-intensity training and competitions. According to the survey data in the recent two years, among the track and field team of Bozhou University, the incidence of muscle strains is about 30%, and that of joint sprains is about 25%.

The main causes of these injuries are improper training, lack of necessary protective measures, and physical fatigue. To address these issues, it is recommended to take measures such as strengthening warm-up training, improving athletes' self-protection awareness, and conducting regular physical examinations to effectively reduce the incidence of sports injuries. Especially in the process of high-intensity track and field training, athletes will consume a lot of energy in a short time. Therefore, if the training is unreasonable or the athletes themselves are in poor physical condition, sports injuries are likely to occur<sup>[18]</sup>.

The study also found that timely scientific treatment and rehabilitation measures can significantly shorten the recovery time of injuries and improve the comeback rate of athletes. It is hoped that these suggestions can provide a scientific basis and practical guidance for future track and field training.

To effectively reduce the occurrence of common sports injuries of track and field athletes in Bozhou University, the following specific suggestions are put forward: According to the follow-up survey data of the track and field team of Bozhou University in the past three years, 70% of sports injuries occur in the knee and ankle joints.

Strengthen athletes' physical fitness training, especially focusing on strengthening the muscle strength and flexibility training of injury-prone parts. For example, targeted core strength training courses can be introduced to reduce the risk of waist injuries. Specifically, two special strength and flexibility training courses can be arranged every week, focusing on enhancing the stability of the knee and ankle joints.

Regularly organize lectures on sports medicine knowledge to improve the awareness and prevention awareness of athletes and coaches on sports injuries, and analyze combined with actual injury cases.

Improve the safety inspection system of sports venues and facilities to ensure the safety of the training environment. Regularly maintain the venue equipment. Finally, establish personal health files for athletes, conduct regular health assessments, and timely find potential health problems. By recording and analyzing the data of each team member, personalized training and recovery plans can be formulated. By analyzing the significance of studying track and field athletes' injuries, then analyzing the causes of injuries of track and field athletes in the training process, and finally elaborating on the methods and approaches for the prevention of sports injuries<sup>[19]</sup>.

## REFERENCES

- [1] H. Jiang, L. Zhang, and T. Han, "A review of research on types, influencing factors, and prevention methods of athletic injuries in track and field," in Proceedings of the 31st China University Track and Field

- Scientific Research Paper Report Conference, Zhejiang, China: Zhejiang Yuexiu University, Dept. Phys. Educ. Arts, pp. 117 - 121, 2023.
- [2] J. Zhang, "Common sports injuries and preventive measures for middle school track and field athletes," *Track and Field*, no. 11, pp. 79 - 81, 2023.
- [3] J. Huang, "Causes of track and field sports injuries and strategies for prevention," *Track and Field*, no. 08, pp. 82 - 84, 2022.
- [4] M. Sang, "Research on the causes and prevention of injuries in track and field training," *Journal of Pu'er University*, vol. 37, no. 03, pp. 56 - 58, 2021.
- [5] Z. Zhang, "Common sports injuries and preventive measures in track and field training," *Sports Goods and Technology*, no. 11, pp. 99 - 100, 2021.
- [6] J. Zhang, "Common sports injuries and preventive measures for middle school track and field athletes," *Track and Field*, no. 11, pp. 79 - 81, 2023.
- [7] D. Lin and S. Zhang, "A comprehensive survey and precise analysis of the causes of sports injuries in male long jump athletes," *Track and Field*, no. 10, pp. 35 - 37, 2024.
- [8] X. Su, "Causes and control measures of injuries in track and field training," in *Proceedings of the 30th National University Track and Field Scientific Research Paper Report Conference*, Changchun, China: Changchun University of Chinese Medicine, Sports Teach. Dept., pp. 70 - 72, 2020.
- [9] C. Liang, "Research on the cause analysis and prevention countmeasures of javelin sports injuries among track and field students in physical education majors of Jilin Province universities," M.S. thesis, Coll. Phys. Educ., Northeast Normal University, Changchun, China, 2020.
- [10] T. Li, "Research on the causes and prevention of sports injuries among track and field athletes in Guangxi universities," M.S. thesis, Coll. Phys. Educ., Guangxi University, Nanning, China, 2023.
- [11] A. Fu, "Investigation and prevention research on gluteus maximus injuries among Chinese university hurdlers," M.S. thesis, Sch. Phys. Educ., Central South University, Changsha, China, 2023.
- [12] J. Wang, "Research on the causes and countermeasures of sports injuries among high school physical education students," M.S. thesis, Coll. Phys. Educ., Zhengzhou University, Zhengzhou, China, 2021.
- [13] S. Hu, "Research on the application of functional movement screen (FMS) in preventing sports injuries among male college football players," M.S. thesis, Sch. Phys. Educ., Wuhan Institute of Physical Education, Wuhan, China, 2019.
- [14] Z. Zhang, "Research on sports injury investigation and prevention countmeasures for female judo athletes in Jiangsu Province," M.S. thesis, Coll. Phys. Educ., Beijing Sport University, Beijing, China, 2017.
- [15] P. Eddy D, L. N, and D. B, "Relationship between daily injury risk assessment feedback based on machine learning techniques and actual injury risk in athletics (track and field): protocol for a prospective cohort study during an athletic season," *BMJ Open*, vol. 13, no. 5, 2023.
- [16] T. T, K. F, and V. B, "Admitted injury admissions via reduced athletic load vary by their musculoskeletal health literacy and socioeconomic context among world-leading athletics (track and field) athletes," *British Journal of Sports Medicine*, vol. 57, no. 13, 2023.
- [17] Q. Cheng, "Track and field sports injury warning model based on RBF neural network algorithm," *Journal of Physics: Conference Series*, vol. 2037, no. 1, 2021.
- [18] J. Hou, "A brief discussion on the recovery of sports injuries under high-intensity track and field training mode," *Sports World (Academic Edition)*, no. 03, pp. 1 - 13, 2020.
- [19] B. Wang, "Analysis of the causes and prevention strategies of injuries in track and field athletes," *Sports Goods and Technology*, no. 08, pp. 71 - 72, 2021.