

# How to Prevent Knee Injury in Cha-cha-cha

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**Abstract:** *Cha-cha dance is a dance that combines speed and beauty. Based on surveys and interviews with experts and professors, personal teaching experience, and analysis of the complete set of video movements of Cha-cha dance, it is found that knee injuries are the most common in fast dance. However, the knee is extremely important for dancers. It bears 70% of the body's weight. Whether it is a lock step or a rotation, it cannot be separated from the support of the knee. Therefore, it is especially important to avoid knee injury in the dance practice and competition. This article combines my own teaching experience, hoping to provide some methods to prevent knee injuries for the basic theories and training methods of Latin dance.*

**Keywords:** Knee, Cha-Cha-cha, The Reasons of getting injured, Prevent injury.

## 1. INTRODUCTION

Cha-cha, first introduced to Latin America by the black Africans, was created by imitating penguins' actions to show the situation where young men and women play with each other. And it is witty, passionate and pretty. According to the document, nowadays the research and findings about every unique character in cha-cha are still imperfect enough at home and abroad. Based on our investigation visit to professors, personal teaching experience and analysis about overall actions of cha-cha, the passage is concerned with the following analysis of methods provided to prevent knee injury in cha-cha training.

Cha-cha dance was first introduced to Latin America by black Africans. It is a dance created by imitating the movements of penguins to express the scene of young men and women playing with each other. It is witty, enthusiastic and beautiful []. According to the author's investigations by visiting experts, years of teaching experience and analysis of the complete set of movements during the competition, it is shown that dancers' knee injuries occur most frequently. The dancer's power is the knee. The knee is like a sports car to the dancer. The patella is the engine of the sports car, and the meniscus is the brake and shock absorber of this sports car. Therefore, it is especially important to avoid knee injuries in Cha-cha dance practice and competition.

According to the comparative analysis of literature review and video observation, it is concluded that the importance of the knee to dance movement in Cha-cha dance can be mainly analyzed from the following aspects: the structure of the knee, the function of the knee, the cause of the knee injury of the dancer, and the training of the knee. Misunderstandings and introduction of correct training methods to avoid dancers' knee injuries in sports.

## 2. CHARACTERISTICS OF THE KNEE JOINT

The knee joint is formed by inner and outer facies articularis malleolaris of lower thigh bone, superior articular surface of tibia and adjacent articular surface of patella in a joint capsule. At the same time, knee joint is also the largest, the most complex and the most easily damaged joint in one's body.

The kneecap forms a joint with the thigh bone, and its rear side rests in a groove on the front of the femur, the femoral groove, enabling the kneecap to glide smoothly. The tendon of the quadriceps femoris muscles inserts into the upper border of the kneecap, and its lower point is linked to the tibial tuberosity through the patellar ligament. Therefore, the patella is embedded in the direction of the quadriceps muscle. On the one hand, it protects the muscle during flexion, and on the other hand, it provides better leverage for the knee during extension movements.

The menisci lie in two sickle-shaped discs of fibrocartilage between the round end of the femur from above and the flat surface of the tibia from below. It is a kind of discs of fibrocartilage without blood support itself, receiving the nutrition that mainly comes from synovial fluid. Besides, only the side level part linking to the joint capsule can get blood support from synovial membrane. The menisci can move with the movement of knee joint. It moves forward in knee extension and moves back in knee flexion.

The mechanics of the knee are supported by a complex system of ligaments, and cruciate ligaments are formed of

two intraarticular ligaments decussating with the other. The anterior and posterior cruciate ligaments respectively join the tibia with the femur. They are the most important ligaments in the knee, thus the human body cannot walk normally when the cruciate ligaments are damaged. The two collateral ligaments are relaxed in knee flexion, helping to provide stability. They prevent the femur from losing contact with the joint surface of the tibia. The anterior cruciate ligament prevents the femur from sliding forward during flexion, and the posterior cruciate ligament prevents a slide in the opposite direction.

### **3. THE FUNCTION AND IMPORTANCE OF THE KNEE**

#### **3.1 Load**

In our life, stability is the top priority in the standing leg, whether during walking, jumping, or balancing. The menisci increase the contact area in the knee joint and thus distribute the load evenly throughout the entire knee when standing or during movement. The spiral of the leg influences the physical structure in multiple ways like the function of knee joint. The hip joint rotating outwards and the front foot rotating opposite turns the lower leg inward, which is the basis for the spiraling of the leg. Thereby hip, knee, and ankle are ideally aligned and the load is evenly distributed within the knee.

When the standing leg is flexed, the spiraling of the leg can increase farther. The ball of the big toe still in contacts with the floor while the thigh rotates outwards, stabilizing the internal rotation of the lower leg. The heel is upright, and the knee is in alignment of the axis of the foot over the second toe. This is ideal weight-bearing line for the knee during the plie(a professional term of dance).

The collateral ligaments strengthen the joint capsule in the internal and external of the knee. The knee tightens and provides the stretched leg with medial and lateral stability during extension.

#### **3.2 Maintain the Movement Coordination in the Knee Joint**

The knee is an improved hinge joint, which not only can extend and flex, but also can rotate when flexed. Dancers can thus complete a lot of difficult actions in dancing. The shape of the joint surface provides high stability for the stretched knee. The medial meniscus lies on the top of the inner tibial plateau, and the lateral meniscus lies on the top of outer one. The inner tibial plateau forms a space when the medial meniscus is embedded into it; the outer one is shaped like a hill on which the lateral meniscus slides. This explains that compared with its medial counterpart, the mobility of the lateral meniscus increases. When the knee is flexed, the menisci slide backwards in a bid to compensate for the differences of the contour between the two articulating partners. When the knee is extended, they move forward. Advocating nature, dance steps in Cha-Cha require that the movements of arms, crotch and leg should be on the coordination of strains. The key of Cha-Cha is leg, including dancing face to face with audience in the combination of dance steps, and coordination between every movement and beat is of particular importance. Consequently, the coordination of knee joints is quite essential in Cha-Cha.

#### **3.3 Maintain Stability**

When the knee is flexed, the lower leg will be rotated inwards or outwards. But usually the external rotation dominates, especially in dancers. The term for the linking of rotation with the final degrees of knee extension is called "locking mechanism". In order to have a connection with the lower leg, the thigh turns slightly inwards in the extended position, thus stabilizing the joint.

The cruciate ligaments become taut when the thigh turns outwards and the lower leg turns inwards. They increase the stability of the knee by crossing over each other. The cruciate ligament is mainly for flexion-extension movements and slight rotation, playing a vital role in both normal walking and movements of human body. During flexion-extension movements, the cruciate ligament is responsible for maintaining stability of anterior-posterior direction and rotation. In brief, only when cruciate ligament connects the thigh bone and the shine bone to form a coordinated and organic whole that moves together, can human body complete difficult movements as well as dance wonderfully. Here correct dance, stable and powerful leg and foot movement are initial conditions for the completion of Cha-Cha.

#### **3.4 Absorb Shocks**

The task of the menisci is to increase the contact area of the knee joint and hence to distribute the pressure evenly throughout the whole knee, both when standing and during movement. At the same time, it helps absorb shocks via their sliding mechanism.

## **4. 4. THE REASONS WHY DANCERS GET INJURED IN SPORTS**

### **4.1 Not Aware of the Need for Warming Up**

Dancers may not have enough warm-up before dancing or training for a variety of reasons. As a result, the joints are not fully open and the muscle is in a state of tension. At this condition, their knees joints will be easily get injured if dancers perform difficult dancing at this condition.

### **4.2 Overuse of the Knee and Fatigue Training**

The normal stretch of the leg is called 0° extension, and a hyperextension of the knee of up to 10° is also common in dancing. The ways of knee movements depend on the forming of femoral groove, the shape of kneecap and the coordination of muscles. Overuse of the knee can lead to displacement in the bone structure and the muscle of dancer. Some dancing movements require dancers to fully extend their knees which will move backwards after a long time of extension. But overuse of knee damages cartilage. Moreover, the asymmetry of the bone structure and imbalance of muscles can cause excess stress in the posterior knee, as a result of which the knee will suffer from severe pain.

In order to make a perfect presentation, some dancers need to be highly concentrated in repeated training and difficult movements, and each step must be accurate. After a long time of training, both human spirit and body begin to fatigue, and then dancers will easily get injured if they present difficult movements at this moment.

### **4.3 Overload**

As the biggest weight-bearing joint of the human body, the knee bears the weight above it. Wear with loss of articular cartilage is almost in proportion to the weight bearing. Thus, in daily training, keeping the knee in a high-load condition for a long time can cause knee injury and faster degeneration.

Some dancers with high professional requirement will train repeatedly in a bid to complete difficult movements like rotation, jumping, somersault, etc. Hence many dancers suffer from knee pain while training, which generally indicates the incorrect bearing of knee. Unfortunately, considering it as a common phenomenon in training, many people often neglect the warning given by their knees, as a result of which they will suffer from diseases related with knee like arthritis, osteoarthritis, synovitis and so on. Moreover, excessive training will also result in leg cramps. The phenomenon of muscle cramp (the muscle appears tetanic contraction uncontrollably) in jumping will do harm to dancer's body.

Hyperextension of knees often leads to the weight being moved backwards, so that the heel takes the main weight. This may cause excess stress in the whole leg, resulting in painful overload.

## **5. MISUNDERSTANDING OF KNEE IN TRAINING**

### **5.1 Pay Less Attention to Knee Pain**

Knee pain is very common in dancing. Relax your tightening thigh muscles after training. If you feel any pain around your knee, relax your quadriceps in particular so as to lessen the pressure of kneecap. Overload and incorrect dance technique are the most common reasons causing the problems of the knee, while many dancers neglect the knee pain when training or performing. However, knee pain is the beginning of knee disease, such as meniscus injury, bone hyperplasia, articular genu osteoarthritis and so forth.

Dancers must attach great importance to knee pain. Special awareness outside training session can help to protect knee or deal with knee problems in the first place.

### **5.2 The Knee Cannot Relax**

Most of the dancers will be exhausted after training of performing for a long time, thus failing to relax their leg muscles. Long-term strain of knees without relaxing, overload in meniscus and cruciate ligament leads to instability of knees.

Dancers can protect their knees well in daily life with awareness of relaxing them. In everyday life, as in dance, whether you are standing, walking or running, the knees should always be positioned in line with the toes.

(1) When climbing stairs with the knee flexed, the femur turns slightly outwards in the hip joint; the foot is positioned parallel. At this time, the lower leg and the knee should be aligned with the second toe. Hence the load of the knee is evenly distributed, while the structures are released.

(2) Relaxation of biceps femoris muscles. Sitting on a stool with one knee bent at an angle of 90°, and the opposite hand should touch the inner side of the lower leg. The foot should be slightly flexed or relaxed on the floor. Rotate the lower leg inwards with the hands supporting. The inner hand supports the internal rotation when the left hand smooths along the thing outside and extends the biceps femoris muscle.

(3) Contract-relax stretching of the quadriceps femoris muscle. Lie supine with legs extended and the inner sides of the knees touching. Bend one knee and grasp the foot with your hand, pulling the leg to a maximum knee flexion. Do not hyperextend the lumbar spine in order to pursue bending amplitude of the knee. Hold the stretch for eight seconds, and then press your foot against your hand with the awareness of the muscle activity in the thigh. Keep the muscle contraction for eight seconds before releasing. Repeat the exercise five times and end with the stretching. Then repeat the exercise with the other leg.

### **5.3 Pay no Attention to the Knee Exercise**

In daily life, dancers can exercise their knees in the following aspects:

(1) Exercise your knees without any pressure to them before training. Riding bicycle on the ground and air cycling are the ideal ways of warming up. Keep the foot axis in the optimal condition that the knee should be in line with the toes, whether you are warming up or flexing the knees.

(2) Do not initiate momentum from your knee. In order to prevent knee from twisting, external rotation must be initiated from the outer rotator to hip, but do not keep it while flexing your knees. The first posture is that the leg should be slowly straightened from hips.

(3) Take care of your leg axis. The external rotation of hip joint should counter with the force of the big toe residing on the floor. Thus you can functionally improve your leg axis and avoid the overextension of knee joints.

(4) Do not push or pull the kneecaps excessively, or it will considerably increase the pressure in knees and even stimulate cartilaginous tissue of the knees. Be aware of the length and spiral of the leg rather than its largest extension range.

(5) Actively keep the optimal leg spiral when squatting: The thigh leg turns outwards and the lower leg counters the movement with an internal rotation. Be aware that in this movement, knee should be in positioned line with the second toe while tensing the hamstring. Then in order to keep the leg spiraling ideally, the muscles can only make way and be centrifugal.

## **6. THE CORRECT TRAINING METHOD**

### **6.1 Strengthen the Warming-up**

Usually, there are difficult movements like jump, rotation and somersault in dancing, thus dancers need to do adequate warm-up exercise before training and performance so as to keep body flexible at its best and to relax the muscle.

Leg pressing is a basic exercise for beginning learners, which addresses the problems related with the softness of legs, hip extension and tightening. The hip can be opened and the flexibility of the body improved through different movements of leg pressing like positive pressure and lateral pressure. Moreover, a warm-up exercise aiming at

various parts of the body is needed, such as knee—Rotate left with eight beats while keeping the legs together, and then rotate in the opposite direction with eight beats. As a result, dancers can not only address themselves to the training and performance as soon as possible, but avoid getting injured.

Nevertheless, for those who get knee injury, especially meniscus injury and those who suffer from osteoarthritis, such movements will damage knee joint further, and even cause meniscus injury as well as compression. An ideal way of warm-up exercise is that the knee joint should be placed on non-loaded position, such as sitting position and flexion of the knee. At this time, rotation left and right and the knee activities can greatly lessen not only the knee pressure, but also the friction between articular surface, helping protect the injured articular cartilage and meniscus. Don't squat on the floor without adequate warm-up exercise, because the kneecap will be forced to move contrarily to the strength of femoral groove when the muscles are still in the cold and lack of mobility.

## 6.2 Reasonable Use of Knee Joints

Knee joint is an essential part of dance. As a difficult movement in dance training, jump is a crucial means of shaping characters and expressing feelings and thoughts. Many exquisite movements on the ground need to be showed by means of jumping up into the air; hence in order to complete different kinds of jump, dancers must experience rigorous training. It is noteworthy that dancer should perform the correct movements in training. Besides, some difficult movements, like rotation and jump, should be combined with the easy ones so as to achieve training, or alternative training can be completed with the combination of hands and legs, through which dancers not only can finish difficult movements, but also do less harm to their bodies. In cha-cha, the hands move with the footsteps, but dancers can stand in front of mirror to figure out whether their movements of the hands are right or not after completing a set of movements when in training, so that they can have enough time to relax their knees. Do not cross your legs on a regular basis when sitting, because in crossing the legs the lower part of the leg which lies on top hangs in a slight external rotation, thus “un-spiraling” the knee. That will do harm to the knee joint in the long term.

## 6.3 Pay Attention to the Load of Knees

Although the knee can withstand most weight of the human body, dancer should pay attention to its bearing range and the bone of it. Besides, one is supposed to attach great importance to knee pain in training, avoiding squatting and kneeling in a short time. Female dancers should avoid wearing high heels in everyday life. High heels can lead to pain and overload, especially on the front part of the knee.

## 7. SUGGESTIONS

Both dancers and sportsmen often meet knee problems, which are very common, thus they should be fully acquainted with the structure of the knee. Lacking enough knowledge about it as well as high attention to the warnings given by it, dancers do not know the knee will get hurt in movements. As a result, they often fail to remedy and cure in time.

In a bid to keep knee joint healthier, I think that publicity and education about preventions of knee injury should be actively carried out, from which not only can dancers have a better understanding of every joint, the role of each muscle in dancing and the significance of movements, but also they can find out their physical problems so as to reduce damage.

Inadequate warming up, excessive training and overuse of knees are the important causes of knee injury. Henceforth, dancers should avoid overusing their knees and unnecessary damages resulted from excessive training while intensifying warm-up exercise, and relax the knees in time.

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