

# *The Relationship between High Heels and Ankle Injury in Latin Dance*

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**Abstract:** Dancers are particular athletes who experience a lot of unendurable injuries in process of pursuing aesthetic due to fastidious requirements of dance skills (Laws, 2005). In Latin dance, the requirement that male and female dancers wear prescribed heels is gradually formed in the historical process of dance development. Although, Latin dancers wearing heels can have a perfectly longer leg line, it increases the risk of ankle injuries. First, the article will elaborate on why Latin dancers insist on dancing in high heels from history and the psychological point of view and why heels increase the risk of dancer ankle injury. Next, the research will analyze how to reduce the risk of dancers' ankle injuries from different perspectives. The peroneus longus and peroneus brevis situated on the lateral side of the lower leg are essential muscles to protect ankles from injury (Batson, 2009). In the end, some professional methods of prevention injury will be proposed.

## **1. Introduction**

In 1925, The International Style of Ballroom Dancing (ISBD) association, which is a professional world dance group, formally presented definition that International Style of Ballroom Dancing has strictly divided into two series of Ballroom and Latin dance by Imperial Society of Teachers of Dancing. The former includes the Waltz, tango, Viennese Waltz, Slow Foxtrot, Quick Step, and Latin consist of Rumba, Chacha, Jive, Samba, Pa-so. This kind of dance is distinct from any other as it has strict regulations that male and female dancers should wear high-heels shoes, which were gradually formed in the past hundreds of years.

The first period from 15th century to 20th century was the enlightenment of Modern dance and Latin dance. At the beginning of the 15th century, a dance with strict gait and ritual was prevalent in the European imperial palace and became a status symbol. At the dance party, people Who perform in turn according to the social status, after the king and the queen acted. The nobility aimed to display their exquisite costumes and supreme status. In formal occasions, women wear high heels is not only respect for others, but also able to show Their identity. Although, the dance was constantly evolving and changing in palace (Tomalonis, 1985), ladies dancing with high heels has not changed. Until Louis XIV of France, he was so addicted to dancing. Because he was short, he designed a high heel for men to dance. Since then, men have been wearing such shoes in court dances. Nowadays, men's dance shoes are also improved based on his high heels<sup>[1]</sup>.

In the 16th century, European conquistadors gained majority of African as laborers. After the black were driven to the United States, the cultures of the three continents gradually merged in the

Americas (Schönberg, Sachs, & Bessie, 1963). Thus, dance from three different continents as the main entertainment at that time, also integrated and developed in the Americas. As time went by, this phenomenon gradually effected dance development in Europe. Then, this kind of dance became handed down to lower class in some European countries, after the French revolution of the 18th century. There was the first ballroom in Paris in 1786. At that time, dancing wearing high heels became more popular with the growing, not only at the imperial palace, but also at Middle class and ordinary people<sup>[2]</sup>.

In the early 20th century, the Latin dance was preliminarily formed. In 1924, after a wide study of traditional court dances, ballroom dancing and various folk dances in Latin America, a mass of professional dancers standardized and beautified performance, which was launched by British. In 1925, The International Style of Ballroom Dancing association (a world dance group) formally presented that Modern dance consist of the Waltz, Tango, Slow Foxtrot, Quick Step and Viennese waltz. After the second world war, Americans spread Latin dances around the world, especially in Europe. Then, Modern dance and Latin dance became two series of International Standard Dance. The Latin dance underwent preliminary development in the mid-20th century<sup>[3]</sup>. The International Style of Ballroom Dancing association spread it in Western Europe through various ways, including holding wide range of competitions and regulating dance dress requirements, such as for men and women Wear formal dance shoes (high heels) to participate in the competition<sup>[4]</sup>.

In Modern dance and Latin dance, the requirement that male and female dancers wear prescribed heels is gradually formed in the historical process of dance development. This result is caused by many historical reasons. In modern society, dancers continue the tradition of wearing high-heeled shoes, not only because of the relevant requirements of the official competition, but also because of the many advantages of high-heeled shoes. For example, high-heeled shoes can improve the proportion of the dancer's body and make the dancer's legs look more slender and perfect.

## 2. Methodology

This study's research strategy has its foundation on secondary research, which is gathering and evaluating material from books, research articles, scholarly publications, and other pertinent sources. Secondary research is chosen because it permits a thorough examination of the body of knowledge in the topic and the incorporation of results from many studies to derive significant conclusions.

A systematic search and retrieval of scholarly resources from reliable academic databases, libraries, and online sources is part of the data collection process. For this study, scholarly libraries from reputable universities as well as PubMed, Google Scholar, JSTOR, and PsycINFO were important databases consulted. "Latin dance and ballroom dance" and "high heels" are two search terms and keywords that were employed during the data collection procedure<sup>[5]</sup>.

## 3. Results and discussion

### 3.1 Reasons of ankle injury

Dancers are particular athletes who experience a lot of unendurable injuries in process of pursuing aesthetic due to fastidious requirements of dance skills(Laws, 2005). They are at high risk of great numbers of injuries. A mass researches about the cause of the injuries, because dancers clearly know reasons will help them improve the ego of protecting consciousness and reduce the risk of injuries, have to say, the pains and injuries may lead to huge impact to the dancers of whole life. The common factors include duration of training and improper shoes<sup>[6-7]</sup>.

According to the results of researches cited, ankle injuries continually occurs in Latin dance( Byhring, 2002). Latin dance is a combination of dance and sport with high heels a wide range of

injuries, especially in the ankle area. Dancers from other ranges of dance also will be exposed to ankle injuries in the clinical investigation, however, ankle injury is more serious and frequent in the Latin dance on account of their ankle with high heels in a certain unstable condition. A reason for this is high speed feet movements and the extreme range of ankle motion required of Latin dancers with high heels. Extreme planter flexion enhanced by high heels cause the posterior ankle has to overload stress<sup>[8-10]</sup>.

Muyor (2017) and other researchers measured the ankle pressure of six professional Latin dancers in barefoot, and compared them to three high heels, including 4.5 cm, 7.5 cm and 10 cm. The data showed that the pressure on the ankle was twice as high as that of the ankle with 10cm high heels. The study found that dancing in high heels, regardless of the dancer's height, caused an unsteady pressure on the ankle.

The type of dance that is known and studied, Latin dance, requires plenty of weight-bearing plantar flexion, especially in the Ball Flat positions ( Stretanski, 2002). In the position of Ball Flat, the shaft of the tibia and the metatarsal is nearly aligned vertically, then, the weight of the body is pointed to the distal phalanges of the toe. The base that supports the whole body becomes smaller, from the whole foot to the forefoot. The Ball Flat is similar to *Demi-pointe in shape of latin* dance, except en pointe position that the weight of the whole body is supported by the heads of the metatarsals. As well as this increased demand for lateral ankle stabilization, Latin dancers also suffer ankle injuries from excessive use of peroneals for the pursuit of aesthetics<sup>[11]</sup>.

Most movements performed by Latin dancers with high heels may result in posterior impingement injury of the ankle, because they get together to bear weight, the posterior edge of the distal tibia, posterior aspect of the talus, and superior surface of the calcaneus (Macintyre and Joy, 2000; Shah et al., 2005)<sup>[12]</sup>. In the plantar flexion, the structure between them is subjected to impact damage and even deformation because they exert excessive force on each other.

One particular ankle injury for Latin dancers to note is ankle sprains, and inversion and eversion are two types of it. The most common reasons of inversion are consisting of turning the foot sole inward, jump with single leg, fast and continuous rotation and so on. A common feature of these movements is that the lateral ligaments of the ankle bear too much stress (Bauman and Gallagher, 1996)<sup>[13]</sup>. In addition, high heels also increased the stress on the lateral ligaments as well as risk of ankle sprains.

## 3.2 Prevention of injury

### 3.2.1 Choice of insoles and maintenance

The footwear of dancers is of great importance because likelihood of ankle injury enhances or decrease through wear various dance shoes. In other words, wearing properly fitting shoes not only contribute to high quality performs of dancers, also protect dancers from reducing possibility of ankle injury. While high heels increase the risk of ankle injuries, Latin dancers are unlikely to abandon them. Surprisingly, Latin dancers can choose shoes from other angles to lower ankle injury<sup>[14-16]</sup>.

First of all, dancers should know their feet clearly and choose the appropriate size shoes, which means the toes should reach the end of the shoes, rather than beyond the end of the shoes. Then, shoes heel with an ankle or crossover strap (sometimes this goes underneath the sole of the shoe) or a t-strap design are much better, since the shoes are completely wrapped around the ankles and there are no gaps. When dancing, strap should not be loose at any time which is extremely dangerous. These designs make shoes hug and support dancers' feet to balance and prevent from sliding off<sup>[17]</sup>.

Besides, insertion of textured insoles into the dancers' shoes can enhanced proprioceptive feedback, and lower possibility of ankle injury. Female Latin dancers require fast movements of feet

and body balance control with high heels to achieve better performance (Bronner, 2012; Kiefer et al., 2011). Somatosensory feedback refers to the proprioceptors located at the skin, muscles, tendons, ligaments, and joint capsules (McKeon & Hertel, 2007), which are applied to confirm the body position and movements in dancing<sup>[18]</sup>. The sensory information from the proprioceptors contributes to providing feedback to the central nervous system regarding any change in foot position, for purpose of keep balance and prevent over balance and injuries (Höhne et al., 2011).

Aesthetical values of dance consists of smoothness, coordination and accuracy which need body balance and muscle power, and proprioceptive feedback is closely related to enhance aesthetical values (Smitt & Bird, 2013)<sup>[19]</sup>. To enhance the proprioceptive system at the ankle is beneficial to improve the body stability, promote the use of muscle strength, increase the detection of reverse motion, and be more sensitive to the peroneal movement. On the contrary, if the ankle is poorly controlled, especially in the medial-lateral direction, the ankle may be in reverse positions, then, raising the likelihood of ankle injuries (Batson, 2009).

Increasing the sensation of the foot and the proprioceptive feedback is of great importance, in order to protect the dancers from ankle injury by wearing high-heels shoes with textured insoles (e.g., Batson, 2009; Li et al., 2009; Muaidi et al., 2009). The activity of the skin receptors on the plantar surface is raised by the texture of the soles, which increases the sensitivity of plantar, thereby reducing the risk of ankle injury<sup>[20]</sup>.

As for female Latin dance shoes, the sole with fur is the best choice, which can produce more friction with the ground to improve the balance and stability in dancing. Latin shoes have high heels, and the feet are so stressed on the ground that the ankle can be easily hurt. The comfort and support ability of dancing shoes is of great importance. But the shoes will be deformed with wear, which requires careful maintenance and repair of the shoes. If the ground is rough, the heel is easy to grind, or break off when dancing. Dancers find and buy a new heel piece in time, and nail it with a small awl. After wearing the Latin shoes for a long time, the soles of the shoes are worn seriously, even from the surface of the fur to the smooth surface, which increase the possibility of ankle injury. The dancer needs a new pair of Latin shoes or a special shoes pad to attach to the shoes, and the new fur will restore the friction coefficient of the new shoe<sup>[21-23]</sup>.

### 3.2.2 Professional training techniques

Appropriate warm-up exercises contribute to lower possibility of injuries. As McGuinness and Doody (2006) claimed, proper warm-up activities conduce to cut down rate of injury by at least 10%. Dance education researchers found that some warm-up movements offer better protection than others, such as muscle stretching. Dance movements of Warm up should prepare the muscles and whole body for a more intensive dance activities routine, including jumping jacks, jogging in place and crunches. Stretching is an indispensable design, especially stretch ankles and calves muscle. For example, Latin dancers stretch ankle through flex and extend ankles before wearing high heels<sup>[24]</sup>.

Investigation findings by Mueller (2013) explored that explored that due to ankle in plantarflexion to support the weight of whole body, warming up the ankle joint plays a significant role on warming-up exercises for Latin dancers. What' more, the experiment from research by Mueller (2013) confirmed the ankle joint warm-up quickly (abduction/adduction), whereas other aspects (flexion/extension) may take longer than other joints. Thus, compared to other regions, the ankle warms up longer, though Latin dancers prefer to warming-up their hamstring muscles by means of various stretching exercises. This result is crucial for prevention of ankle injury. From another research by Conti and Stone (1995), it claimed that the occurrence of musculoskeletal injuries between 10% and 30% is related to ankle joint. Female Latin dancers with high heels, whose ankles are drove to extreme plantarflexion, need to be aware that ankle injuries are

associated with this. In general, Latin dancers are concerned on warming-up ankles through strength due to a long time-consuming process of flexion/extension of the ankle<sup>[25]</sup>.

Female Latin dancers actually are under too much pressure on their ankles. Wearing heels for a series of quick steps and jumps or rotations, the ankles bear most of the weight of the body. Overtraining lead to ankles start to feel sore. Dancers need to be aware of their physical condition, especially when they begin to feel uncomfortable, which signals that the ankle should rest. If dancers' ankles suffer from excessive training, slow down or stop dancing and in turn take off heels shoes to rest. What's more, dancers can do a certain activity to stretch ankles and calves muscle. If continue, dancers will have more mistakes of performance, even if dancers have a higher possibility to sprain ankle or broken ankle<sup>[26]</sup>.

### 3.2.3 Effect of the medical professional

The medical professional not only make a contribution to treating and rehabilitating the injuries, but also play an irreplaceable place on prevention of injuries. In other words, accepting suggestion from the professional health care team make for extending lifespan of dancers. Professional lectures Physical therapists, athletic trainers, and other allied health professionals can teach dancers how to prevent injuries by various forms, such as lectures and speeches. Dancers need to follow professional advice because the professional can balance beauty and health<sup>[27]</sup>.

Besides, when dancers are injured, they can provide the most professional diagnosis and effective treatment. And they can help dancers accelerate recovery through monitoring performance, rehearsal load, fitness and health conditions. In the process, they will design a different strategy to maintain the flexibility and strength dancers' need, which is distinguish from the ordinary medical staff. They can estimate whether the dancers are fully recovered, and in turn inform the dancers when they can resume normal dance training. Then, this avoid getting injuries again because of previous wounds. They should be considered a natural part of a dancer's career and sources of insight into staying healthy<sup>[28]</sup>.

### 3.3 Pain and injury preventing exercises

Latin dancers wearing heels can have a perfect longer leg line, but any heel may cause ankle strain in about four hours or less. While dancing in heels increases the pressure on the ankles and shortens the calf muscles, then, increasing the risk of ankle injuries, it is impossible for a Latin dancer to abandon high heels. Professional dance techniques actually contribute to prevent injuries. Power can effectively reduce the risk of injury. One possible cause of harm is to require the muscle to perform more than it can control. A little more force than the minimum required to pass a normal dance may prevent injuries. The peroneus longus and peroneus brevis situated on the lateral side of the lower leg are essential muscles to protect ankles from injury (Batson, 2009). For example, dancers with strong strength in the calf muscles and good body feel may be more effective in controlling the ankle while dancing. Before accidentally impending sprain, they can use the strength of the calves to try to bring the ankle closer to the inside than to the outer side causes an ankle sprain. Therefore, dancers can improve our control by strengthening that muscle. Wearing high heels while dancing is significant to know how heels affect the body of the dancer and what the dancer can do to reduce the risk of injury<sup>[29]</sup>.

To counteract a certain amount of the pressure on ankles and calves, Fallat (1998) and other researchers claim that dancers need to strengthen butt muscles and stretch hamstrings. This can improve the ability of balance required for high heels. For example, to strengthen the muscles of the buttocks, dancers lie on the floor with knees bent and feet flat. Raising hips, body form a straight line from knees to chest, then squeeze butt and lower slowly, and repetitive this



movements(Howse,2000).

In addition, the exercise of increased flexibility of the ankle can be used to improve the control of the ankle and reduce the possibility of injury. Flexibility in dancing is the ability to safely move and control all parts of the body through a full range of actions, even when dancers seem to be out of control (Welsh, 2009). This is one of the capabilities that dancers can't lack. Flexibility allows the dancer to move more easily and unlimited dance. Experts seem to agree that the healthiest way to build flexibility is to increase the range of motion around the joint without affecting the stability of the joint (Alter, 2004). Therefore, dancers can safely establish ankle flexibility through slow, continuous stretching and proprioception neuromuscular promotion techniques. The following is Welsh (2009) supported about the need to pay attention to stretching muscles<sup>[30]</sup>.

Unlimited increases in flexibility may cause the dancer to hurt (Deighan, 2005). On contrary, the goal should be to obtain enough range of motion to reduce the risk of ankle injuries when performing dance moves. It means reaching balance is the goal. Similarly, the strength needed to develop control campaigns to expand the range of motion may be the key to reducing the risk of injury (Alter, 2004). The strength and flexibility of the muscles around the ankles reduces the risk of dancers being injured and they are mutually supportive<sup>[31]</sup>.

#### 4. Conclusion

Dancers are particular athletes who experience a lot of unendurable injuries in process of pursuing aesthetic due to fastidious requirements of dance skills (Laws, 2005). In Latin dance, the requirement that male and female dancers wear prescribed heels is gradually formed in the historical process of dance development. Today, coupled with the psychology of the dancers' pursuit of beauty, the dancers are kept dancing in high heels on most occasions<sup>[32]</sup>. Therefore, ankle injury is serious and frequent in the Latin dance on account of their ankle with high heels in a certain unstable condition. In order to prolong the dancing life of dancers, it is very important to prevent ankle injuries, reduce the possibility of injury, and protect the dancer's body. The article analyzes three aspects of how to choose the right dance shoes, what should be taken care of during dance training, and professional medical care. It is impossible for a Latin dancer to abandon high heels, and professional dance techniques actually contribute to prevent injuries. The peroneus longus and peroneus brevis situated on the lateral side of the lower leg are essential muscles to protect ankles from injury (Batson, 2009). Therefore, dancers can improve our control by strengthening that muscle.

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