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Best practice for treatment and prevention of ankle sprains in ballet dancers

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BEST PRACTICE FOR TREATMENT AND PREVENTION OF ANKLE SPRAINS IN
BALLET DANCERS

A Thesis Submitted
in Partial Fulfillment
of the Requirements for the Designation
University Honors with Distinction

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This Study by: Sara Bergin

Entitles: Best Practice for Treatment and Prevention of Ankle Sprains in Ballet Dancers

has been approved as meeting the thesis or project requirement for the Designation University

Honors with Distinction

Date

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Introduction

Ballet is a very physically and mentally challenging artistic form. While the physical requirements differ from other sports, the demands on a dancer's body are intense. Throughout many of the moves executed in ballet, large forces are both generated and absorbed by the ankle-foot complex (Clippinger, 2016). Across all dance forms, ankle-foot complex injuries are very frequent due to the complex structures of the foot and ankle, and the large forces acting upon the ankle. Ankle sprains are one of the most common acute injuries that occur in dancers; including ballerinas and ballerinos. The most common ballet moves that cause ankle sprains are poorly landing jumps, falling out of turns, and miscalculating a step. According to Clippinger (2016), “[a]bout 85% of ankle sprains involve inversion and tend to occur when the ankle is in a less stable position of relative plantar flexion, during loading or unloading of the foot” (p. 372).

There are three classifications of ankle sprain: grade I, grade II, and grade III. Grade I is considered a mild sprain. It usually involves a partial tear of the anterior talofibular ligament (ATFL). There is usually little to no resultant instability. Grade II is the most common type of ankle sprain that dancers sustain. These are generally moderate sprains that involve complete tears of the ATFL. However, there is usually minimal damage to the calcaneofibular ligament. The reason grade II sprains are the most common in dancers is because, in demi-pointe and pointe positions, the ATFL is in an almost vertical position relative to the floor and thus can easily be torn should an additional inversion force be applied (Clippinger, 2016). At the same time, the calcaneofibular ligament is almost parallel to the floor when the foot is in a position of demi-point or pointe and is likely to avoid large disruptive forces (Clippinger, 2016). With grade II sprains, there is usually a moderately positive anterior drawer sign present and a normal or

minimally abnormal talar tilt. Grade III sprains are complete ruptures of the lateral ligament complex. There is a positive anterior drawer sign, and it also results in instability.

When a dancer experiences an ankle sprain, the dancer will usually hear a pop or experience a tearing sensation. They will usually experience immediate pain; however, the extent of pain does not necessarily translate to the extent of the injury. After the incidence, the site of injury will experience swelling quickly to prevent further damage to the ligaments. As time passes the swelling will progress and result in limited range of motion. Discoloration will also usually occur several hours after the onset of injury. Depending on the severity of the injury, the dancer might feel that the ankle is unstable and they can no longer continue to dance or if the injury is severe enough to walk normally. When the ankle is examined, plantar flexion and passive inversion will cause discomfort (Clippinger, 2016). This helps medical professionals determine the type of injury

Objectives

The first objective was to determine the most prevalent injury among ballet dancers, which is ankle sprains, and then research the best treatments for this injury. The second objective was to determine the main causes of ankle sprains and prevention strategies. The third objective was to synthesize these findings that could be presented to local dance studios so that their young dancers could find the best treatment should injury occur, but also know what they can do to prevent injuries themselves.

Literature Review

To determine the most prevalent injury among ballet dancers, one article examined injuries reported to the National Electronic Injury Surveillance System (NEISS) for dance-related injuries (Horado, 2021). The authors found that 4152 patients were admitted to the

emergency room with dance-related injuries between the years 2014 and 2018. Of the 4152 patients admitted with dance-related injuries, 1767 (42.6%) were for a strain or sprain. More females, 1525 patients, suffered from a strain/sprain than their male counterparts, 242 patients. The age distribution of these dancers was 76.2% (3164 patients) between 10-18, 12.8% (532 patients) between 19-30, 7.7% (321 patients) between 31-60, and 3.3% (135 patients) over the age of 61). The demographic with the highest amount of reported incidence of injuries were females between the ages of 10 to 18 years old. The incidence rate for females was four times higher than that for males; females accounted for 3459 (83.3%) of injuries compared to males who accounted for only 693 (16.7%) of injuries. The authors also reported that there was an increase in injuries reported over a 5 year period. This implies that more access to injury prevention education and injury prevention medical services is needed for female dancers between the ages of 10 and 18. This article showcases the need for better injury prevention education for young dancers who are really just starting in their dance careers. Ballet is very strenuous on a dancer's body, which is why much care is needed to prevent further damage caused by injuries.

It is very likely that at some point during a dancer's career they will sustain an injury. Knowing the important aspect of treatment, like the best type of treatment, can aid a dancer in their recovery. To investigate the aspects that contribute to the best treatments for an ankle sprain, one article reviewed the functional outcomes of common injuries in dancers when treated operatively and nonoperatively (Junck, 2017). To assess this the author obtained their measurements from a subjective assessment of the degree to which a dancer had returned to their previous level of dance, an SF-12 survey, and the World Health Organization (WHO) functional outcome scale modified for dance. The criteria for this study was participant were 18 years or

older (at the beginning of the study), had participated in any form of dance at the time of injury, had received at least one session of physical therapy at Harkness Center for Dance Injuries' PT facilities between 2006 and 2010, and had suffered an injury common to dance. Of the potential participants, 416 dancers met the criteria, and 164 of them consented to participate in the study. The age range of participants was between 15 to 77 years old, and 79% of participants were female and 21% of participants were male. The average length of time of recovery for an ankle sprain was 4.6 months. Based on their measurement they found that 63% of participants had a full recovery from their injuries. Full recovery was determined by SF-12 score, WHO functional outcome scale modified for dance, and subjective percent-return as tools for assessing functional outcome. It was determined by the authors that all three were highly correlated ($p=0.000$), which provided evidence that the WHO modified score accurately measured functional status in dance.

The majority of the injuries dancers sustain can be treated with conservative (non-operative) care; this would mainly be done through physical therapy or athletic training. The authors believed that positive outcomes were associated with dancers who were younger, dancers whose injury was not chronic, and dancers' recovery that was not limited by fear. The authors believed that the poorer functional outcomes were associated with many factors, but mainly with psychological factors. Because a dancer's career is typically short, anything that causes a dancer to have to take time away will result in significant negative impacts on their career, including lost pay and placement in less desirable roles. The major implication of this article was that it is very important that a patient is given accurate expectations for their recovery due to the important role psychological factors were found to have in the outcome of an injury. When patients have inaccurate expectations they are more likely to experience greater pain and

dissatisfaction. Patient education and psychological support have an important part to play in injury recovery; with both of these, the majority of dance injuries could be treated with conservative approaches (Junck, 2017). This knowledge can empower ballet dancers to seek treatment from a physical therapist or athletic trainer that has an understanding of dancer-related injuries so the most beneficial treatment.

Another aspect of treatment is strengthening the ankle to decrease the risk of future ankle sprains. To examine this aspect, one article strived to understand and identify the optimal intervention to reduce the frequency of ankle sprains and the incidence of re-injury (Osborne, 2003). The authors found that functional ankle rehabilitation is a preferred treatment for ankle sprains compared to immobilization or early surgery for initial treatment. Surgery is principally reserved for patients who have chronic functional instability. Proprioceptive training/exercises have been shown to reduce the frequency of recurrent ankle sprains. There can be a large medical cost associated with ankle sprains due to their frequent nature and the persistent instability that can ensue. The implications of this study, while it didn't focus on dance-related ankle sprains, reiterate the importance of proprioceptive exercises to reduce the recurrence of ankle sprains. The type of rehabilitation used to treat an ankle sprain is important because many injuries have been shown to impair reflex responses and subtle aspects of movement coordination that can interfere with a full return to ballet (Clippinger, 2016). To prevent future injury and have the best return to function possible, finding a physical therapist or athletic trainer that incorporates proprioceptive exercises is important.

If proper treatment is not followed long-term problems can ensue. In one article the authors were investigating the prevalence of chronic ankle instability (CAI) in a student dance population (Simon, 2014). CAI is laxity of the lateral or medial side of the ankle which can

develop after repeated lateral ankle sprains. CAI can either be mechanical, caused by a structural ligament lesion, or functional, caused by a loss of neuromuscular control. People who suffer from CAI can experience their ankle “giving way” while walking or doing other everyday activities. Some other symptoms of CAI people can suffer from are chronic discomfort and swelling, pain or tenderness, and the feeling of an unstable ankle (Valderrabano, 2007). The authors found that 90% of dancers had sustained an injury during their dance career, and that foot and ankle injuries made up about 40% of all injuries (Simon, 2014). Without proper treatment of these foot and ankle injuries, CAI could develop. CAI can cause long-term problems for anyone, however, for female dancers, CAI poses a bigger problem. Due to the extreme stress that they put on their feet and ankles when they are en pointe or in a demi-pointe position, if they have CAI they would have an increased risk of injury. One of the main implications of this article was that without proper treatment of ankle sprains, chronic ankle instability can occur. With more education about what could happen without proper treatment of ankle sprains, the incidence of ankle sprains and possibly the phenomenon of chronic ankle instability could be reduced.

Along with understanding the best treatment of ankle sprains, understanding the factors that can contribute to ankle sprains is also important. This will aid in preventing ankle sprain. To determine one of the main causes of ankle sprains, one article conducted a systematic review to examine the relationship between injuries and two of the stages of a dancer’s career development: transitioning to full-time training and transitioning to a professional company (Fuller, 2019). The authors found limited evidence that dancers transitioning to professional ballet had a significantly higher rate of time-loss injuries per exposure hour relative to established professionals. It was established the weekly training load in dance was comparatively

higher than those observed in Australian football. This means that pre-professional dancers spend most of their time training in dance classes. Comparatively professional dancers spend a more significant amount of time on performances than training in dance classes. This poses an issue because the authors found that dance performances were significantly more strenuous on a dancer's body than training. Pre-professional dancers' high training load is not preparing them for the demands of performances. Strategies to combat the extra strain caused by performances could include extra cardiovascular and strength training (Fuller, 2019). It was theorized that it could be beneficial for the training load of dancers to be adjusted to account for psychological stressors that can be caused by transitioning places in careers or other stressors. This implies that both being in both good physical and psychological health is important to prevent injuries.

Another cause of ankle sprains is related to training load. To investigate the relationship between training load and injury one article compared professional dancers to other professional sports (Jeffries, 2020). The authors found that professional dancers experienced high training loads relative to other sports and simultaneously high injury incidence and risk. An interesting finding in the study was the dancers continued training even when they were affected by injuries that required medical attention, even if their training was modified. The authors also found that an imbalance between training load and recovery time induced fatigue, abnormal training responses, and increased risk of injury. A major implication of this article is that dancers are compelled to return to dance too quickly without proper recovery time. While this does reflect dancers' high level of commitment, the top priority should be the dancer's health, especially in the long term. To improve dancers' health the development of preventive interventions and educational initiatives was encouraged.

Another aspect of preventing ankle sprains, besides understanding the main causes of ankle sprains is preventative measures that dancers can take. The main prevention strategies are making sure dance students are using proper ballet techniques, avoiding abrupt increases in dance training by maintaining dancing condition during breaks, and using proper equipment (Clippinger, 2016). Avoiding extra strain on the body, either by being “out of shape,” compensating for poor technique, or using ill-fitted shoes helps keep a dancer's body in good health and can reduce the incidence of injury. The main treatment strategies discussed were nonsteroidal anti-inflammatory drugs, stretching and range of motion exercises, and other physical therapy modalities like massage, ultrasound, and electric stimulation. Another idea discussed was proprioceptive exercises being a key aspect of the rehabilitation process to help decrease the risk of injury recurrence. One implication of this book was that one of the best ways to prevent ankle sprains is to make sure that basics like properly fitting shoes, and good technique are being used. Another implication was that a comprehensive rehabilitation program needs to be established and completed for a full recovery. A final implication was that one of the best ways to prevent ankle sprains was to use proprioceptive exercises; by reducing the risk for reinjury ankle sprains will hopefully become less common.

Discussion

Ankle sprains are the most common type of injury in ballet at all levels, from beginners to professionals. Based on prior research, the best practice treatment for an ankle sprain is conservative therapy (Junck, 2017). There are important aspects that this therapy has to meet to have maximum effectiveness. One aspect is that the professional who is facilitating the therapy provides their patient with realistic expectations for the time frame and outcome of their rehabilitation (Junck, 2017). Another aspect is not allowing the dancer to return to dance sooner

than they should (Simon, 2014). This could cause reinjury or increased damage to the ankle. Another aspect is adequate psychological support for patients (Junck, 2017). Unnecessary mental anguish can worsen a dancer's recovery. A final aspect of treatment that is important is proprioceptive exercises to help prevent future injury recurrence (Clippinger, 2016). These aspects maximize the effectiveness of conservative therapy and allow dancers to have a better return to function post-injury.

An important component in the treatment of an ankle sprain is to also take measures to prevent the reassurance of injury. The best practice for ankle sprain prevention is to first and foremost make sure basics like properly fitting shoes are used and making sure dancers are using the proper technique so that there is no added stress on the body (Clippinger, 2016). Another prevention technique is to provide dancers with educational programs on the risk of ankle sprains (Honrado, 2021). Teaching young dancers the ways in which they are most likely to suffer ankle sprains, and educating them on the potential consequences of returning to dance too soon after injury, the chance that repeated ankle sprains could lead to chronic ankle instability which can cause long term problems, will hopefully decrease the incidence of ankle sprains. These programs should also educate dancers in regards to the importance of cardiovascular and strength training (Fuller, 2019). The extra training can help dancers transition between different stages in their careers, and it helps dancers maintain their dance conditioning during breaks/different dance seasons so that there are no sudden increases in training that can cause an increased risk of injury.

Many of the issues highlighted in the research are already being worked on in professional dance companies. For example, the Boston Ballet has a comprehensive program of health and wellness for their company dancers (Boston Ballet, n.d.). This program allows

dancers to work with highly qualified professionals to maintain peak health. They are striving to meet many of the aspects of rehabilitation and prevention laid out previously. Professional companies are in a much better financial position to provide the best resources to their dancers than the average dance studio. Dance studios that provide ballet training for young dancers starting out do not have the resources to provide that level of health maintenance. It is training facilities like this that would benefit the most from education on the best ways to treat and prevent ankle sprains.

Athletic trainers are traditionally associated with sports and providing care to athletes. The performing arts, including dance, is an emerging environment (Starfield, 2005). Due to the recent introduction into this field, many dance studios do not yet have an in-house athletic trainer. Thus, it would be beneficial to find a local physical therapist or athletic trainer that they could recommend to their students in the event of an injury, ankle sprain, or otherwise. Having a local physical therapist, or athletic trainer that has knowledge of dance-related injury can greatly improve the outcomes of dance injuries. Dance studios should introduce educational programs for their students to highlight what dancers can do to help prevent ankle sprains. Also if an injury does occur students will know the best treatment for ankle sprains and the importance of allowing their injuries to fully heal before returning to dance.

Conclusion

The best practice treatment for an ankle sprain, the most common ballet injury, is conservative therapy, which includes communication of realistic expectations, taking adequate time away from dance to allow for proper healing, supplemental psychological support, and proprioceptive exercises which will help decrease the risk of future injury. The best practice for the prevention of ankle sprains includes proper footwear, good ballet technique, educational

programs for dancers/instructors, and extra cardiovascular and strength training to maintain dancing condition. Many professional companies have the financial resources to have already implemented programs that provide dancers with qualified professionals; however, where these practices need to be implemented or partially implemented are dance studios that train beginner dancers. Educating dancers, parents, and instructors provided the greatest likelihood of a decrease in the prevalence of ankle sprain among ballet dancers. For future study, constructing an educational program and implementing it in a local dance studio would be beneficial. The quality of these treatment and prevention plans could be evaluated. Real-world implementation would allow for modification to be made if needed.

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