

## STUDY ON MAIN GYMNASTICS INJURIES

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### Abstract

The purpose of this study is to review the distribution and determinants of injury rates as reported in the gymnastics injury literature from PubMed gov, and to suggest measures for the prevention of injury and directions for further research. An extensive search of Pubmed was conducted using the words “gymnastics” and “injury” and limited to the population of (14-16 years) female gymnasts, between 2010-2014. The review focused on studies using denominator-based designs and on those published in the English and Italian language. Additional references were obtained from hand searches of the reference lists. Comparison of study results was compromised due to the diversity of study populations, variability of injury definition across studies and changes in rules and equipment across years. Not with standing, this review of the literature reveals a reasonably consistent picture of gymnastics injuries. The incidence and severity of injuries is relatively high, particularly among advanced level female gymnasts. Body parts particularly affected by injury vary by gender and include the ankle, knee, wrist, elbow, lower back, and shoulder. Ankle sprains are a particular concern. Overuse and nonspecific pain conditions, particularly the wrist and low back, occur frequently among advanced-level female gymnasts. Factors associated with an increased injury risk among female gymnasts include greater body size and body fat, periods of rapid growth, and increased life stress. Above all, this overview of the gymnastics injury literature underscores the need to establish large-scale injury surveillance systems designed to provide current and reliable data on injury trends in both boys and girls gymnastics, and to be used as a basis for analyzing injury risk factors and identifying dependable injury preventive measures.

**Keywords:** *Gymnastics, injuries, study, prevention*

## Introduction

Injuries are very common in gymnastics due to the physicality of the sport. The nature of the sport entails difficult techniques that require forceful loading and twisting of joints and extremities (arms and legs), which can lead to significant stresses on a growing body. In addition to nutritional and hormonal factors, most gymnasts are involved in intense year-round training, which can lead to injuries (particularly overuse injuries that are often unique to gymnastics). Gymnasts must consistently prepare for the physical and emotional toils that the sport requires. With the complexity of routines, the risk of potential injury increases.

## Aim of study/research

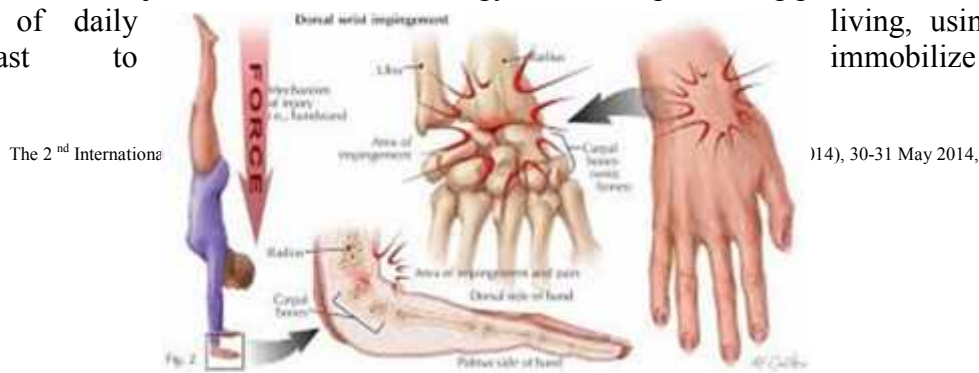
The purpose of this study is to review the difference of distribution of injury rates as reported in the gymnastics injury literature between the years 2010-2014 and to suggest measures for the prevention of injury and directions for further research.

An extensive search of Pubmed was conducted using the words "gymnastics" and "injury" and limited to the population (18-21 years) between 2010-2014. The review focused on studies using denominator-based designs. Additional references were obtained from hand searches from the gymnasts of Shkodra.

It is well known that injuries most commonly occur in the ankles, feet, lower back, knees, wrists, and hands, often from overuse or simple stress. Injuries are rarely severe, but if left untreated they can lead to chronic pain and bone fractures. Often the upper body is used as a weight-bearing joint in gymnastics, injuries to the shoulder, elbow, and wrist are common and may include: Lesions in the Shoulder, Elbow Dislocation and Wrist Sprains. The most common gymnastics injuries to the lower body involve the knee and ankle. Lower extremity injuries usually result from the landing and dismount activities and may include: Anterior Cruciate Ligament (ACL) Injury, Achilles Tendon Injury, and Lower Back Injuries.

**Labral tears** - (sometimes called SLAP tears) may occur during any gymnastic exercise, but ring and bar specialists seem particularly vulnerable. It is characterized by pain that initially resolves but tends to recur with return to sport. An MRI can be helpful in establishing a definitive diagnosis.

**Wrist Injuries** - The wrist is subjected to forces that can exceed twice the body weight. The first step in treating wrist pain is to reduce the training volume of the athlete, relieve symptoms, and to participate in only pain-free activities. After an injury, gymnasts should avoid extensive pressure on the wrist joint for six weeks. If the gymnast is experiencing pain with non-gymnastic activities of daily living, using a brace or cast to immobilize the wrist



temporarily may be helpful.

**ACL injuries** - can result when a gymnast lands "short" or is over-rotated while tumbling, dismounting, or vaulting. A "pop" may be heard or felt followed by knee swelling with hours. MRI is often used to confirm ACL injury. As with other sports, ACL reconstruction is recommended for gymnasts who wish to return to full sports participation.

**Achilles Tendons** - Gymnasts can suffer from a variety of injuries to the Achilles tendon located just above the back of the heel, as a result of the repetitive stress of jumping and landing. Achilles tendinitis results in calf soreness that is aggravated with jumping and landing. Treatment should initially consist of ultrasound, stretching, activity modification, and calf exercises. Foot immobilization for seven to ten days may be beneficial for severe symptoms.

**Foot & Ankle** - Injuries to the foot and ankle are common in gymnastics. Acute injuries are usually sprains which can be minor or more serious. Swelling, bruising and tenderness directly over the bones are signs of a more serious injury. Minor injuries typically have tenderness limited to one side of the joint without significant swelling. Serious injuries require evaluation by a qualified professional while return to participation after a minor injury is often possible within a week if there is no pain (or limping) with weight bearing activity. Protection with taping or a brace can aid recovery and reduce the risk for re-injury. Chronic ankle pain or repeated injuries are worrisome and require evaluation before continuing with participation.

**Muscle Strain** - The cause of low-back pain can include muscle strain, ligament sprain, fracture, and/or disc disorders. Frequently, low-back pain will worsen with activity, especially with extension movements, such as arching the shoulders backwards. Low-back pain in gymnasts related to muscular strain or ligament sprain usually responds to rest and physical therapy exercises. Persistent back pain is uncommon and should not be ignored. An MRI or a bone scan are often helpful to rule out more significant injuries.

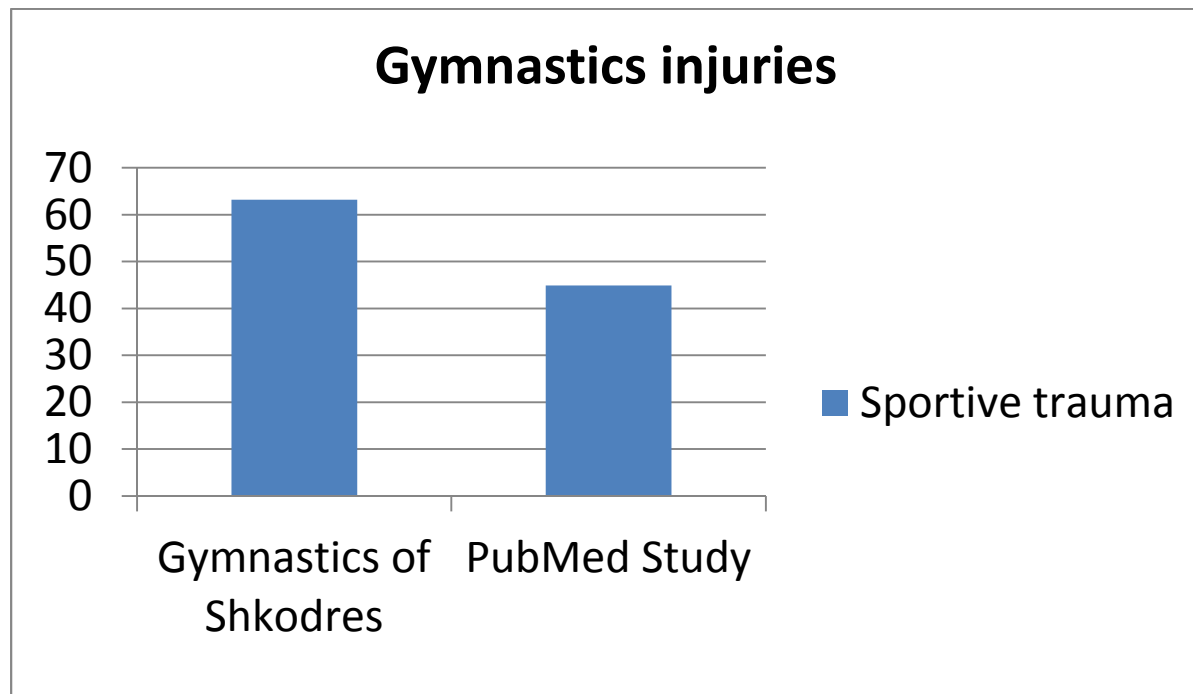
### **Gymnastics Injury Prevention Tips can be:**

- Insist on spotters when learning new skills
- Warm up muscles with light aerobic exercise, such as jumping jacks or running in place, before beginning training or new activities
- Inspect equipment to ensure that it is in good condition, including padded floors, secured mats under every apparatus, and safety harnesses for learning difficult moves
- Wear all required safety gear whenever competing or training — special equipment may include wrist guards, hand grips, footwear, ankle or elbow braces, and pads
- Do not "play through the pain" — if you are hurt, see your doctor and follow instructions for treatment and recovery fully
- Make sure first aid is available at all competitions and practices

## Results

Comparison of study results was compromised due to the diversity of study populations, variability of injury definition across studies, and changes in rules and equipment across years. Not with standing, this review of the literature reveals a reasonably consistent picture of gymnastics injuries. The incidence and severity of injuries is relatively high, particularly among advanced level female gymnasts.

Body parts particularly affected by injury vary by gender and include the ankle, knee, wrist, elbow, lower back, and shoulder. Ankle sprains are a particular concern. Overuse and nonspecific pain conditions, particularly the wrist and low back, occur frequently among advanced-level female gymnasts. Factors associated with an increased injury risk among female gymnasts include greater body size and body fat, periods of rapid growth, and increased life stress.



Injury diagnoses were strains/sprains (44.3%), fracture/dislocation (30.4%), abrasion/contusion (15.6%), laceration/avulsion (3.7%), concussion/closed head injury (1.7%), and other (4.2%). Upper extremity fractures/dislocations were most common (50.2%). Lower extremity sprains/strains were most common (51.8%).

## Conclusions

Gymnastics has one of the highest injury rates of all girls' sports. Prevention of gymnastics-related injuries depends on the establishment and universal enforcement of uniform rules and

regulations for gymnasts, coaches, and spotters. Unfortunately, at this time, a set of uniform rules and regulations has not been developed or implemented.

Whereas some high school gymnastics programs and private gyms require safety training for their gymnasts and coaches, many fail to implement such training programs. A standardized program, including how to fall correctly, how to land safely, how to advance gymnasts to harder skills, and how to spot correctly, should be required for all coaches and gymnasts to ensure proper safety education.

Special attention should be placed on advancing gymnasts to more difficult skills in a more prudent and safe manner via spotting and using soft pits and mats when necessary. To prevent the risk for reinjury, gymnasts should refrain from working out for the appropriate amount of time when advised to do so by a certified athletic trainer or physician.

Further studies are needed to provide the correct prevention on gymnast's injuries.

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