

General

Upper Extremity Injuries in Swimming

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Given the rise of swimming as a casual, competitive, artistic, and health-related activity in the past few years, it has become increasingly important to look at injuries that can be caused by swimming. Through studying swimming-related injuries to the upper extremities, swimmers can understand how to prevent major, long-lasting injuries and how to treat these injuries if they occur. The National Electronic Injury Surveillance System (NEISS) Database was used to analyze data on swimming-related injuries to the upper extremities in the last five years. In these past five years, 82,834 injuries to the upper extremities of swimmers have been reported to the Emergency Department (ED). The study highlights the most common upper-extremity-related injury in swimming and how to prevent it, as well as how to treat it. In addition, it is vital to note that future research could delve into possible equipment that would help prevent the injury altogether.

INTRODUCTION

Swimming has consistently been a popular low-impact sport and activity, ranging from helping people recover from surgeries to being an intense Olympic event. The activity is multifaceted, including causal, competitive, and artistic/rhythmic swimming, contributing to its popularity. An online survey concluded that from 2014 to 2019, swimming experienced a consistent increase in popularity. Although swimming decreased in popularity during the COVID-19 pandemic, the sport experienced the same growth from 2020-2023, where in 2023, over 30 million people in the US went swimming.

Even though swimming is most commonly practiced for fitness, there are many additional benefits to swimming as an activity. Besides being a form of low-impact cardio and delivering numerous physical benefits to completely healthy people, swimming can also benefit people with varying diagnoses. For example, it was found that those with musculoskeletal conditions experienced less pain, improved physical function, and better quality of life overall after swimming.¹ This finding is all the more significant when considering how musculoskeletal conditions are the leading cause of chronic pain, reduced quality of life in health-related areas, and disability.² Swimming can also help with conditions other than that are not musculoskeletal. It is known to help with many instances of lower back pain, including chronic back pain and back pain caused by pregnancy or obesity.^{3,4} Swimming can even aid with conditions that do not necessarily have a cure. One example is in children with asthma, where swimming can benefit their cardiorespiratory health and limit the amount of asthma attacks children experience.⁵ Another example is cerebral palsy, where walking and swimming skills increase while

limiting physical fatigue, which can cause deterioration of motor skills over time due to lack of physical activity.⁶ These aspects can benefit various chronic pain and medical issues, showing how swimming is growing as a sport and a treatment option, therefore, the number of participants will likely continue to grow.

However, although swimming can be advantageous for many individuals, the risks swimming holds must also be acknowledged. There are many recorded instances of craniofacial injuries, with there being a total of 952,111 cases of head and neck injuries recorded from 2013-2022, which makes up the staggering majority of injuries caused by swimming.⁷ However, many other areas, especially the upper extremities, can still be badly injured while swimming. Shoulder injuries in swimming are frequent, with the most common injury being in the shoulder, where the rotator cuffs may be overused, causing physical conditions and fatigue.⁸ These injuries, unlike many head and neck injuries caused by swimming, tend to be long-lasting, affecting individuals for extended periods, and could cause chronic pain. On top of this, limb-related injuries can result in mental health issues, with a study showing how 61% of those going through ACL reconstruction also experienced symptoms of depression.⁹

Ultimately, because of the increased popularity of swimming for leisure, health, and competitive reasons, it is critical to look into the injuries that can be caused by participating in the sport and who is most affected by them. This study will specifically look into upper extremity injuries that swimming can cause, comparing years, genders, and age groups to see who is most susceptible to injuries. After this, the study will discuss the most common injuries and how to help treat them before medical help arrives. Finally, limitations to the study will be acknowledged.

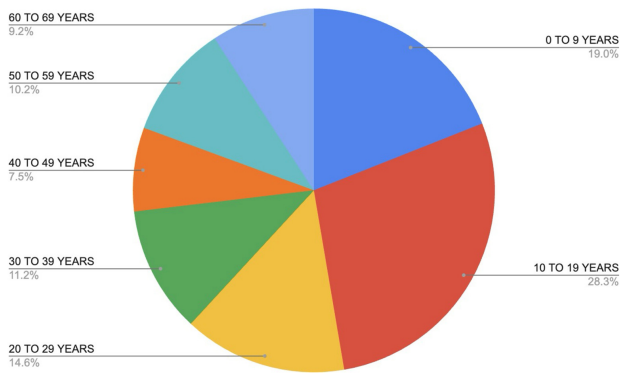


Figure 1. Age Group Susceptible to Upper Extremity Injuries When Swimming

METHODS

A study on upper extremity injuries caused by swimming was conducted using the National Electronic Injury Surveillance System (NEISS) database. The NEISS can track how consumer products affect consumer health by actively monitoring data from emergency departments in the United States, allowing this information to be used for this study.

Of the 5000 emergency departments in the United States, only 100 are used in the NEISS for data. In this study, data from 2019-2023 was analyzed. In terms of age, the data was grouped into 10-year ranges. Only swimming injuries were included. This concerned incidents in above-ground, underground, and portable pools, as well as with equipment used in pools and activities associated with pools and swimming, including floatation toys, slides, scuba diving, and water polo. Injuries to the upper extremities were also analyzed, which included the following: finger (92), hand (82), upper arm (80), wrist (34), lower arm (33), elbow (32), and shoulder (30).

RESULTS

Over the past five years, swimmers have had 82,834 upper extremity injuries. Of the five years studied, 2019 had the highest number of injuries, with 21,105 (25.5%), while 2021 had the lowest, with 13,972 (16.9%). In terms of gender, there was a near-even split in the past five years, with men making up 51.4% of the total while women made up 48.6% of the total, as shown in [Figure 2](#). The age group most susceptible to upper extremity injuries while swimming were 10-19-year-olds, who made up 28.3%, while 40-49-year-olds were the least susceptible, with only 7.5% of the injuries ([Figure 1](#)). Finally, barely any cases were admitted to the hospital after initial treatment, with 2,903 cases out of the 82,834 admitted, around 3.5%.

DISCUSSION

Averaging 16,566 cases annually for the past five years, swimming injures a surprising number of people yearly.

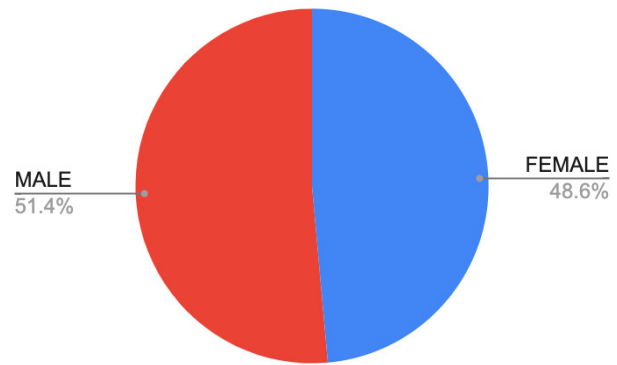


Figure 2. Sex Distribution of Upper Extremity Injuries

There is a relatively equal representation of women and men in swimming as a sport, meaning there is no massive difference between the two statistics in the study. In this study, the age group most affected by swimming injuries were 10-19-year-olds. However, people are worse and slower swimmers as they age, which may result in them swimming less.¹⁰ On top of this, people tend to develop more musculoskeletal issues as they get older, which may prevent them from swimming as much. As a result, the data comparing age groups may be slightly skewed as fewer swimmers are in older populations.

Undeniably, when people swim or are near a pool, there are safety hazards that everyone should be attentive to. Even though there is no necessary protection gear for swimmers, it is still essential to ensure that pools are in safe locations and that people swim at safe times to prevent issues with health and trauma while swimming. For example, watching kids who cannot swim is essential if living by an underground pool. Not taking these precautions can result in kids wandering to the pool and drowning, which is a relatively common incident. These measures can be taken in a few ways, like ensuring that someone is watching or keeping a gate or screen in front of the pool to prevent kids from wandering too close.

The most common injury in swimmers is called Swimmer's Shoulder. This injury involves the rotator cuff tendon, subacromial bursa, or bicipital tendon. Swimmer's Shoulder is due to excessive shoulder rotation when swimming, which can weaken the rotator cuff and lead to further injury. This can affect joint mobility, and continual overhead extension can lead to pain when the shoulder is moved. Overextension is commonly an issue that can be caused by incorrect form that results in abnormal pressure exerted on the shoulder, ultimately resulting in the tendons experiencing more strain than normal. Other exercises that build strength for swimmers can also yield this injury if done excessively or incorrectly.¹¹ The best way to prevent Swimmer's Shoulder is to practice proper form while swimming or working out and limiting straining. Treating Swimmer's Shoulder, doing physical therapy, avoiding overexertion, and performing specific exercises are the best ways to ensure quick recovery.

LIMITATIONS

NEISS may only report cases where the injured person went to the emergency department for care. This actively excludes people who sustained injuries but did not seek help, which cannot be recorded in this database. It is also essential to consider that some states have more access to pools and water-related activities than others, and only around 100 emergency departments are used to collect information for this database. In addition, since only emergency departments were used to collect information, the NEISS eliminates data that may come from private or small clinics, which could cause inaccuracies in representation. As a result, NEISS could continuously eliminate data that could be important to comparing sex, age, and year-to-year injuries.

CONCLUSION

Swimming has undeniable potential to help many populations. Whether used to stay fit, as a competitive sport, or as a treatment option for people with currently untreatable diseases, swimming has continued to gain popularity in the United States. However, due to this growing popularity, the risks of swimming—most notably overexertion—must be acknowledged to prevent many people from sustaining upper extremity injuries while swimming.

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