



Prevalence of shoulder injuries and disability in competitive swimmers

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Abstract

Swimming is a special activity that combines aerobic training with upper and lower limb strength workouts in a non-weightbearing setting.

In competition swimming, the freestyle, butterfly, backstroke, and breaststroke are the four recognized strokes. Movements of the human shoulder represent a complex dynamic relationship of many muscle forces, ligament constraints, and bony articulations. Static and dynamic stabilizers allow the shoulder the greatest range of motion of any joint in the body and position the hand and elbow in space. If any of the static or dynamic stabilizers are injured by trauma or overuse, the shoulder is at increased risk for injury. Shoulder injuries account for 8% to 20% of athletic injuries.

Keywords: aerobic training, non-weightbearing setting, static and dynamic stabilizers

Introduction

There are four strokes in competitive swimming which are the freestyle, butterfly, backstroke, and breaststroke. Regardless of the expertise of the stroke, freestyle stroke training is the main focus. Regardless of the expertise of the stroke, freestyle stroke training is the main focus. Freestyle stroke power is distributed 80/20 between the draw and the kick. The hand enters, forward reach, pull-through, middle pull-through, hand exit, and middle recovery are the six components of the freestyle. Like the freestyle, the backstroke's shoulder is prone to injury, therefore it's crucial to pay attention to how the arm and body are oriented. For both strokes, the stages are the same. The breaststroke is the most traditional of all competitive swimming strokes, and it is distinctive in that the arms don't leave the water. In this stroke, the legs serve as the power source or propeller more so than the arms do. The breaststroke seems to be the stroke for which shoulder discomfort complaints are most seldom reported. The pull pattern and body motion are also distinct; in the butterfly stroke, the upper body pivots up and down around the hips rather than spinning about the central axis as in freestyle and backstroke. The arms are stretched in front of the shoulders when the hands enter the water.

Most swimming injuries are classed as overuse injuries and relate to faulty biomechanics. Muscle fatigue of the rotator cuff, upper back, and pectoral muscles caused by repetitive movement may result in microtrauma due to the decrease of dynamic stabilization of the humeral head. Hyperlaxity, scapular dyskinesia, subacromial impingement, labral damage, os acromiale, suprascapular nerve entrapment, and glenohumeral rotational imbalances all may be included within a differential diagnosis for shoulder pain in the competitive swimmer.

Swimmer's shoulder, also known as shoulder impingement, is a type of tendonitis which causes inflammation and swelling of the tendons. The inflammation occurs in the tendons of the rotator cuff, a group of muscles and tendons surrounding the shoulder joint. The inflamed tendons can, in

turn, press on the surrounding bones, muscles, and other tendons. These tendons are also known to exert pressure on the acromion (the outermost bony projection of the shoulder blade). This can cause friction on the shoulder blade that leads to the development of bony growths known as bony spurs.

An understanding of the mechanics of the swim stroke, in combination with the complex static and dynamic properties of the shoulder, is essential to the comprehension and identification of the painful swimmer's shoulder.

Knowledge of risk factors that predict shoulder pain can assist professionals working with swimmers in developing prevention strategies.

Many studies are done on the prevalence of shoulder pain in the competitive swimmers but this study will help the community to understand the prevalence of shoulder injuries in competitive swimmers and its effect in activities of daily living by using shoulder pain and disability index.

With an ever-increasing understanding of the etiology of shoulder pain in elite swimmers, more effective treatment and rehabilitation programs can be instigated.

Materials and methodology

Methodology

Study type: Cross sectional study.

Sampling method: Convenient sampling.

Sample size: 30

Target population: State and district level competitive swimmers.

Study set up: Swimming academy in and around Pune.

Outcome measure

Shoulder pain and disability index (SPADI) -ICC >0.89

Material

consent form, cell phone, internet, pencil, laptop, notepad, pen, table.

Inclusion criteria

- Competitive swimmers of both genders (male and female)
- Age group between 18-35
- State and district level competitive swimmers
- Swimmers practicing for 5 or more than 5 days a week.
- Swimmers practicing for 1 or more than 1 hour at one session.
- Swimmers who can read, write, and speak English language.

Exclusion criteria

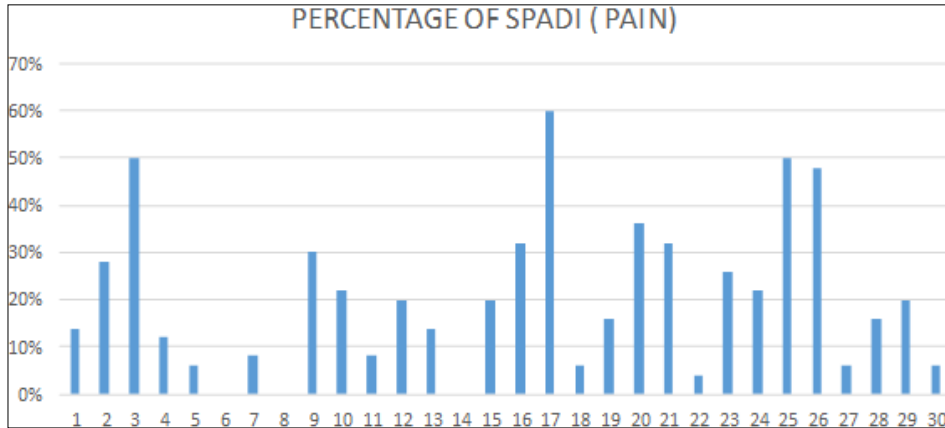
- Those who are not willing to participate.

Results

Graph No. 1- Percentage of SPADI (PAIN)

On X axis- No. of participants

On Y axis- Percentage of SPADI score pain component.

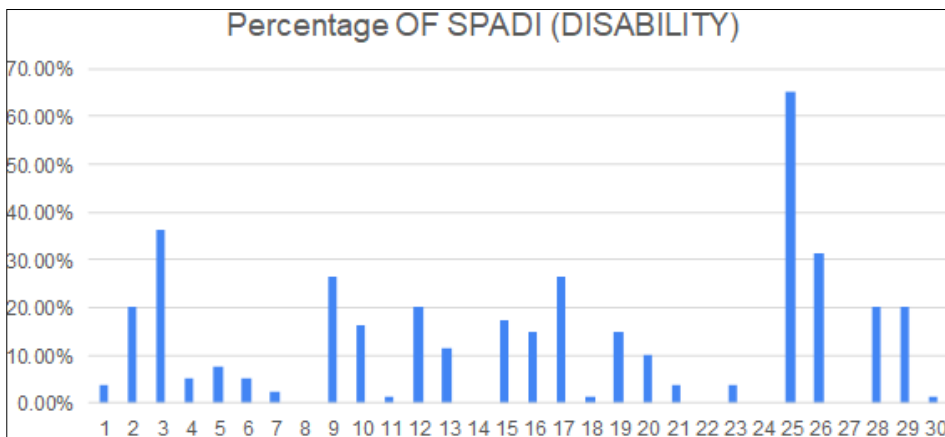


Interpretation Graph 1: interprets that the maximum score is 60%

Graph No. 2- Percentage of SPADI (DISABILITY)

On X Axis-No. of people

On Y axis- Percentage of SPADI score disability component

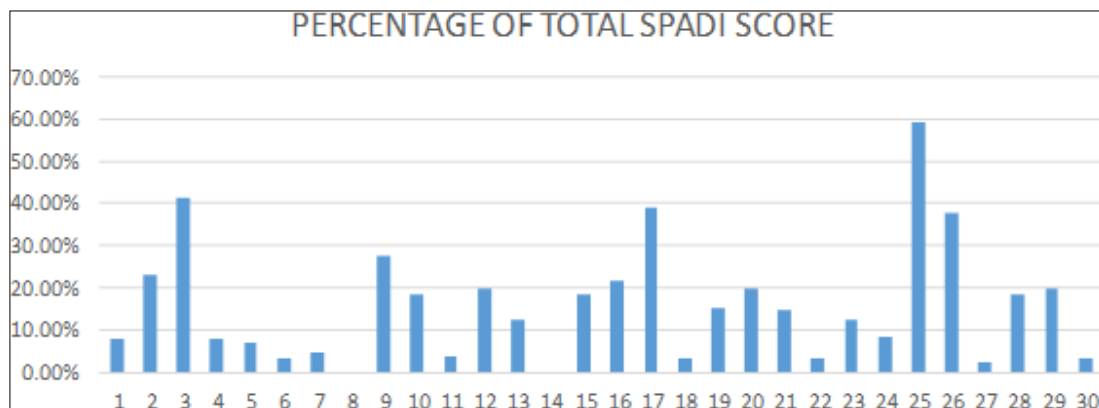


Interpretation Graph 2: interprets that the maximum score is 65%

Graph No. 3- Percentage of total SPADI score (TOTAL)

On X axis- No. of participants

On Y axis- Percentage of total SPADI score53



Interpretation Graph 3: interprets that the maximum score is 59.23%

Discussion

This study was done to verify that repetitive shoulder movement caused by swimming can lead to shoulder injury and/or disability in swimmers. The objective of this study was to find out the prevalence of shoulder injuries and disability in competitive swimmers using Shoulder pain and disability index.

Total 30 participants were included in the study of which 66.7% were male and 33.3% were female.

Swimming is a unique sport that combines upper and lower extremity strength exercises with cardiovascular training in a non-weightbearing environment. Swimmers at the elite level may swim up to 9 miles per day (more than 2500 shoulder revolutions). Muscle fatigue of the rotator cuff, upper back, and pectoral muscles caused by repetitive movement may result in microtrauma due to the decrease of dynamic stabilization of the humeral head.

According to data analysis done that 80% subjects were freestyle swimmers, 10% people were backstroke swimmers, 6.7% people were breaststroke swimmers, 3.3% people were butterfly stroke swimmers from which 63.3% subjects had pain in the shoulder, 36.7% people had no pain in the shoulder. 78.9% subjects had gradual onset of pain, 21.1% people had Sudden onset of pain.

In accordance with our study, Klaus bak and Peter Fauno evaluated 36 competitive swimmers who had shoulder pain, out of which 23 swimmers had unilateral shoulder pain and 13 had bilateral pain. In 25 shoulders, concomitant signs of impingement and increased glenohumeral translation, together with a positive apprehension sign, were found. Four swimmers, who were generally joint hypermobile, exhibited bilateral impingement signs and excessive humeral head translation, most commonly in the anteroinferior direction. Four shoulders had excessive humeral head translation and apprehension without impingement. Lack of coordination in the scapulohumeral joint was seen significantly more often in symptomatic than in asymptomatic shoulders. Hawkins' test for impingement was more sensitive than Neer's test. Swimmers with shoulder pain have variable clinical findings. The majority demonstrate signs of impingement and increased humeral head translation in the anteroinferior direction together with a positive apprehension sign. This nontraumatic instability might result from wearing of the anteroinferior capsuloligamentous complex. The different clinical findings might represent different stages of the same condition.

According to the data analysis was done, 31.6% subjects were having the pain for less than a month, 21.1% subjects were having the pain for less than 3 months, 47.4% subjects were having the pain for more than 3 months.

In this study, 43.3% subjects had a participation in the physical activity other than swimming, amongst which gym is the commonest activity and 56.7% subjects did not have a participation in the physical activity other than swimming.

William C McMaster and John Troup underwent a study titled "A survey of interfering shoulder pain in United States competitive swimmers" The American journal of sports medicine 21 (1), 67-70, 1993 found that the prevalence of current shoulder pain in the studied population varied between 10% to 26% and increased with time in the sport. In those athletes with a painful shoulder, weight training, use of hand paddles, kickboard use, stretching, and various resistance activities aggravated the painful shoulder.

In accordance with our study Bárbara Oliveira Venâncio, Pascale Mutti Tacani, Paulo César Porto, Deliberato underwent a study titled "Pain prevalence in swimming athletes" and found that Pain prevalence was of 39.6% in the shoulder. In the studied subjects, there was high pain prevalence, with the shoulder and thigh being the most affected areas, not presenting correlation with the back stroke style neither in sports time of practice.

According to a study published in 1974, the prevalence of shoulder pain in swimmers was 3% whereas in more recent publications the percentage has increased up to 91%. The considerable gap between the two figures lies both in the difference between the underlying assumptions used to establish the definition of the painful event and in the different inclusion and exclusion criteria adopted. At present, a clear consensus is lacking regarding the causes of shoulder pain in swimmers and the aetiology of swimmer's shoulder is multifactorial.

According to this study and the results outcome, the maximum score of pain component is 60%, the second maximum score of pain component is 50% according to SPADI.

This study interprets that the maximum score of disability component is 65%, the second maximum score of disability component is 36.25%.

Kennedy and Hawkins originally suggested that subacromial impingement syndrome was caused by repetitive primary shoulder impingement (outlet impingement) of the supraspinatus tendon and/or the long head of biceps tendon under the anterior inferior one third of the coraco-acromial arch coupled with recurrent episodes of avascularity of these two tendons. However, there is no evidence suggesting that the incidence of primary impingement is greater in the swimming population than in the ordinary population.

Two authors subsequently differentiated primary from secondary impingement (or "non-outlet impingement"). Secondary impingement can be defined as impingement secondary to the instability of the glenohumeral joint (GHJ). The term "instability" is referred to any structural or functional deficit in the GHJ leading to pathologic motion of this joint. Instability can be defined also as a symptomatic laxity. Factors contributing to the development of swimmer's shoulder include neuromuscular system alterations, joint overload, muscular soreness and imbalances, excessive or reduction of flexibility, biomechanics of swimming, style technique and training mistakes. To date, GHJ laxity is no longer considered as one of the most important etiological factors.

This study interprets that the maximum score of SPADI is 59.23%, the second maximum score of SPADI is 41.53%.

In accordance with our study, Shana Harrington, Corinne Meisel, Angela Tate had assessed 37 samples, and participants were classified as positive for pain and disability if the following 2 criteria were met: The DASH sports module score was $>6/20$ points and the PSS strenuous pain score was $\geq 4/10$. If these criteria were not met, participants were classified as negative for pain and disability. Significant differences were found between the 2 groups on the dominant side for pectoralis muscle length at rest ($P = .003$) and stretch ($P = .029$). The results provide preliminary evidence regarding an association between a decrease in pectoralis minor length and shoulder pain and disability in Division I female swimmers.

The study concludes that there is high prevalence of pain in competitive swimmers and low prevalence of disabilities.

Conclusion

The study concludes that there is high prevalence of pain in competitive swimmers and low prevalence of disabilities.

Reference

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