

A Study of Musculoskeletal Injuries in Greek Male and Female Swimmers

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Abstract

An epidemiological survey was conducted to collect data relating to the prevalence and frequency of musculoskeletal injuries in male and female Greek swimmers. A questionnaire was administered on site thus ensuring that the response rate was 100 percent. Analysis of results revealed that of the 149 respondents there were 76 male (51%) and 73 female subjects (49%). A total of 48 athletes (32.21%) indicated that they had musculoskeletal injuries, and mainly shoulder problems (62.41%; N=50 males and N=43 females), followed in descending order by knee injuries and low back pain problems. The prevalence of musculoskeletal injuries ranked highest among freestyle swimmers (N=26) followed by breaststroke (N=11), butterfly (N=7) and finally backstroke (N=4) swimmers. Musculoskeletal injuries are common in Greek under aged elite swimmers and thus care must be taken for their prevention and early safe return to play.

Keywords: Injuries; Swimming; Shoulder; Knee; Low back pain

Introduction

According to past literature, limited information exists regarding the epidemiology of swimming injury patterns at the collegiate [1] elite, amateur, and master's levels [2-6]. Some studies were retrospective using either questionnaires or not [7,8] and some described the pattern of injury in terms of body location.

A lack of information exists regarding the epidemiology of musculoskeletal injury for competitive Greek swimming. The purpose of the current study was to describe pattern of injuries in competitive, Greek, male and female teenage swimmers over the course of 10 years. Additional goals of the study were to analyze patterns injury relative to gender and stroke specialty [9,10].

Materials and Methods

We recruited 149 (76 males and 73 females; age 13.95 ± 2.03 years and 14.33 ± 2.10 years respectively) competitive, at national and international level, elite Greek, male and female swimmers, representing all stroke categories, from 2008-2010. Informed consent was obtained prior to participation in the study. Because all our swimmers were minors, a legal guardian signed the consent form. A sports injury, self-reported questionnaire was given to study participants (Table 1).

Number of participants M/F	149 Male=76/Female=73
Age (years) M/F	$13.95 \pm 2.03/14.33 \pm 2.1$
Height (cm) M/F	$186 \pm 6.45/162 \pm 5.54$
Weight (kg) M/F	$59.77 \pm 6.68/52.42 \pm 4.34$
Age of entry into swimming (years) M/F	$5.81 \pm 1.47/5.84 \pm 1.38$
Age of entry into competition (years) M/F	$8.08 \pm 0.85/8.02 \pm 0.81$
Training (hours) M/F	$12.52 \pm 1.58/12.55 \pm 1.67$
Dry training (hours) M/F	$3.52 \pm 1.3/3.55 \pm 1.62$
<i>Values are mean \pm SD or mean (range)</i>	

Table 1: Demographics and training data of study participants.

Questionnaire

The questionnaire included items on anthropometry, age of entry into swimming, age of entry into competition, training history, and training volume (including dry training) as well as on sport injuries. In addition, questions were asked about injury location. The self-reported questionnaire data were validated and reliability-tested against interview data in 40 athletes a week after filling the questionnaire [1,4].

Statistical Analysis

Statistical analyses were performed with SPSS (version 17.0; SPSS Inc., Chicago, Illinois, USA). We used t-test to compare frequencies between male and female swimmers. A statistically significant threshold was accepted at $p < 0.05$.

We received no funds from any commercial source, and the Institutional Review Board at Aristotle University in Thessaloniki, approved the research protocol for this study.

Results

Of the 149 responders, 48 (32.21%; 26 male swimmers, 32.1% and 22 females, 30.13%) reported musculoskeletal problems and especially pain originating in the shoulder, knee, or lower back region (Figures 1-3).

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Received April 04, 2013; **Accepted** May 04, 2013; **Published** May 06, 2013

Citation: Sambanis M, Athanailidis I, Sambanis A, Kiriotsi O, Tsitas K, et al. (2013) A Study of Musculoskeletal Injuries in Greek Male and Female Swimmers. J Nov Physiother 3: 140. doi:[10.4172/2165-7025.1000140](http://dx.doi.org/10.4172/2165-7025.1000140)

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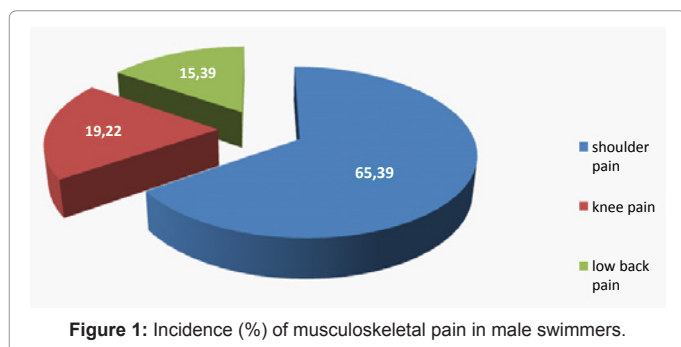


Figure 1: Incidence (%) of musculoskeletal pain in male swimmers.

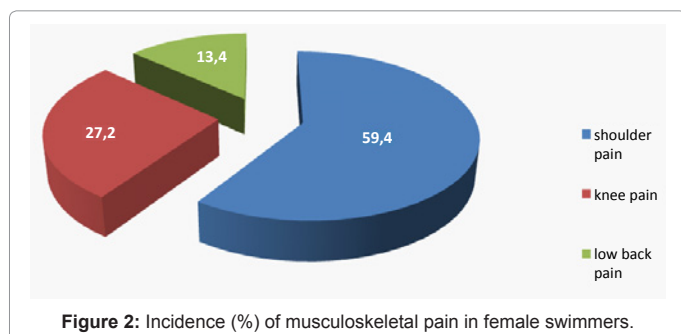


Figure 2: Incidence (%) of musculoskeletal pain in female swimmers.

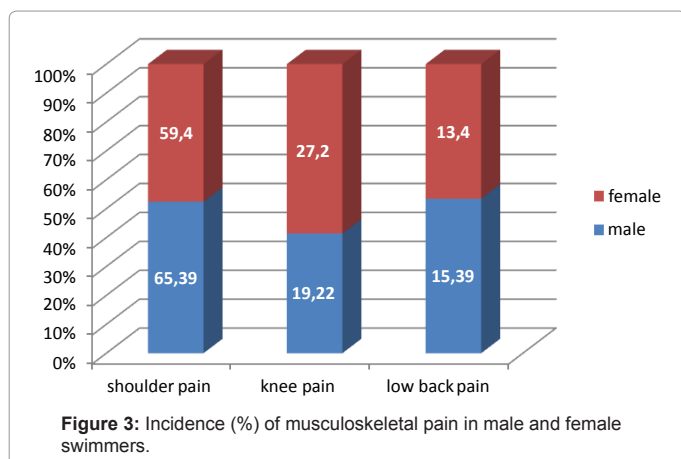


Figure 3: Incidence (%) of musculoskeletal pain in male and female swimmers.

In swimmers, shoulder pain was the most common musculoskeletal complaint (30 out of 48 athletes, 62.5%), followed by knee pain (11 out of 48 athletes, 22.91%), and low back pain (7 out of 48 athletes, 14.59%). There was no statistical difference between male and female swimmers regarding the incidence of different types of musculoskeletal problems ($p > 0.05$).

Most complains were related to pool training (68%) for both genders. In contrary cross training or weight lifting activities were associated with musculoskeletal pain in 32%.

The highest incidence of musculoskeletal complaints occurred during the first year of the competitive period (55%). Additionally, both genders demonstrated a gradual decrease in the number of injuries in later years of competition.

Freestyle swimmers experienced more frequently musculoskeletal pain (54.17%) compared to other stroke specialties following in descending order by breaststroke swimmers (22.91%), butterfly responders (14.58%) and backstroke athletes (8.34%).

Discussion

There were no significant differences in the number of injuries when comparing them by gender. Our outcome is in accordance with other studies [11].

According to our results, the highest incidence of musculoskeletal complaints occurred during the first year of the competitive period. Additionally, both genders demonstrated a gradual decrease in the number of injuries in later years of competition. It has been observed that swimmers transitioning to a new level of swimming are at an increased risk for injury [11].

According to our data the most frequent injured body part was the shoulder (65%). The shoulder is the most frequently injured body part and the most common reason for a swimmer to miss practicing or competing [1,2,5,6,11-13]. Previous studies reported that the incidence of shoulder injuries ranged from 3%-67% [11] demonstrated that the shoulder accounted for 36% of men's and 50% of women's injuries. Shoulder injuries are likely to represent overuse injuries occurring mainly during water practice. Shoulder symptoms can relate to impingement, glenohumeral instability, or a combination of both.

Knee injuries were the second most frequent cause of pain in our study (19.22% of males, 27.2% of females). According to literature knee pain ranks second to shoulder pain as a common complaint in competitive swimmers [13]. However in other studies spine problems were the second most common injuries associated mainly with in pool or cross training activities [12] followed by other upper extremity injuries and knee problems [11,12]. Medial sided knee pain is also common in breaststroke swimmers. Breaststroke kick places increased stress on the medial structures of the knee, including the medial collateral ligament, the medial patellar facet, and the medial synovial lining of the knee joint [14]. Axial loading during weight lifting can aggravate the low back and frequently results in lower spine complaints among athletes. In the pool, the dolphin kick, utilized for the butterfly stroke, places greater stress on the low back due to the extension stresses on the lumbar spine [12].

Free style was by far the most common stroke specialty and was also associated with the highest total number of injuries. In previous reports as well as in ours it was not demonstrated a clear relationship between stroke specialties and injuries to specific body parts both in male and female swimmers [11]. In contrary, in other reports breaststroke swimmers have been found to have increased injury problems with the hip and knee region [6,14,15]. Shoulder pain is quite common in non-breaststroke swimmers, and especially those who specialize in freestyle and butterfly events. Surveys have demonstrated a prevalence of up to 35 percent of these swimmers with current interfering shoulder pain [15].

It should be stated that all our participants in our survey were minors and not adults as they were in most of the other studies. In addition, it's surprising how many musculoskeletal injuries occur even in young underage athletes.

Conclusion

Injuries in swimming most frequently involve the shoulder, the knee and axial spine. The majority of injuries result from in-pool training, but cross-training also contributes significantly. Musculoskeletal injuries are not uncommon in Greek underage, elite swimmers and thus care must be taken for their prevention and early safe return to play.

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Citation: Sambanis M, Athanailidis I, Sambanis A, Kiritsi O, Tsitas K, et al. (2013) A Study of Musculoskeletal Injuries in Greek Male and Female Swimmers. *J Nov Physiother* 3: 140. doi:[10.4172/2165-7025.1000140](https://doi.org/10.4172/2165-7025.1000140)

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