

Risk Factors Associated with Shoulder Pain and Disability across the Lifespan of Female Competitive Swimmers

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Background: There are currently over 340,000 U.S. competitive swimmers and many suffer from shoulder pain, yet no guidelines or programs exist to reduce shoulder injuries.

Purpose: To determine the prevalence of shoulder pain in female swimmers across the lifespan and to determine if physical characteristics or exposure variables differ between swimmers with and without shoulder pain and disability. If differences exist, they could be used as a basis for a prevention program.

Design and Setting: Multicenter trial performed poolside.

Participants: 236 female swimmers aged 8-77 enrolled in youth, high school, or U.S. Masters teams.

Methods: Subjects completed a survey including swimming history, participation in additional sports, the DASH sport scale and Penn Shoulder Score. They underwent testing of shoulder strength, ROM, muscle flexibility, pectoralis minor muscle length, and core endurance. Independent t-tests and Chi square analyses were performed for continuous and categorical data respectively.

Results: Shoulder pain during swimming was reported by 21% of swimmers aged 8-11 (n=42), 44% of those aged 12-14 (n=43), 76% of high school swimmers (n=84), and 54% of masters swimmers aged 23-77 (n=67). The 8-11 year olds with pain had reduced shoulder internal rotation (IR) ($p=0.05$) and flexion ROM ($p=0.02$), tighter latissimus dorsi ($p=0.03$), and were less likely to participate in another sport ($p=0.02$), specifically a lower extremity (LE) dominant sport such as soccer ($p=0.04$). Swimmers aged 12-14 with pain and disability had increased IR torque ($p=0.05$) and less endurance for side bridge ($p=0.02$). The high school swimmers with pain and disability had reduced pectoralis minor length ($p=0.03$), had swum more years ($p=0.009$), and were more likely to participate in water polo ($p=0.05$). Masters swimmers with pain and disability demonstrated reduced side bridge endurance ($p=0.04$), were less likely to participate in a walking or running program ($p=0.003$), and had swum a greater number of hours per year ($p=0.02$) and years per lifetime ($p=0.05$).

Conclusions: Shoulder pain and disability were positively correlated with exposure variables such as years swimming and participation in water polo and negatively correlated with participation in LE dominant sports for the young and walking/running programs for mature swimmers. Reduced shoulder flexibility was found in symptomatic young swimmers whereas pectoral tightness and decreased core endurance were associated with symptoms in those aged 12 and above. Pectoral tightness may reduce subacromial space and a loss of proximal stability may increase demand on the rotator cuff, thus producing pain, altered stroke mechanics and secondary impingement.

Clinical Relevance: Results suggest that guidelines for safe swimming exposure are needed. Pectoral stretching, UE/core endurance, and cross-training are areas that may be relevant for a prevention program aimed at reducing the incidence of shoulder pain in female swimmers across the lifespan.

This study was funded by United States Masters Swimming.