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Assessment of conventional and non-conventional wheelchair propulsion using surface electromyography activity of shoulder muscles

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The high demand on the upper limbs during propulsion on the standard wheelchair is contributing to multiple injuries of the rotator cuff. Since the conventional wheelchair is being responsible of a second handicap, a new prototype based on a lever system has been suggested to reduce the risk of shoulder injuries. The objective of this study is to compare shoulder muscle activity during propulsion on the conventional and non-conventional wheelchair. 18 able-bodied were recruited from the Lebanese University. All Subjects were healthy males only for convenience in electrode placement. Participants propelled the conventional and non-conventional wheelchair at a speed of 0.9 m/s for two trials each one. Mean power frequency, RMS, Frequencies above 95% of the power spectral intensity, Median and Peak electro-myographic intensities of anterior deltoid, posterior deltoid, biceps brachii, triceps brachii, pectoralis major and middle trapezius were compared between the two wheelchairs. The results showed that anterior and posterior deltoid intensities were decreased during propulsion on the non-conventional wheelchair compared with conventional wheelchair. The activity of these muscles has been shifted by the brachial biceps and brachial triceps. However, the intensity of pectoralis major tended to increase during propulsion on the prototype contrariwise the intensity of the middle trapezius diminished compared to the standard wheelchair. The non-conventional wheelchair reduces and shifts the muscular activity during propulsion. Triceps and biceps brachii are the principle muscles; their activity decreased the intensity of anterior and posterior deltoid therefore the likelihood of shoulder injuries may diminish.

Biography

Tarek Atallah has completed his Research Master's degree in Physical Therapy from the Lebanese University. He is an Instructor at the Lebanese University and a Physical Therapist at Saint Georges Hospital University Medical Center.

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