

# The Effect of Clavicle Support on Myoelectric Activity of Axioscapular Muscles During Computer Typing<sup>\*</sup>

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## Abstract

In the current office environment, office personnel are using computers for long periods of time on a daily basis. Consequently, there have been increased reports of work-related neck and upper limb musculoskeletal disorders and tension neck syndrome, which affect countless office workers who use computers, which is also the leading cause of occupational illnesses. In rehabilitation treatment, clavicle support that involves the use of elastic material is prescribed to exert corrective pulling forces at the upper back and stabilise the clavicle and shoulder movements. This study therefore aims to evaluate the effect of clavicle support on the myoelectric activity of the axioscapular group of muscles, including the Anterior Deltoid (AD), Upper Trapezius (UT), Middle Trapezius (MT), and Lower Trapezius (LT) in young women who experience chronic neck and shoulder pain during computer use. The results indicate that there is an overall significant difference in the percentage of maximum voluntary electrical activation (MVE%) of the axioscapular group of muscles between the use and absence of clavicle support ( $t = -2.982$ ,  $p = 0.005 < 0.05$ ). Amongst the four types of muscles studied, the use of clavicle support has significant effects on the MT and UT muscles. The results is important to improve our understanding of clavicle support in association with muscle activity, thereby providing the basis for prescribing suitable rehabilitation treatment and intervention devices in the workplace for the reduction of musculoskeletal disorders.

*Keywords:* Clavicle Support; Axioscapular Muscles; Myoelectric Activity

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## 1 Introduction

Today, it is considered normal worldwide for people to use computers for longer periods of time on a daily basis due to increased computer-based tasks at work and as leisure activities. As a negative consequence of computer use, neck and shoulder disorders are now common problems amongst office workers, especially those who are extensive computer users due to constant muscle fatigue. The symptoms include pain, tenderness, fatigue and stiffness in the neck and shoulder

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musculature, and headaches that contribute to demand for medical services as well as the economic cost of absence from work due to the pain [1, 2]. Moreover, the etiology of work related neck and shoulder disorders are multidimensional, associated and influenced by a complex array of individual, physical and psychosocial factors. Prolonged sitting tasks and poor posture or those who sit in a slumped position at a computer may lead to abnormal patterns of trapezius muscle behaviour, fatigue of the lumbar extensor muscles, as well as tightening and shortening of pectoral muscles [3, 4]. In addition, a habitual slouched posture leads to, or is brought on by, a rounded shoulder posture, which over time, fixes the shoulders into a forward position. The rounded shoulder posture is associated with the forward head posture and therefore, results in an increased anterior tilt of the scapula, upward scapular rotation, and retraction during elevation of the arm. Such a change in the axioscapular group of muscles may contribute to more severe neck pain due to mechanical stresses on pain sensitive cervicobrachial structures. During clinical examinations, palpable hardening areas, tender spots and spasms may be found in the trapezius or sternocleidomastoid muscles which are frequently associated with pain on the resistant side of the neck accompanied by a decreased range of flexion, extension, or rotation of the neck [5, 6].

In traditional physical rehabilitation treatment, restoration of a shortened pectoralis minor to its normal length by means of stretching exercises and/or simple therapeutic elastic style of support is generally adopted. Stretching exercises and soft tissue mobilization are very useful in correcting rounded shoulder posture as they assist in relieving pectoralis minor tightness [7, 8]. Therapeutic elastic support such as kinesiology taping is increasingly used to relieve pain, enhance muscle activity, and even offer immediate correction of shoulder misalignments [9]. As compared to other posture correcting devices, the adhesive tape is thin, light in weight, easy-to-use and disposable. However, the application of adhesive tape might cause skin irritation in some patients. For long term user of tape, it may result in large amount of disposable taping. Its effects on correction of rounded shoulder posture are greatly affected by the taping techniques and control of taping stretchability which is subjectively prescribed by the practitioners in each attempt of tape application. Han et al. [9] showed that kinesiology taping with stretch significantly increased the pectoralis minor length, the supine measurement of rounded shoulder posture, and the total scapular distance. Kinesiology taping without stretch, however, has no significant impact on the pectoralis minor, shoulder posture and/or scapular. For shoulder disorders patients with adhesive tapes being aligned on the back, taping might not be a feasible treatment for daily or prolonged use.

More recently, a clavicle support (in the form of a postural strap/shoulder brace) that involves the use of elastic material is may also be prescribed to stabilise the clavicle and shoulder movements which may relieve the intense pain and muscle tension of the neck and shoulder regions. As shown in Fig. 1, this is an ergonomic device which typically features two straps that go over the shoulders, thus forming an “x” in the back that prevents muscle strain in the neck, back and shoulders, restores the resting position of the scapula and maintains the proximal shoulder girdle stability necessary to elevate the arms [10-13]. A pair of wide elastic bands may also be placed at the center back so that tension is exerted which can maintain the body in an upright posture. When the clavicle support is worn, it helps to pull the shoulders back, open up the chest, and straighten the thoracic spine by controlling the length (and the corresponding pulling force) of the elastic bands. As indicated by Cole et al. [14], the application of therapeutic scapular bracing helps to reduce the forward shoulder angle and strengthen shoulder instability. Previous study has also shown the effect of kinesiology taping on the immediate correction of rounded shoulder posture [9]. As compared to kinesiology taping, a clavicle support is more durable and ready to