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# Chiropractic manipulative therapy of the thoracic spine in combination with stretch and strengthening exercises, in improving postural kyphosis in woman

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ABSTRACT

*Purpose:* This study serves to determine the effectiveness of either chiropractic spinal manipulative therapy to the thoracic spine or stretch and strengthening exercises (stretching the pectoralis major muscle and strengthening the rhomboid, middle and inferior trapezius muscles) versus the combined treatment of chiropractic spinal manipulative therapy to the thoracic spine in conjunction with stretch and strengthening exercises.

*Method:* A randomised study design with thirty female participants between the ages of twenty and thirty nine was selected. Group 1 (n = 10) received chiropractic spinal manipulative therapy to the thoracic spine. Group 2 (n = 10) received chiropractic spinal manipulative therapy to the thoracic spine as well as stretch and strengthening exercises i.e. stretching the pectoralis major muscles and strengthening the rhomboid, middle and inferior trapezius muscles. Group 3 (n = 10) received stretch and strengthening exercises. The stretch and strengthening exercises were performed in the consultation rooms to ensure that the participants were complying with the treatment and doing the exercises properly. The study consisted of seven consultations for Group 1 (they received treatment once a week for six weeks) and for Groups 2 and 3 there were nineteen consultations (they received three treatments a week for six weeks). Objective data was recorded at the beginning of the first, fourth and seventh consultations for Group 1, and the first, tenth and nineteenth consultations for Groups 2 and 3. On the seventh consultation (for Group 1) and nineteenth consultation for Groups 2 and 3, only data collection was done. Objective data were obtained by using the Flexicurve® Ruler measurements for the angle of kyphosis. Visual analysis was done by taking lateral (sagittal) view photographs at the beginning of the initial and final consultations.

*Results:* Statistical analysis revealed significant statistical changes for the intragroup results for all three groups. No significant statistical difference was found between the groups for the inter-group analysis.

*Conclusion:* The study showed that all three treatment protocols for Groups 1, 2, and 3 were effective. However, Group 1 had not shown a great improvement in their postural kyphosis,

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Group 3 had shown a relatively good improvement in their posture, while Group 2 had shown the best results with regards to improvement of the participants' posture. Therefore, in conclusion, Groups 2 and 3 treatment protocols can be used effectively to treat postural kyphosis but Group 2's treatment protocol, consisting of chiropractic spinal manipulative therapy to the thoracic spine in combination with stretch and strengthening exercises, will yield the best results.



## 1. Introduction

Thoracic kyphosis is defined as an increase in the normal thoracic curvature of the spine (Teixeira & Carvalho, 2007). Postural kyphosis most commonly presents in young women owing to a number of factors, such as: sitting with a slouched posture; carrying heavy bags or backpacks to school or university; watching television; breast development leading to insecurity in some individuals (thereby causing shoulder protraction); and heavy manual work, as well as those owing to fashion trends, such as wearing high heeled shoes (Britnell et al., 2005).

The normal range of kyphosis is between twenty and forty degrees, but it does vary with age and gender (Heary & Albert, 2007). The angle of kyphosis increases with age and this increase is greater in females than males (Yochum & Rowe, 2005). It has been shown that women are more susceptible to societal influences and psychological factors such as depression, insecurity and anxiety, leading to poor postural habits (Lewis & Valentine, 2010).

Studies have shown that teenage girls tend to develop kyphosis as a result of discomfort and insecurities that are experienced with breast development and altered body image. Women with large breasts have a tendency to have an increased kyphosis because of the increased weight of the breast tissue. In older women (twenty five to forty five years of age), the increased kyphosis has been attributed to certain sporting activities, financial stresses, physical abuse, pregnancy and wearing high heeled shoes (Britnell et al., 2005).

Hrysomallis and Goodman, stated that one of the causes of postural deviations such as kyphosis was weak and/or lengthened agonist muscle groups combined with a strong and tight antagonistic muscle group (Hrysomallis & Goodman, 2001). Stretch and strengthening exercises should be given in order to try and correct the postural deviation. The trapezius (middle and inferior parts) and rhomboid muscles need to be strengthened and the pectoralis major muscle needs to be stretched (Hrysomallis & Goodman, 2001). These exercises can help correct the postural kyphosis, as well as decrease the "rounded shoulder" effect that results from poor posture (Gatterman, 2004).

According to Gatterman, the mechanical effects of chiropractic spinal manipulative therapy are that it causes changes in joint alignment and corrects abnormal joint movement and spinal curves. There are various causes of altered joint function, such as: acute or repetitive injury, abnormal posture, poor coordination, age, defects that may be congenital or developmental and various diseases (Gatterman, 2005).

According to Pickar and Wheeler, spinal manipulative therapy increases joint mobility, thereby silencing gamma motor neurons. Gamma motor neuron activation is elevated in fixated spinal segments. When there is an increase in gamma motor neuron activation, joint mobility is impaired because the muscle stretch reflex is able to detect small changes in muscle length. Therefore, spinal manipulative therapy increases joint mobility, thus causing a barrage of impulses in muscle spindle afferents, decreasing gamma motor neuron activity. This will then cause a reduction in the gain of the gamma-loop through an undetermined neural pathway (Pickar & Wheeler, 2001).

Pickar (2002) stated that gamma motor neuron mechanoreceptors reset muscle spindles, which then restores muscle tonus. Increase in muscle strength has been noted (by using an electromyogram) after spinal manipulative therapy. Therefore, spinal manipulative therapy has shown to improve muscle function, either through facilitation or disinhibition of neural pathways (Pickar, 2002).

Spinal manipulative therapy will stretch the adjacent musculature of the vertebral level being adjusted. This "stretch" in the muscles activates the muscle spindles and Golgi tendon organ reflexes. The spinal manipulation will result in decreased hypertonicity in the muscles and therefore alter the tone of the muscle (Esposito & Philipson, 2005).

Instruments that are used to assess kyphosis must be viewed in terms of their accuracy, reliability, practicality and cost. The Flexicurve® Ruler was used to measure the angle of thoracic kyphosis in this quantitative study. It has been proven to be a valid and reliable means to measure thoracic kyphosis and is also inexpensive (Teixeira & Carvalho, 2007).

## 2. Materials and methods

### 2.1. *Selection criteria*

A selection of thirty female participants between the ages of twenty and thirty nine years was recruited for this study. This specific sample group was chosen because most cases of postural kyphosis occur in females (Hanfy, Awad, & Allah, 2012). The specific age group chosen was selected to limit structural changes that occur with increasing age (in the middle and elder years) (Britnell et al., 2005). All participants