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Fascial Manipulation® method applied to pubescent postural hyperkyphosis: A pilot study

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Summary *Background:* Treatment of pubescent postural hyperkyphosis commonly includes postural exercises and auto-elongation. Myofascial imbalances can be involved in functional, sagittal plane deviations of spinal curves. This pilot-study assesses the effects of one manual therapy approach that addresses fascial dysfunctions (Fascial Manipulation®) in pubescent subjects with postural hyperkyphosis.
Methods: 17 subjects (mean age 11.8 DS 0.8; 9 males, 8 females) were evaluated for familiarity; psychological aspects; sport; pain; anteposition of shoulders, head, and pelvis; distance C7 and L3 from plumb-line; distance fingers to floor on forward bend.

Each subject received 2–4 weekly sessions of Fascial Manipulation®. Parameters were evaluated before and after manual treatment, with a follow-up at 7 months.
Results: A statistically significant difference ($p < 0.05$) was present in all the parameters analysed before and after treatment and at a 7 month follow-up.
Conclusions: Results suggest that Fascial Manipulation® could represent an approach to integrate into treatment of postural hyperkyphosis in pubescent subjects.

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Introduction

Sagittal spinal deformity can be defined as pathological deviations of the posterior (kyphosis) or anterior (lordosis) physiological curve of the spine on the sagittal plane due to structural alterations of discs, ligaments, and bony structures as well as myofascial tensional imbalances. Deviations can present as either excessive (thoracic hyperkyphosis or curved back, lumbar hyperlordosis), reduced (flat back, concave back, hypolordosis, lumbar kyphosis) or altered in their normal distribution (lumbar kyphosis, cervico-dorsal kyphosis) and may have various aetiologies (Shelton, 2007). It is necessary to distinguish between structured curves and correctable functional curves in pubescent subjects, even though correctable curves (curved back, postural hyperkyphosis, postural lumbar hyperlordosis) can potentially evolve in terms of stiffness and structural changes. In adults, hyperkyphosis is mostly structural and cannot be completely reversed.

In reference to the Cobb angle measured on X-rays taken in standing, normal kyphosis in the developing age and in adolescence can be between 20° and 45°. The condition described as 'flat-back' is applied for angles less than 20° whereas 'thoracic hyperkyphosis' (THK) is applied for angles more than 45°. Only 2% of subjects with this type of deformity require orthopaedic and/or physiotherapy treatment (Dimeglio et al., 1995).

The postural curved back consists of THK generally accompanied by pronounced lumbar lordosis, however inversion of the lumbar lordosis can also occur.

Some authors affirm that THK can be painful (Bernstein and Cozen, 2007) and that it is more frequent in adolescence and in males (Poussa et al., 2005).

Aetiology of thoracic hyperkyphosis

The aetiology of THK can be attributed to a variety of causes including perceptive, postural, sports, trauma, psychological aspects, post-surgical and genetic factors.

Scheuermann's disease is one of the more common causes of hyperkyphosis, with a reported incidence of 18% in the general population (Lowe, 1990). This disease is characterised by reduced growth of the anterior portion of the vertebral body due to alterations in the cartilaginous end plates (a form of osteochondritis) that inhibit bone growth via mechanical factors and cause anterior vertebral body wedging (Aufdermaur and Spycher, 1986; Digiovanni et al., 1989). In subjects with Scheuermann's kyphosis, three or more vertebrae, generally located in the middle of the thoracic segment, present anterior wedging with an anterior cuneiform deformation greater than 5° (Sorensen, 1964).

Nevertheless, structural deformation of the vertebrae or the intervertebral joints is not the cause for the increase in the dorsal curve in the majority of cases of postural THK. Altered dynamics in the thorax that involve the intercostal, intrinsic thoracic, thoracolumbar, abdominal and long dorsal muscles can produce changes in the relationship between tension along the length of the curve favouring the anterior muscle groups, which are already stronger and shorter (Wojtys et al., 2000). These tensional changes may interfere with the activation of the longer and weaker posterior muscles. Consequently, this vicious circle not only maintains the spinal deviation, it also involves segments adjacent to the thorax (cervical, lumbar) by altering the neutral position and the functional dynamics, resulting in forward head, rounded shoulders and an increase in the lumbar lordosis. While various aetiological factors exist, one study of the hip and pelvic regions in 629 children with idiopathic scoliosis (including THK) highlighted contractures or shortening, particularly in the region of right hip, of the iliotibial tract, fascia lata, joint capsule, fasciae of gluteus medius and minimus, sartorius, and rectus femoris muscles (Karski, 2002) as important biomechanical components. The spine and pelvis are functionally interdependent and, in normal subjects, their relationships result in a stable and compensated posture, presumably to minimize energy expenditure (Mac-Thiong et al., 2007) and as adaptation in the presence of pathology (Roussouly and Pinheiro-Franco, 2011). Therefore, any shortening or rigidity of the myofascial components in the neck, trunk and pelvis needs to be addressed in postural THK. Rib articulations, vertebral positions and myofascial elements are all interconnected with the elastic expansion of the thorax on the three spatial planes, which is essential for normal breathing (Chaitow et al., 2002), should also be considered.

Traditional treatment

The more common reasons to treat THK include the aesthetic appearance of the dorsal curve, back pain, quality of life, progression into adulthood and psychological well-being (de Mauroy et al., 2010), as well as prevention of shoulder (Gumina et al., 2008), neck and back pain in later years.

According to Negrini et al. (2005), treatment of THK should aim to:

- correct or limit progression of the curve and the vertebral changes
- improve biomechanical efficiency of vertebral column support mechanisms
- improve neuromotor control
- improve the aesthetic aspect
- limit psychological stress
- and, where necessary, reduce pain.

Treatment is generally based on the degree of Cobb angle, whether the curve is correctable and the presence of pain, and ranges from therapeutic exercises for totally correctable curves, bracing for partially correctable curves to surgery if results from conservative treatment are unsatisfactory (Negrini et al., 2008).

One review of rehabilitation and conservative orthopaedic approaches (Zaina et al., 2009) suggests that exercise programmes should always include:

- patient awareness of spinal alignment
- patient awareness of neutral and correct position of the vertebral column
- mobilisation of the thoracic cage
- muscular reinforcement and neuromotor integration