

Association Between Forward Head, Rounded Shoulders, and Increased Thoracic Kyphosis: A Review of the Literature

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ABSTRACT

Objective: The purpose of this review was to explore the association between forward head posture, rounded shoulders, and increased thoracic kyphosis.

Methods: The PubMed, ERIC, and Cochrane databases were searched using the key words *posture, head, shoulder, forward scapular posture, and thoracic kyphosis* through December 2016.

Results: Our initial search yielded 6840 research studies, 6769 of which were excluded because they either were duplicates or did not satisfy the inclusion criteria. After the abstracts of the remaining studies were read, 15 were assessed for eligibility, and only 4 papers were included in the present review. Cervical lordosis values were found to be significantly associated with thoracic kyphosis values. Also, there were significant correlations between rounded shoulders and increased thoracic kyphosis.

Conclusion: Forward head posture, rounded shoulders, and increased thoracic kyphosis can exist alone or in any combination. (J Chiropr Med 2017;xx:1-10)

Key Indexing Terms: *Posture; Kyphosis; Shoulder*

INTRODUCTION

Various occupations require people to assume static postures for long periods, which causes continuous contractions of the head and neck muscles.^{1,2} The head constitutes 6% of the total body weight, which is linked to the cervical spine and all other joints through the kinematic chain³ by various muscles.

Normally, the cervical spine is lordotic. Other than flexion and extension movements of the neck that take place in the sagittal plane, protraction and retraction movements also come into play in this plane. Protraction movement is a result of extension of the upper cervical spine and flexion of the lower cervical spine, whereas retraction movement results from flexion of the upper cervical spine and extension of the lower cervical spine. If the cervical spine is held in protracted position for prolonged duration, it can lead to alterations in head posture ultimately leading to poor posture known as

forward head posture (FHP), which is thought to be a deviation from neutral or normal posture.^{4,5}

Normal posture is defined as when the line of gravity (LOG) passes through the external auditory meatus, the bodies of the cervical spine, and the acromion and anterior to the thoracic spine⁶ (Fig 1). Normally, the external moment produced by gravity and ground reaction forces at a joint is offset by the internal moment produced by various muscles and other soft tissue structures around that joint. However, presence of postural malalignments may require greater internal forces to balance the external torque produced by gravity, which in turn is exaggerated owing to the altered location of the LOG.⁷⁻⁹

Failure of the head to align with the vertical axis of the body^{3,10} (Fig 2) can lead to further malalignments in the body, namely, rounded shoulders and increased thoracic kyphosis,^{11,12} to compensate¹³ for the altered location of the LOG, leading to further impairments.¹⁴ Combination of all these postural deviations is often known as “slouched posture”^{15,16} or “slumped posture.”^{3,17}

According to Kendall et al,⁶ there should be vertical alignment between the midline of the shoulder and the mastoid process. If the acromion processes are more anteriorly positioned compared with the mastoid processes, a condition known as forward shoulder posture (FSP) or rounded shoulders or protracted shoulders^{11,15} occurs (Fig 3); this condition is characterized by protracted, internally rotated, anteriorly tilted, elevated, and abducted scapula along with winging of scapula.^{15,18,19} This poor alignment of the

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Fig 1. Normal posture and line of gravity.



Fig 2. Forward head posture. Note that d is the distance between the line of gravity and the external auditory meatus.

shoulders leads to greater torque production by gravitational forces, which is being offset by greater internal forces generated by muscles and other soft tissues around the shoulder.

Normally, a flexion moment is being created by the passage of LOG anterior to the thoracic spine that is offset by the extensor muscles, ligamentum flavum, supraspinous ligaments, and posterior longitudinal ligament. This gravitational moment would increase if there is an increase in the thoracic spine's posterior convexity causing increased distance between joint axes and LOG (Fig 4). In such a case, to maintain an upright posture, ligaments and muscles would be required to produce a greater moment to counterbalance the increased gravitational moment,^{7-9,20} thus leading to an increase in posterior convexity or kyphosis of the thoracic spine, also known as round back.⁹

Posture can be assessed using different methods such as a plumb line, photography, photogrammetry, radiography, Flexicurve, moiré topography, and an electromagnetic tracking device. Any of these methods can be used to detect the presence of abnormal posture.²¹⁻²³ Electromyography is also very commonly used in postural assessment studies to ascertain the changes in muscular activities that occur as a result of postural changes.²⁴

Most previous studies mention the causes and consequences of FHP, rounded shoulders, and increased thoracic kyphosis. However, there is a dearth of studies focused on the association between forward head, rounded shoulders, and hyperkyphosis. Therefore, the aim of this review was to explore the relationship between FHP, FSP, and increased kyphosis of the thoracic spine.

METHODS

Studies were included if they reported association between FHP and FSP, or between FHP and thoracic kyphosis, or between FSP and thoracic kyphosis, and if they were available in free full text online entirely in the English language. Review articles, conference papers, and unpublished dissertations were excluded, as were studies that involved subjects having pain or some pathology other than a postural problem. Studies were also excluded if they described the impact of exercise training or any other modality on posture.

PubMed, ERIC, and Cochrane databases were searched using the key words *posture, head, shoulder, forward*

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