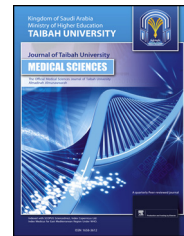




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Original Article

## Relationships among head posture, pain intensity, disability and deep cervical flexor muscle performance in subjects with postural neck pain

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### المخلص

**أهداف البحث:** يتبنى محترفو تقنية المعلومات؛ العاملون بأجهزة الحاسب الآلي، تدريجياً قوام ثني الرأس للأمام، ونتيجة لذلك فإن هؤلاء المهنيين معرضون للعديد من الاضطرابات العنقية. هدفت هذه الدراسة إلى الكشف عن العلاقة بين شدة الألم والإعاقة ووضع الرقبة وأداء عضلات الثني الأمامي العميقة عند المرضى الذين يعانون من ألم الرقبة الناتج عن سوء القوام.

**طرق البحث:** أجريت دراسة مقطعية على 84 من محترفي تكنولوجيا المعلومات، الذين تم تشخيصهم بألم في الرقبة ناتج عن سوء القوام. تم اختيار المشاركين بأسلوب الاختيار العشوائي. واستخدم مقياس النظير البصري المرني، واستبانة "نورثوك بارك" لآلام الرقبة، وأداة انثناء العمود الفقري المعدلة لوضعية الرأس، ووحدة الارتجاج الحيوي للضغط المثبت لقياس كل من شدة الآلام الرقبية، والحجز في الرقبة، ووضع الرقبة، وأداء عضلات الثني الأمامي العميقة العميقة على التوالي.

**النتائج:** كشف معامل ارتباط بيرسون علاقة إيجابية قوية بشكل كبير بين مقياس النظير البصري المرني واستبانة نورثوك بارك لآلام الرقبة. ووجد أن الزاوية بين الرأس والعمود الفقري لها علاقة سلبية كبيرة مع مقياس النظير البصري المرني وعلاقة سلبية ضعيفة مع استبانة نورثوك بارك لآلام الرقبة.

**الاستنتاجات:** خلصت هذه الدراسة إلى أنه كلما صغرت الزاوية بين الرأس والعمود الفقري كلما زادت شدة آلام ومقدار عجز الرقبة. وعلاوة على ذلك، فإنه لا توجد علاقة ذات قيمة بين الزاوية بين الرأس والعمود الفقري وبين أداء عضلات الثني الأمامي العميقة العميقة، مما يشير إلى أن إعادة تأهيل الرأس من

خلال تمارين تصحيح القوام لن تعيد تصحيح الإعاقات العضلية في عضلات الثني الأمامي العميقة. بالإضافة إلى ذلك، فإن برنامج تدريبي مناسب يستهدف عضلات الثني الأمامي العميقة فقط لتحسين قدرتها على التحمل هو أمر مطلوب.

**الكلمات المفتاحية:** قوام الرأس؛ ألم الرقبة الناتج عن سوء القوام؛ الإعاقة؛ أداء عضلات الثني الأمامي العميقة العميقة؛ الزاوية بين الرأس والعمود الفقري

### Abstract

**Objectives:** Information Technology (IT) professionals working with computers gradually develop forward head posture and, as a result, these professionals are susceptible to several neck disorders. This study intended to reveal the relationships between pain intensity, disability, head posture and deep cervical flexor (DCF) muscle performance in patients with postural neck pain.

**Methods:** A cross-sectional study was conducted on 84 IT professionals who were diagnosed with postural neck pain. The participants were recruited with a random sampling approach. A Visual Analogue Scale (VAS), the Northwick Park Neck Pain Questionnaire (NPQ), the Modified Head Posture Spinal Curvature Instrument (MHPSCI), and the Stabilizer Pressure Biofeedback Unit were used to measure neck pain intensity, neck disability, head posture, and DCF muscle performance, respectively.

**Results:** The Pearson correlation coefficient revealed a significantly strong positive relationship between the VAS and the NPQ ( $r = 0.734$ ). The cranio-vertebral (CV) angle was found to have a significantly negative correlation

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with the VAS ( $r = -0.536$ ) and a weak negative correlation with the NPQ ( $r = -0.389$ ).

**Conclusion:** This study concluded that a smaller CV angle corresponded to greater neck pain intensity and disability. Furthermore, there is no significant relationship between CV angle and DCF muscle performance, indicating that head posture re-education through postural correction exercises would not completely correct the motor control deficits in DCF muscles. In addition, a suitable exercise regimen that exclusively targets the deep cervical flexor muscle to improve its endurance is warranted.

**Keywords:** Craniovertebral angle; Disability deep cervical flexors muscle performance; Head posture; Postural neck pain

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## Introduction

Posture is one of the most frequently cited risk factors for musculoskeletal disorders.<sup>1</sup> Proper posture is considered a state of musculoskeletal balance that involves a minimal amount of stress or strain to the body.<sup>2–4</sup> Deviation from normal alignment (i.e., postural abnormality) suggests the presence of imbalance and abnormal strain on the musculoskeletal system.<sup>5</sup> Alignment is considered ‘poor’ when the head is held forward in relation to the trunk, which is referred to as ‘forward head’, ‘poke chin’ and ‘rounded shoulders’.<sup>6,7</sup> Forward head posture is one of the common types of poor head posture seen in patients with neck disorders.<sup>8,9</sup> and is commonly described as an anterior position of the head in relation to the vertical line of the body’s centre of gravity.<sup>10,11</sup> Anatomically, the upper cervical spine is in flexion and the lower cervical spine is in extension, but forward head posture causes extension of the head and the upper cervical spine (C1–C3), accompanied by flexion of the lower cervical spine (C4–C7) so that the cervical curvature is increased, a condition called hyper-lordosis.<sup>12,13</sup> This altered positioning magnifies the effect of gravity, thereby increasing the flexion moment of the head, which may cause changes in the length-tension relationships of the anterior, posterior and lateral cervical musculature.<sup>14,15</sup> Forward head posture is considered a cervical musculoskeletal variation that is associated with shortening of the posterior neck extensor muscles and weakening of the anterior neck flexor muscles.<sup>16</sup> If one maintains this poor head posture for a long period of time, the length-tension relationship of the cervical musculature can become altered. As a result, there is shortening of the posterior cervical muscles and weakening of the anterior cervical flexor muscles, increasing the loading to non-contractile structures and creating abnormal stress on posterior cervical structures, which leads to myofascial

pain.<sup>17,18</sup> Additionally, in 2006, Fernández-de-las-Peñas et al.<sup>19</sup> found that most of the trigger points in forward head position were in the upper trapezius, temporalis, sternocleidomastoid and the sub-occipital muscles.

Computer operators involved in visual display terminal (VDT) gradually develop forward head posture as a compensatory posture due to either poor work habits or ergonomically poor work station arrangements.<sup>20</sup> Consequently, they are more frequently prone to neck pain disorders.<sup>21,22</sup> In 2013, Sabeen et al.<sup>23</sup> confirmed that severe neck pain was found in people who spend more than 5 h a day on a computer. This postural neck pain is usually associated with sustained static loading of the cervical spine and shoulder girdle during occupational or leisure activities.<sup>24</sup> Therefore, three specific impairments are noted in these postural neck pain patients, including altered head posture, pain and its subsequent disability, and impaired deep cervical flexor muscle performance.<sup>25</sup> To effectively manage these impairments, it is essential to understand the relationship between these postural deviations, the severity of neck pain, and corresponding disabilities.

Few studies have been conducted to understand the relationship between postural deviations, the severity of neck pain, and subsequent disabilities.<sup>3,26</sup> In 2010, Lau et al.<sup>27</sup> established a relationship among the sagittal postures of the thoracic and cervical spines, the presence of neck pain, neck pain severity and disability. A previous study indicated that neck pain in working positions was related to incorrect postures of the head and the cervical and thoracic spine.<sup>28</sup> Contrary to these findings, a more recent study found no association between craniocervical posture and disability variables, except for small differences in the measurements of craniocervical posture between asymptomatic subjects and patients with chronic cervico-craniofacial pain.<sup>29</sup> In the literature, very few studies have addressed the relationship among deep cervical flexor muscle performance, head posture, neck pain intensity and disability. Unlike previous studies, the present study is unique in that it intends to establish a relationship among variables such as head posture, pain intensity, disability and DCF muscle performance in the most vulnerable group of IT professionals who are frequently prone to postural neck pain disorders. Furthermore, the present study utilizes the MHPSCI to measure head posture, in which a therapist can objectively fix the pivot exactly over the C7 spinous process to improve the clinical accuracy of measuring the CV angle.

## Materials and Methods

### Study design

A cross-sectional study design was adopted to study the relationship among variables such as pain intensity, disability, head posture and deep cervical flexor muscle performance in subjects with postural neck pain.

### Subjects

Subjects between the ages of 20 and 40 years working both day and night shifts at a selected Information Technology

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