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Postural Aberrations in Female Patients With Chronic Low Back Pain

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국문요약

만성요통 여성 환자들에서 발생되는 자세의 변화

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이 연구의 목적은 만성요통 여성 환자들에서 나타나는 자세 이상을 평가하고 방사선적 변수들과 임상적인 변수들과의 상관성을 알아보는 것이다. 이 연구의 대상자는 만성요통 여성 환자 38명과 대조군 32명이었다. 변수의 측정은 모든 대상자들이 이완된 자세로 기립한 상태에서 방사선 검사를 실시한 후 경추전만각, 흉추후만각, 요추전만각, 그리고 요추경사각을 측정하였다. 대상자들의 연령과 통증기간은 의무기록지를 참고하였다. 자료분석은 요통군과 대조군의 방사선적 변수들 간의 유의한 차이가 있는지를 알아보기 위해 독립된 t-검정을 시행하였고, 방사선적 변수들과 임상적 변수들과의 상관성을 알아보기 위해 피어슨 상관분석을 시행하였다. 연구결과 만성요통 환자군과 대조군사이의 경추전만각($p<.05$), 요추전만각($p<.001$), 그리고 천추경사각($p<.01$)에서 통계학적으로 유의한 차이가 보였다. 통증기간은 요추전만각과 통계적학으로 유의한 상관관계가 있었으며($p<.05$), 경추전만각은 흉추후만각과 통계학적으로 유의한 상관관계가 있었다($p<.05$). 또한 흉추후만각, 요추전만각, 그리고 천추경사각은 각각 상호간에 상관관계가 있었다($p<.05$).

만성요통은 요추만곡의 변화를 초래하여 흉추부 및 경추부의 자세이상을 유발할 수 있다. 그러므로 요통으로 인하여 올 수 있는 신체 전반적인 자세이상을 미리 예측하고 이를 교정하여야만 장기적으로 올 수 있는 합병증들을 예방할 수 있을 것이다.

핵심단어: 요통; 척추 자세; 방사선적 평가.

Introduction

Low back pain is one of the most common medical problems of today's society and causes a significant amount of professional and social disability (Yorulmaz et al, 1999). It has been accepted that 70 75% of population experiences low back pain at least once in their lives (Deyo et al, 1992; Pope and Novotny, 1993). Many factors associated with low back pain are reported including degenerative disc disease, spondylosis, sprains and strains, poor posture (Frymoyer et al, 1980; Na et al, 1996; Nachemson, 1975). Low back pain may have an insidious onset where the specific cause of the in unknown (Rowe, 1969).

Clinical observations suggest that aberrations of posture may play a role in the development of low back pain (Lee and Amstrong, 1967). Faulty postures cause excessive stress on the joints and weaken soft tissue such as muscles and ligaments by overstretching them (Yorulmaz et al, 1999). With postural changes, a change in alignment with respect to the line of gravity occurs that may cause to other adaptive postural changes (Kappler, 1982; Magee, 1987).

Traditionally, postural evaluation and education have been an important aspect of rehabilitation in individuals with low back pain (Day et al, 1984; Grieve 1984; Magee, 1987; McKenzie, 1981; Yorulmaz et al, 1999). Differences in lumbar lordosis and thoracic kyphosis are primarily cited among postural changes that are related to low back pain (Christie et al, 1995; Jackson and McManus, 1994). There is controversy in the literature regarding lumbosacral posture and low back pain (Christie et al, 1995). Itoi (1991), Jackson and McManus (1994), and Christie et al (1995) reported that low back pain was related to the changes of spinal curvatures such as lumbar lordosis and thoracic kyphosis, but not for Day and Gary (1984) and During and associates (1985). Magora (1975) recommended the changes of vertebral curvatures as a confidential criteria of low back pain.

The purposes of this study were to evaluate static standing postural aberrations in patients with chronic low back pain in comparison with healthy individuals and to investigate correlations of radiological parameters with each other and with clinical parameters for the patients with chronic low back pain.

Methods

Subjects

The study population consisted of 38 patients with chronic low back pain and 32 controls. Chronic low back pain was defined as pain with a duration of longer than 6 months and/or pain that was recurrent. Inclusion criteria for the patients with low back pain were as follows: 1) women aged 20 to 45; 2) no spondylolisthesis, inflammatory, infectious, malignant and metabolic diseases of the spine, and pregnancy; 3) no prior spinal operation; and 4) no clinical deformity. The normal age-matched group consisted of individuals who had never experienced low back pain in their lives.

Measurements

The age and pain duration for the patients was taken at medical record. A lateral radiographic film of the whole spine was obtained with the patients in a relaxed upright standing position without wearing shoes. On the lateral radiograph, the angles of lumbar lordosis and thoracic kyphosis were measured using Cobb's method (Magee, 1997). The angle of sacral inclination was determined by measuring the angle between the upper border of the sacrum and the horizontal line (Meschan, 1973). Cervical lordosis was evaluated as the angle formed by the lower border of the vertebral body of C_3 and the lower border of the body of the vertebral body of C_7 (Kasai, 1996). All of the radiological assessments were taken by the same clinician.

Statistics

Differences in sacral inclination, lumbar lordosis, thoracic kyphosis, and cervical lordosis between the two groups were analyzed using independent t-test. Pearson product-moment correlation coefficiants were used to determine correlations between each variables. A p-value of .05 was set for significance of the results.

Results

The mean age of the subjects was 30.68 ±7.43 years in the low back pain group and 31.53±6.99 years in the control group. No statistically significant difference was detected between the two groups in the age. The average pain duration for the low back pain group was 24.11±9.33 months.

Table 1 shows the comparison of the angles of cervical lordosis, thoracic kyphosis, lumbar lordosis, and sacral inclination between the two groups. The mean cervical lordosis angle in the low back pain group was 13.50±5.90°, and in the control group it was 16.38±5.16°; the mean thoracic kyphosis angle in the low back pain group was 27.52±10.55°, and in the control group it was 30.22±4.05°; the mean lumbar lordosis angle in the low back pain group was 26.41±8.21°, and in the control group it was 34.56±5.89°; sacral inclination angle in the low back pain group was 34.07±4.08°, and in the control group it was 37.22±5.02°. There was no significant difference between the two groups on thoracic kyphosis angle ($p > .05$). However, cervical lordosis ($p < .05$), lumbar lordosis ($p < .001$), and sacral inclination ($p < .01$) angles in the low back pain group were significantly lower than those in the control group.

Based on the angle measurements performed on the lateral radiographs, the correlations matrix for low back pain group are shown Table 2. Using Pearson product-moment correlation coefficients, the results were that pain duration had a significant negative correlation with lumbar lordosis angle and that cervical lordosis angle was correlated significantly with thoracic kyphosis angle. It was also revealed that thoracic kyphosis, lumbar lordosis, and sacral inclination angles with each other were correlated one another.

Table 1. The comparison of the angles of cervical lordosis, thoracic kyphosis, lumbar lordosis, and sacral inclination between the low back pain and control groups.

	Low Back Pain Group	Control Group	t-Value
Cervical Lordosis Angle	13.50± 5.90	16.38±5.16	2.15*
Thoracic Kyphosis Angle	27.52±10.55	30.22±4.05	1.37
Lumbar Lordosis Angle	26.41± 8.21	34.56±5.89	4.69***
Sacral Inclination Angle	34.07± 4.08	37.22±5.02	2.90**

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 2. The correlations matrix for variables in low back pain group

	Age	Pain Duration	Cevical Lordosis Angle	Thoracic Kyphosis Angle	Lumbar Lordosis Angle	Sacral Inclination Angle
Age	1.00	.09	.21	.07	.24	.10
Pain Duration	-.91	1.00	-.05	-.24	-.40*	-.18
Cervical Lordosis Angle	.21	-.05	1.00	.38*	.17	.18
Thoracic Kyphosis Angle	.07	-.24	.38*	1.00	.33*	.39*
Lumbar Lordosis Angle	.24	-.40*	.17	.33*	1.00	.36*
Sacral Inclination Angle	.10	-.18	.18	.39*	.36*	1.00

* $p < .05$

Discussion

Low back pain is a primarily cited condition among problems that are linked to postural imbalance (Yorulmaz, 1999). The relationship between the changes of physiological curvatures of the spine and low back pain has become one of the most studied fields. Observation of postural changes is frequently included in the physical examination of patients with low back pain (Christie et al, 1995; Magee, 1997). However, there is no consistency among methods assessed the postural changes of low back pain patients, moreover, different results are reported for the postural changes detected in patients with low back pain.

The finding of this study showed that cervical lordosis angle was significantly lower for the low back pain group compared to that of the control group. Magee (1987) proposed that head and neck postures is often associated with a lumbar posture. The results of this study agree to the findings of Magee (1987), but not for the result of Christie and associates (1995). No previous research was found that investigated cervical posture with respect to chronic low back pain in a manner similar to this study, therefore, so no direct comparisons can be made. Cervical postures are related to head and shoulder postures. Therefore, it is necessary to assess head, neck, and shoulder postures in order to evaluate overall cervical postures. Thoracic kyphosis angle of the low back pain group was lower than that of the control group, but the difference of thoracic kyphosis angle between the two groups was not significant. This finding was consistent with the results of Magora (1975). However, it was in contrast to the result of study conducted by Na and associates (1996). Magora (1975) stated that thoracic postural changes was correlated with heavier occupation such as heavy industry work rather than low back

pain. Lumbar lordosis and sacral inclination angles were significantly lower in the low back pain group than those in the control group. This findings were in contrast to the results of Christie and associates (1995). This results were similar with the findings of previous research conducted by Roncarati and McMullen (1988). The increase of muscles tension and the weakness of paraspinal muscles caused by a pain could lead to decrease of lumbar lordosis.

Pain duration was correlated significantly with lumbar lordosis angle. This finding means that the more pain duration increases, the more postural imbalances of lumbar regions increase. Therefore, it would be helpful for preventing long-term complications to treat low back pain patient with specific rehabilitation therapy as soon as possibile. Cervical lordosis angle was correlated significantly with thoracic kyphosis angle. Thoracic kyphosis, lumbar lordosis, and sacral inclination angles were correlated significantly with one another. With chronic low back pain the individuals have adapted to the pain with a localization of postural changes to the lumbar spine and compensatory upper spine changes. The postural segments of the body should not be regarded as independent from each other. The treatment for relieving pain tends to be focused in pain sites and patterns. However, it is important to manage long-term complications caused by postural aberrations.

Postural evaluation is an important aspect of management in patients with low back pain. During daily practice, postural evaluation takes place by observing body contours. Although variations in the spine, to some extent, correlate with variations in the body contours, it is not accurate to evaluate spinal postures by observing contours. This difference between clinical and radiological evaluations could be partly due to alterations in the skin and/or subcutaneous adipose tissues, which could affect body contours, especially in middle-aged and elderly adults (Yorulmaz, 1999). Therefore, further studies to investigate an easy, clearly defined, simple, and precise clinical methods with respect to postural evaluation should be continued.

Conclusions

This study showed that radiological parameters are significantly different between the chornic low back pain (CLBP) and the control groups. However, based on this study, it could not be stated whether poor posture leads to pain or pain precipitate postural aberrations. Cervical lordosis angle had a significant correlation with thoracic kyphosis angle, and thoracic kyposis, lumbar lordosis, and sacral inclination angle were significantly correlated with one another. The patients with chronic low back pain have adapted to the pain causing postural changes to the lumbar spine and a compensatory upper spine changes. Mechanical stress caused by postural deviations may potentially lead to pain and injury.

Further study is required to determine whether treatment of postural aberration can have an effect on chronic low back pain and to investigate a simple and accurate clinical methods with respect to postural evaluation.

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