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Original research article

Prognostic value of measuring the angles of lumbar lordosis and thoracic kyphosis with the Saunders inclinometer in patients with low back pain☆

Marek Kluszczyński[a,*], *Jacek Wąsik*[a], *Dorota Ortenburger*[a], *Daniel Zarzycki*[b], *Piotr Siwik*[c]

[a] *Institute of Physical Education, Tourism and Physiotherapy, Jan Dlugosz University in Częstochowa, Poland*
[b] *Podhale State Higher Vocational School in Nowy Targ, Poland*
[c] *Department of Rehabilitation, Faculty of Medical Sciences, University of Warmia and Mazury in Olsztyn, Poland*

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ABSTRACT

Introduction: The objective of the study is evaluation of usefulness of measuring angles of lumbar lordosis and thoracic kyphosis in adults suffering from the low back pain (LBP).
Aim: The aim of this paper is to show the usefulness of measuring the angles of anteroposterior curvatures of the spine with the Saunders electronic inclinometer, using a direct method of measurement, in the LBP patients treated in a rehabilitation outpatient clinic.
Material and methods: The sample group included 87 people suffering from LBP, treated in the outpatient rehabilitation clinic. The angle of lumbar lordosis (LL) and the angle of thoratic kyphosis (TK) were measured with the use of the Saunders inclinometer. The differences between the compared groups were assessed on the basis of the Pearson χ^2 significance test.
Results and discussion: The LL angular values were mostly included within the 20°–40° in both, men and women, and they were found in 72%–78% of the examined patients. Lower LL was found to occur more often in men, but the difference was not statistically significant. Statistically significant functional shortenings of lower limbs above 1 cm were more often found in men (62.5%).
Conclusions: (1) An alteration of the spine shape in the sagittal plane can be regarded as one of the potential factors of the LBP risk. (2) Measurements of the LL and TK angular values seem to be a legitimate element of the orthopedic examination of the patients suffering from LBP. (3) Reduction of lumbar lordosis can be an LBP risk factor, particularly in men.

☆ The study was carried out at the first author's own expense.

* *Correspondence to*: Troniny 5, 42-165 Lipie, Poland. Tel.: +48 603370328; fax: +48 034 3188520.
E-mail address: kluszcztroniny@gmail.com (M. Kluszczyński).

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1. Introduction

Chronic low back pain (LBP) can be diagnosed when it persists for more than 6 months.[1] The LBP is one of the most common afflictions and it can affect about 80% of human population.[2] Many systematic review articles have been published with reference to the efficacy of various methods of the LBP treatment, but the results are inconclusive.[3] Many risk factors of LBP have been proposed, including age, gender and body mass index (BMI), or physical activity.[4–9] However, correlation between those risk factors and the LBP remains elusive. Alteration of anteroposterior curvatures of the spine is considered to be a possible risk factor of the LBP.[10,11] Disorders of body posture often result from static or dynamic imbalance of the spine, the source of which is in the disharmony of muscle tonus of different antigravitational muscle groups.[7,10,11]

Disorders of body posture manifest clinically with abnormal angles of anteroposterior curvatures of the spine.[8,12] Mutual interaction between different sections of the spine, as well as the role of the whole spine in the biomechanical chain, affects position of the pelvis, which can lead to abnormal anatomical interactions between the spine and the pelvis in a long-term perspective.[12–15]

2. Aim

The aim of this paper is to show the usefulness of measuring the angles of anteroposterior curvatures of the spine with the Saunders electronic inclinometer, using a direct method of measurement, in the LBP patients treated in a rehabilitation outpatient clinic.

3. Materials and methods

3.1. Patients

The studied group of patients consisted of 87 adults, 25–75 years of age (53.8 ± 13.8 years). There were 55 women (aged 54.65 ± 12.66) and 32 men (aged 52.5 ± 15.4), undergoing an LBP treatment in a rehabilitation outpatient clinic (Table 1). The patients were selected on the basis of the following criteria: chronic back pain located in the lumbar section of the spine, lasting minimum 6 months during the preceding 3 years. Patients who had the history of spinal surgeries or injuries – such as fractures, undergone surgical stabilizations, car crash accidents, falls from heights, psychological traumas, spondylolisthesis, scoliosis with Cobb angle exceeding 10°, or any other conditions (e.g. neurological) that could induce LBP of other origin than age-associated spondylosis, were excluded from the study.

Table 1 – Number, age and gender of the examined patients.

Age	Men		Women		Total	
	n	%	*n*	%	*n*	%
25–35	7	21.8	5	9.1	12	13.8
36–50	7	21.8	12	21.8	19	21.8
51–75	18	56.4	38	69.1	56	64.4
Total	32	100	55	100	87	100

The Human Subjects Research Committee of the University scrutinized and approved the test protocol as meeting the criteria of Ethical Conduct for Research Involving Humans. All subjects in the study were informed of the testing procedures and voluntarily participated in the data collection.

3.2. Protocol

The measurements have been carried out with a Saunders inclinometer. The evaluated parameters were magnitudes of lumbar lordosis (LL) and thoracic kyphosis (TK) (Fig. 1). The measurements have been carried out in accordance with guidelines elaborated by the inclinometer's manufacturer, on the basis of recommendations of American Medical Association.[16,17] In addition, the leg length discrepancy (LLD) was evaluated according to Derbolovsky sign, regarding at least 1 cm difference between the functional length of lower extremities as a positive result. Each researcher repeated

Fig. 1 – Lumbar lordosis assessment: (A) 1st phase, (B) 2nd phase read the angle of LL, then we reset the device; (C) move to the upper thoracic spine and read the angle of TK.

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