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Mini Review

The Importance of Lumbosacral Angle Measurement in Low Back Pain

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Abstract

The lumbosacral region represents the support base of the spine. Its stability depends essentially on the balance between its bone, muscle, ligament, capsular and neurovascular components. Changes in the lumbosacral angle directly interfere with the balance and stability of the spine, being associated with the appearance of low back pain.

Keywords: *Spine; Lumbosacral Angle; Low Back Pain*

Introduction

The spine is the fundamental structure of the axial skeleton. It represents the pillar of support, support and mobility of the human body. Its stability is essential so that there is an adequate balance of the other structures that make up the appendicular skeleton [1].

The physiological curvatures of the spine are necessary and essential so that in the face of the vectorial forces acting, they can neutralize themselves and allow the functionality of the locomotor system to be effectively ensured in different tasks performed in social life [1,2].

In the frontal plane, it is observed that the spine appears to be apparently rectilinear, while in the sagittal plane there is the presence of 4 curvatures, being 2 lordoses (cervical and lumbar) and 2 kyphosis (dorsal and sacral). The physiological curvatures of the spine exert a compensatory mechanism with each other, where kyphosis is compensated with lordoses and vice versa [2,3].

The lumbosacral region represents the support base of the spine. Its stability depends essentially on the balance between its bone, muscle, ligament, capsular and neurovascular components. The body's center of gravity is located anterior to the second sacral vertebra and is the point where the forces acting on the body cancel each other out in order to allow balance and stability [4].

In the standing posture, the lumbar spine in general presents the position of lordosis, with the change to sitting posture the lordosis position of the lumbar spine tends to be significantly reduced. In an upright sitting posture, the pelvis and sacrum are rotated posteriorly, in addition to an important increase in pressure in the intervertebral discs compared to the biped upright posture [4-6].

Lumbosacral region

The lumbar region consists of 5 vertebrae that together form the curvature with posterior concavity. Its development occurs in response to the weight support exercised by the child when standing and starting the first steps. Another important aspect to be considered is the fact that the lumbar curvature is directly influenced by the pelvic position exercised in part by the action of the iliopsoas, rectus femoris, gluteal and ischiotibial muscles, in addition to the iliofemoral ligament [6,7].

The sacral region is formed by the junction of 5 vertebrae that together form a curvature with posterior convexity. The combination of the lumbar spine with the sacral portion is called the lumbosacral region [7].

Between the lumbar vertebrae are located the intervertebral discs, which are structures that present the richly hydrated pulpous nucleus and surrounded by fibroelastic cartilaginous rings. The main function of intervertebral discs is to withstand the compressive and torsional forces exerted on the support base located in the lumbar spine up to the lumbosacral junction [6-8].

Lumbosacral angle

The load tolerated by the lumbosacral spine is related to the proper alignment and distribution of the physiological curvatures present in the spine [5,9].

The angle of the joint or lumbosacral region is a measure that measures the lumbosacral curvature (L5-S1), the angle being determined by the intersection of the line that passes through the lower edge of L5 and the upper edge of S1, having as reference normal angulations between 12 and 16 degrees (Figure 1). Another way to measure the lumbosacral angle is to draw a perpendicular line through the center of L5 and proceed towards the sacral axis. The reference for this measurement is around 135 to 140 degrees. Angles below these values are related to the presence of lordosis, while higher values are related to the presence of rectification of this curvature [5,8,9].

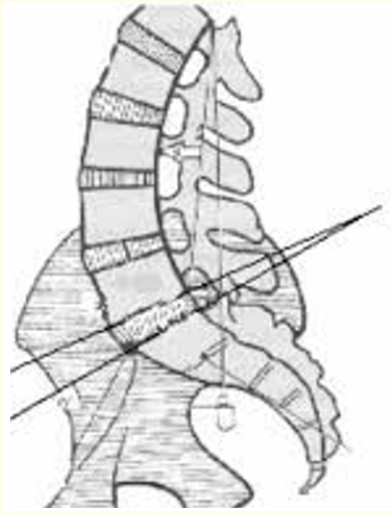

Figure 1: *Lumbossacral angle.*

The average values of this angle vary according to age, gender, physical activity and other factors [9].

Importance of the lumbosacral angle

The angular measurement of the lumbosacral spine has been described in different studies of biomechanics and analysis of the movement of the spine. In orthopedics, it allows the analysis of the impacts resulting from its increase or reduction in the structural arrangement and stability of the lumbar region. The muscles, ligaments and tendons that are inserted there are the main responsible for the maintenance of the postural balance, be it in the practice of sports, as well as in work activities [8-10].

Low back pain is considered to be one of the main causes of morbidity and disability in the economically active population. Regardless of the causes, low back pain reaches high epidemic levels, affecting about 70 to 85% of individuals at least once in their lives. Mechanical factors are the most frequent causes of low back pain, either by performing biomechanically inadequate movements or postures or simply by changes related to the lumbosacral angle [11,12].

Despite being considered as a multifarorial disease by some authors, low back pain has a strong association with postural changes. The imbalance in the physiological curvatures of the spine is compensated for by muscle retractions or shortening, as well as by weakness or hypotonia of the supporting musculature. The changes resulting from the reduction or increase in the lumbosacral angle are observed in a radiographic view of the profile and are directly linked to the appearance of low back pain [12].

When analyzing the lumbosacral angle through a perpendicular line passing through the center of L5 and following towards the sacral axis, observing that: the reduction in the lumbosacral angle is directly related to the appearance of lumbar hyperlordosis. In the hyperlordosis of the lumbar region, weakness of the abdominal, gluteal and lumbar paravertebral muscles is associated with increased flexibility of the posterior thigh muscles (hamstrings). It is important to highlight that the shortening of the iliopsoas and pubic adductors favor the displacement of the lumbar spine downwards and forwards in anteroversion of the pelvis. This muscular imbalance generates a great overload for the lumbosacral region, thereby triggering low back pain [2,8,13,14].

On the other hand, the increase in the lumbosacral angle is related to the presence of retroversion of the pelvis, where the abdominal and gluteal muscles shorten simultaneously, in addition to reducing the flexibility of the posterior thigh muscles (hamstrings) [8,13,14].

In summary, the angular changes in the lumbosacracral region directly interfere with the balance and stability of the spine. Muscle structures have to adapt to different angular variations, thereby losing part of their synergistic function in the static and dynamic balance of the body [8,9,15].

Conclusion

It is concluded that the understanding of the variations of the lumbosacral angle has a direct influence on the lumbar region, causing the need to adapt the muscular and ligament structures that are found there. With this, the appearance of low back pain becomes remarkable, requiring an individualized therapeutic approach for the reestablishment and balance of the support base and balance of the body - the lumbosacral region.

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