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Relationship Between Lumbar Disc Herniation and Benign Joint Hypermobility Syndrome

Lomber Disk Hernisi ile Benign Eklem Hipermobilite Sendromu Arasındaki İlişki

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Summary

Objective: Benign joint hypermobility syndrome (BJHS) can present with a wide variety of musculoskeletal problems. Lumbar disc herniation (LDH) is a common cause of low back pain. On the other hand, low back pain may be a presenting symptom in patients with BJHS. The purpose of this study was to identify the relationship between BJHS and LDH.

Materials and Methods: The study included 184 patients diagnosed with LDH. All patients were assessed for existing hypermobility using the revised (Brighton 1998) criteria.

Results: The mean age of the patients was 40.9±11.6 years (range: 18-76 years); 50 (27.2%) were male and 134 (72.8%) female. The mean Beighton score was 2.04±2.2. Out of 184 cases, 123 (68.4%) had hypermobility according to the revised Brighton criteria. In addition, there was a positive correlation between LDH and BJHS (r=0.15, p=0.0018).

Conclusion: We suggest that BJHS may be a risk factor for LHD. As such, BJHS may be considered a concomitant problem in patients with low back pain due to LDH. *Turk J Phys Med Rehab 2011;57:85-8.*

Key Words: Benign joint hypermobility syndrome, Beighton score, Brighton criteria, lumbar disc herniation, low back pain

Özet

Amaç: Benign eklem hipermobilite sendromu (BESH) çeşitli kas-iskelet problemleri ile birlikte görülebilir. Lomber disk herniasyonu (LDH) bel ağrısının sık sebeplerinden biridir. Benign eklem hipermobilite sendromlu hastalarda bel ağrısı bir semptom olabilir. Bu çalışmanın amacı (BEHS) ile lomber disk hernisi arasındaki ilişkiyi göstermektir.

Gereç ve Yöntem: Çalışmaya lomber disk hernisi tanısı konmuş 184 hasta dahil edildi. Tüm hastalarda hipermobilite varlığını değerlendirmek için revize Brighton hipermobilite kriterleri kullanıldı.

Bulgular: Hastaların yaş ortalaması 40,9±11,6 yıl (18-76 yıl) olup, 50 (%27,2) hasta erkek ve 134 (%72,8) hasta kadın idi. Ortalama Beighton skor 2,04±2,2 olup, 123 (%68,4) hasta revize Brighton kriterlerine göre hipermobiliteye sahipti. Ek olarak, lomber disk herniasyonu ile bening eklem hipermobilite sendromu arasında pozitif korelasyon tespit edildi. (r=0,15, p=0,0018).

Sonuç: Sonuç olarak, biz benign eklem hipermobilite sendromunun lomber disk herniasyonu için bir risk faktörü olabileceğini düşünmekteyiz. Bunun için, benign eklem hipermobilite sendromu lomber disk herniasyonuna bağlı bel ağrılı bir hastada eşlik eden bir durum olabilir. *Türk Fiz Tıp Rehab Derg 2011;57:85-8.*

Anahtar Kelimeler: Benign eklem hipermobilite sendromu, Beighton skoru, Brighton kriterleri, lomber disk hernisi, bel ağrısı

Introduction

Benign joint hypermobility syndrome (BJHS) is a hereditary disorder characterized by the presence of musculoskeletal symptoms in persons with generalized joint laxity in the absence of systemic rheumatologic disease (1-3). Collagen fibrils have a relatively thin and irregular structure in patients with generalized joint hypermobility. This abnormality in the collagen structure leads to laxity of the joints, increased fragility of the connective tissue, and decreased proprioception, thereby resulting in a predisposition to joint degeneration and soft tissue injuries (1,4).

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The intervertebral disc consists of 3 zones: an outer zone made up of fibrocartilage attaching the other 2 zones to each other; the vertebral body consisting of the central nucleus pulposus (i.e. a fibro-gelatinous mass composed of 80%-90% water, collagen, and a mucopolysaccharide matrix); and the peripheral annulus fibrosus (formed by the concentric alternating lamellae of obliquely oriented collagenous fibers). The annulus fibers run obliquely between vertebrae and are arranged primarily in concentric layers. The annulus is the primary disc structure that resists rotational forces through the orientation of the lamellae. Resistance to forward bending is due to the relatively greater thickness of the posterior lamellae (5-9).

The main function of the intervertebral discs is shock absorption. Primarily, the annulus acts as a shock absorber, not the nucleus, which is predominantly liquid (and incompressible). When an axial load occurs, the increased force on the incompressible nucleus pushes on the annulus and stretches its fibers. If the fibers break, then a herniated nucleus pulposus occurs (10).

Although BJHS is a heritable collagen disorder, the occurrence of herniated nucleus pulposus may be common in patients with this syndrome. We know that excessive spinal joint laxity under mechanical loading in BJHS can lead to a torn annulus fibrosis because of abnormal annular collagen alignment in the lumbar spinal discs; therefore, the purpose of the present study was to identify whether or not there is a relationship between BJHS and LDH.

Materials and Methods

Participants

Patients with the complaint of low back pain were prospectively evaluated for LDH and joint hypermobility. LHD diagnosis was based on patient history (low back, leg, or low back/leg pain, numbness, tingling, paresthesia, etc.), clinical examination, conventional radiography, and magnetic resonance imaging (MRI). The nature of the pain was discussed with the patients (e.g. location and intensity of the pain, aggravating movements, relieving movements, onset and duration of pain, possible causes). In addition, total spinal posture, active/passive range of motion, neurodynamic tests (straight leg raising test, prone knee bending test), and neurological examination of the lower legs were evaluated (11). Peripheral joints (sacroiliac, hip joints, knee joints, ankle joints, foot joints) were scanned to rule out obvious pathology in the extremities. The patients diagnosed with LDH based on clinical examination and MRI findings (including protrusion, extrusion, and sequestration) were included in the study. Exclusion criteria were as follows: 1. disc herniation at the level of bulging; 2. history of low back surgery or trauma; 3. sacroiliac dysfunction; 4. inflammatory, infectious, or systemic disease; 5. malignancy; 6. neurological or vascular disease; 7. spondylolisthesis. In addition, routine biochemistry and immunologic laboratory tests were performed when needed to rule out other diseases mentioned in the exclusion criteria.

Assessment of Hypermobility

The patients were assessed for BJHS using the Beighton scoriye (Table 1) and the revised (Brighton 1998) criteria for the diagnosis of BJHS (Table 2) (12). According to Brighton (1998) criteria, the presence of 2 major criteria, 1 major and 2 minor criteria, 4 minor criteria, or 2 minor criteria and findings in first-degree relative(s) are required to establish the diagnosis of BJHS.

Statistical Analysis

Statistical analysis was performed using SPSS v.10.0 for Windows. All descriptive analyses were performed using this program. Pearson's correlation coefficient analysis was also performed to determine if there were any correlations between the evaluated parameters.

Results

A total of 184 patients were included in the study. The mean age of the patients was 40.9±11.6 years (range: 18-76 years); 50 (27.2%) were male and 134 (72.8%) were female. The mean height and weight of the patients were 164±7.5 cm and 72.7±11.4 kg, respectively. Demographic characteristics of the patients are shown in Table 3. Mean Beighton score was 2.04±2.2. In total, 123 cases (68.4%) had hypermobility based on the revised (Brighton 1998) criteria.

Correlation analysis showed that there was a positive correlation between LDH and BJHS (r=0.15, p=0.0018). On the other hand, a negative correlation between height and BJHS (r=–0.21, p=0.001) was observed, and significantly more of the female patients had BJHS (r=0.28, p<0.001).

Discussion

BJHS can manifest with a wide variety of musculoskeletal symptoms. Typical signs of a connective tissue disorder may be present, including, scoliosis, back pain, lordosis, pes planus, genu valgum, recurrent dislocation of the joints, and soft tissue rheumatism (13). It has been reported in many studies that there is a relationship between joint hypermobility syndrome and other musculoskeletal diseases, such as fibromyalgia, carpal tunnel syndrome, temporomandibular joint disease, and osteoarthritis (14-20). Excessive joint laxity causes wear and tear of joint surfaces as well as strains and fatigue of the soft tissue surrounding these joints.

Low back pain is an extremely common, seriously disabling nonfatal public health problem worldwide. In general, 1 of every 3 patients with low back pain has a diagnosis of LDH (21). Risk factors can be divided into 2 major groups: occupational and patient-related (22). Work-related heavy lifting was once the primary suspected risk factor for disc degeneration, which was generally considered to be the result of wear-and-tear exacerbated by the poor nutritional status of the disc. Additionally, lifting, pulling, pushing, and twisting were associated with an increase in the risk (23). Patient-related factors are age,

Table 1. Beighton Scoring for Joint Hypermobility.

More than 90º dorsiflexion in the fifth metacarpophalangeal joint
Thumb extending to volar forearm
Hyperextension in the elbow joint
Hyperextension in the knee joint
Palms to or with knees extended
The Beighton criteria (>/= 4 positive tests)

* Scoring of the first four signs is done separately for each side of the body, with each item equaling 1 point. Maximum score is 9.

gender, anthropometric factors, postural factors, spine mobility, muscle strength, heredity, etc. (24).

BJHS can be associated with many risk factors for LDH. Excessive lumbar spinal mobility and abnormal annular collagen alignment in the lumbar spinal discs can increase the vulnerability of the lumbar spine. To the best of our knowledge, the present study is the first to evaluate the relationship between LDH and hypermobility. Based on our results, 68.4% of the cases with LDH had BJHS according to the revised (Brighton 1998) criteria, and there was a positive correlation between LDH and BJHS. In our country, Seckin et al. (25) studied the prevalence of joint hypermobility among healthy students with a mean age of 15.4 years. According to the Beighton scoring system, joint hypermobility was observed in 11.7% of their study population; however, the present study did not include a control group, and we know that the prevalence of generalized joint hypermobility varies from 10% to 30% in the general population (26-28). Overall, women have more joint laxity than men. The present results support this knowledge. We observed that the prevalence of BJHS was significantly higher among the female patients; however, 72.8% of our study population was female. The BJHS prevalence rate in the present study was much higher than that estimated by Seckin et al. (25) for healthy young population. On the other hand, the actual prevalence of BJHS remains unknown. The results of the present study show that BJHS occurred more commonly in patients diagnosed with LDH than in the general population. Our study was like a preliminary study with no control group, although hypermobility was quite higher than that in the normal population.

Table 2. The Revised (Brighton 1998) Criteria for the Diagnosis of Benign Joint Hypermobility Syndrome.

Major criteria
1. Beighton score of 4/9 or greater (either currently or historically)
2. Arthralgia for longer than 3 months in four or more joints.
Minor criteria
1. A Beighton score of 1, 2, or 3/9 (0,1,2 or 3 if aged 50+)
2. Arthralgia in one to three joints or back pain or spondylosis, spondylolysis/spondylolisthesis
3. Dislocation/subluxation in more than one joint, or in one joint on more than one occasion.
4. Three or more soft- tissue lesions (e.g. epicondylitis, tensosynovitis, bursitis)
5. Marfanoid habitus (tall, slim, span >height; upper segment: lower segment ratio less than 0.89, arachnodactyly)
6. Skin striae, hyperextensibility, thin skin, papyraceous scarring
7. Eye signs: drooping eyelids or myopia or antimongoloid slant
8. Varicose veins or hernia or uterine/rectal prolapsus
Necessary criteria for diagnosis
Two major criteria or one major and two minor criteria
Four minor criteria
Two minor criteria and findings in first-degree relative(s)

Table 3. Demographic Characteristics of the Patients.

Dics herniation level n%	
Protrusion	130 (57.5%)
Extrusion	54 (24%)
Sequestration	0 (0%)
Age year (mean±SD)	40.9±11.6
Gender	
Female	134
Male	50
Height (cm) (mean±SD)	164.3±7.5
Weight (Kg) (mean±SD)	72.7±11.4
Beigthon Score (mean±SD)	2.04±2.2
Revised (Brighton 1998) Criteria	
Presence	123
Absence	61

Although height is excessive in some genetic collagen disorders (such as Marfan disease) as compared to the normal population, in the present study, there was a negative correlation between height and hypermobility, as reported also by Seckin et al. (25) whose hypermobility patients were shorter than their controls.

Determination of hypermobility is especially important in preventive medicine in order to strengthen the muscles and therefore prevent further injury resulting from hypermobility, such as overuse syndrome. Moreover, strengthening abdominal and back muscles can prevent low back pain. As such, if a patient suffers from low back pain due to LDH, they should also be examined for BJHS.

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