



Research Article

Slump Test versus Straight Leg Raise Test in the Diagnosing of Lumbar Disc Herniation: A Prospective Comparative Study

Mohammed Al-Sharaa¹, Salwan Akram Salo², Ako Faiq Kareem², Mohammed Sh. Al-Edanni^{3*}

- 1- College of Medicine - University of Wasit, Wasit, Iraq
- 2- Al-Kindy Teaching Hospital – Al-Risafah Health Directorate, Baghdad, Iraq
- 3- Al-Kindy College of medicine - University of Baghdad, Baghdad, Iraq

* Corresponding author: mohammedaledanni@gmail.com

ABSTRACT

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Background: The clinical examination is one of the best suitable methods for diagnosis of low backache. Backache is one disease that the signs, clinical examination finding, and the results on imaging modalities not always related. The straight leg raising (SLR) and slump tests, can be used for diagnosis of lumbar disc herniation.

Objectives: To compare the result of the slump test and SLR test in the diagnosis of lumbar disc herniation.

Subjects and Methods: A prospective comparative study conducts on 280 patients in Al-Kindy teaching and private clinics complaints of backache, aging between 18-70 years old with acute or recurrent backache, sciatica pain, or low back and sciatica pain for last 12 weeks, while patients with spinal surgery, sacroiliac joints pain, cervical dysfunction and hip and knee pathology, and chronic illness were excluded.

MRI of the lumbar region was done and clinically examine first by SLR test then Slump test on the next days by separated author. All the record collected patient's data are interpreted with the MRI finding by the third doctor.

Results: The Slump test is significant than the SLR in the patients with disc herniation at L4-L5 and (L4-5 & L5S1) 93.1% versus 70%, while for L5S1 level no significant in both tests. Leg pain present in 74.1 %, low back and leg pain in 21.5%, and only 4.4% present with low back only.

Conclusion: The Slump test is more sensitive than the SLR test in diagnosis of lumbar disc herniation.

Introduction

Low backache is a public problem with an incidence of about 5% annually, and the common cause of debility for persons below 45 years old and the major reasons for visiting the primary care doctor about 7% of the patients per year. Lumbar pain is the recurrent site for hurt in much activity, like football, heavy work, fighting, and tennis. (1)

Clinical examination is the mainstay of diagnosis, to be confirmed by plain X-ray, invasive radiography like myelography, discography,

etc. MRI has taken over the onus of diagnosis of the prolapsed intervertebral disc. (2)

There are many clinical tests used to identify whether the pain arises from pressure on the neural tissues or other sites. The straight leg raise (SLR) and Slump tests are the foremost physical examination tests commonly used to access lumbar disc herniation LDH (3). The familial Straight Leg Raising test is commonly the first test used for diagnosis of the low back, the test performs in the supine position and the patient lying flat. The patient raised his one foot slowly away from the table with maintaining the knee in the full

extension until utmost hip flexion is gotten or until feeling pain. Measure the angle between the lower limb and the table, and should be done for both limbs. Normally up to 70° to 90° can be reached without pain. In patients with sciatica, the angle will be decreased and the patient feeling shooting pain radiating with the course of the sciatic nerve. SLR test stretches the L5 and S1 nerve roots from 2 to 6 mm, while upper nerve root (L2, L3, and L4) this test is of little tension occur (4).



Figure 1: Straight leg raise test.

The other test is the Slump test which is distinct from the SLR test done in the seated situation. The Slump test is the progress of movements aiming to put the sciatic nerve roots under aggregate tension (4, 5).

A slump test performs while the patient is seated and both hands put behind the back to accomplish a neutral spine. Initially, the patient drops forward at the thoracic and lumbar spine. If no pain, then the second phase is to flex the neck of the patient until the chin touch chest after that extend one knee as the patient tolerance. If the patient feels pain, then the patient extends the neck into a neutral posture. If the patient is still incapable to extend the knee because of pain, the test is regarded as positive (6).

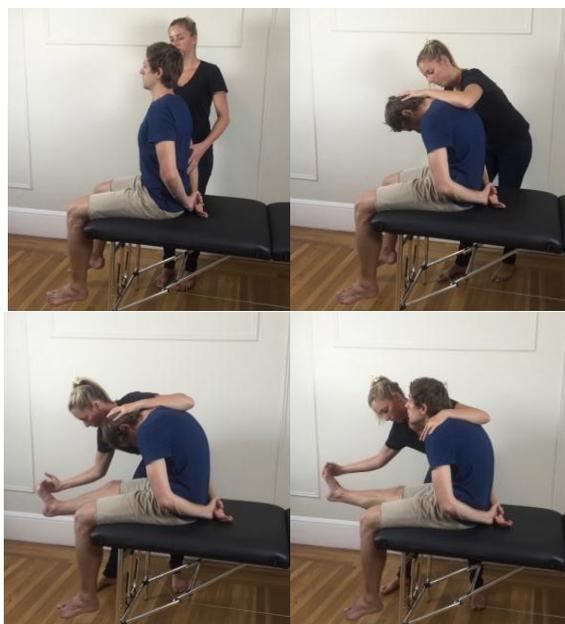


Figure 2: The Slump test.

The Slump test is preferred over the SLR test for two causes. First, the Slump test is more sensitive since it enhances the cephalad sliding of the spinal cord, as compare to caudal gliding in the SLR test. Second, the Slump test adds specificity as flexion and extension

of the neck help differentiate motion limitations in neural tissue from other soft tissue inflexibilities. While the SLR test, it is difficult to differentiate between neural tension and hamstring or gastrocnemius tautness (7).

Both tests produce pain due to herniated discs because of the traction on the nerve root. The SLR on L5 - S1 roots. While the Slump test on all the lumbar roots. (8)

MRI is considered a highly sensitive and specific test for diagnosing prolapsed intervertebral disc; however, the problem is over-diagnosing the condition. MRI shows multiple level disc prolapses, which is theoretically uncommon, surgically unfeasible, and unrequired to treat all of them. (9)

On magnetic resonance imaging (MRI) disc herniation can be diagnosed on sagittal view pictures but necessity is confirmed on axial views. The herniation range from disc bulge leads to pressure on epidural fat to disc protrusions (the nucleus pulposus is limited to the outmost layers of the annulus pulposus), to disc extrusions when the annulus is ruptured and the nucleus extruded through it. (10)

Thus, the definitive determination of the presence of LDH is typically reliant on the use of Magnetic Resonance Imaging (MRI), which provides accurate information on the structure of the spinal column and the gold standard in identifying LDH. (3, 11)

Subjects and Methods

This is a prospective comparative study conducts on 280 patients in Al-Kindy teaching hospital complaining of backache

Inclusion criteria:

Acute or recurrent backache, sciatica pain, or low back pain and sciatica within last 12 weeks duration, patients aged 18-70 years.

Exclusion criteria

Patients with previous spinal surgery, sacroiliac joints pain during the examination, Spondylolysis and/or spondylolisthesis diagnosed by X-Ray, Diabetes, pulmonary, or cardiac disease, patient on medications for backache during the first examination, Cervical dysfunction, and hip and knee pathology

All patients performed the SLR test by the first author then the Slump test on the next days by the second author. Examining doctors were blind to the result of each other. A subsequent MRI study of the lumbar spine was performed for each.

The entire records collected were interpreted with the MRI study by the third doctor

Written Informed consent was obtained from each patient after explaining the purpose of the study.

Detailed histories were taken for all patients regarding the illnesses, systems diseases, and medical history. A physical examination of the spine, hip, and sacroiliac joints was done to exclude any disorder. Slump and SLR tests were done for both sides of each patient and the angle is measured and recorded by using a goniometer in the SLR test.

Finally, the patients received physiotherapy treatment and back care advice from the researchers to satisfy ethical requirements.

Ethical approval was obtained from the scientific and ethical committee of Al-Kindy College of Medicine, University of Baghdad.

Statistical Analysis

A Student's t-test was done, using SPSS to determine statistical differences. P-value ≤ 0.05 denoted a highly significant difference.

Results

A total of 280 patients included 162 females and 118 males. The mean age was 41.35 years. The patients complaining were low back,

sciatica pain, or low back and sciatica. The time of the beginning of the present symptoms was less than three months before the examination (the mean duration of 6.7 weeks).

The abnormal MRI group consisted of 158 out of 280 patients (56.5%), but at different levels: 48 patients (30%) herniation at the L5-S1 level, 87 (55%) herniation at the L4-L5 level, and 23 patients (15%) are herniated at both levels. Table 1.

Table 1: Disc herniation level by MRI and Physical tests

Disc level	NO.	%	Slump Test		SLR Test		P value
			No.	%	No.	%	
L4-L5 level	48	31%	81	93.1	61	70	0.03
L5-S1 level	87	55%	39	81.3	37	77	0.06
Both levels	23	15%	22	95.6	19	82.6	0.04

Regarding the clinical presentation of the patients, 117 (74.1%) out of 158 presented with leg pain only while 34 (21.5%) out of 158 presented with low back and leg pain, and only seven patients (4.4%) presented with low back only. table 2.

Table.2: Clinical presentation with positive MRI findings.

Clinical presentation	NO.	%
Low back pain	7	4.4
Low back & leg pain	34	21.5
leg pain	117	74.1

When correlating the herniated level with a physical test, Slump, and SLR test, Slump test was more positive and significant in detected the herniation than slump test in L4-L5 level and two levels (L4-5 &L5-S), 81(93.1%) out of 87 versus 61 (70%) out of 81 patients for L4-L5 level with a P-value of 0.0 and 22 (95.6%) out of 23 patients versus 19 (82.6%) out of 23 patients for both level herniation L4-5 &L5-S1 with a P-value 0.04, while for L5-S1 level herniation was non-significant for the detection of herniation clinically between both tests (Slump and SLR) with a P-value 0.06 in which Slump test positive in 39 (81.3%) out of 48 versus 39 (77%) out of 48 patient positive SLR test. Table 1

Regarding the types of disc herniation according to the MRI finding, the types of herniation were as follows: 6 (3.8%) bulging, 47 (29.8%) protrusions, 17 (10.8%) extrusions, 7 (4.4%) bulging and extrusion, 48 (30.3%) protrusions with root compressions, and 33 (20.9%) extrusions with root compressions. Table 3.

Table 3: Type of disc herniation level by MRI.

Type of herniation	NO.	%
Bulging	6	3.8%
Protrusions	47	29.8%
Extrusions	17	10.8%
Bulging and extrusion	7	4.4%
Protrusions and root compressions	48	30.3%
Extrusions and root compressions.	33	(20.9%)

Discussion:

The office of National Statistics accomplished a survey in 1998. They found that 40%of adults complaining of backache for more than one day in the last year. One every six of these people had been in pain during the whole year. Half of these patients consult their general physician and 10% had visited a complementary medicine physician. (2)

The age of the patients in this study ranged between 18 to 70 years, mean 41.35 year, which is similar to the study of Andrew et al 2010,

(9) and it is higher than other studies, Baldwin NG 2002 (12) and Battie MC et al 2004 (13)

In our study, the female gender is 58%, which is higher than Battie MC et al 2004 (13), this because the male can tolerate pain more than the female and because in our society she engages in heavy duties.

Regarding herniated disc level more than half of our patients, the herniation involve at L4-L5 level

55%, followed by L5S1 level 30% and lastly only 15% of our sample the herniation occur in two lower-level L4-5 & L5S and it similar to Andrew 2010 (9) and Videman 1995. (14)

Our results demonstrate that the Slump and the SLR tests had positive rates in disc herniation, but the Slump test appeared to be more positive in detect disc herniation, the Slump test was found significant differences comparing to SLR in L4-5 disc herniation 93.1% versus 70 % (P value 0.03) and also significant differences in two-level herniation 95.6% versus 82.6& (P-value 0.04), while in level L5S1 there are no significant differences between two test as (P-value 0.06) 81.3 % in Slump test versus 77% in SLR test. This result similar to the result done by Maitland GD 1985 (5), Walsh J et al 2009 (3), Majlesi J et al 2008 (15), and Shacklock et al. (16) But against the study of Rebain 2002(17), Rabin A 2007 (11), and O'Reilly & Pillastrini R 2001 (18). The idea behind that the Slump test put extra traction to neuromeningeal tissues; While the SLR test mainly applied traction over the L5- S1 roots. (8)

The SLR test has been created highly connected with results on lumbar disc operations and also for those not requiring surgery, while the Slump test is more positive in herniation disc not leading to root compressions (19).

Special precautions should be taken that the pain originating from neural tissues and not from the hamstrings, the hip, or the sacroiliac joint otherwise false-positive result in the SLR test. (20) This needs continuous communication between the doctor and the patient. Hamstrings' tightness with or without pain also can affect the usefulness of the Slump test. However, this can be confirmed by the cervical section of the test. (8) Johnson and Chiarello stated that hamstrings tightness and pain with limitation in the knee extension can be reflected normal, during the Slump test, in the patients without disc herniation. (21) This limitation was found to be confused by cervical flexion and ankle dorsiflexion. (22)

The limitations of SLR efficacy studied by many investigators, most of them using the "instrumental leg rising test to detect the extensibility and elasticity of the back and hamstring muscles, also the pelvic rotation in disc herniation patients" (23, 24). The limiting factors for SLR test applications are hamstrings and medial hip, if uncontrolled, give more tension and exaggerated neurologic signs. (25) Also, hip flexion and rotation in the SLR test are unclear but can be detrimental. (17)

The above factors may limit the practicality of the SLR test in patients with hip and hamstrings pain with disc herniation of the lumbar spine, these factors can prevent or decreases in Slump test as the patient in a sitting position during the application of this test, however similar to SLR, some degree of hamstring tightness also occur in the Slump test, but in this test the traction on the nerve root due to total flexion of the spine. This may be valuable in both positive and even negative SLR results.

The cervical part of the Slump test can affect the hamstring muscles and include in the differential diagnosis, and it beneficial in reducing the causative relationship between the hamstring tightness and a positive Slump result. (26).

Conclusion

The Slump test may be a useful test and more accurate in detecting lumbar disc herniation in patients with backache at the upper levels of the lumbar spine than the SLR test could be used extensively.

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Conflict of Interest

No conflict of interest

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