Examining the Correlation Between the Straight Leg Raising Test and Lumbago

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Abstract:
Objectives: To determine the correlation of low back pain with Straight leg raising test.

Study Design: Observational study.

Study Settings & Participants: This research was performed at the different hospitals of Karachi i.e Ziauddin Hospital and IPRS, LUMHS, Jamshoro, Pakistan. Sample of 384 patients were calculated through open Epi with a point prevalence 18.1% at 95% confidence level and margin of error is 0.05.

Outcome measures: The study enrolled 384 patients at outpatient department of physiotherapy at Ziauddin Hospital. These patients reported with a history of low back pain, which included acute, sub-acute and chronic low back pain. Bilateral sacroiliac joint assessment and SLR test were done. SLR was measured through goniometry.

Results: Total 384 patients were enrolled in this research of which 218 (56.6%) were male and 166 (43.1%) were female. The FABER and Trendelenburg test were measured and results showed that 26.2 % FABER test was positive in these patients. A Pearson product-moment correlation was run to calculate the relationship between low back pain with straight leg raising test. There was a negative correlation between low back pain and straight leg raising test, which was statistically significant (r = -0.297n = 384, p< .000).

Conclusions: The SLR test shows Substantial arbitration and negative correlation in low back pain. When it is being explained in this way might also be applicable test for neural tissue hypersensitivity.

Key Words: Low back pain, SLR, VAS scale, FABER test, goniometry

I. INTRODUCTION

In the world around low back pain is said to be the leading cause of disability, contributing around 10% of all age groups living with disability.[1] Approximately about 632 million people are affected throughout the world [1.] And along with 12-33% involving older people suffered with LBP throughout the lifetime and it's known for one of the most considerable reasons of healthcare and socio-economic burden[3].

The lumbar spine also provides attachments to muscles, ligaments, and tendons. Consisting of neural foramen through which[4] nerves leave the spinal cord and supplies the peripheries.[4,5] The lower back pain is classified into two divisions acute and chronic therefore, acute lower back pain has sudden onset with the time duration of 3-4 weeks. If chronic lower back pain persists for more than 4 weeks usually after an acute injury so, it could also last over for a period of 3 months without any acute injury.[6,7]

Risk factors of developing LBP include old age, family history, pregnancy, compression fractures of the spine, back surgery, congenital deformity, prolong sitting, sedentary lifestyle, smoking, poor posture and stress[,8 ,9] The low back pain can occur as a result of muscle strain, ligament tear or sprain of the back[10] resulting in spinal cord injuries. The Disco genic pain and disorders which include herniated disc, disc budged, disc protrusion, and disc prolapsed. So, irritation of the lumbar nerves which termed as radiculitis or abnormality of lumbar nerve root also known as reticulated.

Arthritis involving facet joint, central spinal stenosis or narrowing of the spinal canal, vertebral body fracture.[11] The predicted value of the population that might get effected is 90% of world's population, mostly affecting the age group between 35 and 55years.[12] Prevalence is reported to be 6%-33% for low back pain. prevalence of 1 year 22%-65% and 11%-84% is for life time[.13,14,15]

Hoy D et al in their study reported the epidemiology of low back pain with prevalence vary from 1.0% to 58.1% with a mean prevalence of 18.1%.[16] annually in the UK 7% of the adult's population complains of low back pain.[17]

There are numerous clinical tests that are employed to recognize discomfort by neural tissues. The Straight Leg Raising test (SLR)

is often applied to check for prognosis involving lower back or low back and leg pain[20]. The another name of straight leg raise, is Lasègue's sign, is the test which is utilize for examination to find out regardless of whether a person having lower back pain, soreness or has a root herniated disk, usually based with L5 spinal nerve.[18]The test which is performed in supine position with patient's head as well as pelvis flat, keeping knee in full extension. The extremity is than progressively being lifted to reach maximal hip flexion or patient might have asked the examiner to stop due to unbearable pain.[19]. Angle between the extremity being examined and examination table is at maximal elevation, and the procedure is repeated in non-effected side, in normal adults 70-90% SLR is normal. Feeling of tightness might develop in posterior thigh in case of sciatica, the angle flexion of hip might reduce and patient may report stabbing pain radiating down the posterior aspect of thigh, often in leg too along the sciatic nerve pathway.[20,21] L5 and S1 nerve root is being stretched by 2mm-6mm by SLR performing. Proximal vertebrae L2, L3-L4 might be in little more tension. Lesion of L5-S13 nerve root is suggested by painful SLR.[22]
Compression of sciatic nerve root outside the spinal canal is indicated by reproduction of symptoms that is sciatic only with beyond 70% hip flexion.[23]The nerve root tension signs are important physical signs in establishing findings of acute leg pain because of a prolapsed disc. While moving the limb passively, as straight leg raising (SLR) adds pressure and pulls about 1.4-4mm caudally on the lower lumbar nerve roots thus, increasing leg pain. As SLR is performed and maintaining the position, dorsiflexion of the foot or knee flexion is done to decrease the intensity of pain due to decrease in nerve root tension.

On the other side the low back pain during the SLR is not merely, due to nerve root tensioning but is initiated because of sacroiliac joint, referred pain from posterior primary ramus and lumbar spinal movement. A research study done by Edgar, Park and Shiqing*et et al*, to compare patients with sciatica and compare the pain patterns with discectomy which concluded that central disc protrusion cause back pain on the other side the lateral protrusions cause leg pain on passive SLR.[23] None of the patients underwent imaging that reported with back pain and sciatica also the authors concluded pain eliciting on the back pain while performing the passive SLR was due to disc compression.[23]

Another researcher Vega C, et al, which worked on a similar study, explained his view by the findings of the MRI scan and comparing it to patients with acute and severe lower back pain without radiation to the legs. A total of 12 patients reported with back pain that was increased when passively SLR and dorsal flexion of the foot was added which in turn was relieved instantly on by flexing the knee. The conclusion of the study was that acute leg pain is clinically due to poster o-lateral disc prolapse and who demonstrated similar root tension signs. The author reported that none of the other studies done on patients with acute low back pain report this type of clinical of signs and symptoms.[22]Adolescence

MATERIAL AND METHODS

A. Study Design:
Observational study was conducted.

B. Study setting:
This research was conducted at the department of physiotherapy, Ziauddin Hospital, Karachi, Pakistan.

C. Duration of study:

Duration of research was Six months.

D. Sample Size:
A sample size of 384 patients was calculated through Epi with a point prevalence 18.1%[16] at 95% confidence level and margin of error is 0.05.

E. Sampling Techniques:
Non probability, purposive sampling technique

F. Sample Selection:
1. **Inclusion Criteria:**
2. Patients diagnosed with low back pain within age of 18 – 65 years were included in this study.
3. Both genders (male and female).

2. **Exclusion Criteria:**
   1. Diagnosed medical red flags
   2. Post operated spine
   3. Congenital anomalies
   4. Diagnosed psycho social problems

G. Ethical Consideration:

All the ethical norms from patient privacy, Patient hygiene, Patient therapist relationship and environment of the area of study were given due importance.

H. Data collection procedure:

The study was conducted on the 384 patients with age ranging from 18-65 years. The subjects reported to be suffering from Low Back Pain. An informed consent was taken from the subjects before their participation in the study; to conduct the research an approval was asked which was granted by the ethical review committee of the university. A detailed medical history was taken from all the patients and a physical investigation included evaluation of the hip, spine and SI joints. The test was performed on both sides according to method describe above.

I. Data analysis procedure:

The SPSS (Statistical package for social science 20) was applying to analyse data.

II. RESULTS

The results are summarized in Figures 1-2. Briefly, a total of 384 subjects were a part of the study, males = 218 (56.6%) and females = 166 (43.1%). FABER test and Trendelenburg test were measured and result shows that 26.2 % FABER test was positive in these patients.
A Pearson product-moment correlation was run to determine the relationship between low back pains with straight leg raising test.

There was a negative correlation between low back pain with straight leg raising test, which was statistically significant (r = -0.297, n = 384, p< .000).

Table: 1.

	straight leg raising test	**duration of pain**
straight leg raising test	r = 1 n = 384	r = -0.297 n = 384 p = .000
duration of pain	r = -0.297 n = 384 p = .000	r = 1 n = 384

Correlation is significant at the 0.05 level (2-tailed)

During this study dorsiflexion of foot increased the pain and knee flexion helped in pain relieving. Negative correlation was observed in our findings by SLR test and FABER test.

III. DISCUSSION

Total 384 patients complaint of low back pain without any leg symptoms. They showed considerable restriction in the performance of SLR due to pain. These individuals diagnosed to have either protuded disc or prolapsed disc, when they had MRI done. We concluded therefore that patients with central disc protrusion/prolapsed putting pressure over anterior theca mostly at L4-L5 level or may be little higher. Individuals who demonstrated diminish SLR of 45 degree or less and with supportive thecal tension signs. Intensity of low back pain or leg pain caused by acute disc prolapsed, depends on part, position, size of prolapsed disc. Inter-vertebral disc prolapsed usually indicated in individuals who show acute low back pain and reduced SLR.

The authors Edgar, Park and Shiqing et al., 1987 used myelography to compare patterns of pain on SLR performed passively in patients suffering from sciatica who later on gone for discectomy. It was also found that the disc protrusions that were more towards the centre may cause lower back pain, leg pain on SLR performed passively as compare to lateral protrusions. These patients mostly came up with sciatica and not back pain and they also didn't have CT or MRI done.[23, 24]

The authors Edgar and Park accomplished that by compression by the disc over the anterior Dura was found to be one of the causes of back pain when SLR being performed passively.[23] The author reported 384 patients with lower back pain without any leg pain, these individuals showed increased pain in back when SLR was being performed passively. During this case dorsiflexion of foot further increased the pain and back pain decreased when patients performed knee flexion. We observed that there is negative correlation in findings by SLR test and FABER test and duration of time.

A number of studies conducted to understand the mechanics of the acute mechanical low back pain but studies shows controversial results till date with exact cause still not known as discussed by writer Bruce Summers, quoted from the Princess Royal Hospital in Telford, Shropshire, UK that; with the advancements of the imaging techniques and high degree of clinical assessments it is still difficult to estimate the source of pain. The 11 subjects out of 12 had disc protrusions or extrusions (prolapsed) on lumbar spine MRI with only acute lower back pain without any leg pain with a restriction in passive SLR due to low back pain. A comparison of groups of patients with acute leg pain and restricted SLR had the same proportion of disc prolapses.[26]

Although both groups had equal proportions of significant disc prolapses, the disc prolapses in a group with only back pain which were more towards the centre, smaller in size, and on the upper lumbar level were to compress the theca only when compared with the group having only leg pain. The author states that the prolapsed disc adds pressure on the anterior theca which is caused by the restriction in SLR and resulting in low back pain. The authors continue to writes that; all these factors that are considered mainly, focuses on the acute conditions rather than the chronic ones because the chronic conditions cannot be isolated to a specific anatomic problem but being more global.

The authors note that restricted SLR is often associated with sciatica or leg pain caused by nerve root compression from inter vertebral disc prolapsed. Previous studies in patients presenting sciatic pain undergone decompresses surgery and investigated by mylegraphy showed a correlation of the prolapsed disc that tends to be central is more likely, to induce back pain and lateral leg pain. During our study we found that there is still a controversy between mechanism and exact origin of acute lower back pain. It was also made clear with the evidence that a person having acute low back pain, no leg pain and restricted passive SLR might be due to back pain only without any protrusion or prolapsed. This study was compared to the result of another study which states that leg pain and restricted SLR had protrusion and prolapsed.

This study also draws attention towards the fact that restriction in SLR with back ache in disc prolapsed and protrusion must only consider subjects with acute low back pain not chronic. According to the observation of author SLR restriction is mostly associated in sciatica and leg pain caused as a result of nerve root compression due to disc prolapsed. Author of the study had also observed that central disc prolapsed induces back ache and leg pain comes from lateral prolapsed. According to the research none of the studies have dealt with patients suffering from back pain only and limited SLR.

In this prospective clinical and radiological study, the researchers measured two different groups of subjects with acute lower back pain or acute leg pain only, with restriction in SLR. An experienced spinal radiologist blinded to clinical presentation interpreted the magnetic resonance imaging (MRI) scans and recorded imaging features according to a detailed protocol.

IV. CONCLUSION

It has been observed that the SLR tests are interpreted as positive in reproduction of symptoms of leg pain that are aggravated by ankle dorsiflexion. The SLR show negative correlation with low back pain and FABER test show considerable agreement and good correlation in low back pain. This test may be appropriate test to find out neural tissue hypersensitivity, but further a criterion is needed for definitive conclusions along; with this finding for proper measurement plan.

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