

# What is the Weight of Degenerative Lumbar Spine Disease Examination in the Matrix of Reaching the Diagnosis?

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**Abstract:** Introduction: To find out the sensitivity of the common points in history and physical examination in cases of degenerative lumbar spine disease at King Abdul Aziz University Hospital (KAUH), Jeddah, Material and method: Retrospective study From January 2005 to December 2010. The medical files of the patients were reviewed for history and physical examination. The sensitivity and specificity were calculated. Results: A total of 133 cases were reviewed. 92 (58.6%) were males and 65 (41.4%) were females. The mean age was 50.5 +/- 12.8 years. The most common degenerative lumbar spine changes were found at L4-5 levels. The sensitivities for pain radiation was 94.6%, for history of numbness was 73.06%, for history of motor weakness was 59%, for finding of motor weakness was 77.47%, and finding abnormal sensation was 59.75% and for finding abnormal reflexes was 95.92%. Conclusion: The sensitivity of the pointed neurological history and physical examination is variable with no single reliable point in the history or physical examination to ascertain the diagnosis of degenerative lumbar spine disease. Further diagnostic test(s) is required to confirm the diagnosis prior to initiating the treatment.

**Keywords:** lumbar, spine, sensitivity, specificity, diagnosis, Jeddah.

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## I. INTRODUCTION

Degenerative lumbar spine disease is a group of conditions including lumbar spinal stenosis, degenerative spondylolisthesis, and intervertebral disc herniation [1]. By radiological criteria alone, 21% of all persons over age 60 have lumbar spinal stenosis. The main radiological criteria for spinal stenosis are bony narrowing, epidural fat obliteration, and deformities of the spine in the lateral and frontal imaging planes [2]. Lumbar spinal stenosis typically manifests itself clinically in neurogenic claudication; a symptom classically includes exercise-related pain in the back and sometimes radicular or pseudoradicular radiation of pain into the lower limbs. As the condition progresses, neurological deficits may develop in the lower extremities, including autonomic disturbances. The symptoms are typically worst when the patient walks in a marked lumbar lordosis body posture, e.g., when the patient climbs downstairs; conversely, they are less pronounced when the lumbar spine is kyphotic, e.g., when the patient rides a bicycle or climbs upstairs. A further classical feature is that the older person stoops forward while walking. This can be related to a compensatory measure for the narrowing of the spinal canal [3]. The symptoms and some signs of the degenerative lumbar spine disease are common with other conditions such as plasmocytoma, neurinomas, extradural space metastases, and meningiomas in the intradural space. Or spinal cord ependymomas and astrocytomas, in addition, benign cavities (syringomyelia). Some other conditions are rare, but very important because they are treatable at an early stage are such as spinal epidural abscesses and spinal epidural hematomas with anticoagulation. Vertebral osteomyelitis must also be considered in differential diagnosis. Inflammatory nerve root lesions rarely cause pain, apart from subacute demyelinating polyneuropathy that can respond to steroid treatment, and radiculitis caused by herpes zoster and borrelia [4]. On the other hand, preserving resources and avoid long waiting time for diagnostic images are needed, so, patients selection is of paramount importance [5]. The sensitivity and specificity of important history and physical examination points are not thoroughly examined in the Middle East area, the aim of this study is to find out the sensitivity and specificity of important history and physical examination points in degenerative lumbar spine diseases.

## II. MATERIAL AND METHOD

This study was done at King Abdulaziz University Hospital (KAUH) in Jeddah-Saudi Arabia. This was a retrospective study. The medical files were reviewed between January 2005 till December 2010 All patients had a proven degenerative lumbar spine disease by MRI study and complaining of low back pain. The medical files of patients visited the neurosurgery service were reviewed for: age, gender, medical history ( including low back pain, radiation, numbness, weakness) and physical examination (including straight leg raising test, motor power changes, abnormal sensory examination and abnormal reflexes). The MRI spine was performed with GE1.5T machine; the MRI images were reported by a neuroradiologist at KAUH.

The sensitivity of each point in the history and physical examination was calculated by plotting the **receiver** operating characteristic (ROC) curve (figure1). The demographic data was presented in form of mean $\pm$  standard deviation for the parametric data and the frequency with percentage for the nonparametric data. The results were presented with the *P* value significance and the 95% confidence interval. A *P* value of  $< 0.05$  was considered significant.

The statistical analysis was performed using IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.

The research ethics committee at King Abdulaziz University approved the research project without a need for obtaining a patient consent.

## III. RESULTS

### *Patients' statistics:*

Total of 157 patients were enrolled. 92 (58.6%) were males and 65 (41.4%) were females. The mean age was 50.5  $\pm$  12.8 years the minimum age was 18 years and the maximum age was 79 years. The most common degenerative lumbar spine changes were found at L4-5 levels followed by the L4-S1 level.

The mean duration of symptoms prior to the presentation to the medical facility was 41.5  $\pm$  70.5 months (minimum 25 months and maximum 560 months).

### **A- The history points (table1):**

#### *Pain radiation sensitivity:*

There were 133 patient complained of radiation to the lower extremities with low back pain given a false negative rate of 11.5%. The sensitivity was 94.6%, the specificity was 55.56%. ( $p = .7$ , 95% CI [0.231, 0.936]) in detecting the degenerative lumbar diseases. The positive predictive value was 94.63%, while the negative predictive value was 55.56%.

#### *History of numbness sensitivity:*

There were 86 patients complained of numbness in the lower extremities with back pain given a false negative rate of 32.5%. The sensitivity was 73.06%, the specificity was 19.61%. ( $p = .83$ , 95% CI [0.037, 0.868]) in detecting the degenerative lumbar diseases. The positive predictive value was 77.47%, while the negative predictive value was 0.16%.

#### *History of weakness sensitivity:*

There were 43 patients complained of weakness in the lower extremities with back pain given a false negative rate of 45.2%. The sensitivity was 59%, the specificity was 14.08%. ( $p = .43$ , 95% CI [0.043, 0.624]) in detecting the degenerative lumbar diseases. The positive predictive value was 69.8%, while the negative predictive value was 9.26%.

### **B- Physical examination points:**

#### *Physical examination of abnormal motor power sensitivity:*

There were 100 patients found to have abnormal motor power in the lower extremities with back pain given a false negative rate of 28% .The sensitivity was 77.47%, the specificity was 22.73%. ( $p = .46$ , 95% CI [0.355, 0.955]) in detecting the degenerative lumbar diseases. The positive predictive value was 80.57%, while the negative predictive value was 19.61%.

***Physical examination of abnormal sensation sensitivity:***

There were 46 patients found to have abnormal sensory examination in the lower extremities with back pain given a false negative rate of 58%. The sensitivity was 59.75%, the specificity was 10.99%. ( $p = .28$ , 95% CI [0.027, 0.521]) in detecting the degenerative lumbar diseases. The positive predictive value was 63.51%, while the negative predictive value was 9.52%.

***Physical examination of abnormal reflexes sensitivity:***

There were 31 patients found to have abnormal reflexes examination in the lower extremities with back pain given a false negative rate of 68.8%. The sensitivity was 95.92%, the specificity was 62.5%. ( $p = .75$ , 95% CI [0.067, 0.79]) in detecting the degenerative lumbar diseases. The positive predictive value was 95.92%, while the negative predictive value was 62.5%.

***Physical examination of abnormal straight leg raising test sensitivity:***

There were 53 patients found to have abnormal SLR test examination in the lower extremities with back pain given a false negative rate of 12.7%. The sensitivity was 61.57%, the specificity was 50%. ( $p = .49$ , 95% CI [0.334, 0.952]) in detecting the degenerative lumbar diseases. The positive predictive value was 93.38%, while the negative predictive value was 10.2%.

#### IV. DISCUSSION

Sensitivity is the ability of the test to detect the diseased individual, while the specificity refers to the ability of the test to label the individual as non-diseased. The positive predictive value is the percentage of people with a positive test who actually have the disease. The negative predictive value is the percentage of patients with a negative test who do not have the disease[6]. A likelihood ratio of more than 1 indicates the test result is associated with the disease. A likelihood ratio of less than 1 indicates that the result is associated with absence of the disease. In case the likelihood ratios is close to 1, this will have a little practical significance [7]. Using these terms in validating the clinical advantage of performing some test may help the efficiency of the physician in detecting a specific disease.

Degenerative changes are thought to develop following loss of hydration of the nucleus pulposus lead to tears within the annulus fibrosus. Outer annular tears stimulate the ingrowth of blood vessels and associating nociceptors into the outer and sometimes inner annulus. Sensitization of these nociceptors by inflammatory repair mechanisms may lead to discogenic pain[8]

Degenerative lumbar spine disease is not uncommon problem among adult population. It is estimated that lumbar stenosis is present in 5 cases per 100 000 of the adult population [9]. Usually the patients present with low back pain that radiates to the lower extremities or with unsteady gait with possible bowel and/or bladder control abnormality that can be associated with numbness and weakness of the lower limb(s). The most important need for performing the physical examination after localizing the lesion is to decide whether the patient needs surgery or conservative treatment. The gold standard image for diagnosing degenerative lumbar spine diseases is the MRI.

In this article it is shown that there are no sensitive points in the history for diagnosing degenerative lumbar diseases; including the enquiry about pain radiation, enquiry about numbness and a complaint of muscle(s) weakness. This finding is in line with previous study that show no significant red flag in the history or physical examination is reliable for diagnosis [10]. The SLR test shows no sensitivity in the diagnosis. This has been reported before as well [11].

On the other hand, Cook et al shows the most diagnostic combination included a cluster of: bilateral symptoms; pain during walking/standing; leg pain more than back pain; pain relief upon sitting; and age greater than 48 years are highly sensitive in diagnosing the lumbar spine stenosis [12]

Having said that there is no sensitive or specific symptom or sign in diagnosing degenerative lumbar spine disease, it is important to get MRI and/or electrophysiological studies to increase the degenerative lumbar spine diagnostic specificity [13;14], thus avoid misdiagnosis of the patients that share the same symptoms and signs with another diagnosis.

It is crucial to document the patient's history and physical examination as a baseline and for the follow up purposes to assess the progression of the disease. In addition, the documentation of the clinical history and physical examination is important for medico-legal referencing. This article is addressing the isolated value of performing the history and physical

examination in a single visit without considering the follow up and the documentation aspects of the patients. Thus, the results need to be interpreted carefully to avoid the abuse of other diagnostic modalities. Other limitations of this study are the retrospective design, single center experience and relative limited number of patients

It is recommended to do further prospective studies with a larger group of patients in multiple centers.

## V. CONCLUSION

The sensitivity of the pointed neurological history and physical examination is variable with no single reliable point in the history or physical examination to ascertain the diagnosis of degenerative lumbar spine disease. Further diagnostic test(s) is required to confirm the diagnosis prior to initiating the treatment.

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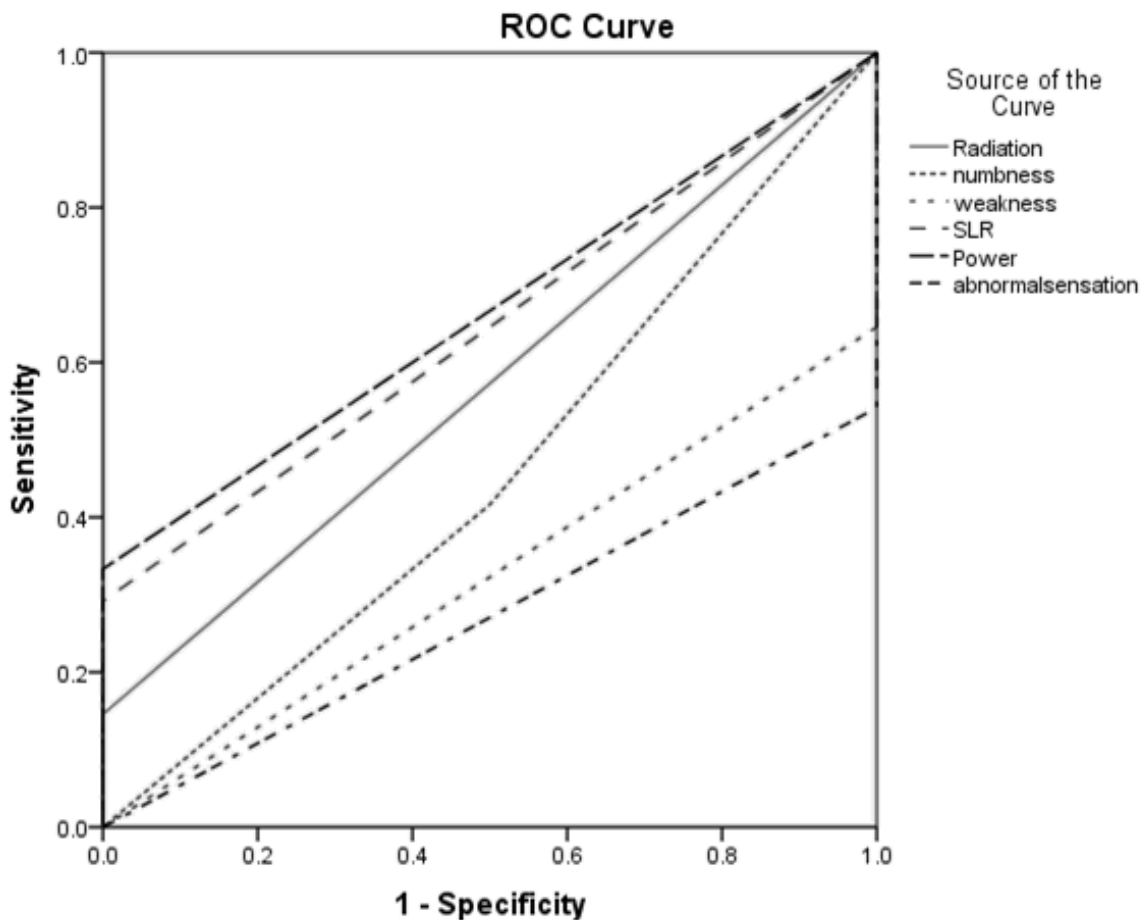
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**APPENDIX: A**

| Clinical feature             | Sensitivity (%) | Specificity (%) | Likelihood ratio |
|------------------------------|-----------------|-----------------|------------------|
| Pain radiation               | 0.94            | 0.55            | 0.39             |
| History of numbness          | 0.73            | 0.19            | 0.53             |
| History of weakness          | 0.59            | 0.14            | 0.44             |
| SLR                          | 0.61            | 0.50            | 0.11             |
| Finding abnormal motor power | 0.77            | 0.22            | 0.54             |
| finding of abnormal reflexes | 0.95            | 0.62            | 0.33             |

**Table 1: showing the sensitivity, specificity and likelihood ratio for each point in the study**



**Figure1: the ROC curve showing the relationship between the sensitivity and specificity**