

THE PLAIN RADIOGRAPHIC EVALUATION OF DEGENERATIVE CHANGES OF LUMBOSACRAL SPINE-CORRELATION WITH MAGNETIC RESONANCE IMAGING FINDINGS

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ABSTRACT

Background: Back pain caused by degenerative spine disease is one of the most prevalent causes of disability in working-age individuals. Bone (spondylolisthesis, spondylolysis), ligaments (hypertrophy of the spinal ligaments, notably the ligamentum flavum), facet joints (facet hypertrophy, synovial cyst), and intervertebral disc are the elements that may be responsible for the onset of degenerative spine (bulging and herniation). **Objective:** In this study our main goal is to evaluate the Plain Radiographic Evaluation of Degenerative Changes of Lumbosacral Spine-Correlation with Magnetic Resonance Imaging Findings. **Method:** This cross-sectional study was carried out tertiary medical hospital from June 2021 to June 2022. Where 100 patients with low back pain were included in the study. All Plain X-ray and MRI findings were collected for each patient in a pre-designed structured data collection sheet. **Results:** during the study, 60% belong to 47-57 years group. According to c between plain X-ray and MRI for prediction of spinal stenosis from posterior disc height where MRI diagnosis of spinal stenosis was found in 75%. In addition, according to Correlation between plain X-ray and MRI for prediction of disc herniation from facet hypertrophy in plain X-ray facet hypertrophy was found in 74% cases. Among these 74% cases 63% confirmed disc herniation on MRI. Plus, Correlation between plain X-ray and MRI for prediction of disc herniation from facet hypertrophy in plain X-ray facet hypertrophy was found in 74% cases. Among these 74% cases 63% confirmed disc herniation on MRI. **Conclusion:** The assessment of disc herniation and nerve root compression by facet hypertrophy and posterior disc height, respectively, was shown to be virtually perfect in agreement. On the other hand, significant agreement was reported in the detection of spinal stenosis by posterior disc height as assessed by plain X-ray. In contrast, a reasonable agreement was obtained for the prediction of disc herniation by posterior osteophytes examined by plain X-ray. For the study of low back pain, a plain lumbosacral radiograph was sensitive but not specific.

KEYWORDS: plain x-rays. Magnetic Resonance Imaging (MRI), back pain.

INTRODUCTION

On conventional radiographs, the typical observations of discogenic degenerative degeneration include loss of disc height, irregularity and sclerosis of the endplates, and herniation of nuclear disc material into the endplate borders (Schmorl's node) & intranuclear gas owing to vacuum phenomena.^[1] Another component of spinal degenerative disease that may be accountable for the patient's symptoms while contributing to spinal canal stenosis or neural foraminal constriction is osteoarthritis of the facet joints.^[2] Degenerative changes in the facet joints can be seen on conventional radiography as enlarged sclerotic and oblique projections, and joint gaps can often be defined.^[3,4]

Because of its ease of use and low cost, plain x-ray is the most usually requested spine imaging test, and it may be

highly useful in demonstrating bone abnormalities. An x-ray of the spine is generally the first diagnostic tool used in evaluating back pain, and it is normally performed before considering an MRI or a CT scan. Good quality X-rays will allow you to analyze not only the individual bones of your spine, but also the general shape of your spinal column.^[5] Although MRI of the lumbosacral spine is now regarded the gold standard imaging modality for evaluating nerve root compression and spinal stenosis, it does have significant limitations.^[6]

In this study our main goal is to evaluate the Plain Radiographic Evaluation of Degenerative Changes of Lumbosacral Spine-Correlation with Magnetic Resonance Imaging Findings.

OBJECTIVE

To evaluate the Plain Radiographic Evaluation of Degenerative Changes of Lumbosacral Spine-Correlation with Magnetic Resonance Imaging Findings.

METHODOLOGY

This cross-sectional study was carried out tertiary medical hospital from June 2021 to June 2022. Where 100 patients with low back pain were included in the study. All Plain X-ray and MRI findings were collected for each patient in a pre-designed structured data collection sheet.

All data was recorded methodically in a preformed data sheet and was analyzed by relevant statistical procedures with the windows software version 20. The prevalence

rates of hypertension were determined by simple percentage. Unpaired t-test, chi-square tests were done to see the level of significance. All statistical test was considered significant at the level of 95% ($p < 0.05$).

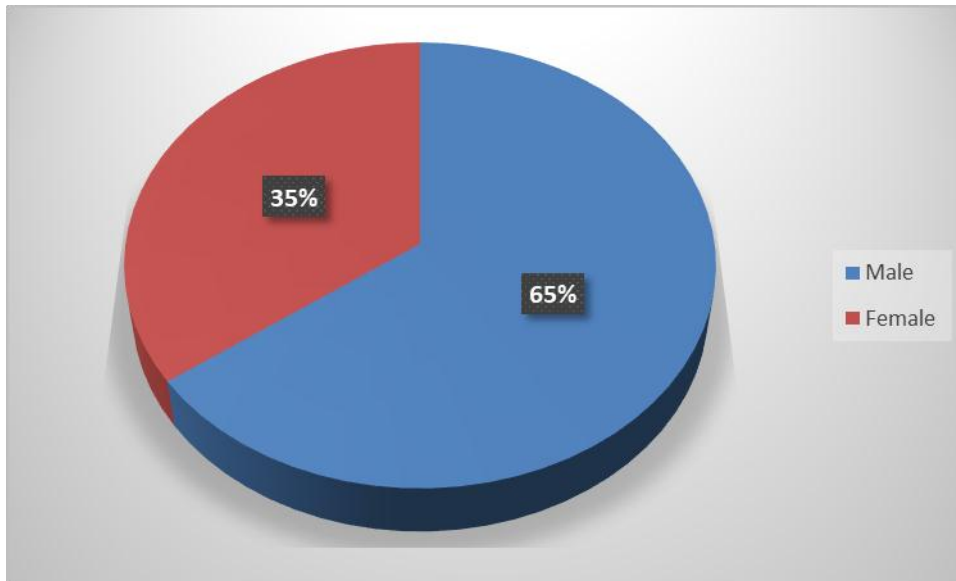
RESULTS

In table-1 shows age distribution of the study group where majority were belonging to 47-57 years age group, 60%. The following table is given below in detail:

Table-1: Age distribution of the patients.

Age group	%
26-36 years	10%
37-47 years	5%
47-57 years	60%
>57 years	15%

In figure-1 shows gender distribution where 65% were male and 35% were female. The following figure is given below in detail:



In table-2 shows Correlation between plain X-ray and MRI for prediction of spinal stenosis from posterior disc height where MRI diagnosis of spinal stenosis was found in 75%. The following table is given below in detail:

Table-2: Correlation between plain X-ray and MRI for prediction of spinal stenosis from posterior disc height.

Plain-Xray	MRI diagnosis for spinal stenosis
Posterior disc height	Present, %
<6mm, 74%	75%
>6mm, 21%	5%

In table-3 shows Correlation between plain X-ray and MRI for prediction of nerve root compression from posterior disc height < 6mm posterior disc height found in 74% (X-ray), among them 57% were confirmed MRI diagnosis for nerve root compression. The following table is given below in detail:

Table-3: Correlation between plain X-ray and MRI for prediction of nerve root compression from posterior disc height.

Posterior disc height	MRI diagnosis for spinal stenosis
Plain-Xray	Present, %
<6mm, 74%	57%
>6mm, 21%	4%

In table-4 shows Correlation between plain X-ray and MRI for prediction of disc herniation from facetaly pertrophy in plain X-ray facetal hypertrophy was found in 74% cases. Among these 74% cases 63% confirmed disc herniation on MRI. The following table is given below in detail:

Table-4: Correlation between plain X-ray and MRI for prediction of disc herniation from facetaly pertrophy

Facetal hypertrophy	MRI diagnosis for spinal stenosis
Plain-Xray	Present, %
<6mm, 74%	63%
>6mm, 21%	9%

In table-5 shows Sensitivity, specificity, accuracy, positive and negative predictive values of the plain X-ray and MRI evaluation for prediction of disc herniation by posterior osteophytes & facetal hypertrophy, prediction of spinal stenosis and nerve root compression by posterior disc height. The following table is given below in detail:

Table-5: Sensitivity, specificity, accuracy, positive and negative predictive values of the plain X-ray and MRI evaluation for prediction of disc herniation by posterior osteophytes & facetal hypertrophy, prediction of spinal stenosis and nerve root compression by posterior disc height.

Validity test	Posterior osteophyte	facetal hypertrophy	Spinal stenosis	Nerveroot compression
Sensitivity	47	86	96	93
Speceficty	85.2	66	58	60
Accuracy	61	80	79	80
PPV	87	85	75	75
NPV	45	67	92	90

DISCUSSION

In this current study it was observed that the mean (\pm SD) age of the subjects was 50.0 \pm 13.0 years with range from 28 to 72 years and 60% of the patients were in the 47-57 years of age group. Similarly, Bennekeret et al^[7] showed mean age was 54 years with range from 19 to 86 years. Almost similar age range obtained by Dunlop et al^[8] and Yong et al.^[9]

Here plain X-ray and MRI findings were compared for identification of posterior disc height (PDH) and nerve root compression respectively.^[7-9]

In plain X-ray evaluation for posterior disc height, out of 74 (PDH <6mm) subjects 56 presented with nerve root compression. Among subjects (PDH \geq 6mm) only 3 cases found to have nerve root compression. Here the measure of agreement, Kappa=0.910 (p=0.001), which was almost perfect agreement for identification of posterior disc height. Similarly, Yong et al. showed good agreement (k=0.701) in both the imaging modalities.^[9]

In this current study it was found that post disc height less than 6 mm was observed higher than more than 6 mm of the subjects having low back pain evaluated by plain X-ray.

For plain radiograph findings reduction of posterior intervertebral disc height (<6 mm) was the most frequent finding seen in patients reported by Yong et al.^[9] In plain X-ray facetal hypertrophy found in 74% subjects, among them 63 have disc herniation. Which was supported by other studies.^[10-11]

Signs of degenerative disc disease (DDD) were recorded by Jaovisidha et al. from both plain radiographs and MR imaging and found that anterior disc height (ADH) <11.3

mm or posterior disc height (PDH) <5.5 mm indicate DDD at LS junction with 95% confidence interval.^[10] Cohn et al. study results indicates that PDH is the most reliable and easily used criterion for detection of DDD at the Lumbosacral junction (LSJ). PDH < or =5.4 mm on plain lateral film indicates DDD; PDH > or =7.7 mm indicates the absence of DDD on plain film.^[11]

CONCLUSION

The assessment of disc herniation and nerve root compression by facetal hypertrophy and posterior disc height, respectively, was shown to be virtually perfect in agreement. On the other hand, significant agreement was reported in the detection of spinal stenosis by posterior disc height as assessed by plain X-ray. In contrast, a reasonable agreement was obtained for the prediction of disc herniation by posterior osteophytes examined by plain X-ray. For the study of low back pain, a plain lumbosacral radiograph was sensitive but not specific.

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