Original Research Paper

Volume - 13 | Issue - 03 | March - 2023 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Radio-Diagnosis

MODIFIED OSWESTRY DISABILITY INDEX (ODI) IN ASSESSING MAGNETIC RESONANCE IMAGING FINDINGS IN LUMBAR DEGENERATIVE DISEASES

Santhosh Babu — Professor and Head of the Dept. Department of Radiology, Chalmeda Anand Rao Institute of Medical Sciences.

Dr. Konakanchi Vamshi Krishna* — Junior Resident-3, Department of Radiology, Chalmeda Anand Rao Institute of Medical Sciences.*Corresponding Author

Kolan Rushwender Reddy — Junior Resident-3, Department of Radiology, Chalmeda Anand Rao Institute of Medical Sciences.

ABSTRACT **INTRODUCTION:** Lumbar degenerative disease is one of the common causes for low back pain may cause debilitation. Mild degenerative changes of spine are physiological and should be considered pathological only if these abnormalities are causing symptoms and clinical signs. Many structural components of spine are responsible for low backache of degenerative etiology including the intervertebral disc, vertebral periosteum, facet joints and spinal ligaments. The most frequent and common location of these changes is lumbar spine due to heavy mechanical stress. **AIM:** The aim of this study is to establish a relationship between the MRI changes in established lumbar degenerative disease and the severity of self-assessed modified Oswestry Disability Index in patients. **MATERIALS & METHODS:** Study included 120 consenting patients of all age groups irrespective of sex, having low back pain who were referred for MRI lumbar spine. Standard spine protocol sequences like T1- weighted image T2-weighted image Fluid-sensitive sequence, such as STIR or fat suppressed T2-weighted image Gradient-echo image Post gadolinium T1- weighted image were performed and the findings were correlated with Modified Oswestry Disability Index(ODI). **RESULTS:** Disc degenerative changes is common among 40 – 60 years age group. Females are more commonly affected than males. Central is the most type of disc bulge. L5-S1 is the most common level to be affected by disc bulge. Annulus fissure/ tear is most common in L4-L5 intervertebral disc level. Type I degenerative end plate changes are most common in L5-S1 intervertebral disc level. Whereas typeII degenerative end plate changes are most common in L4-L5 intervertebral disc level. Facetal Arthropathy changes are common in L4- L5 levels both in grade I and II. Spinal canal stenosis is common in L4-L5 levels both in grade I and II. Oswestry disability score is higher in patients with severe spinal canal stenosis. So, there is significant correlation between spinal canal narrowing and Oswestry disability index is seen. So ODI score acts as an invaluable tool for assessing patients' functional disability. **CONCLUSION:** MRI is better for the identification and grading the severity of lumbar degenerative disease. Oswestry disability index is a better tool for assessing patients' functional disability.

KEYWORDS : Oswestry disability index, Facetal arthropathy.

INTRODUCTION

The national center for health statics data shows impairments of back and spine ranked as one of the leading causes of limitation of physical activity in people less than 45 years of age. Low back pain (LBP) is one of the most common complaints throughout the world and our country due to degenerative spine disorder1,2,3 In most of the developed countries low back pain resulting from the lumbar degenerative spine diseases is most common cause of physical disability in all ages, predominantly in the 4th decade and above age groups and second most common cause to seek consultation from the physicians4,5,6. The severity of the low back pain may be severe and may cause debilitation. Mild degenerative changes of spine are physiological and should be considered as pathological only if these abnormalities are causing symptoms and clinical signs. Many structural components of spine are responsible for low backache of degenerative etiology including intervertebral disc, vertebral periosteum, facet joints and spinal ligaments. The most frequent and common location of these changes is lumbar spine due to heavy mechanical stress and rotatory forces. In magnetic resonance imaging, these changes are manifested as T2 signal loss in the intervertebral discs, narrowing of disc spaces, presence of fissures in the annulus, air locules in disc space, calcification within intervertebral disc, altered marrow signals, marginal osteophytosis, disc herniation (protrusion, extrusion, sequestration), spinal canal stenosis (grade I, II, III). With continuous advancement in imaging technology and hardware, MRI has improved identification and diagnosis of the cause of Low back pain and MRI has become the preferred modality for evaluation of the degenerative spine diseases as it provides multi-planar imaging capability, superior delineation of intervertebral disc, nerves, ligament, para spinal muscles, epidural fat, cerebrospinal fluid and bone marrow7. Oswestry Low Back Pain Disability Questionnaire tool is used to measure the patient's permanent functional disability and considered as the 'gold standard' of low back functional outcome tools.8 Correlation of MRI findings with modified oswestry disability index will make MRI a more valuable tool for diagnosis of low back pain due to lumbar degenerative disease. Correlating with physical disability will help orthopedicians inearly intervention and management of lumbar degenerative disease. This study was done to correlate disc as well as vertebral body degenerative changes with modified oswestry disability index.

AIMS AND OBJECTIVES

The aim of this study is to characterize the MRI findings in low back pain due to lumbar degenerative disease and to establish a relationship between the MRI changes and the severity of self-assessed modified Oswestry Disability Index in patients.

MATERIALS AND METHODS

Prospective cross-sectional study was done in Department of Radiology, Chalmeda Anand Rao Institute Of Medical Sciences, Karimnagar, a tertiary care hospital, over a duration of 2 years (2021-2022). 120 patients were studied for MRI L-S spine with chief complains of chronic low backache who fit for our inclusion criteria. After completion of MRI examination, findings were graded according to the severity and patients were instructed to duly answer and complete the national translation of the ODI questionnaire which contains six statements (denoted levels 0 to 5) in each of the 10 sections related to impairments like pain, and abilities such as personal care, lifting, walking, sitting, standing, sleeping, sex life, social life and traveling. Each section, the patient will have to choose the statement that best describes his/her status. If the limitation falls between two levels, the higher point value will be selected. The chosen statements will receive scores 0 to 5 corresponding to the levels indicated. The total scores could range from 0 (highest level of function) to 50 (lowest level of function). To accommodate patients who did not respond to every section, a percentage disability will be calculated on the basis of the total possible points. Upon adding up all of the points, the total score will be divided by 50 and multiplied by100 to calculate the percentage disability: Total Points /50 * 100 = % Disability. The relationship of MRI findings with total score will be assessed.

STATISTICAL ANALYSIS

The data was expressed in number, percentage, mean and standard deviation. Statistical Package for Social Sciences (SPSS 16.0) version

used for analysis. Microsoft word and Excel have been used to generate tables etc.

OBSERVATIONS & RESULTS

Table 1: Distribution of patients based on the age

Age (Years)	Number	Percentage (%)
20-40 y	47	39.17%
41-60 y	64	53.33%
Above 60 y	9	7.5%

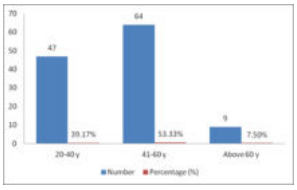


Table 2: Distribution of patients based on the gender

Gender	Number	Percentage (%)
Male	54	45.00%
Female	66	55.00%

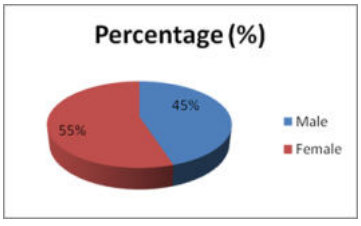


Table 3: Distribution pattern based on disc bulge

Disc bulge	Number	Percentage (%)
C	115	95.83%
PC	19	15.83
E	2	1.67

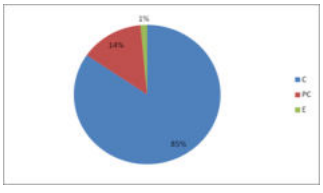


Table 4: Distribution pattern based on disc bulge and different levels

Disk bulge	C		PC		E	
	Number	(%)	Number	(%)	Number	(%)
L1 - L2	1	0.87	0	0.00	0	0.00
L1 - L2, L3 - L4	6	5.22	2	10.53	0	0.00
L1 - L2, L3 – L, L4 - L5	9	7.83	9	47.37	0	0.00
L1 - L2, L3 - L4, L4 -L5, L5 - S1	71	61.74	4	21.05	0	0.00
L5 - S1	19	16.52	3	15.79	0	0.00
L4 - L5, L5 - S1	9	7.83	1	5.26	2	100.00

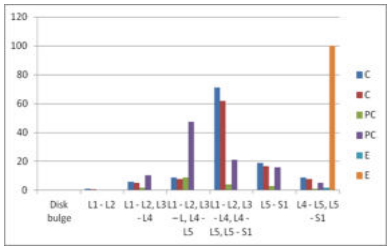


Table 5: Distribution pattern based on facetal arthropathy

Facetal arthropathy	I		II	
	Number	(%)	Number	(%)
L1-L2	1	7.69	0	0.00
L2-L3	0	0.00	0	0.00
L3-L4	0	0.00	0	0.00
L4-L5	5	38.46	1	100.00
L5-S1	2	15.38	0	0.00
L1-L2, L2-L3	0	0.00	0	0.00
L4-L5, L5-S1	3	23.08	0	0.00
L3-L4, L4-L5	1	7.69	0	0.00
L3-L4, L4-L5, L5-S1	1	7.69	0	0.00

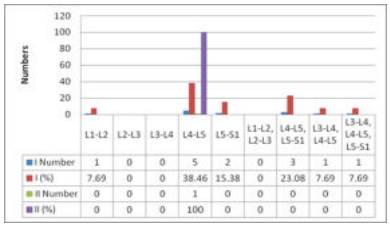


Table 6: Distribution pattern based on spinal canal stenosis

Spinal canal stenosis	I		II	
	Number	Percentage (%)	Number	Percentage (%)
L1-L2	0	0.00	0	0.00
L2-L3	0	0.00	0	0.00
L3-L4	0	0.00	0	0.00
L4-L5	1	100.00	4	57.14
L1-L4	0	0.00	1	14.29
L5-S1	0	0.00	1	14.29
L1-L2,L2-L3	0	0.00	0	0.00
L4-L5, L5-S1	0	0.00	1	14.29
L3-L4, L4-L5	0	0.00	0	0.00
L3-L4, L4-L5, L5-S1	0	0.00	0	0.00

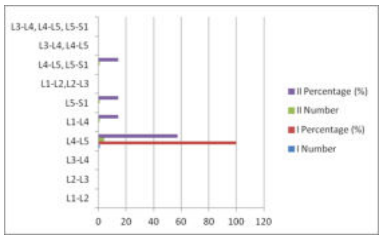
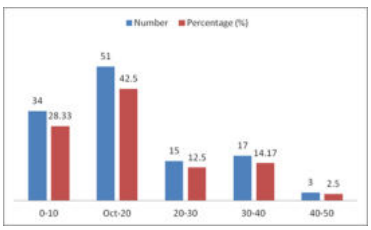


Table-7: Distribution pattern based on Oswestry score

Oswestry score	Number	Percentage (%)
0-10	34	28.33
10-20	51	42.50
20-30	15	12.50
30-40	17	14.17
40-50	3	2.50



DISCUSSION

Our study showed among 120 patients, females i.e., 66 (55%) with the age group of 41-60 years (53.3%) were commonly associated with lower backache and lumbar degenerative diseases. Pattern of lumbar disease showed maximum patients with central disc bulge i.e., 115 (95.85%). L5-S1 is the most common level to be affected by disc bulge i.e., 71 (61.74%) with central disc bulge. Facetal Arthropathy changes

are common in L4-L5 levels both in grade I i.e., 5 (8.46%) and grade II i.e., 1 (100%). Spinal canal stenosis is common in L4-L5 levels both in grade I and II i.e., 1(100%) and 4(57.14%) respectively. Oswestry disability score is 10-20 in maximum patients i.e., 51(42.5%).

Miller JA et al, 1988[2], correlated macroscopic disc degeneration grades with age, sex, and spine level in 600 lumbar intervertebral discs from 273 cadavers (ages: 0-96 years).Male discs were more degenerated than female discs at most ages; significantly so in the second, fifth, sixth, and seventh decades. On average, L4-L5 and L3-L4 level discs showed more degeneration than discs at other lumbar levels. In our study too the most common level is L4-L5 intervertebral disc.

Fairbank et al, 2000[8], concluded that Oswestry Disability Index (also known as the Oswestry Low Back Pain Disability Questionnaire) is an extremely important tool that researchers and disability evaluators use to measure a patient's permanent functional disability. The test is considered the 'gold standard' of low back functional outcome tools. In our study also oswestry disability score correlated well with spinal canal stenosis. So it is an invaluable tool assessing patient's functional disability.

Ji Hee Hong et al, 20157, studied 117 consecutive patients with central lumbar Spine Stenosis of at least a three-month duration and they found that there is significant correlation between Oswestry disability index (ODI) scores and multilevel LSS. In our study also we found significant correlation between oswestry disability index and spinal canal stenosis.

CONCLUSION

MRI is better for the identification and grading the severity of lumbar degenerative disease. Patients' with severe spinal canal narrowing had higher Oswestry score. Hence, there is significant correlation between spinal canal narrowing and Oswestry disability index (ODI) is seen. So ODI score acts as an invaluable tool for assessing patient's functional disability.

REFERENCES

1. Weiler C, Lopez-Ramos M, Mayer HM, Korge A, Siepe CJ, Wuertz K, et al. Histological analysis of surgical lumbar intervertebral disc tissue provides evidence for an association between disc degeneration and increased body mass index. BMC research notes. 2011;4(1):497.
2. Miller JA, Schmatz C, Schultz AB. Lumbar disc degeneration: correlation with age, sex, and spine level in 600 autopsy specimens. Spine 1988;13(2):173-8.
3. De Schepper EI, Damen J, van Meurs JB, Ginai AZ, Popham M, Hofman A, et al. The association between lumbar disc degeneration and low back pain: the influence of age, gender, and individual radiographic features. Spine 2010;35(5):531-6.
4. Modic MT, Ross JS. Lumbar Degenerative Disk Disease. Radiology. 2007;245(1):43-61.
5. Modic MT, Ross JS, Obuchowski NA, Browning KH, Cianflocco AJ, Mazanec DJ. Contrast enhanced MR imaging in acute lumbar radiculopathy: a pilot study of the natural history. Radiology 1995;195(2):429-35.
6. Pratt RK, Fairbank JC, Virr A. The reliability of the Shuttle Walking Test, the Swiss Spinal Stenosis Questionnaire, the Oxford Spinal Stenosis Score, and the Oswestry Disability Index in the assessment of patients with lumbar spinal stenosis. Spine 2002;27(1):84-91.
7. Hong JH, Lee MY, Jung SW, Lee SY. Does spinal stenosis correlate with MRI findings and pain, psychologic factor and quality of life? Korean J Anesthesiol 2015; 68(5):481-7
8. Fairbank JC, Couper J, Davies JB, O'Brien JP. The Oswestry low back pain questionnaire. Physiotherapy 1980;66:271-3.