Original Article

CORRELATION OF PAIN AND DISABILITY WITH MRI FINDINGS IN PATIENTS WITH LUMBAR DISCOGENIC BACK PAIN

Surendra K. Wani [1], Neha Deshpande *[2].

[1] Assistant Professor, *[2] Post Graduate Student,
Department of Musculoskeletal Physiotherapy, MGM's Institute of Physiotherapy, N-6 CIDCO Aurangabad. (MAH), India.

ABSTRACT

Background: Lumbar disc prolapse is one of the common causes of low back pain seen in the working population. There are contradictorty reports regarding the clinical significance of various magnetic resonance imaging (MRI) findings observed in these patients.
Purpose: The aim of the study was to determine the association of magnetic resonance imaging (MRI) findings with intensity of pain and self reported disability among persons with lumbar discogenic back pain.
Material And Methods: A consecutive series of patients aged between 20 – 50 years, who were investigated by MRI of lumbar spine because of LBP(Low Back Pain) were selected.LBP intensity was measured by using Numerical Pain Rating Scale (NPRS) and functional disability by Modified Oswestry Disability Questionnaire (MODI). Each MRI scan was assessed and graded by radiologist according to standardized protocol.
Results: The Pearson's correlation coefficient for pain intensity on NPRS (r value = -0.01614) and disability percentage (r value =-0.5628) in discogenic back pain patients demonstrated negative correlation.
Conclusion: Our findings suggest that there is no association of MRI findings in the lumbar spine with intensity of pain and disability among persons with lumbar discogenic back pain.
KEYWORDS: Discogenic low back pain, Pain, Disability.

Address for correspondence: Miss. Neha Deshpande. P G Student, Department of Musculoskeletal Physiotherapy, MGM's Institute of Physiotherapy, N-6 CIDCO Aurangabad. (MAH), India.
Contact No.:91-9503401302, 91-9421923461 **Email:** happyneha22@gmail.com

Access this Article online

Quick Response code

International Journal of Physiotherapy and Research
ISSN 2321- 1822
www.ijmhr.org/ijpr.html

Received: 18-01-2014 Accepted: 13-02-2014
Peer Review: 18-01-2014 Published: 11-04-2014

BACK GROUND

Low Back Pain (LBP) is neither a disease nor a diagnostic entity of any sort.[1] LBP is one of the most common conditions that impair individual's functional capacity in activities of daily living and at work , as well as their general health and quality of life.[2] LBP & lumbago is common musculoskeletal disorder affecting 80% of people at some point in their lives.[3] Back pain is one of the most common medical problems, affecting 8 out of 10 people at same point during their lives.[4] Recurrence of LBP is also common with the percentage of subsequent LBP episodes ranging from 20% to 44% within 1 year for working populations to life time recurrences of up to 85%.[5] Incidence of LBP is highest for those aged 30 to 50 yrs.[6]

Diagnosis is foundation of management and is based on clinical assessment; however– a specific diagnosis has been shown to be Possible in only 10-15 %of cases LBP.[7] The use of specific differential diagnosis with the combination of radiological signs (CT, MRI, and X-rays) and invasive methods.EMG, contrast medium radiography; injects has been suggested.[8] In a series of comparative radiological studies on evaluation of lumbar herniated discs ,MRI was found to be slightly better than or equal to CT.[9] MRI is considered to be best imaging techniques for investigations of LBP.[10]

MRI & CT scanning have been found to demonstrate abnormalities in ''normal'' asymptomatic people.[11] LBP is not necessary a consequence of degenerative processes for many patients with recurring Low Back Pain have no evidence of degenerative changes radiologically; and many who do have degenerative radiological changes have no back pain, it is clearly stated that there is no obvious relationship between degenerative changes and back pain.[12] In the study done by Porchet et al., observed that pain on NPRS scale was associated with 10% lower odds of observing severe disk degeneration on MRI findings. In spite of this, studies often were not able to identify any MRI abnormality associated with pain for most LBP patients.[10]

LBP has been linked with various abnormalities of spine detectable on MRI-including disc herniation, nerve root impingement, disc degeneration & HIZ (High Intensity Zone), however, many patients with LBP do not exhibit any of these pathological features & even when abnormalities are present, they are not necessarily responsible for symptoms.[13]

Studies among the people with back pain have shown poor correlation between imaging appearance and LBP symptoms.[14] Another problem with MRI is the high prevalence of abnormal findings among individuals without LBP .This high prevalence makes it difficult or possibly even perilous, to attribute a patient's symptoms to certain imaging findings.[15] The best evidence strongly indicates that these structural findings on X-Ray and MRI are not clearly related to the onset, severity, duration on prognosis of LBP. The presence of degenerative changes, disc pathology muscle wasting, even spondylolisthesis and spondylolysis are common in those without pain and are poorly correlated with the signs and symptoms of LBP.[16] Problems of MRI results those were at odds to clinical findings.[17]

According to Porchet et.al established a positive correlation between the pain and disability in LBP patients and also the correlation between investigative findings. But some authors contradict that clinical symptoms and functional impairment cannot be correlated to investigative findings.

So the present study intended to observe the correlation of pain and disability with MRI findings in patients with lumbar discogenic back pain using NPRS and MODI. The observation of this study can provide an evidence to recommend MRI scan which needs higher costs in clinically diagnosed patients with discogenic LBP in Indian settings.

METHODOLOGY

Type of study: Observational Case study, Study Setting: Musculoskeletal Department of Physiotherapy OPD, MGM Hospital, Aurangabad. Study Population: 64 subjects. Study duration: August 2011 – Feb 2012.

Inclusion criteria:

Both genders between the age group 20 to 50 years.

Low back pain with or without radiation to lower extremity.

Patients with MRI scan of lumbar spine.

Exclusion criteria:

Patients with inflammatory, infectious, metabolic diseases of spine & malignancy.

Patients with history of vertebral fractures.

Pregnancy.

Patients with neurological defects such as altered sensation, muscle weakness, altered deep tendon reflexes, severe orthopaedic, cardiovascular, or metabolic disorders.

Material Used:

1. Numerical Pain Rating Scale (NPRS).
2. Modified Oswestry Disability Index (MODI).
3. MRI grading according to Christian W, Boos N 2004.
4. McKenzie assessment protocol.

Procedure: Before commencement of the project, college level ethical committee approval was taken.

Randomly selected participants who reported to Physiotherapy OPD of Mahatma Gandhi Mission Hospital, Aurangabad with LBP having MRI Scan of lumbar spine were included for the study. The purpose of the study was explained, subjects were screened based on the inclusion and exclusion criteria and a written informed consent was obtained from all the participants after their inclusion. Low back pain intensity was measured

by using NPRS and functional disability by MODI. Investigative findings of MRI as reported by radiologist were classified as per the grading system and documented in master chart.

Participants were then divided into two subgroups depending on the duration of symptoms for finding its correlation with investigative features as:

Acute LBP- comes on suddenly & is caused by an injury such as muscle strain last for 6 – 12weeks, physical therapy &relaxation help to relive acute LBP.

Chronic LBP- is pain that lasts longer than 12 weeks, patient with chronic

LBP have daily pain that can affect their quality of life.[18]

Outcome measures

1. Numerical pain rating scale (NPRS): The Numerical Rating Scale offers the individual in pain to rate their pain score. Statford P (2001) [19] concluded Numerical Pain Rating Scale as reliable, valid, and appropriate for use in clinical practice. The Numerical rating pain scale allows the health care provider to rate pain as mild moderate or severe, which can indicate a potential disability level.

2. Modified Oswestry Disability Index (MODI): Modified Oswestry Disability Questionnaire is used to assess current level of disability and to make clinical decisions regarding the effectiveness of treatment in patients with low back pain. The Modified Oswestry Disability Index is a good functional scale because it deals with the activities of daily living and therefore is based on the patient's response and concerns affecting daily life. [20]

3. MRI Grading system :(According to Christian W, Boos. N. in 2004) [21]

Grade 0 (normal) **–** No compromise of the nerve root is seen. There is no evident contact of disk material with the nerve root, and the epidural fat layer between the nerve root and disk material is preserved.

Grade 1 (contact) – There is visible contact of disk material with nerve root and normal epidural fat layer between the two is not evident, the nerve root has normal position and there is no dorsal deviation.

Grade 2 (deviation) – Nerve root is displaced dorsally by disk material.

Grade 3 (compression) – Nerve root is compressed between disk material and wall of spinal canal. It may appear flattened or be indistinguishable from disk material.

TABLES

Table 1: Demographic data.

Characteristic	No. Of Participants (n=32)	Percentage (%)
Sex		
Males	12	37.5
Females	20	62.5
Age in years		
20-39	5	15.6
40-49	13	40.6
50-75	14	43.7
Disc Degeneration		
Absent	13	40.6
Present	19	59.3
Disc Herniation		
Absent	14	43.7
Present	18	56.25
Nerve Root Compression		
Absent	14	43.7
Present	18	56.25
Abnormalities on MRI		
Grade 0	0	0
Grade 1	2	6.25
Grade 2	12	37.5
Grade3	18	56.25
Classification based on duration of pain		
Acute	20	62.5
Chronic	12	37.5

Table 2: Age & Sex history of LBP participants

Age		Sex	
Age in years	No. of participants	Males	Females
20-40	5	2	3
40-60	20	5	15
>60	7	5	2
	Total	37.50%	62.50%

Table 3: Showing mean and SD of various characteristics of participants.

Characteristics	Mean ± SD
Age	48.59 ± 13.32
Duration of symptoms	3.06 ± 8.81
Pain (NPRS)	7.83 ± 1.58
MODI disability %	52 ± 0.14

Table 4: Pearson's Correlation Coefficient for all type of LBP participants.

		Correlation Co-efficient (r)	95% Confidence interval	Coefficient of determination (r^2)	P Value
Pain	MRI finding grades	-0.01614	-0.3629 to 0.3349	0.00026	0.931(NS)
Duration of symptoms	MRI finding grades	0	-0.3488 to 0.3488	0.000	>0.99(NS)
MODI disability %	MRI finding grades	-0.5628	-0.3973 to 0.2984	0.003167	0.7597(NS)

Table 5- Pearson's correlation coefficient for acute type of LBP participants.

Acute		Correlation Co-efficient (r)	95% Confidence interval	Coefficient of determination (r^2)	P Value
Pain	MRI finding grades	0.1286	-0.33 to 0.54	0.016	0.588(NS)
Duration of symptoms	MRI finding grades	0.175	-0.29 to 0.573	0.030	0.460 (NS)
MODI disability %	MRI finding grades	0.087	-0.369 to 0.510	0.007	0.713 (NS)

Table 6- Pearson's correlation coefficient for chronic type of LBP participants

Chronic		Correlation Co-efficient (r)	95% Confidence interval	Coefficient of determination (r^2)	P Value
Pain	MRI finding grades	-0.287	-0.739 to 0.343	0.082	0.364 (NS)
Duration of symptoms	MRI finding grades	-0.475	-0.824 to 0.135	0.225	0.1184 (NS)
MODI disability %	MRI finding grades	-0.303	-0.7471 to 0.3281	0.0918	0.338 (NS)

FIGURES

Fig. 1: Age wise distribution of participants with lumbar discogenic back pain.

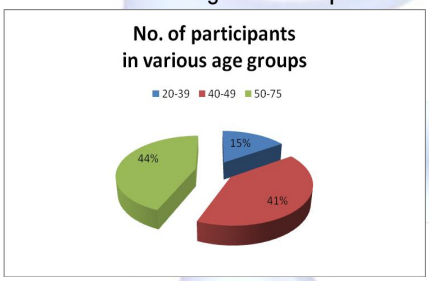


Fig. 2: Gender wise distribution of participants with of lumbar discogenic back pain.

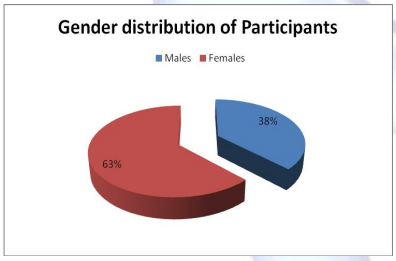


Fig. 3: Abnormalities on MRI of participants with lumbar discogenic back pain.

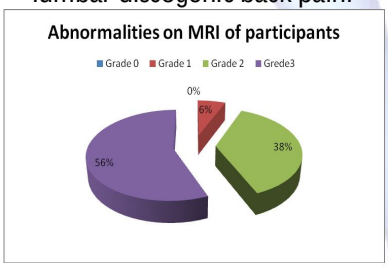
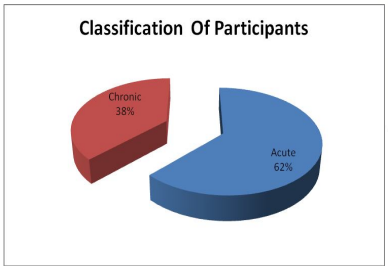


Fig. 4: Classification of participants with lumbar discogenic back pain.



RESULTS & STATISTICAL ANALYSIS

Mean score, standard deviation, confidence interval, correlation co-efficient, co-efficient of determination and p value were calculated to express the results. SPSS- version 14(Statistical Package for Social Sciences) for Windows and Microsoft Office Excel- 2007 was used to statistically analyze the obtained data from the study.

The obtained data from the patients were organized in a master chart. Various tables were derived for statistical analysis for easy interpretation of results. The demographic data and gender distribution is summarized in [Table-1 &2and figure 1&2]. Percentage of classification of patients with lumbar discogenic back pain shown in [figure 4].Abnormalities of participants with lumbar discogenic back pain on MRI is shown in[figure 3]. The mean & SD of various characteristics of participants including age, duration of symptoms, pain on NPRS and MODI disability percentage shown in [Table –3]

In the present study to evaluate relation between pain intensity on NPRS, duration of symptoms, disability percentage & between MRI finding grades Pearson's correlation test were carried out separately for acute and chronic discogenic low back pain patients [Table-4,5 & 6]. The results of this study do support research indicating no relation on MRI scan abnormalities as classified as various grades with clinical symptoms as pain intensity on NPRS (Pearson's correlation coefficient (r) = -0.01614) and disability percentage (Pearson's correlation coefficient (r) =-0.5628) in discogenic back pain patients.

DISCUSSION

In the present study we have randomly selected 64 participants having low back pain (LBP) with MRI scan of lumbar spine of both genders (Males-37.5% & Females -62.5%) with mean age and SD of 48.59 ± 13.32 years respectively. These participants were classified based on duration of symptoms as acute – 62.5% and chronic – 37.5%.The mean and SD value for pain on NPRS and duration of symptoms of LBP patients was 7.83 ± 1.58 & 3.06 ± 8.81 respectively. The functional disability was determined by using MODI which is one of the highly reliable measure and

mean and SD was found to be 52 ± 0.14 in present sample of patients.

The purpose of this descriptive study was to determine the association of (MRI) findings in the lumbar spine with intensity of pain and disability among persons with lumbar discogenic back pain.

The result of this study is compared to established normative values for the general population and specifically to normative values for people aged 20 and older and gender. Speculatively MRI scan have been found to demonstrate abnormalities in "normal "asymptomatic patients. [11] In a present study, we included the LBP patients with abnormalities seen in lumbar spine on MRI confirming disc pathology.

The abnormal findings on MRI were disc degeneration present in 59.3% patients, disc herniation observed in 56.25% & nerve root compression found in 56.25% patients. However the research conducted by Philip MCNee & James Sham brook in 2011 [22] found abnormal MRI findings with disc degeration present in 32% patients, disc herniation present in 39% & nerve root compression present in 46% patients which are comparable to our results. These abnormal investigative findings of MRI were classified as per the grading system given by Christian W, Boos N 2004 [21] in which Grade 0 (normal) - 0%, Grade 1 (contact) –6.25% patients, Grade 2 (deviation) –37.5%, Grade 3 (compression) – 56.25% patients.

In the present study to evaluate relation between pain intensity on NPRS, duration of symptoms, disability percentage & between MRI finding grades Pearson's correlation test were carried out The results of this study do support research indicating no relation on MRI scan abnormalities as classified as various grades with clinical symptoms as pain intensity on NPRS (Pearson's correlation coefficient (r) = -0.01614) and disability percentage (Pearson's correlation coefficient (r) =-0.5628) in discogenic back pain patients. The finding of our study goes in favor of the study done by Tapio Videman, Michelle C. Battie et.al.[23] To investigate the association between different spinal MRI findings & current, past year & life time LBP and concluded that after considering disc height, annular tears, herniation, osteophytes on MRI were not associated with LBP symptoms.

But according to some authors there is positive correlation between MRI findings & LBP symptoms, such as the study done by Oberg B, McDonald et.al[24] concluded that MRI parameters and discography findings are correlated with each other and with clinical parameters influencing the diagnostic value of MRI spine in back pain.

Also in present study, to evaluate association between the acute & chronic onset of LBP & their MRI findings grades using Pearson's correlation test. The statistical analysis shows no correlation between the onset of the disease & MRI finding grades. This finding of our study supported by Neil O'Connell in 2011[17] to find out the structural findings on MRI related to onset, severity , duration ,prognosis of low back pain and showed that the structural findings on MRI are not clearly related to onset, severity, duration, prognosis of low back pain.

The observation of this study provided a evidence to advise MRI scan which needs higher costs in clinically diagnosed patients with discogenic LBP in Indian settings.

Limitations

· Limited sample size

·We did not calculate the reliability (inter observer reliability) of observations noted by the radiologists.

Clinical Implication: It can safely be concluded that treating clinician should put more emphasis on history, clinical examination and make the inference by these should not correlate the clinical findings with that of MRI to reach a final diagnosis. It may useful in gaining faith of patients and lowers the financial burden on patient, keeps update in sense of knowledge as today we are too much dependent on machine.

CONCLUSION

This study has shown that there is no association of MRI findings in the lumbar spine with intensity of pain and disability among persons with lumbar discogenic back pain. Clinician should not correlate clinical findings with that of MRI findings to reach the final diagnosis.

LIST OF ABBREVIATIONS

LBP – Low Back Pain
MRI – Magnetic Resonance Imaging
CT – Computed tomography
NPRS – Numerical Pain Rating Scale
MODI – Modified Oswestry Disability Index
SD – Standard Deviation.

Conflicts of interest: None

Funding: None

Acknowledgement:

Authors thanking Almighty first for the successful completion of this study and also thankful to the Principal, all the staff members and my colleagues who have given constant support and encouragement. Never forget the unconditional help from family members who are always with all endeavors. Last but not least must thank all the patients for their kind co-operation for this study.

REFERENCES

1. Ehrlich GE .Low back pain. Bulletin of the World Health Organization 2003a; 81:671-676.
2. Hestback L, Leboeuf - Yde C, Manniche C. Low Back Pian : What is the long-term cause? A review of studies of general patient populations.Eur spine J 2003; 12:149-65.
3. Rubin DI. Epidemiology and risk factors for spine pain.Neurol clin.2007; 25(2):353-371.
4. Fidvi.N.May.S. Physiotherapy Research International.2010; 15(3):150-159.
5. Van Tulder, M.Koes B, Bombar dier C.LBP.Best Pract. Res Clin Rheumatol.2002; 16(5); 761-775.
6. Atlas SJ,Chang Y,Kammann E,et.al. Long –term disability and return to work among patients who have a herniated lumbar disc:the effect of disability compensation.J Bone Joint Surg Am.Jan 2000;82(1) :4-15.
7. Spitzer Wo,Leblanc FE,Dupuis M et.al. Scientific approach to the assessment and management of activity releated spinal disorders.A monograph for clinicians. Report of the Quebac Task Force on spinal disorders. Spine 1987; 1 2:15-595.
8. Aprill and Bogduk 1992, Schellhas et. al. High-intensity Zone: a diagnostic sign of painful disc on magnetic resonance imaging. Br J Radiol 1992; 65:361-9.
9. Goscinski I, Ulatowski S, Urbanik A. Comparison of the clinical usefulness of magnetic resonance (MR), computer tomography (CT) and radiculography (R) in diagnostic lumbar discopathy. Przegl Lek 2001; 58:885–8.
10. Beattie P. The relationship between symptoms and abnormal magnetic resonance images of lumbar intervertebral disks. Phys Ther 1996; 76:601 –608.
11. Boden SD, Davis DO, Dina TS, Patronas NJ, Wiesel SW. Abnormal magnetic-resonance scans of the lumbar spine in asymptomatic subjects. A prospective investigation. J Bone Joint Surg [Am] 1990; 72:403.
12. La Rocca, H. and MacNab, I. Value of pre-employment radiographic Assessment of the lumbar spine. Conad. Med. Assoc.J. 1969;101:383.
13. Endean A,Palmar KT,-Potential of MRI findings to refine case definition for mechanical LBP.spine 2011.
14. Jarvik JJ, HollingWorth W,Heagerty P et.al. The longitudinal assessment of imaging and disability of the back (LAIDBack) study:Baseline data.Spine 2001;26:1158-66.
15. Boden SD. The use of radiographic imaging studies in the evaluation of patients who have degenerative disorders of the lumbar spine. J Bone Joint Surg Am 1996; 78:114 –124.
16. Deyo RA, Mirza SK, Turner JA, et al. Over treating chronic back pain: time to back off? J Am Board FAM Med2009; 22:62 –68.
17. Neil o cannels-of shiny pictures and poorer outcomes: spinal MRI and back pain-29 march 2011
18. Lippincott Williams and Wilkins.Guide to care for patient – Nurse Practitioner , American journal of primary health care ; may 2009:volume 34&5:page 19-20.
19. Stratford P. & Spadoni. The reliability , consistency & clinical application of a numeric pain rating scale. Physiotherapy Canada 2001; 53(2);88-91.
20. Roland Melzack et al, Transcutaneous Electrical Nerve Stimulation for low back Pain: A comparison of TENS and massage for pain and range of motion. Physical Therapy 1983; 63(4): 489 - 493.
21. Christian W, Dora C, Maritus R,Zanetti M,Holder & Boos N 2004; MR images – based grading of lumbar nerve root compromise due to disk herniation ; reliability study with surgical correlation , radiology 230 ; 583-588.
22. Sham brook J,MCNee P , HarissEC , Kim M , Sampson M,Coggon D,clinical presentation of low back pain and association with risk factors according to findings on magnetic resonance imaging , PAIN 2011;152:1659-65.
23. Borenstien DJ, O'Mara Jw. Boden SD.et.al.abnormal magnetic resonance scans of the lumbar spine in asymptomatic patients."J bone joint surg AM.1995nov77 (11):16318.
24. Laslett M.Oberg B, Mcdonald .et.al.centralizattion as predictor of provocation discography results in chronic low back pain and the influence of disability and distress on diagnostic power.Spine J.2005Jul-Aug;5(4):370-380.

How to cite this article: Surendra K. Wani, Neha Deshpande. CORRELATION OF PAIN AND DISABILITY WITH MRI FINDINGS IN PATIENTS WITH LUMBAR DISCOGENIC BACK PAIN. Int J Physiother Res 2014;2(2):418-23.