



## **A study to evaluate the role of Magnetic resonance Imaging in the evaluation of Low back ache among non-traumatic patients.**

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### **Abstract:**

**Background:** Musculoskeletal pain is defined as pain originating from the musculoskeletal system. When the pain originates from the lower back to the gluteal fold it is usually defined as low back pain. The aetiology of low backache is multifactorial and can be broadly classified as spondylogenic, neurogenic, vascular and psychogenic. The role of diagnostic imaging in patients with back pain is an important one in today's health care environment. Previous studies have demonstrated a high prevalence of morphologic abnormalities in both symptomatic and asymptomatic individuals. The causes of LBP in adolescents and young adults are often not known. Magnetic resonance imaging (MRI) studies are useful sources of information regarding lumbar spinal anatomy. The purpose of the study was to describe the prevalence of certain MRI

findings in the lumbar spine and to evaluate any possible associations between LBP/care seeking and the MRI findings. Therefore, a prospective study was designed to evaluate the role of MRI in the evaluation of low back pain in young adults. However, because almost all lumbar structures can elicit pain. It is reasonable to assume that morphologic changes of the lumbar spine also play a role in LBP. Many imaging modalities are available for the evaluation of chronic low back pain namely Plain radiography, CT, MRI, scintigraphy, discography etc. each of which have their set of advantages and limitations in the identification of the cause of pain.

**Objective:** To study the prevalence and MR imaging finding in non-traumatic adults with low back pain. **Methodology :** The present cross sectional study was conducted at the Department of Radiology at East point college of medical sciences and Research Institute , from May 2022. to February 2023. A total of 50 study subjects were selected based on the inclusion and exclusion criteria . Informed consent of participating individual was taken. The patient was briefed about the procedure and relevant instructions was given to the patient. A pre-structured proforma was used for collection of clinical data. **Results :** The Mean age of subjects was 49.87  $\pm$  13.82 years. Majority of subjects were in the age group 30 to 39 years (32%) followed by 40 to 49 years (30%), 60 to 69 years (18%), 50 to 59 years (16%) and aged more than 70 years in 4%. In the present study 48% of them were Female and 52% were Males . In the study 12% had L1-L2 , 16% had L2-L3 , 54% had L3-L4 , 82% had L4-L5 and 70% had L5-S1 Degenerative disc. In the present study Spondylolisthesis, sarcoilitis, schroml nodules , Haemangiomas were found to be other causes of back pain . **Conclusion :** According to the findings of this research, MRI is one of the most complete, non-invasive, and safe imaging modalities for the early identification of low back pain. When compared to previous studies in the literature, the incidence of MRI alterations in the spine in symptomatic patients appeared to be greater in our research, and these changes were more common in the (24 to 30 years) age group.

**KEYWORDS:** Low Back Pain, Magnetic Resonance Imaging, Spine Degeneration , Non Trauma

**Introduction:**

Low back pain is defined as any pain or discomfort that is felt below the costal margin and above the inferior gluteal with or without leg pain. Surprisingly, 65 % of the population will have low back discomfort at some point in their working lives.<sup>1,2</sup>

The National Centre for Health Statistics reports that back and spine issues are one of the main causes of physical activity limitation among persons under the age of 45. Low back pain (LBP) is one of the most common complaints worldwide and in our country due to degenerative spine disorder (DSD).<sup>1,2,3</sup>

A common musculoskeletal condition that everyday affects people is low back discomfort. According to estimates, up to 85% of people in industrialized countries will have low back pain at least once in their lives. The severity of the low back pain may be great, leading to debilitation. Low back pain produces severe handicap, resulting in major limits in normal activity and engagement, such as the inability to work. Mild degenerative changes in the spine are common, and they should only be classified as problematic if they result in symptoms and other clinical signs. Low back pain with a degenerative cause is caused by the intervertebral disc, vertebral periosteum, facet joints, and spinal ligaments, which are all structural parts of the spine.<sup>4,5</sup>

A more complete anatomic examination is made possible by contemporary diagnostic imaging equipment, but it also has the potential to disclose unwanted findings. The results that are morphologically abnormal but not the cause of the symptoms go into the first category, while

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the abnormal findings that are likely related to the symptoms but have no bearing on clinical judgement or outcome fall into the second category.

Diagnostic imaging is important in today's healthcare environment for people with back pain. According to earlier studies, morphologic anomalies can occur in both symptomatic and asymptomatic individuals.

These results' importance, as well as the significance of their changes over time and connection to symptoms, are still up for debate. Due to the high incidence and considerable effect of the illness, we were interested in seeing what type of magnetic resonance imaging (MRI) results persons with chronic low back pain (LBP) with or without lower limb radiculopathy had.<sup>6,7</sup>

The cause of LBP in adolescents and young adults is frequently yet unclear. Investigations using magnetic resonance imaging (MRI) may provide important details regarding the lumbar spine's anatomy. The aim of the study was to evaluate any potential associations between LBP/care seeking and the MRI results as well as the prevalence of certain MRI abnormalities in the lumbar spine. the cause of suffering. As a result, a prospective research was established to assess the usefulness of magnetic resonance imaging (MRI) in the diagnosis of low back pain .

### **Objective:**

To study the MR imaging finding in non-traumatic adults and to assess the patients with low back pain.

### **Materials and Methods :**

The present cross sectional study was conducted by the department of Radiology at East point medical college and Research Institute from May 2022 to February 2023

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A total of 50 study subjects who met the inclusion criteria were selected for the purpose of the study .

Inclusion Criteria :

- Patient referred to radiology department with complaints of low backache.
- Male and female patients with LBP between the age group of 30-80 yrs.

**EXCLUSION CRITERIA:**

- Traumatic patients.
- Postsurgical LS spine cases.
- Pregnant women.

The study is was conducted among 50 patients, who visited Department of Radio Diagnosis at East Point Medical College, Bengaluru for magnetic resonance imaging from the period of May2022 to February 2023 for Low Back Ache after obtaining the Consent. The data was collected in a pre-structured proforma.

Philips Achieva 3 tesla MRI machine was used for the study of low backache patients. If the inclusion criteria is fulfilled, the patients will be thoroughly evaluated to find out any contraindications for MR imaging. The parameters which will be assessed include lumbar spondylosis, facet joint hypertrophy, spondylolisthesis, canal stenosis, disc lesions at each level and any other additional spine/soft tissue details. The images procured and the radiology

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reports will be stored in the department computer database. Representative cases and images will be discussed in detail

### **Use of surface coils**

Motion suppression technique such as anterior radio frequency saturation bands, gradient moment nulling are critical to reduce motion artefacts.

### **Technique:**

Fast Spin Echo (FSE), T1weighted, T2 weighted, Short Time Inversion

Recovery (STIR)

### **Planes:**

Coronal, Axial, Sagittal

All statistical analysis was performed according to intention to treat principle by SPSS software version 21 for Windows (SPSS Inc., Chicago, IL, USA). Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and Percentage . Chi-square test / Pooled chi square was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation. Student T test was used to test the level of significance between two groups for continuous variables.

### **Results :**

A total of 50 study subjects were analyzed during the study period .

**Table 1 : Social profile of the study subjects**

		Count	%
Age	30 to 39 years	16	32%

	40 to 49 years	15	30%
	50 to 59 years	8	16%
	60 to 69 years	9	18%
	>70 years	2	4%
Gender	Female	24	48%
	Male	26	52%

The Mean age of subjects was  $49.87 \pm 13.82$  years. Majority of subjects were in the age group 30 to 39 years (32%) followed by 40 to 49 years (30%), 60 to 69 years (18%), 50 to 59 years (16%) and aged more than 70 years in 4%. In the present study 48% of them were Female and 52% were Males .

Table 2 : Distribution of study subjects based on MRI Findings

		Yes		No	
		Count	%	Count	%
Degenerative Disc changes	L1-L2 (1)	6	12%	44	88%
	L2-L3 (2)	8	16%	42	84%
	L3-L4 (3)	27	54%	23	46%
	L4-L5 (4)	41	82%	9	18%
	L5-S1 (5)	35	70%	15	30%
Spondylolisthesis		11	22%	39	78%
Lumbar Canal Stenosis		16	32%	34	68%
Infection		5	10%	45	90%

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Sacroiliitis	4	8%	46	92%
Schmorl Node	6	12%	44	88%
Hemangioma	12	24%	38	76%
Sequestred Disc	3	6%	47	94%

In the study 12% had L1-L2 (1), 16% had L2-L3 (2), 54% had L3-L4 (3), 82% had L4-L5 (4) and 70% had L5-S1 (5) Degenerative disc. Spondylolisthesis was seen in nearly 22% of the study subjects . Lumbar Canal Stenosis was seen in 32% of the study subjects. Nearly 10% of the study subjects had infectious etiology for the back pain. Sacroiliitis was seen in nearly 8% of the study subjects. 12% of the study subjects had Schmorl Node. Haemangioma was seen in nearly 24% of the study subjects with back pain . Sequestered Disc was seen in nearly 6 % of the study subjects.

### **Discussion :**

The Present Cross sectional study was conducted at Department of Radiology at East point college of medical science & Research Institute from may 2022 to February 2023 total of 50 study subjects who met the inclusion criteria were included in the study and analyzed based on the objective of the study .

From various studies done through out the world it was found that lumbar disc degeneration was the major reason for the low back pain and leads to disc herniation leading to chronic Back pain if not diagnosed and treated properly . By advanced diagnostic test like Magnetic Resonance Imaging which are non invasive and easy to perform we could get excellent



imaging of spine can be obtained .

In the present study the mean age of the study participants was  $49.87 \pm 13.82$  years. Majority of subjects were in the age group 30 to 39 years (32%) followed by 40 to 49 years (30%), 60 to 69 years (18%), 50 to 59 years (16%) and aged more than 70 years in 4% . The age group of subjects with low back pain in our study was found to be similar to the study findings of Ganesan S et al <sup>8</sup> and Kopec J A et al.<sup>9</sup>

Adeyinika and Omidiji <sup>10</sup> found a mean age of 53.27 years in their study on magnetic resonance imaging diagnoses in the lumbar spine of adults with low back pain, whereas Galukande et al <sup>11</sup> found a lower mean age of 43.83 years, possibly because most of Galukande's patients were in the younger age group..

Among the gender it was found that 52 % of the male and 48 % of female were present in our study . Distribution of Low back pain in the study done by Ganesan S et al <sup>8</sup> and Wang Y X et al<sup>12</sup> . Similar to our study other studies also showed male predominance in lower back pain due to increased mechanical stress and injury . The male predominance, on the other hand, may be linked to the larger amount of physical/vigorous activities that the male gender is thought to engage in, resulting to an increase in musculoskeletal 'wear and tear' and so predisposing them to a higher prevalence of low back pain. Schneider et al <sup>13</sup> and Wijnhoven et al <sup>14</sup> showed contrasting findings to our study where female were found to be more affected by Lower back pain than male. This increased incidence of ow back pain in female is due to hormonal changes , prolonged or irregular menstrual cycle as mentioned in the earlier studies . Wedderkopp et al <sup>15</sup> also reported incidence of low back pain more among female than male may be due to failure to identify back pain from different pain perception and difficulty in recalling of the symptoms .

In the present study the disc degeneration at the level of L1-L2 was found to be 12%, at L2 - L3 it was 16% , L3-L4 it was 54% , L4-L5 it was 82% and at the level of L5 -S1 it was 70%.

Disc degeneration is a common degenerative change of intervertebral discs. It results from the replacement of the glycosaminoglycans within the nucleus pulposus with fibro cartilage which leads to reduced disc height due to reduction in nucleus pulposus volume . In the present study majority of the subjects had Disc degeneration at the level of L4- L5 followed by L5-S1. Similar study findings were also seen in the study conducted by Shafaq Saleem et al <sup>16</sup> where 64.45 of them had disc degeneration at L4-L5 and Schwarzer et al where 39% of the subjects had degeneration at L4-L5 and L5-S1 levels.

Degenerative spondylolisthesis (DS) is a condition in which one vertebral body slips over the one below it. The lack of a pars interarticularis defect (spondylolysis) distinguishes it from spondylolytic spondylolisthesis, in which the whole upper vertebra (vertebral body and posterior section of the vertebra, including neural arch and processes) slides relative to the lower vertebra.

Among the study subjects Spondylolisthesis was seen in nearly 22% of the study subjects in the present study. The Spondylolisthesis was also found to be increasing along with the age of the subjects Sacroiliitis was found to be in nearly 8% of the study subjects with back pain in the present study with majority of them aged more than 60 years of age and among Male subjects . Sacroiliitis is a non-infectious inflammatory condition that affects the sacroiliac joint and is used to diagnose seronegative spondyloarthropathies. For validating the diagnosis of this illness, imaging modalities are quite useful. Patients often experience a gradual onset of discomfort that is alleviated by physical exercise but intensifies late at night. Sciatica may be caused by referred pain or inflammatory changes in the area of the sacroiliac joint that damage

the nerve directly. The patient's symptoms help guide the diagnosis, although CT and MRI results are pathognomonic. MRI, on the other hand, may offer information on the activity of the illness and aid in the early diagnosis of sacroiliitis by displaying the associated acute inflammatory changes.

Schmorl Nodules was named after the Schmorl who originally characterised them in 1927, the herniation of the nucleus pulposus through the cartilaginous endplate into the body of a vertebra has been commonly accepted. In our study lower back ache was seen in nearly 12% of the study subjects with Schmorl Nodes . It was seen more among the younger age group with less than 50 years of age with female predominance . The findings of our study was found to be much lesser when compared with the study done by Pfirrmann and Resnick Et al <sup>17</sup> where Schmorl nodules was seen in 58% of the study subjects.

Bone Hemangiomas are found to be most common benign bone tumors which constitutes less than 1% of all primary bone tumors. These Malformed vascular lesions are more frequently seen in the vertebral column and the skull. Hemangiomas at other sites are quite rare. In our study Back Ache due to hemangiomas was seen in nearly 24% of the study subjects. The findings of our study was found to be comparable to be findings of Matrawy K A et al <sup>18</sup>.

### **Conclusion :**

According to the findings of this research, MRI is one of the most complete, non-invasive, and safe imaging modalities for the early identification of low back pain. When compared to previous studies in the literature, the incidence of MRI alterations in the spine in symptomatic patients appeared to be greater in our research, and these changes were more common in the (24 to 30 years) age group.

Degenerative disc disease, especially in the L4-L5 region, was the most prevalent cause of low back pain. Other causes of low backache were discovered in addition to degenerative illnesses. Finally, MRI is the most accurate way to evaluate illnesses of the bone marrow, disc, posterior vertebral components, spinal cord, and nerve roots on a global scale.

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