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Degenerative Changes of the Lumbosacral Spine on Magnetic Resonance Imaging and its Associated Selective Risk Factors at Hayatabad Medical Complex, Peshawar

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ABSTRACT

Disc degeneration marked by structural and functional alteration, presents a significant health concern, often leading to pain, discomfort, and immobility. The study aimed to find the relation between disc degenerative diseases with age, gender, and occupation using MRI as a diagnostic tool. This study was a cross-sectional study carried out at HMC, Peshawar. Patients who came to the Radiology department with lower back pain were included in our study. Data were collected through a written questionnaire including three sections (demographic section, patient-related questions, and questions related to MR personnel). In this study, data from 338 patients who were clinically diagnosed with disc degenerative diseases were analyzed. The study consisted of 175 male and 163 female participants. We found that the most affected age group by disc degenerative changes was 40-60 years (41%). Males (n=175) were more prone to disc degenerative diseases than females (163). Among disc degenerative diseases disc bulging was the most common disease and housewives were the most common occupation. Our findings suggest that among patients with disc degenerative changes between the ages of 40 and 60, disc bulging was more common in women than in men. Patients aged between 20 to 40 with disc desiccation, were more likely to be female than male. Women had a higher prevalence of spinal stenosis than men between the ages of 40 to 60. In contrast, disc herniation was more common in men between the ages of 20 to 40. Men had more disc protrusion than women between the ages of 20 and 40, while men had more disc extrusion between the ages of 40 and 60 than women. Based on our findings, we determined that males were more prone to disc degenerative alterations than females, and the most affected spinal levels were L4-L5 and L5-S1. Finally, we found that disc bulging is the most frequent spinal disease, followed by disc desiccation and spinal stenosis.

Keywords: Hayatabad Medical Complex, Magnetic Resonance Imaging, Disc Degenerative Changes, Associated Selective Risk Factors.

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INTRODUCTION

Degenerative lumbar spine disease is when an intervertebral disc and surrounding spinal components are weakened due to age or a pathogenic cause [1,2]. Around the world, lumbar disc degeneration is the most frequent cause of low back pain [3,4,5]. Lower back pain caused by disc degenerative disease primarily impacts the individual in their young to middle-aged years, with the highest occurrence around the age of 40 [6,7]. The lumbar region comprises 5 vertebrae, represented by L1-L5. A passageway for spinal nerves to exit is created by the intervertebral discs, adjacent vertebrae's laminae, pedicles, and articular processes. Together, the lumbar vertebrae form a lordotic curve [8].

The intervertebral disc which is the largest avascular structure made up of cartilage positioned superiorly and inferiorly, the outer annulus fibrosus, and the inner nucleus pulposus [9,10,4]. The spinal column is supported by an intervertebral disc and acts as a shock absorber that cushions the human body against vertical loads [11]. The osmotic characteristics of the proteoglycans allow the intervertebral disc to withstand compression [12]. The disc's resistance to flexion, compression, and anterior and lateral shears constitute the intervertebral disc, aside from the facets, the most significant load-bearing component of the spine [9, 12].

Disc degeneration brought on by loading causes a decrease in intradiscal pressure, reduced disc height, and increased stress on the facet joints and annulus surrounding it. Reduce disc height, narrowing of facet, spondolysis and sclerosis of the upper and lower endplates, spinal stenosis, lateral recess narrowing, desiccation, fibrosis, diffuse annular bulging, extensive annular tears, and sclerosis of the endplates, are some of the symptoms of degeneration. Disk herniation, lumbar spinal stenosis, facet joint arthropathy, or any combination of these conditions may be the first signs of lumbar disc degeneration [12]. Radial tears in the annulus allow nuclear materials to protrude or extrude into the perineural space, resulting in herniation [10,12]. Any kind of narrowing of the spinal canal, nerve root canal, or intervertebral foramina is referred to as lumbar spinal stenosis [12]. The main cause of spinal stenosis is known to be degenerative disk disease, which is most common at the L4-5 level and subsequently occurs at L3–4, L5–S1, and L1-2 [13].

A disc bulge is a widening of the disc that extends past the boundaries of the surrounding vertebral endplates. For a diagnosis of a disc bulge, over 90% of the disc's perimeter must extend beyond the boundaries of the vertebral endplates. Disc bulges that protrude backward into the spinal canal and extend evenly into both the left and right halves of the canal are termed symmetric. An asymmetric disc bulge, on the other hand, would extend more to the left or right of the spinal canal. By contrast, Disc herniation is characterized by a concentrated extension of the disc that involves less than 90 degrees of the normal circumference of the intervertebral disc. Disc protrusions and disc extrusions

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are the two subtypes of disc herniation based on their morphology. A broad-based herniation with a base width greater than any other component of the herniation is called a disc protrusion. A disc extrusion occurs when a herniation in any plane has a base width that is smaller than the remaining herniation [14].
The degeneration of lumbar intervertebral discs is affected by various factors, such as genetics aging, obesity [7,4,6,15], elevated BMI, being overweight, high levels of LDL, cholesterol, occupational lifting, and participation in sports activities [15]. Long-term smoking is strongly associated with lower back pain and lumber sacral radicular pain [16]. Research may also point to a link between chemical exposure-induced disc degeneration and smoking [17]. Damage to both cellular and acellular components is accelerated by disc degeneration, which is brought on by overloading and minor injuries [18].

In the clinical assessment of intervertebral disc pathology MRI is the primary and most important technique. On magnetic resonance images using T2 weighting, the decreased signal intensity is indicative of reduced water content, proteoglycans, and collagens that can be observed in degenerative intervertebral discs. From a radiological perspective, spondylosis and degenerative disc disease in the lumbar spine can be detected by examining alterations in the signal intensity of vertebral body endplates on magnetic resonance imaging [19].

The research was conducted at the University of Lahore Gujrat campus in Pakistan and the Department of Radio Diagnosis and Imaging in Nepal. Disc desiccation was found to be the most frequent overall (Arising at L5 and S1) and the disc level that is most frequently involved are L4 and L5 with disc bulging and disc herniation and a decrease in Disc height observed at the L5 and S1 level [20].

In the Radiology Department, cross-sectional research was carried out in Muhimbili National Hospital Dar Es Salaam on 165 patients with lower back pain in 2010. In this study, patients 20-80 years of age were included. A total of 3 age groups were made between 20-39, 40-59 and 60-80. The research revealed four findings: disc degeneration, bulging, herniation, and Modic changes. According to the study, the most common findings were disc degeneration with a high percentage between 60-80 ages. The study also shows that a high percentage of males suffer in comparison to females from disc degeneration. These changes were more frequent at the L4/5 level. The limitation of the study was, no association of DDD changes with associated risk factors like smoking, obesity, and diabetes [21].

A study was performed in Birat Medical College at the Department of Radio Diagnosis and Intervention Radiology in 2021 with a sample size of 899, among which 45.16% were males and 54.84% were females. A total of 3 age groups were made 18-35 age, 36-56 age, and 57-90 age. The most affected group with DDD was between 36 to 55 ages. Study shows that the most common finding was disc desiccation between the age of 35 and 55 age and the commonly involved spinal level were L4/5 and L5/S1. The limitation of the study was no distinction between pregnant and non-pregnant females [22].

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A retrospective study was carried out from two centers North Central and South Western Nigeria showing that out of 205 patients, 104 (51%) were females and 101 (49%) were males. The study shows that the most common pathology was disc bulging with an 82.8% occurrence rate in the most affected age group between 51-60 years. The limitation of the study is they do not correlate DDD with associative risk factors i.e., pregnancy, obesity, occupation, and smoking [23].

LITERATURE REVIEW

Review of relevant theories

Degenerative disc disease (DDD) is a prevalent condition impacting the intervertebral discs in the spine. The most common factor associated with disc degenerative changes is the inherent aging process. As individuals age, intervertebral discs in the spine undergo changes that contribute to degeneration, occupation, lack of physical activity, and poor posture.

Existing Studies

A study conducted at Jordan University Hospital showed that out of 167 participants 92 were Males and 75 were Females. Among males 1.14% showed Disc bulge whose age was less than 20 years, 15.91% were between 20 to 40 ages, 27.27% were between 40 to 60, and 12.5 % were greater than 60. Another associated factor is Disc protrusion whose prevalence shows 0% in patients whose ages were less than 20, 11.4% in ages between 20- 40, 37 % in ages between 40-60, and 05% in age greater than 60. In this research article there is no correlation between obese and lower back pain, no difference between pregnant and non-pregnant females. Also, there is no limitation for the weight of the patients and the daily routine of those patients. (16)

A retrospective cross-sectional study conducted in a teaching hospital in North-Central Nigeria shows that among 233 Patients 132 were males and 101 were females. Among males no patient experienced lower back pain with a slipped disk whose age was less than 20, 5.9% were between 20-29, 14.3% were between 30-39 age, 19% were between 40-49 age, 20.8% were between 50-59 age, 5% were greater than 60 age. In this article there is no correlation between smoking and disc degenerative changes, no association between BMI and lower back pain & and no difference between pregnant and non-pregnant females. (17)

A study was conducted at a tertiary care hospital in Lahore Pakistan with a sample size of 266 patients, among 266 patients 143 were females and 123 were males. A total of 3 age group were made which were between 20–40, 40–60, and 60–80 years old, in which the most affected age group were 40-60 age having 56.8%, followed by 16% in 20-40 age and 26.3% were between 60-80 age. In this article, there is no gander-wise distribution of patients with disc degenerative changes. Their results were based on a cumulative percentage of DDD among male and female patients. (2)

A study was conducted in de Janeiro during the 2016 Summer Olympics Games. The findings of the study are out of 11274 athletes, 40% have DDD having a Ratio of 42% Female and 58% male. The study also shows that among these athletes 39% [53% F, 47% M] have affected lumber discs with DDD. In this article, there is no correlation between age with DDD and no specific affected lumber level is mentioned. (18)

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A study performed at the China-Japan Friendship Hospital in Beijing China reported that those patients who are involved in high workload activities face more disc degenerative changes. This study has limitations as there is no distinction between pregnant and non-pregnant women. (19).

METHODOLOGY

Research Design

This study adopted a cross-sectional study design.

Data Collection Methods

Data were collected at the radiology department from all patients referred to MRI for lumbosacral disc degenerative spine scan irrespective of gender and age through a pre-design questionnaire. The type and status of disc degenerative disease were obtained using MRI as a diagnostic tool. All post-operative and Traumatic patients of the lumbosacral spine were excluded from this study. Data was obtained on 1.5T Philips's machine.

We use a non-probability convenient sampling technique for sample size. The sample size was calculated through Cochran's sample size formula i.e. $N=p\,(1-p)\,(Z/E)^2$, with (anticipated frequency) p=27.3%, (confidence interval) z= 95% and (standard sample error) E =5%, which shows 306 total sample size.

Data Analysis Methods

Statistical analysis was done through SPPS version 22. Statistical tests were applied to determine the frequencies and correlations among various parameters. The chi-square test was applied to assess the association of DDC with age, gender, and occupation.

Ethical Considerations

Ethical permission was acquired from the university ethical committee before conducting this cross-sectional study. Following that, the data was gathered from Hayat Abad Medical Complex Peshawar.

RESULTS

In our study, N=338 patients with MRI scans were selected randomly from the radiology department of Hayatabad Medical Complex, Peshawar, irrespective of age and gender, which fulfilled our inclusion criteria. The male ratio was higher (n=175, 51.8%) than the female (n=163, 48.2%). The study participants were divided into five age groups, with group 3 (40-60) having the maximum number of participants n=139 (41.1%). The occupation status of the participants and their frequencies are listed below in **Table 1,** among which a maximum number of participants were in the housewife occupation category with n=129 (38.9%) followed by teachers with n=42 (12.4%) and mechanics with n=25 (7.4%).

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Table 1: Descriptive statistics of the demographic profile of the participants

S.no	Variables		Frequency (F)	Percentage (%)
1.	Age of the participants	0-20	19	5.6
		20-40	131	38.8
		40-60	139	41.1
		60-80	45	13.3
		80-100	4	1.2
2.	Gender of the participants	Male	175	51.8
		Female	163	48.2
3.	Occupation of participants	No occupation	3	0.9
		Farmers	17	5.0
		Teachers	42	12.4
		Students	21	6.2
		Drivers	25	7.4
		Tailors	17	5.0
		Mechanics	31	9.2
		Housewives	129	38.2
		Masjid Imams	4	1.2
		Electricians	2	0.6
		Clerks	17	5.0
		Bankers	1	0.3
		Laborers	29	8.6

The participants with the most commonly affected level by DDCs were n=101 (29.9%) on L4-L5/L5-S1, n=68 (20.1%) on L4-L5, and n=40 (11.8%) on L5-S1 followed by; n=37 (10.9%) on L3-L4/L4-L5/L5-S1, n=25 (7.4%) on L3-L4/L4-L5

Among the various types of disc degenerative changes, most frequently observed was disc bulging with NRC at different spinal levels. Specifically, n=80 (23.7%) at L4-L5 level, n=33 (9.8%) at L5-S1, and n=25 (7.4%) at L4-L5/L5-S1. Additionally, 9 cases (2.7%) at L3-L4/L4-L5, 6 cases (1.8%) at L2-L3/L3-L4/L4-L5 levels and n=5 (1.5%) at L3-L4 level. The others least affected levels were multiple levels (L1-L3/L4-L5, L3-L4/L5-S1 & L3-L4/L4-L5/L5-S1) with 4 cases (1.2%), 3 cases (0.9%) at L2-L3/L3-L4/L4-L5/L5-S1, 2 cases (0.6%) on multiple levels (L2-L3/L3-L4, L1-L2/L2-L3/L3-L4, L2-L3/L3-L4/L5-S1) and 1 case (0.3%) on multiple levels (L2-L3, L1-L2/L2-L3, L2-L3/L4-L5, L1-L2/L4-L5/L5-S1, L1-L2/L2-L3/L3-L4/L4-L5/L5-S

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Disc bulging without NRC was highest at L4-L5 (n=50, 14.8%), at L5-S1 (n=48, 14.2%) and at level L4-L5/L5-S1 (n=31, 9.2%) followed by L3-L4/L4-L5 (n=14, 4.1%), at L3-L4 (n=12, 3.6%) and at level L3-L4/L4-L5/L5-S1 (n=9, 2.7%). The other least commonly effected levels were L2-L3/L4-L5 (n=5, 1.5%), followed by multiple levels L2-L3/L3-L4, L3-L4/L5-S1 and L2-L3/L3-L4/L4-L5/L5-S1 (n=4, 1.2%) and n=1 (0.3%) on multiple levels (L1-L2, L2-L3, L1-L3/L3-L4, L1-L2/L4-L5, L1-L2/L5-S1, L2-L3/L5-S1, L1-L2/L4-L5/L5-S1, L1-L2/L2-L3/L3-L4 /L4-L5 /L5-S1 and L1-L2/L3-L4 /L4-L5 /L5-S1).

Spinal stenosis mainly affected the L4-L5 level (47 cases, (13.9%), followed by L5-S1 (23 cases, (6.8%) and L4-L5/L5-S1 (7 cases, (2.1%). The least affected levels were two levels (L3-L4 and L3-L4/L4-L5) with five cases (1.5%), and three levels (L3-L4/L4-L5/L5-S1) with 3 cases (0.9%). L2-L3/L3-L4 with 2 cases (0.6%), and 1 case each (0.3%) with multiple levels (L1-L2/L3-L4, L3-L4 /L5-S1, L1-L2/L2-L3/L3-L4, L2-L3/L3-L4/L4-L5 and L2-L3/L3-L4/L4-L5/L5-S1).

The most commonly affected levels with disc desiccation were L5-S1 with 32 cases (9.5%), followed by L4-L5 with 31 cases (9.2%) and 30 cases (8.9%) on L4-L5/L5-S1.The next commonly effected levels were L3-L4 /L4-L5/L5-S1 with 15 cases (4.4%), L3-L4/L4-L5 with 12 cases (3.6%) and L2-L3/L3-L4/L4-L5/L5-S1 with 7 cases (2.1%). The other least affected levels were (L3-L4 and L2-L3/L3-L4/L4-L5) with 6 cases (1.8%), four cases (1.2%) on L1-L2/L4-L5/L5-S1, 3 cases (0.9%) on two levels (L3-L4/L5-S1 and L1-L2/L3-L4/L4-L5/L5-S1), and two levels (L2-L3/L3-L4 and L1-L2/L2-L3/L3-L4 /L4-L5/L5-S1) with two cases (0.6%). Multiple levels (L2-L3, L1-L2/L4-L5, L2-L3/L3-L4 and L2-L3 /L3-L4/L5-S1) with 1 case (0.3%). Disc herniation was found to be most commonly affecting the L5-S1 level, with 31 cases (9.2%), followed by L4-L5 with 13 cases (3.8%), and L4-L5/L5-S1 with 6 cases (1.8%). The other least commonly affected levels were two levels (L2-L3 and L3-L4) with 2 cases (0.6%) and L3-L4/L4-L5/L5-S1 with 1 case (0.3%). Disc protrusion most commonly affects the L5-S1 level with 14 cases (4.1%), 3 cases (0.9%) on two levels (L3-L4 and L4-L5), and 2 cases (0.6%) on L3-L4/L4-L5 level. On the other hand, Disc extrusion was most commonly found to affect the level L4-L5 with n=5 (1.5%) and L5-S1 with n=1 (0.3%).

Type 2 Modic changes were most commonly affected with n=24 (7.1%) followed by Type 1 Modic changes n=8 (2.4%). The combination of Type 1 and Type 2 Modic changes were n=2 (0.6%), other Disc Degenerative changes found on MRI scans were Reduced Disc Height n=14 (4.1%), Hemangioma n=12 (3.6%), and Spondylethiasis n=2 (0.6%). The other least common Disc degenerative diseases were Spinal canal stenosis, meningocele, and spinal canal widening, all with n=1 (0.3%) mentioned in **fig 1 and Table 2** below:

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Fig 1: Levels of DDC

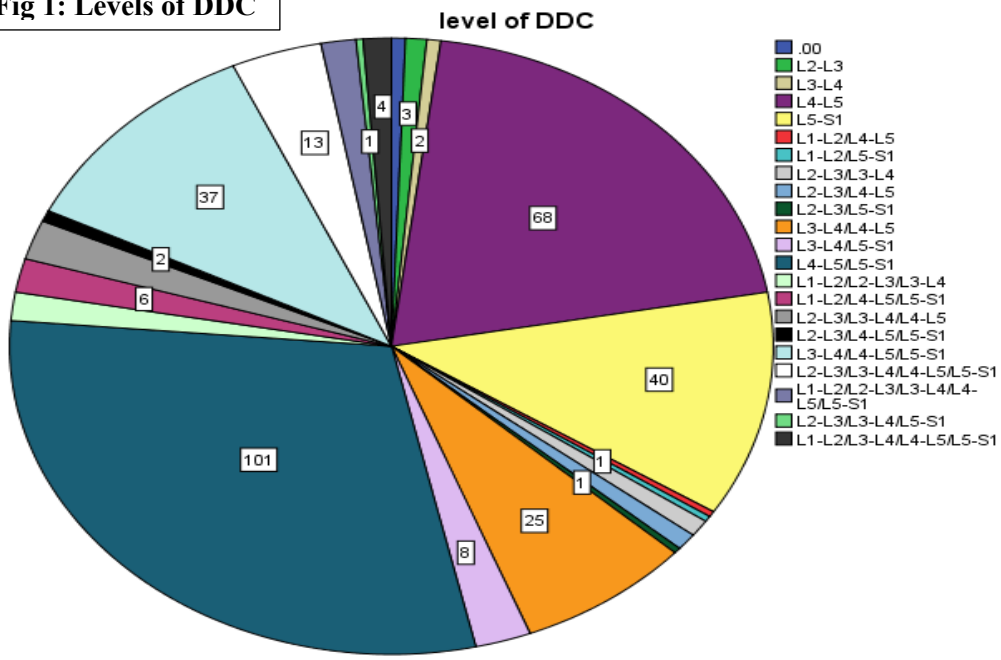

TABLE 2: **Disc degenerative changes along with the affected levels, frequency, and percentage**

S.no	Variables				Frequency	Percentage
1	DDC	Yes			338	100
		No			0	0
2	Level of DDC	L4/L5			68	20.1
		L5/S1			40	11.8
		L4/L5-L5/S1			101	29.9
		Others*			129	38.16
3	kind of DDC	Disc bulging	With NRC	L4/L5	80	23.7
				L5/S1	33	9.8
				L4/L5-L5/S1	25	7.4
				Others*	46	13.60
				No disc bulge with NRC	154	45.6
			Without NRC	L4/L5	50	14.8
				L5/S1	48	14.2
				L4/L5-L5/S1	31	9.2
				Others*	61	18.0
				No disc bulge without NRC	148	43.8
		Disc herniation	L5/S1		31	9.2
			L4/L5		13	3.8
			L3/L4		2	0.6

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			Others*	9	2.66
			No herniation	283	83.7
		Disc desiccation	L4/L5	31	9.2
			L5/S1	32	9.5
			L4/L5-L5/S1	30	8.9
			Others*	64	18.33
			No disc desiccation	181	53.6
		Spinal stenosis	L4/L5	47	13.9
			L5/S1	23	6.8
			L4/L5-L5/S1	7	2.1
			Others*	20	5.91
			No spinal stenosis	241	71.3
		Disc protrusion	L4/L5	3	0.9
			L5/S1	14	4.1
			L3/L4	3	0.9
			Others*	2	0.59
			No disc protrusion	316	93.5
		Disc Extrusion	L4/L5	5	1.5
			L5/S1	1	0.3
			No disc extrusion	332	98.2
		Modic Changes	Type 1	8	2.4
			Type 2	24	7.1
			Both 1&2	2	0.6
			No-Modic changes	304	89.9
		Others diseases	Reduced disc height	14	4.1
			hemangioma	12	3.6
			Spondylethiasis	2	0.6
			Others**	3	0.88
			No others disease	307	90.8

(*) **denotes** multiple levels **and** (**) **denotes** other diseases **that are discussed in the description above.**
(DDC**) Disc degenerative changes,** (NRC) **Nerve root compression.**

Relationship between age and DDC

We performed a chi-square test to assess the relationship between age and degenerative disc conditions (DDC). The most affected age group was 40 to 60 years, with 139 cases (p=0.000). Disc bulging was common among DDC cases, and there was a significant association between disc bulge with nerve root compression (NRC) and age (p=0.003). Disc desiccation also showed a strong correlation with age (p=0.000). Additionally, reduced disc height and hemangioma were significantly associated with age (p=0.012), along with spinal stenosis (p=0.000), as shown in **Table 3 below**.

Table 3: Association of age and disc degenerative changes

Variables	Age Group	Most affected Level	Total affected participants	P Value
Most Affected Level	0-20	L4-L5	19	**0.000**
	20-40	L5-S1	129	
	40-60	L4-L5	139	

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	60-80	L4-L5	45	
	80-100	L4-L5/L5-S1	4	
Disc Bulge With NRC	0-20	L4-L5	59	**0.003**
	20-40	L4-L5	101	
	40-60	L4-L5	88	
	60-80	L4-L5	27	
	80-100	L4-L5/L5-S1	1	
Disc Bulge Without NRC	0-20	L5-S1	10	0.69
	20-40	L5-S1	72	
	40-60	L4-L5	82	
	60-80	L4-L5	25	
	80-100	L3-L4/L4-L5	1	
Spinal Stenosis	0-20	L4-L5	5	**0.000**
	20-40	L4-L5	23	
	40-60	L4-L5	48	
	60-80	L4-L5	20	
	80-100	L2-L3/L3-L4/L4-L5/L5-S1	1	
Disc Desiccation	0-20	L4-L5/L5-S1	5	**0.000**
	20-40	L5-S1	65	
	40-60	L4-L5/L5-S1	63	
	60-80	L4-L5	20	
	80-100	L4-L5/L5-S1	4	
Disc Herniation	0-20	L5-S1	1	0.628
	20-40	L5-S1	28	
	40-60	L5-S1	24	
	60-80	L5-S1	2	
	80-100	-	0	
Disc Protrusion	0-20	-	0	0.931
	20-40	L5-S1	13	
	40-60	L5-S1	7	
	60-80	L5-S1	2	
	80-100	-	0	
Disc Extrusion	0-20	-	0	0.6
	20-40	L5-S1	1	
	40-60	L4-L5	4	
	60-80	L4-L5	1	
	80-100	-	0	

Relation between gender and DDC

We conducted the chi-square test to analyze the relationship between gender and disc degenerative changes, as illustrated in **Tables 4a and 4b**. The results indicated that among all DDC, disc extrusion exhibited a strong association (p=0.056) with gender.

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Table 4a: Association of gender and disc degenerative changes with their commonly affected levels.

Variable	Gender	Effected Level	Frequency	P Value
DDC	Male	L4-L5/L5-S1	58	0.313
	Female	L4-L5/L5-S1	43	
Disc Bulge Without NRC	Male	L4-L5	24	0.191
	Female	L5-S1	27	
Disc Bulge With NRC	Male	L4-L5	40	0.175
	Female	L4-L5	40	
Spinal Stenosis	Male	L4-L5	21	0.323
	Female	L4-L5	26	
Disc Desiccation	Male	L5-S1	20	0.239
	Female	L4-L5	17	
Disc Herniation	Male	L5-S1	21	0.247
	Female	L5-S1	10	
Disc Protrusion	Male	L5-S1	9	0.181
	Female	L5-S1	5	
Disc Extrusion	Male	L4-L5	5	**0.056**
	Female	L5-S1	1	

Variable	Most common	Gender	Frequency	P value
Modic changes	Type 2	Male	16	0.191
		Female	8	
Other disease	Reduce disc herniation	Male	6	0.317
		Female	8	

Table 4b: Association of modic changes, other diseases, and gender

Relation between occupation and DDC

A chi-square test showed a significant relationship (p=0.000) between occupation and Disc Degenerative Changes (DDC). Female housewives (n=129) were the most affected, followed by male laborers (n=29) and mechanics (n=31). Among housewives, 78 experienced disc bulge without nerve root compression (NRC), compared to 24 laborers and 11 mechanics (p=0.001). Housewives (n=71) also had a higher incidence of disc bulge with NRC than teachers (n=20) and mechanics (n=17) (p=0.000).

Significant correlations were also found for disc protrusion, Modic changes, hemangioma, and reduced disc height, as shown in Tables 5a and 5b below.

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Variable	Total Participants	Occupation	Frequency	P Value
Disc Bulge Without NRC	190	Housewives	78	0.001
		Laborer	24	
		Mechanics	11	
Disc Bulge With NRC	184	Housewives	71	0.000
		Teachers	20	
		Mechanics	17	
Spinal Stenosis	97	Housewives	44	0.725
		Farmers	11	
		Mechanics	8	
Disc Desiccation	181	Housewives	59	0.878
		Laborer	17	
		Mechanics	21	
Disc Herniation	55	Housewives	18	0.278
		Tailors	7	
		Drivers	7	
Disc Protrusion	22	Mechanics	5	0.093
		Laborer	5	
		Drivers	2	
Disc Extrusion	6	Farmers	1	0.212
		Laborer	1	
		Mechanics	1	

Table 5a: Association of Modic changes, other diseases, and occupation

Variable	Most common	Total Participants	Occupation	Frequency	P value
Modic changes	Type 2	24	Housewives	7	0.025
	Type 1	8	Mechanics	2	
	Both type 1 & 2	2	Farmers	2	
Other disease	Reduce disc herniation	14	Housewives	5	0.000
	hemangioma	12	Housewives	9	

Table 5b: Association of disc degenerative diseases and occupation.

DISCUSSION

Interpretation of results

In recent years, lumbosacral disc degeneration has become a serious public health problem, with significant impacts on the quality of life and socio-economic burden of affected individuals. Since it enables a non-invasive and thorough view of the anatomical structures, magnetic resonance imaging (MRI) has established itself as a crucial diagnostic tool for assessing degenerative changes in the lumbosacral region.

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Linkage with Existing Literature

A gender correlation shows that men (51.8%) were statistically more likely than women (48.2%) to experience degeneration, which is concerning for society. Our study's results were in line with those of another study [4]. The majority of participants in our sample size were male, which supports the widespread belief that men are more vulnerable to DDC than women.

In our study disc bulges were more common in women (50.53%) than men (49.46%) although there are different results according to gender relation with Disc bulging. According to [24] Kanaan et al. 2020 and their co-workers, males (27.27%) were more affected than women (15.91%) by disc bulging [24].

In our study disc desiccation was more common in women (55.67%) than men (44.32%), but our results were not in agreement with Kanaan et al. 2020 according to them, men (28.04%) were more affected than women (16.82%) [24]. Because in our study most of the female participants were housewives, and due to work overload and housekeeping they are more prone to disc desiccation.

In our study spinal stenosis was more common in women (55.67%) than men (44.32%), which is nearly similar to Parenteau et al.2021 their results show that the prevalence of spinal stenosis is greater in men (13.6%) than women (10.9%) [25].

In our study herniation were more common in male (58.18%) than female (41.81%), which is similar to Jada, Härtl, and Baaj 2018 according to this study male has more chances to develop disc herniation than women [26].

In our study protrusion is more common in males (59.09%) than female (40.9%) our study is supported by Kanaan et al. 2020, which state that we found that disc protrusion is significantly more common in males [24].

In our study Modic changes were more common in males (64%) than females (35%), our results were supported by Kanaan et al. 2020. Their results show that males were more affected by Modic changes [24]. Age group 3 (40-60) (41.1%) had the highest number of disc degeneration cases in our study, comparable with another study Zafar et al. 2022 concluded that the most affected age by disc degeneration was (40-59) having 56.8% [1].

Among the most affected age group by disc bulging were 40-60 (45.45%). Our results were in agreement with Nida Sha, and Rehana Mushtaq 2021 they stated that the most affected age group by disc bulge was 40-60 (58.97%) [2].

In our results, disc herniation was more common in the age group 20-40 (50%) which was opposed by (Nida Sha, and Rehana Mushtaq 2021). they conclude that the age group 40-60 (70%) was more affected by disc herniation [2]. Because in our study there were more housewives in the age group 20-40, and due to bad poster and workload they are more affected by disc herniation.

In our results, spinal stenosis was most common in the age group 40-60 (49.48%) which is in agreement with Nida Sha, Rehana Mushtaq 2021. They concluded that the age group 40-60 (55.55) was more affected by spinal stenosis [2].

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In our study, Modic changes are common in age group 40-60 (52%). this statement is supported by Nida Sha, Rehana Mushtaq 2021. they state that the age group 40-60 is most affected age by Modic changes. [2]

In our study, different occupations such as housewives, mechanics, and laborers were elevated. The most common occupation was housewives with n=129 (38.2%) followed by mechanics with n=31 (9.25%) and laborers with n=29 (8.6%). Occupation result reveals that housewives were more affected by DDC as compared to another study conducted in 2020, in which Çetintepe et al and his coworkers suggested that the most common occupation group was housewives (41.9%) [27].

Disc bulging without NRC was the most common in housewives n=78 (23.2%) followed by laborers n=24 (7.16), mechanics n=11 (3.28), and Disc bulge with NRC was the most common in housewives n=71(21.1%) followed by teachers with n=20 (5.9%), mechanics with n=17(5.07%). both comparisons show that housewives are most affected by disc bulging which is supported by another study conducted in 2017 in which Thomollari et al and his coworkers stated that disc bulging was more regulated in group 1 which were housewives [28].

Housewives (n=18, 5.3%) were mostly affected by disc herniation which is supported by the study conducted in 2020 in which Çetintepe et al and his coworkers suggested that the most common occupation group with lumber disc herniation were housewives (41.9%) [27].The second common occupation was tailors n=7 (2.2%) affected by lumbar disc herniation, as, most of the time tailors are sitting in a slouched or hunched over position that is supported by another study that put forward that the sitting category was most affected by herniation with n=65 (59.6%). Drivers were the third most commonly affected by disc herniation with n=7 (2.2%) but another study accompanied by Battié et al. and his coworkers in 2002 stated that disc herniation was more frequent in the lower lumber region in the non-drivers than the drivers [29].

Modic changes total affected participants were 34 (10.4%) in which type I changes mechanics with n=2(0.59%) was most affected, and farmers with n=2 (0.59%) were affected by both type I and type II changes but we did not find any relevant article to support this finding. Housewives (n=7,2.0%) were most affected by type II change in comparison to another study directed by Han et al. and Cowrkers in 2017 that proposed that type II was most common in females and the moderate workload category which includes walking and sitting so this study supports our study [30].

CONCLUSION

Our study findings indicate that among degenerative disc changes, the most prevalent condition was disc bulging (55.3%) which predominantly occurred in the age groups of 40-60 followed by disc desiccation (46.4%) occurred in the age group 20-40, spinal stenosis (28.6%) in 40-60, and disc herniation (16.2%) occurred in 20-40 age group. According to our research, males (51.8%) are more prone to experiencing degenerative disc changes compared to females (48.2%) and the most affected spinal levels by DDC were L4-L5/L5-S1. Based on our findings, we determined that the age group most commonly affected by degenerative disc changes is 40 to 60 years.

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