



Overview of Lumbosacral MRI Findings in Jos University Teaching Hospital

Salaam AJ¹*, Danjem SM¹, Salaam AA², Ogbu AE¹

¹Department of Radiology and ²Department of Family Medicine, Jos University Teaching Hospital.

*Corresponding Author: Dr. Salaam AJ. Department of Radiology, Jos University Teaching Hospital. E-mail: adeku2s@gmail.com

ABSTRACT

Lumbosacral conditions are common disorders involving the soft tissues and bones of the low back. They may be due to underlying pathologies such as slipped disc, low back pain, TB spine, paraplegia, spinal tumour, degenerative disc disease, lumbosacral spondylosis, cord compression syndrome, traumatic spinal cord injury, cauda equina or fractures of any part of the vertebrae below T₁₂ down to the gluteal fold. Degenerative disc disease, lumbar spondylosis, degenerative disc disease and exit nerve root compression are common findings in the MRI scan of patients with lumbosacral conditions. The MRI scan of patients with lumbosacral conditions seen between 2016 and 2017 were evaluated for the study. The features assessed were degenerative disc diseases, lumbar spondylosis, degenerative disc disease with exit nerve root compression, spinal cord contusion/injury, Pott's disease and lumbar spondylolisthesis. myelitis, lumbar spondylosis with degenerative disc disease, as well as lumbar fracture were also assessed. A total of 233 patients with lumbosacral pathologies were included in this study. There were 132 (56.7%) males and 101 (43.3%) females. Of all the patients with radiculopathies, patients with low back pain as the major indication constituted 23.2%, followed by those with lumbosacral spondylosis (19.3%), paraplegia (15.5%) and slipped disc (13.7%), while patients with cauda equina and spinal tumour represented 2.6% and 1.7% respectively. Degenerative disc disease was the most common finding representing 38.2% patients, followed by lumbar spondylosis (14.6%) and degenerative disc disease with exit nerve root compression (14.2%). Lumbar fracture was the least common finding in 1.3% of patients with lumbosacral conditions. MRI can be used to identify pathologies of lumbosacral tissues in a non-invasive manner. There was a high prevalence of radiculopathies in the lumbosacral spine of patients.

Keywords: Degenerative disc disease, Low back pain, Lumbosacral spondylosis, Paraplegia, Slipped disc.

INTRODUCTION

Lumbosacral conditions are interrelated and often leads to low back pain, which varies from a dull, heavy sensation to sharp agonizing spasm. The cause of the pain is equally variable. For example, joint instability can lead to disc degeneration, which in turn can put

pressure on the nerve roots, etc.¹ Slipped disc is a vertebral disc that has broken down to the point where the inner material, called the nucleus pulposus, has seeped through the wall of the vertebral disc, causing pain in the surrounding structures or nerves. A slipped disc can occur in the lower back, the neck and, rarely, in the mid-back.²

Low back pain or lumbago, which may or may not occur with sciatica, is a common disorder involving the soft tissues and bones of the lower back. The “low back pain” has been defined as pain limited to the region between the lower margins of the twelfth ribs and the lower gluteal fold.³ Low back pain may be classified by duration as acute (pain lasting less than 2 weeks), sub-acute (pain lasting between 2 weeks to 3 months) and chronic (pain lasting more than 3 months).⁴ It has also been classified as specific and non-specific. The specific low back pain is defined as low back pain attributable to a recognizable, known specific pathology, while non-specific low back pain is defined as low back pain not attributable to a recognizable, known specific pathology. The non-specific low back pain constitutes about 90-95% of all low back pain cases.

TB spine, also known as tuberculous spondylitis or Pott's disease, refers to vertebrate body and intervertebral disc involvement with tuberculosis. The spine is the most frequent location of musculoskeletal TB and commonly related symptoms are back pain and lower limb weakness/paraplegia.⁶

Paraplegia is a spinal cord injury that paralyses the lower limbs. It is a result of severe damage to the spinal cord and the nervous system. Paraplegia mainly affects the trunk, legs and the pelvic region, resulting in loss of movement. It can be caused by accident, motor neuron disease, tumor or blood clot within the spinal cord. They are two main categories: complete and incomplete. Complete paraplegia is witnessed when the injury affects the neurological level and it hinders the movement of limbs, whereas in case of incomplete paraplegia, some of the limbs are still moving.⁷

Spinal tumour is an abnormal mass of tissue within or surrounding the spinal cord and/or spinal column. These cells grow and multiply uncontrollably, seemingly unchecked by the mechanisms that control normal cells. Spinal tumour can be benign (non-cancerous) or malignant (cancerous). Primary tumours originate in the spine or spinal cord while metastatic or secondary tumours result from cancer spreading from another site to the spine. Spinal tumours may be referred to by the region of spine in which they occur. These basic areas are cervical, thoracic, lumbar and sacrum. Additionally, they are also classified by their location in the spine into three major groups: intradural-extramedullary, intramedullary and extradural.⁸

Lumbosacral degenerative disc disease refers to a syndrome

in which a compromised disc causes low back pain. It is related to a combination of bio-mechanical stresses and genetic predisposition which alter the metabolic and structural integrity of the intervertebral disc. These changes, in turn, modify the ability of the intervertebral disc to sustain and transmit forces and, subsequently, compensate for these alterations in a variety of ways. This leads to billions of dollars in health care services and lost productivity every year due to associated morbidity from these conditions. Degenerative changes include any of the following: desiccation, fibrosis, narrowing of the disc space, diffuse bulging of the annulus beyond the disc space, annular fissures, mucinous degeneration of the annulus, intra-discal gas, osteophytes of the vertebral apophyses, inflammatory changes and sclerosis of the end plates.⁹

Lumbosacral spondylosis, also referred to as lumbar spondylosis, is a unilateral or bilateral defect of the pars inter-articularis that affects one or more of the lumbar vertebrae. Numerous hypotheses have been proposed on the etiology of lumbosacral spondylosis. They include: separate ossification centre, fracture during post natal life, stress fracture, increased lumbar lordosis, impingement of the articular process on the pars inter-articularis, weakness of supporting structures, pathologic changes in the pars articularis and dysplasia of the pars interarticularis.¹⁰

Spinal cord compression syndrome develops when the spinal cord is compressed by bone fragments from a vertebral fracture, a tumour, abscess, ruptured intervertebral disc or other lesion. Spinal cord compression can occur anywhere from the neck down to the lower spine and cause symptoms, such as numbness, pains and weakness. Depending on the cause of compression, symptoms may develop suddenly or gradually, and they may require anything from supportive care to emergency surgery.¹¹ Traumatic spinal cord injury (SCI) is an insult to the spinal cord resulting in a change, either temporary or permanent, in the cord's normal motor, sensory or autonomic function.¹² Traumatic SCI may stem from a sudden traumatic blow to the spine that fractures, dislocates, crushes or compresses one or more vertebrae.¹³ They can be complete or incomplete. Traumatic SCI can be categorized into primary and secondary phases. The primary SCI is the result of physical forces of the initial traumatic events and is often the most important determinant of injury severity. Physical forces involved can include compression, shearing, laceration, and acute stretch. After the primary injury event, a cascade of secondary injury events is initiated

which serves to expand the zone of neural tissue injury and exacerbate neurological deficits. Secondary SCI is a delayed and progressive tissue injury following the primary SCI.¹⁴ Cauda equina syndrome (CES) is a rare disorder in which there is a compression of the spinal nerve roots. CES affects a bundle of nerve roots called cauda equina. These nerves are located at the lower end of the spinal cord in the lumbosacral spine.¹⁵

MRI has the potential to identify pathologies of these tissues in the lumbosacral spine in a non-invasive manner. The role of MRI in lumbosacral conditions could be to exclude patients without a target condition, to spare invasive treatment or to identify as many patients as possible where delayed treatment would result in worse patient outcome. This current study was aimed at investigating the pathological changes in the lumbosacral spinal tissue identified on MRI which could be responsible for lumbosacral conditions.

MATERIALS AND METHODS

Study Location

This was a retrospective cross-sectional study conducted in a teaching hospital, which is a tertiary health institution, in North-Central Nigeria. The patients were referred from the orthopaedic clinic. Majority of the residents around the study area, are engaged in mining, farming and other agricultural activities. The MRI of all cases of lumbosacral conditions carried out between 2016 and 2017 were evaluated to identify cases suitable for the study. The study criteria was met by 233 patients who were then included in the study. The exclusion criteria were as follows: history of previous lumbosacral surgery, patients with profound scoliosis or kyphosis of the lumbosacral spine, history of spinal laser interventions and patients with osteoarthritis of the knee and hip. Patients with ankylosing spondylitis and those with incomplete records were also excluded.

Informed consent from patients was not required as this was a retrospective study.

Data Collection and Image Interpretation:

MRI examination was performed using 0.2 tesla MRI machine (Magnaton concerto, Siemens medical system, DEU). All the patients were placed supine with straight leg in a psoas tight position to imitate the lumbar lordosis seen in erect position. A rectangular flat surface coil was used. The

imaging protocol consisted of one coronal localizer with repetition time and echo time (TR/TE) of 25/10 msec, sagittal T1 weighted spin echo, (TR/TE) of 412/19 msec, and a sagittal view with a TR/TE (dual echo sequence of 2500-4000/20 and 127 msec). The axial image were performed to cover the last three lumbar intervertebral disc. If slipped disc was present at higher lumbar levels, relevant supplementing axial series were performed. Gradient nulling was employed to minimize motion artefacts. For all the sequences, the slice thickness was 3mm. The images were assessed by a diagnostic radiologists. The features assessed were degenerative disc disease, lumbar spondylosis, degenerative disc disease with exit nerve root, Pott's disease and spinal cord contusion. Lumbar spondylolisthesis, nerve root disease, lumbar spondylosis with degenerative disc disease and myelitis were also assessed.

Statistical Analysis

The data were analysed using statistical package SPSS version 21. The prevalence of changes in the above mentioned features were tabulated. The number of affected variables in the tables can be single or multiple, hence when added up were usually more than the study population of 233.

RESULTS

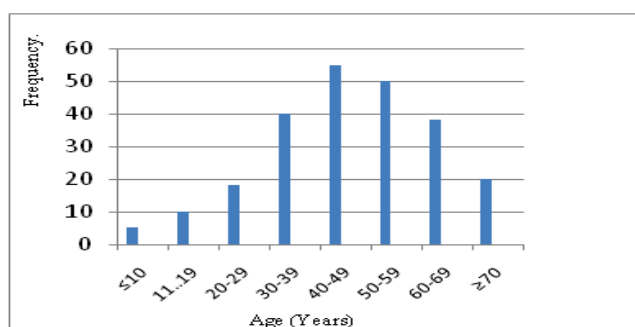
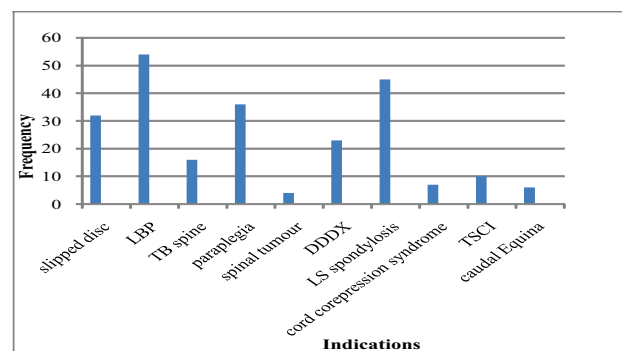
A total of 233 patients with spinal conditions were included in the study. There were 101 (43.3%) females and 132 (56.7%) males giving a F:M ratio of 1:1.1. The age group of 40-49 years had the highest frequency, constituting 24.9% of the patients. (Table 1)

Distribution of Indications in patients

Out of 233 patients, 54 (23.2%) patients were evaluated for low back pain, representing the most common condition evaluated. This was followed by 45 (19.3%) patients evaluated for lumbosacral spondylosis and 36 (15.5%) patients evaluated for paraplegia. (Figure 2)

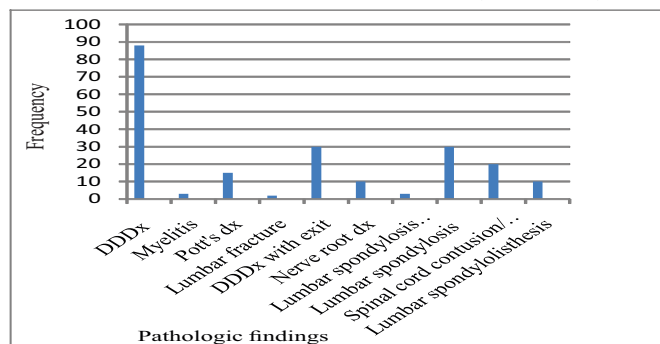
Table 1. Demographic variable of patients

Variable	Frequency	Percentage (%)
Gender		
Male	132	56.7
Female	101	43.3
Total	233	100.0
Age (years)		
≤10	3	1.3
11-19	9	3.9
20-29	17	7.3
30-39	42	18.0
40-49	58	24.9
50-59	48	20.6
60-69	40	17.2
≥70	16	6.9
Total	233	100.0

**Figure 1:** Distribution of patients' age-group**Figure 2:** Frequency distribution of indications for MRI in patients.

Distribution of findings in patients

Degenerative disc disease was found in 89 (38.2%) patients, accounting for the most common condition in the patients. Degenerative disc disease with exit nerve root was present in 33(14.2%) patients and lumbar spondylosis in 34 (14.6%) patients. Only 3 (1.3%) patients had lumbar fracture, which represented the least common condition diagnosed (Figure 3)

**Figure 3:** Distribution of pathologic findings in patients**Table 2:** Association between age group and indications.

Age Group	<20	20-29	30-39	40-49	50-59	60-69	>70
Indications							
Slipped disc	0(0.0)	1(5.9)	6(14)	11(19.0)	10(20.8)	2(5.0)	2(12.5)
Low back pain	3(25.0)	5(29.4)	6(14.3)	17(29.3)	17(35.4)	6(15.0)	0(0.0)
TB spine	1(8.3)	0(0.0)	0(0.0)	7(12.1)	3(6.3)	3(7.5)	3(12.5)
Paraplegia	4(33.3)	7(41.2)	10(23.8)	4(6.9)	5(10.9)	3(7.5)	3(18.8)
Spinal tumour	0(0)	1(5.9)	0(0)	1(1.7)	0(0.0)	2(5.0)	0(0.0)
Deg. Disc dx	1(8.3)	1(5.9)	6(14.3)	4(6.9)	1(2.1)	7(17.5)	3(18.8)
Lumbosacral Spondylosis	0(0)	1(5.9)	10(23.8)	9(15.5)	11(22.9)	11(27.5)	3(18.8)
Cord compression Syndrome	0(0)	0(0)	2(4.8)	2(3.4)	0(0.0)	3(7.5)	0(0.0)
Traumatic spinal Cord injury	3(25.0)	0(0)	2(4.8)	2(3.4)	1(2.1)	0(0.0)	2(12.5)
Cauda equina	0(0)	1(5.9)	0(0.0)	1(1.7)	0(0.0)	3(7.5)	1(6.3)

Association between age group and indications for MRI.

Out of a total number of 32 patients that had slipped disc as indication in all age groups, 11 (19.0%) represented the highest frequency seen within the 40-49 years age group, followed by 10 (20.8%) seen between the ages of 50-59 years. The highest frequency of TB spine as an indication was seen in 7(12.1%) patients aged between 40-49 years. The age group of 60-69 years had the highest frequency of patients with cord compression syndrome as indication, constituting 3(7.5%). Age groups 30-39 years and 40-49 years had frequencies of 2(4.8%) and 2(3.4%) patients respectively (Table 2)

Association between gender and pathologies (Table 3)

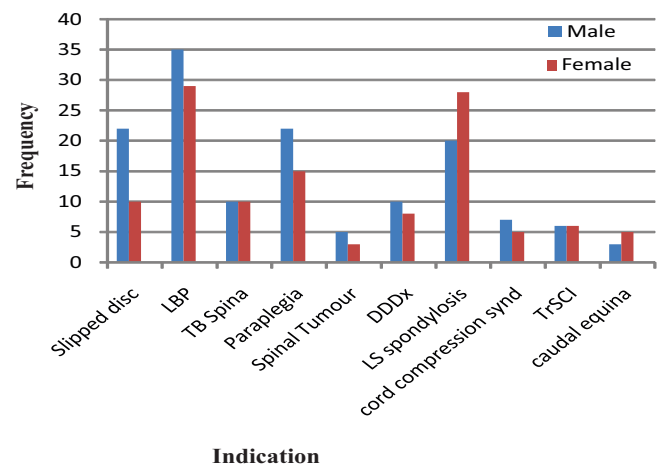
The study shows that, from the total of 89 (38.2%) patients that had degenerative disc diseases, males accounted for the highest frequency, constituting 50 (37.9%) patients and females accounted for 39 (38.6%) patients. Out of the 18(7.7%) patients with Pott's disease, 12(9.1%) were males and 6(5.6%) were females. Therefore more males had Pott's disease than females. There was lumbar spondylosis in 34(14.6%) patients, and more females were affected, (19(18.8%) females versus 15(11.4%) males). Spinal cord contusion was found in 28 (12.0%) patients; 15 (11.4%) of these patients were males and 13(12.9%) were females.

Table 3: Association between gender and lumbar pathologies.

Findings	Male	Female	Total
Degenerative disc disease	50(37.9)	39(38.6)	89(38.2)
Myelitis	2(1.5)	2(2.0)	4(1.7)
Pott's disease	12(9.1)	6(5.9)	18(7.7)
Lumbar fracture	2(1.5)	1(1.0)	3(1.3)
Degenerative disc disease with exit	23(17.5)	10(9.9)	33(14.2)
Nerve root disease	4(3.0)	1(1.0)	5(2.1)
Lumbar spondylosis with deg. Disc dx	2(1.5)	2(2.0)	4(1.7)
Lumbar spondylosis	15(11.4)	19(18.8)	34(14.6)
Spinal cord contusion/Injury	15(11.4)	13(12.9)	28(12.0)
Lumbar spondylolisthesis	7(5.3)	8(7.9)	15(6.4)

Distribution of gender and indications for MRI

Low back pain was indicated in 52 patients in total, which accounted for the most common indication, out of which 35(26.5%) were males and 19(18.8 %) were females. Similarly, males were in the majority at 23 (17.4%), out of a total of 32 patients who had slipped disc as their indication, while the females were 9(8.9%). Females accounted for the majority of 4 (4.0%) patients who had cauda equina as indication, while the males were 2(1.5%). (Figure 4)

**Figure 4:** Association between gender and indications

Degenerative disc disease was seen in all age groups, however the highest frequency of 22(37.9%) was seen between the age of 40-49 years, followed by 20 (50.0%) aged 30-39 years, The least affected aged group was ≤ 20 years with 3(25.0%) patients. Age group 40-49 years had the highest number of patients with Pott's disease i.e. 8(13.8%). Lumbar fracture was seen in age group 20-29 years with 2(11.8%) patients and 30-49 years with 1(2.4%).

Association Between Indications and Findings (Table 5)

A total of 54 patients had low back pain as an indication, among which 24 had degenerative disc disease, 11 had degenerative disc disease with exit nerve and 10 had lumbar spondylosis.

Out of a total of 16 patients with an indication of TB spine, Pott's disease had the highest finding with 9 patients, of which 3 patients also had degenerative disc disease and 2 patients had lumbar spondylosis.

A total of 36 patients had an indication of paraplegia, among which 13 cases were due to spinal cord contusion/injury, 9 had degeneration disc disease and 4 had lumbar spondylolisthesis. Degenerative disc disease was an indication for a total of 23 patients, among which 13 had degenerative disc disease, accounting for the majority. In a total of 45 patients with lumbar spondylosis, degenerative disc disease findings accounted for the highest with 18 patients, followed by lumbar spondylosis with 13 patients.

Table 4: Association between age group and findings

Age Group	≤ 20	20-29	30-39	40-49	50-59	60-69	≥ 70
Findings							
Degenerative disc Disease	3(25.0)	4(23.5)	17(40.5)	22(37.9)	15(31.3)	20(50.0)	8(50.0)
Myelitis	1(8.3)	0(0.0)	2(4.8)	0(0.0)	0(0.0)	0(0.0)	1(6.3)
Pott's disease	2(16.7)	0(0.0)	1(2.4)	8(13.8)	3(6.3)	3(7.5)	1(6.3)
Lumbar fracture	0(0.0)	2(11.8)	1(2.4)	0(0.0)	0(0.0)	0(0.0)	0(0)
Degenerative disc disease with exit	1(8.3)	2(11.8)	7(16.7)	10(17.2)	5(10.4)	7(17.5)	1(6.3)
Nerve root disease	1(8.3)	1(5.9)	1(2.4)	0(0.0)	1(2.1)	1(2.5)	0(0.0)
Lumbar spondylosis with deg. Disc dx	0(0.0)	0(0.0)	1(2.4)	3(5.2)	0(0.0)	0(0.0)	0(0.0)
Lumbar spondylosis	0(0.0)	3(17.6)	4(9.5)	7(12.1)	16(33.3)	2(5.0)	2(12.5)
Spinal cord contusion/Injury	4(33.3)	5(29.4)	5(11.9)	2(3.4)	6(12.5)	3(7.5)	3(18.8)
Lumbar spondylolisthesis	0(0.0)	0(0.0)	3(7.1)	6(10.3)	2(4.2)	4(10.0)	0(0.0)

Table 5: Association between findings and indications

Findings	Indication										Total
	Slipped disc	Low Back pain	T B spine	Para plagia	Spinal tumour	Deg. disc dx	Lombo Sacral spondylosis	Cord Compression syndrome	Traumatic spinal cord injury	Caudal equina	
Degenerative disc disease	12	24	3	9	2	13	18	5	1	2	89
Myelitis	2	1	1	0	0	0	0	0	0	0	4
Potts disease	1	3	9	2	0	2	0	0	1	0	18
Lumbar fracture	0	0	0	2	0	0	0	0	1	0	3
Degenerative disc disease with exit.	7	11	0	2	0	3	7	1	2	0	33
Nerve root disease	1	1	0	2	0	1	0	0	0	0	5
Lumbar spondylosis with deg. Disc dx	0	0	0	0	0	2	2	0	0	0	4
Lumbar spondylosis	4	10	2	2	1	1	13	0	0	1	34
Spinal cord / adjacent injury	3	2	0	13	0	1	3	0	5	1	28
Lumbar spondylolisthesis	2	2	1	4	1	0	2	1	0	2	2
Total	32	54			4		45	7	10	6	233

DISCUSSION

In a study conducted by Fredrik Stromqvist et al, at the Department of Orthopedics, Lund University, over 6 years (2000-2005 inclusive) involving 3000 patients (165 males), pre- and post-operative parameters for all patients with lumbosacral spinal conditions were analyzed for sex difference. Statistically significant and clinically relevant sex differences were found. Pre-operatively, females had more pronounced back pain and disability and also lower quality of life (QoL) in some aspects. At 1 year follow-up, females reported a higher rate of consumption of analgesics, a higher rate of post-operative back and leg pain and less improvement regarding disability and some aspects of QoL. They reported a difference between females and males, as there were more females affected than males.¹⁶ In contrast, our study indicated that more males had lumbosacral conditions than females.

Low back pain is one of the most common causes of physician visits by patients in the United States, with an enormous socio-economic burden. Because of this burden, numerous lumbosacral MRI (LS MRI) studies have been done to focus on its diagnosis and management.¹⁷ Since MRI, as a diagnostic tool, has been widely used in Iran, the health system is encountering a high volume of LSMRI request in patients with low back pain.¹⁸ In our study, 211 (75%) of MRI requests were consistent with the indications. Different studies show varied results. Some studies show a higher rate of MRI request (Spain 88 %), while there are studies with similar (USA: 74% and 78%) or lower rate (Canada: 44.3%, Iran: 20.8%).¹⁹

In another Iranian study, Saadat showed that 17.2 % of all MRI reports were associated with normal results, with a lower back pain rate of 4.8%.²⁰ Suwaid et al reported LS MRI as the commonest MRI in their study, with the commonest indications for the MRI being low back pain and trauma.²¹ These reports are similar to our findings, with low back pain being the most frequent indications for lumbosacral MRI.

According to Mark Hancock, MRI findings including disc degeneration, modic changes and herniation, are more common in selected people with recurrent acute (likely discogenic) low back pain. His previous studies have focused on degenerative disc findings or disc herniation and few have investigated a range of different pathologies on MRI including annular tears, and modic (end plate) changes.²² The commonest findings were spondylosis, disc prolapse, compression fracture and spinal metastasis, as seen in the

study by Suwaid *et al*.²¹ These findings are similar to ours, as degenerative disc disease was the most frequent finding and lumbar fracture was the least finding.

Roger H reported that men have roughly twice the risk for lumbar herniated discs compared with women.²³ This is similar to our study where more men compared to women had slipped disc.

There are a significant number of reports illustrating gender specific estimates of low back pain. Albatool HAY reported that the prevalence of back pain was greater in females (29.9%), compared to males (26.8%), independent of age.²⁴ Kofi AK reported a higher prevalence of 56% among females, while males had 44% of the total population.²⁵ Low back pain was found in our study to affect both men and women, but more prevalent in women than men.

In a study carried out in South Africa, among the 100 patients with TB spine, females comprised 58% of cases. The incidence rate was 1.17 per 100,000 females and 0.916 per 100,000 males Godlwana L *et al*.²⁶ We noticed male and female having the same incidence.

In a study comprising 47 new paraplegic patients conducted over a one year period, Equebal *et al* reported that 37(78.7%) were males and 10(21.3%) were females,²⁷ which was similar to our findings, where the incidence in men is higher than in women. This is similar to another study, in which there is slight male preponderance for almost all ages was recorded with male: female ratio of 1.26: 1, according to Abdul R.B.²⁸

Teraguchi *et al* in the Wakayama Spine Study comprising 975 participants (324 males and 651 females) between the ages of 21-97 years. The prevalence of degenerative disc disease was 71% among the males and 77% among the females aged < 50 years, and > 90% in both men and women aged > 50 years. The intervertebral space with degenerative disc disease was highest at L4/5 (men 69.1%, women 75.8%).²⁹ This is in contrast to our study where males had slightly higher indication than females. A recent Japanese study involving 3040 participants reported the prevalence of lumbar spondylosis to be 80.6% among males and 64.6% among females.³⁰ The prevalence was noted to increase with age, and was significantly higher among males than females in all areas surveyed in our study.

Cord compression syndrome (CCS) more commonly affects patients aged 50 and older who have sustained a lumbosacral hyper-extension injury secondary to Road traffic accident. It affects males more frequently than females, at a ratio of 3:1. It

is anticipated that the incidence and prevalence of CCS will increase proportionately with an aging population.³¹ We observed same findings in our study, with males having higher indication.

According to Anda N, their report includes 134 patients with traumatic spinal cord injury. Among these cases, 42 were registered the year 2011, 31 in 2012, 21 in 2013 and 40 in 2014. With respect to sex, 122 (84%) of the 134 patients with TSCI were males and 22 (16%) were females. The male to female ratio was 5:1.³² This is same with our study here, however, there is a slight difference in their percentages, female 5.0 (56.8%) and male 3.8 (43.2%). Konstantinou *et al* reported the prevalence of symptomatic herniated/slipped disc to be about 1-3%, depending on age and sex.³³ The highest prevalence in this study was found, among patients aged 30 - 50 years. Our study was different with the highest age group being 40-49 years.

In the patient we studied with slipped disc, about half were aged between 50 – 59 years. Therefore, there is a strong similarity between our study and the study carried out by Jennifer SW *et al*, which describe the association between back pain related with herniated disc and disability in adults aged 50 years and older.³⁴

In Nigeria, the majority of patients with Pott's disease were below the age of 20 years.³⁵ In Western countries, the highest incidence is seen in the young adults i.e. ages 20 – 30 years.³⁶ In Northern Ireland, there was increase in the proportion of adults to children, whereas in Poland, TB Spine was observed to be a disease that predominantly affects old people above 60 years of age.³⁷ Generally, TB Spine was found in the age group 45 – 54 years in 12 patients (24%).³⁸ According to a study carried out in 72 patients by Bashir GEA *et al*, the highest incidence of TB spine was seen in age group 41 – 56 years and the age group 55 – 64 years were least affected in a study.³⁹ It showed that the age group with the highest indication in the study we conducted is 40 – 49 years.

Development of paraplegia in both males and females is bimodal. Males are more at risk in young adulthood (20-29 years) and older age (above 70 years). Females are most at risk in adolescence (15-19 years) and older age (above 60 years).⁴⁰ In another study in Minnesota, USA, the age of peak incidence was typically between 15-30 years of age and over 70 years for both sexes. An exception to this was South East Turkey, where the peak incidence occurred in the 40 - 49 years age group.⁴¹ We observed paraplegia more in the age group of 30-39 years, which is different from the previous studies stated

earlier.

Depending on the age of the patient and the type of spinal tumor; in adults, the mean age of occurrence is between 35-40 years while in children, the mean age of occurrence is between 5-10 years.⁴² We found more spinal tumours in the age group of 60-69 years, which is higher than in the previous study.

Powel *et al* had 302 women with no history of back pain undergo MRI of the lumbar spine. More than a third of the women aged 18-40 years had at least one degenerating disc.⁴³ The percentage was however highest for those older than 40 years of age in our study.

In the United States, more than 80% of individuals older than 40 years have lumbosacral spondylosis, increasing from 3% of individuals aged 20-29 years. Approximately 30% of men and 28% of women aged 55-64 years have lumbar spondylosis. In another study conducted simultaneously by Bruce MR *et al*, approximately 20% of men and 22% of women aged 45-64 years have lumbosacral spondylosis. Internationally, lumbar spondylosis can begin in persons as young as 20 years. It increases with, and perhaps is an inevitable concomitant of age.⁴⁴ Our study was quite different as the highest age group was 60-69 years.

Cauda equina syndrome, CES occurs primarily in adults, although trauma-related CES can affect people of all ages. According to a study conducted in 2018, patients with CES had a mean age of 44.16 ± 12.83 years, ranging from 22 to 64 years.⁴⁵ We observed that the age group of 60-69 years have the highest incidence in our study. Regarding degenerative disc disease, West *et al*⁴⁶ found out that gender did not affect the presence or the extent of the disease. Compared to our study, females showed a marginally increased tendency to have degenerative disc disease.

Dorlan *et al* carried out a retrospective cohort study of 192 patients initially presenting with myelitis of unknown etiology, which showed that sex and races for adults and children are equally affected.⁴⁷ We noted equal affectation in both sexes in our study, and more among the age group of 30-39 years. Kudlacek reported a higher prevalence of lumbar fracture in the male population.⁴⁸ This is similar to our study. According to the AHRQ's 2010 National statistic of lumbar radiculopathy, females are affected more frequently than males and accounts for 53.69% of cases and the most affected age group is between 45 and 64 years with 51.03% of incidents.⁴⁹

Our study showed that males have more nerve root disease.

Contrary to our study findings, Ali *et al* reported that nerve root disease was more prevalent in women than in men.⁵⁰ Most recent studies agree to the fact that lumbar spondylosis was more prevalent and more severe in men whereas Degenerative Disc disease was more prevalent in women.⁵¹ we noticed equal prevalence among males and females. Lawrence reported that males were approximately four times more likely to have spinal cord contusion than females. Overall, males accounted for 80.7% of reported injuries/contusion of the spinal cord.⁵² There is a slight increase in males compared to females in our study.

The male /female ratio of lumbar spondylolisthesis prevalence was 1:1.3 in the elderly.⁵³ Lai-chang *et al* reported that men were more likely to have retrolisthesis.⁵³ Females were noted with more lumbar spondylolisthesis compared to males in our study, which is quite different from the previous study. A small study group of 64 women, aged 20-29 years, with a mean age of 21.3 years were shown to have a Degenerative Disc disease. Two (4.8%) patients aged 30-39 years had myelitis, which accounted for the highest frequency, while both extremes of ages (≤ 20 and ≥ 70 years of age) had the lowest frequency of 1(8.3%) and 1(6.3%) respectively.⁵⁴ The peak incidence rates are bimodal, occurring between 10-19 years and 30-39 years.⁵⁴ This is different to our study findings, where the highest incidence was seen in the age group of 40-49 years. In a study of 100 patients with Pott's disease, Elwathiq *et al* reported that it was more frequent in the age group of 45-54 years.⁵⁵ It occurred earlier in our study, in which is commonest in the age group of 40-49 years. Degenerative disc disease is an age related condition that can often be the underlying cause of bulging/slipped discs. Over time, and with years of pressure from weight and movement, the discs become less flexible and lose water content leading to degeneration.⁵⁶ However, more advanced degeneration, diagnosed as degenerative disc disease can lead to displacement of the disc through bulging or herniation that causes painful nerve compression.⁵⁶ Ong *et al* reported that degenerative disc disease was more common compared to other pathologies.⁵⁶ This is similar to what was found in this study.

Brinjikji *et al*, in a meta-analysis, demonstrated MRI evidence of degenerative disc disease being more common in adults with low back pain, compared to asymptomatic individuals.⁵⁷ Similar findings was observed in our study. In a study conducted by Ravindra *et al*, MRI results revealed an involvement of the vertebral bodies, disc destruction,

vertebral collapse and spinal deformity. In the early stages, however, only disc degeneration with alteration of bone marrow signal intensity of vertebra was seen, which may not be sufficient findings to diagnose TB spine.⁵⁸ Similar findings noted in this study.

The most common cause of spinal cord trauma is automotive accident, which corresponds to more than half of the cases of paraplegia.⁵⁹ The most common spinal cord injury region is cervical region, present in 50-64% of patients, while the lumbar region represents 20-24% of the cases of paraplegia.⁵⁹ Spinal cord injury was the most common cause of paraplegia in our study. Spinal tumour can be seen involving osseous, extra-osseous, marrow infiltration, epidural, nerve and the cord.⁶⁰ Increase in the growth of the spinal tumour can cause impingement on the neural element and theca sac, as well as the spinal cord.⁶⁰ It is commonly seen involving the bones in our study.

Suther et al diagnosed and studied a total of 109 patients with lumbar disc degeneration, aged between 17 and 80 years, using 1.5 Tesla MRI machine.⁶¹ Findings like lumbar lordosis, Schmorl's nodes, decreased disc height, disc annular tear, disc herniation, disc bulge, disc protrusion and disc extrusion were observed. Narrowing of the spinal canal, lateral recess and neural foramen with compression of nerve roots were also observed.⁶¹ MRI can also be used to visualize the vertebrae, the facet joints, the nerves, and the ligaments in the spine and nerve compression, said Dries M.⁶² The visualized intervertebral disc shows some degree of disc herniation. The articular joints were not clearly visualized because of the low strength MRI used in our study. Similar to this study, Saleem *et al* reported an obvious severe multilevel lumbar degenerative disc disease and spinal cord compression in the extension posture, and may present as disc herniation, lumbar spinal stenosis, facet joint arthropathy or any combination, accounting for a higher prevalence compared to other findings.⁶³

MRI with superior tissue characterisation provides the best evaluation of soft tissue pathology and is essentially the only direct evaluation of the spinal cord and nerve roots.⁶⁴ Several types of traumatic spinal cord lesions can be identified, including intramedullary haemorrhage, spinal cord contusion/oedema, extrinsic compression by a bone fragment or a traumatic disc herniation and even complete transection of the cord. Sarita M *et al*,⁶⁴ as noted in our study.

MRI with and without contrast provides a detailed look at

tumors, infection, degenerative intervertebral disc disease and nerve root disease.⁶⁵ It determines if the nerves are being compressed, to what degree and by what structures,⁶⁵ as noted in our study. MRI has helped us tremendously in making diagnosis in patients that presented with low back pain which is due to conditions involving the lumbosacral region

Conflict of Interest

None declared.

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