

## Magnetic Resonance Imaging Diagnoses in the Lumbar Spine of Adults With Low Back Pain in South West, Nigeria

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### SUMMARY

**Background:** The prevalence of low back pain in Nigeria is comparable to what obtains in industrialized countries, where it is recorded as affecting more than 80% of the populace in their lifetime and accounting for a mean of 3 days off work per person per year.<sup>1</sup> Although numerous modalities are available, Magnetic resonance Imaging (MRI) has emerged as the procedure of choice for the diagnostic imaging of the lumbar spine, due to its imaging characteristics which allow examiners to observe lumbar anatomy in precise detail and detect morphologic and biochemical abnormalities that were not observable previously.

This study is done to determine the pattern, prevalence and probable cause of low back pain in adults and to compare the results with those of previous studies.

**Methodology:** Two hundred and fifty patients who had MR imaging of lumbar spine performed during a 12-month period (June 2008 - May 2009) were reviewed. An open magnet of 0.2TESLA strength (SIEMENS MAGNETOM CONCERTO (MR 2004A) was used to obtain images. Data recorded included disc contour, disc space narrowing/height, nerve root compression, central spinal stenosis, bony destruction, bone marrow changes/Modic changes, spondylosis/spondylolisthesis and the presence of paravertebral or paraspinal soft tissue masses.

**Results:** The mean age of the patients was 53.27±14.39 years, with majority of the patients (23.6%) in the 6<sup>th</sup> decade. In all 42.4% were females and 57.6% were males. Commonest clinical finding was idiopathic back pain in which majority (87.4%) had mechanical low back pain which comprises degenerative, idiopathic and congenital abnormalities; while 12.6% had non-mechanical low back pain comprising infections and tumors. The commonest radiological diagnosis in both genders and in all the age groups, (except in the 21-30 years) was

Intervertebral osteochondrosis.

**Conclusion:** Mechanical low back pain, of which intervertebral osteochondrosis accounts for the highest percentage and is the most common cause of low back pain in our environment.

KEY WORDS: MRI, LUMBAR SPINE, LOW BACK PAIN, ADULTS

### INTRODUCTION

Low back pain (LBP) can be defined as pain, stiffness, or discomfort in the region of the lumbosacral spine or more specifically as pain limited to the region between the lower margins of the 12th rib and the gluteal folds.<sup>2</sup> It often begins in childhood and during the early teenage years<sup>3</sup>; approximately 60% to 80% of all adults develop low back pain sometime in their life.<sup>1</sup> It is one of the common causes for consultation in accident and emergency departments, clinics, and hospitals.<sup>1</sup> The prevalence of low back pain in our community is comparable to levels recorded in developed countries.<sup>4</sup> The lifetime prevalence of LBP (at least one episode of LBP in a lifetime) in developed countries is reported to be up to 85% and the range of LBP point prevalence among western societies is also reported to be between 12% and 33%<sup>4</sup>. A review of various studies done in Africa indicated that there is little difference in the prevalence of LBP among Africans compared with the prevalence of LBP in developed countries.<sup>5</sup> Low back pain is a major health problem in all parts of the world, accounting for two-thirds of the visits to the physician and is the most common work related disorder, both in developed and developing countries.<sup>6</sup>

Often benign and self-limited, it is occasionally the presenting symptom of systemic diseases like cancer or infection<sup>7</sup>. Most causes of back pain, especially those with neurologic symptoms, are surgically remediable. Thus, the major diagnostic task is to distinguish the 95% of

patients with simple back pain from the 5% with serious underlying diseases or neurologic impairments.<sup>6</sup>

The importance of MRI in the evaluation of low back pain is well established. It provides high resolution, multiaxial, multiplanar images of tissue with no known biohazard effects. It gives a higher yield in the investigation of low back pain in disc degeneration compared with other imaging modalities<sup>8</sup>, delineates herniated discs<sup>9</sup>, detects spinal stenosis<sup>10</sup>, directly visualizes nerve root impingement<sup>20</sup>, is the most useful for delineating spinal infections<sup>21</sup> and is sensitive in patients with known primary tumors or metastasis<sup>22</sup>.

There is a dearth of work on this subject in our environment, hence this study will add to the knowledge of etiology of LBP in this environment. This study set out to evaluate the MRI findings in the lumbar spine of low back pain patients by assessing and documenting the pattern, cause and prevalence of abnormalities seen in MRI in low back pain patients in our locality

## MATERIALS AND METHODS

### *Patient Selection*

A retrospective evaluation of Magnetic Resonance Imaging (MRI) scan of 250 adult patients referred to the MRI unit of the Lagos University Teaching Hospital specifically for the evaluation of low back pain over a twelve (12) month period (June 2008- May 2009) was performed. Patients less than 18 years of age and traumatic cases were excluded from the study because the study was on adults and on chronic causes of low back pain.

The ages of the patients, sex, probable cause of low back pain and the time interval between the onset of pain and the MR scan were recorded. Using a structured interview form, information on biodata, clinical history and diagnosis, history of previous surgeries, injury by metallic foreign bodies, previous reactions to contrast medium used for Computed Tomography (CT) or MRI and history of pregnancy or breastfeeding in women were acquired. Patients with ferromagnetic devices in place were not

examined because of the possibility of dislodgement by magnetic fields<sup>11</sup>. Patients' consent was obtained with signatures on a form and confidentiality maintained.

Ethical approval for the proposed study was obtained from the Research and Ethics committee of the Lagos University Teaching Hospital and approval was given prior to the commencement of the study.

### *Imaging Technique*

All dorso-lumbar MRI scans were obtained using the Siemens Magnetom Concerto (MR 2004A) which is an open magnet of 0.2TESLA strength.

Patient was positioned supine on the MRI scanner table such that the median sagittal plane was equidistant to the edges of the table. A radiofrequency surface coil was placed over the patient to cover the lumbar spine (areas between the costophrenic angle and the iliac crest<sup>46</sup>). Laser beam was aligned on patient at the centering point (between L1 and L3). The table was then moved under the magnet until the patient was at the isocentre of the magnet.

The studies consisted of five spin-echo sequences:

- i. coronal, sagittal and axial localizers with a repetition time and echo time (TR/TE) of 25/10 msec; field of view(FOV) of 40cm, matrix 128x256
- ii. sagittal view with a TR/TE of 500/19 msec, FOV of 31cm, matrix 358x512
- iii. axial view with a TR/TE of 600-1100/25 msec, FOV of 21cm, matrix 288x512
- iv. sagittal view with a TR/TE of 3970/127 msec, FOV of 32cm, matrix 358x512
- v. axial view with a TR/TE of 5000-6000/103 msec, FOV of 26 - 28cm, matrix 338x512

A slice thickness of 4 mm with a 1mm gap was used for all sequences. Flip angles of 90<sup>0</sup> and 180<sup>0</sup> was used for the T1 and T2 weighted images respectively.

The sagittal views covered the entire width of the spine from foramen to foramen. Axial views were obtained parallel to the plane of the disc space and also covered as much of the adjacent

vertebral body as possible.

### Image analysis

Morphologic evaluation of the MR images was performed in consensus by two experienced radiologists. The frequency of the pathologies obtained was analyzed in relation to causes of low back pain. MRI diagnoses were grouped into eight (8) main outcomes. These are: (a)NORMAL, (b)CONGENITAL (c) V E R T E B R A L I N F A R C T I O N , (d)INFECTIO/SPONDYLDISCITIS, (e) INTERVERTEBRAL OSTECHONDROSIS (f) SPONDYLOSIS, (g) PRIMARY NEOPLASIA and (h)METASTSIS. Histological confirmation of the radiological diagnosed cases of Primary Neoplasia seen in the study was recorded. The results were presented in graphic and tabular forms.

### Data Analysis

The data was entered using Microsoft Excel and analyzed using the SPSS for Windows version 18.0 software program. Correlations were obtained with chi-squared tests with 95% confidence interval. Mean values, distribution of variables are represented on tables, Pie charts, histograms and bar charts where appropriate

### RESULTS

A total number of 250 (Two hundred and fifty) patients which included 106 (42.4%) females and 144 (57.6%) males] were evaluated with Magnetic Resonance Imaging (MRI) scan during the study period, with age range of 21 to 81years. The mean age overall was 53.27 ± 14.39years. There were more males than females (M: F 1.36:1), but not statistically significant (p=0.351). In most of the age groups, except in the 6<sup>th</sup> decade, the males were more than the females, but this was not statistically significant (P = 0.351). Majority of the patients with low back pain were found in the 6<sup>th</sup> (23.6%) and 7<sup>th</sup> (22.4%) decades, while the lowest frequency was in the 9<sup>th</sup> decade (0.4%).

The highest frequency of female patients (30.2%) was in the 6<sup>th</sup> decade while that of males (22.2%) was in the 7<sup>th</sup> decade (Table 1)

In all, 9.1% of patients with low back pain had normal MRI diagnosis while 90.9% had

abnormal diagnosis (Table 2). Majority of the patients with abnormal MRI diagnosis were in the 6<sup>th</sup> (25.2%) and 7<sup>th</sup> (21.7%) decades of life. Intervertebral osteochondrosis (61%) was the commonest cause of low back pain in the patients, followed by Spondylosis (degenerative) 16.5%, while Congenital (0.8%) and vertebral infarction (0.4%) were the less common causes. Neoplasia and Spondylodiscitis recorded 7.1% and 5.1% respectively.

The males recorded higher frequency of Intervertebral Osteochondrosis 56.8% and Primary Neoplasia 57.1% than the females, while the females recorded higher frequency of Spondylosis 52.4% than the males. However, no statistically significant difference is seen in the distribution of the diseases amongst the sexes (p 0.424) (Table 3)

Table 1: Age and Sex Distribution of Low Back Pain Patients

| Age (year)   | Male (%)          | Female (%)        | Total (%)       |
|--------------|-------------------|-------------------|-----------------|
| 21-30        | 11                | 6                 | 17(6.8)         |
| % within age | (64.7)            | (35.3)            |                 |
| % within Sex | (7.6)             | (5.7)             |                 |
| 31-40        | 24                | 14                | 38(15.2)        |
| % within age | (63.2)            | (36.8)            |                 |
| % within Sex | (16.7)            | (13.2)            |                 |
| 41-50        | 28                | 21                | 49(19.6)        |
| % within age | (57.1)            | (42.9)            |                 |
| % within Sex | (19.4)            | (19.8)            |                 |
| 51-60        | 27                | 32                | 59(23.6)        |
| % within age | (45.8)            | (54.2)            |                 |
| % within Sex | (18.8)            | 30.2)             |                 |
| 61-70        | 32                | 24                | 56(22.4)        |
| % within age | (57.1)            | (42.9)            |                 |
| % within Sex | (22.2)            | (22.6)            |                 |
| 71-80        | 21                | 9                 | 30(12.0)        |
| % within age | (70)              | (30)              |                 |
| % within Sex | 14.6)             | (8.5)             |                 |
| 81-90        | 1                 | -                 | 1(0.4)          |
| % within age | (100)             | -                 |                 |
| % within Sex | (0.7)             | -                 |                 |
| <b>Total</b> | <b>144(100.0)</b> | <b>106(100.0)</b> | <b>250(100)</b> |

**Table 2:** Age Distribution Pattern and MRI Diagnosis

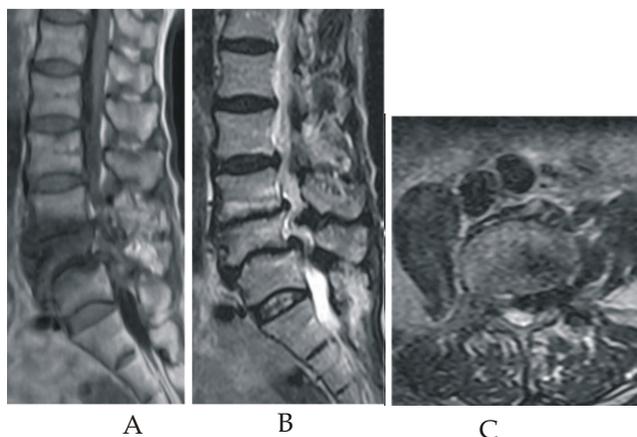
| AGE RANGE    | NOR             | CONG           | INFA           | INF/ SPDS       | INT. OST          | SPONDY           | PRY NEOP      | METS            | TOT              |
|--------------|-----------------|----------------|----------------|-----------------|-------------------|------------------|---------------|-----------------|------------------|
| 21-30(%)     | 6(35.2)         | 2(11.7)        | 1(5.9)         | -               | 4(23.5)           | -                | 4 (23.5)      | -               | 17(6.7)          |
| 31-40(%)     | 9(23.7)         | -              | -              | 5(13.2)         | 16(42.1)          | 5(13.2)          | -             | 3(7.9)          | 38 (14.9)        |
| 41-50(%)     | 2(4.1)          | -              | -              | 2(4.1)          | 29(59.2)          | 15(30.6)         | -             | 1(2.0)          | 49 (19.3)        |
| 51-60(%)     | 5(7.8)          | -              | -              | 5(7.8)          | 42(65.6)          | 8(12.6)          | 2 (3.1)       | 2(3.1)          | 64 (25.2)        |
| 61-70(%)     | -               | -              | -              | -               | 39(70.9)          | 11(20.0)         | 1 (1.8)       | 4(7.3)          | 55 (21.7)        |
| 71-80(%)     | 1(3.3)          | -              | -              | 1(3.3)          | 24(80.1)          | 3(10.0)          | -             | 1(3.3)          | 30 (11.8)        |
| 81-90(%)     | -               | -              | -              | -               | 1(100)            | -                | -             | -               | 1 (0.4%)         |
| <b>TOTAL</b> | <b>23 (9.1)</b> | <b>2 (0.8)</b> | <b>1 (0.4)</b> | <b>13 (5.1)</b> | <b>155 (61.0)</b> | <b>42 (16.5)</b> | <b>7(2.8)</b> | <b>11 (4.3)</b> | <b>254 (100)</b> |

**KEY:**

- NOR = NORMAL [No disc or Spinal pathology]
- CONG = CONGENITAL [Hydromyelia and Tethered Cord with Spina Bifida]
- INFA = INFARCTION
- INF/SPDS = INFECTION/SPONDYLODISCITIS [Soft Tissue abscess & Spondylodiscitis]
- INT.OST = INTERVERTEBRAL OSTEOCHONDROSIS
- SPONDY = SPONDYLOSIS
- PRY NEOP = PRIMARY NEOPLASIA [Multiple Myeloma, Chordoma, Eosinophilic Granuloma, Neurofibromatosis and Lymphoma]
- METS = METASTASIS

**Table 3:** Sex Distribution and MRI Diagnosis of Patients with Low Back Pain

| DIAGNOSIS                      | MALE (%)          | FEMALE (%)        | TOTAL (%)        |
|--------------------------------|-------------------|-------------------|------------------|
| NORMAL                         | 16                | 7                 | 23 (9.1)         |
| (% within diagnosis)           | (69.6)            | (30.4)            |                  |
| CONGENITAL                     | 2                 | -                 | 2 (0.8)          |
| (% within diagnosis)           | (100)             |                   |                  |
| VERTEBRAL INFARCTION           | 1                 | -                 | 1 (0.4)          |
| (% within diagnosis)           | (100)             |                   |                  |
| INFECTION/SPONDYLODISCITIS     | 8                 | 5                 | 13 (5.1)         |
| (% within diagnosis)           | (61.5)            | (38.5)            |                  |
| INTERVERTEBRAL OSTEOCHONDROSIS | 88                | 67                | 155 (61.0)       |
| (% within diagnosis)           | (56.8)            | (43.2)            |                  |
| SPONDYLOSIS                    | 20                | 22                | 42 (16.5)        |
| (% within diagnosis)           | (47.6)            | (52.4)            |                  |
| PRY NEOPLASIA                  | 4                 | 3                 | 7 (2.8)          |
| (% within diagnosis)           | (57.1)            | (42.9)            |                  |
| METASTASIS                     | 7                 | 4                 | 11 (4.3)         |
| (% within diagnosis)           | (63.6)            | (36.4)            |                  |
| <b>TOTAL</b>                   | <b>146 (57.5)</b> | <b>108 (42.5)</b> | <b>254 (100)</b> |



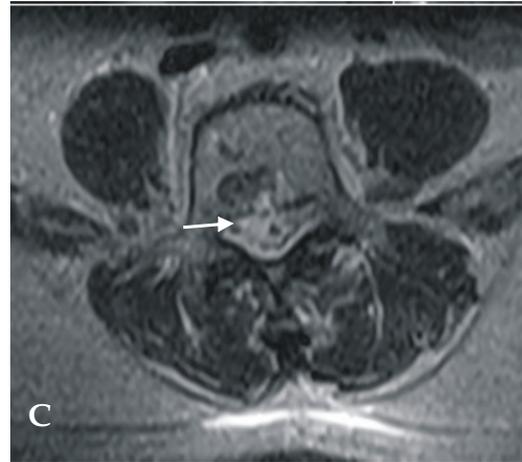
**Fig 1 A-C:** Intervertebral osteochondrosis in a 73year old male.

(A) Sagittal T1 and (B) Sagittal T2 weighted MR images demonstrate marked disc height reduction of L3/L4 and L4/L5 with desiccation (loss of signal) of all the discs. Also noted is an extension of the L4/L5 disc material beyond the posterior border of the vertebral bodies and the superoinferior aspects of the disc indicative of disc **extrusion**. Posterior osteophytes are seen on L4 end plates with Grade 1 anterior shift of the vertebra indicative of anterolisthesis. A **protrusion** is also seen at L3/L4 disc level. Disc **bulges** are seen as minimal extensions (less than 3mm) of the discs into the spinal canal at the T12/L1 and L1/L2 disc levels. (C) Axial T2 weighted image shows the left posterolateral extrusion (block arrow) in L3/L4 disc space.



**Figs 2 A-B. Congenital abnormalities - Hydromyelia in a 28year old male.**

Sagittal T1 and T2-weighted MR images respectively show abnormally thin walled cystic collection (*arrow*) within the spinal canal, with associated canal widening.



**Fig s 3 A-C: Metastasis from Prostate carcinoma in a 79year old male.**

Sagittal T1, Parasagittal T2 and Axial T2 weighted MR images respectively demonstrate hypointense lesions on T1 and T2 in L4 S1 vertebral bodies (*arrows*). There is involvement of the L5 posterior element (*dashed arrow*). The hypointense lesions are consistent with sclerotic disease. There is associated disc space narrowing with a protrusion at L4/L5 disc level from an underlying intervertebral osteochondrosis



**A**



**B**

**C**

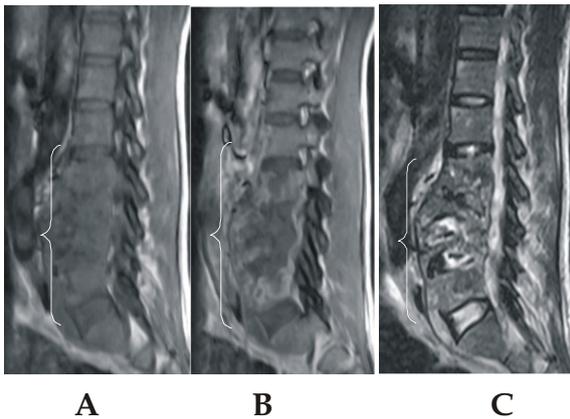
**Figs 4 A-C: Lymphoma in a 67year old male.**

**Figs 4 A-C: Lymphoma in a 67year old male.**

Axial T1, Sagittal T1 and Parasagittal T2 MR images show large paravertebral soft tissue masses (*brace*) encasing the T12 L3 vertebral bodies with permeative destruction but no cortical destruction and displacing the major vessels anteriorly. There is an extension of the mass into the spinal canal with resultant canal and foraminal stenoses. Also noted is vertebra plana of L1 (*arrow*) with reduction in marrow signal in both sequences

**Figs 5A-C:Pyogenic spondylodiscitis in a 41year old male.**

(A) Sagittal T1 weighted MR image shows low signal intensity in the L3 L5 vertebral bodies with adjacent end plate destruction (*brace*). (B) Sagittal T1 weighted MR image with contrast. The low signal intensity areas seen in (A) demonstrate ring enhancement (*brace*) (C) Sagittal T2 weighted MR image demonstrates the multilevel vertebral body destruction with heterogenous signal intensity within them and their intervening discs.



**DISCUSSION**

Various classification systems for the etiology of patients with low back pain (LBP) have been described in the literature.<sup>12</sup> Low back pain results from many causes including congenital, degenerative, neoplastic, and infective, traumatic, inflammatory or arthritic processes.<sup>13</sup> Good history taking and thorough physical examination are essential for making a diagnosis of the cause of low back pain<sup>8</sup> which, unfortunately, is not made in 80% of low back pain syndromes.<sup>14</sup>

The mean age in the study of Lakadamyali et al

was 51.2 years; while that of Moses et al was lower, at 47.83 years because they had more patients in the younger age ranges. The mean age in this study however correlated with that of Lakdamyali et al, at 53.27 years with the age range between 18 and 81 years.

Sex distribution in the study of Moses et al<sup>15</sup> and Lakadamyali et al<sup>16</sup> showed a female preponderance with a ratio of male to female ratio of 1:2. This was adduced to higher predisposition to low back pain in their women or that the women sought more medical attention than men. This study however showed a male preponderance with a male to female ratio of 1.36:1. Moses et al<sup>15</sup> however demonstrated no statistically significant age and gender differences among diagnoses; this is comparable with the results obtained in this study.

Low back pain results from many causes.<sup>13</sup> In the literature, mechanical low back pain accounted for over 90% of the etiology<sup>15</sup>. This is comparable with the percentage of mechanical causes obtained in this study as it accounted for 87.4% of the etiology (intervertebral osteochondrosis, spondylosis, normal (no disc or spinal pathology), and Congenital)

Normal or idiopathic low back pain (LBP) accounts for majority (60 - 70%) of the mechanical causes of LBP,<sup>15,17</sup> but this accounted for only 9.1% of the mechanical causes in this study. This is likely due to the fact that the diagnosis of idiopathic low back pain is made clinically and the frequency reduces drastically after disc related problems are excluded on imaging.<sup>18</sup>

Degenerative diseases of the spine which comprises of intervertebral osteochondrosis, which is pathological and spondylosis accounted for 77.5% of the mechanical causes in this study. These diseases have been reported to be age-related.<sup>19</sup> Other studies documented that the two are interwoven, the only difference being the narrowing of the disc space seen in the former.<sup>20,21</sup> Intervertebral osteochondrosis (61%) was the commonest cause of low back pain in this study, followed by spondylosis (16.5%).

MR imaging is sensitive for early changes of intervertebral osteochondrosis.<sup>22</sup> The classification proposed by Pffirman and

colleagues<sup>85</sup> for the MR imaging features of internal disc degeneration, based on sagittal fast spin echo T2-weighted sequences were also seen in this study (Figs 2A-C). The early changes seen included loss of normal homogenous T2 hyperintensity within the nucleus; later changes involved decreasing signal within the nucleus pulposus with loss of normal distinction between the nucleus pulposus and the annulus fibrosus. Progressive disc height loss and bulges also characterized the later changes. Posterior osteophytes contributed to spinal and foraminal stenosis.<sup>85</sup>

The congenital abnormalities in this study were seen in the younger age group and include spina bifida occulta with tethered cord and hydromyelia. A solitary case of hydromyelia (Figs 3 A-B) was also seen in the study as a cystic region with mild abnormal expansion of the spinal canal in the upper lumbar region. This is an unusual location as the cervical cord is involved more often, then the thoracic cord. The spinal cord is enlarged in 80%, normal in 10% and atrophic in 10%. The cavity is well circumscribed and the cyst fluid yielded a similar signal to CSF on both T1- and T2-weighted images.<sup>23</sup> The signal may be variable on T2-weighted and other types of images depending on the pulsatility pulsatile cysts show flow-related signal changes, nonpulsatile cysts do not.<sup>24</sup>

Metastasis has been noted in literature as the most common tumor to affect the vertebral marrow, particularly in those over 40 years of age.<sup>25</sup> It is also well established that MR imaging is more sensitive for detecting metastasis than other imaging modalities.<sup>26</sup> The features seen in metastatic spine disease were as those described in literature<sup>27</sup> low and high signal intensity lesions on T1- and T2- weighted images; multifocal with the involvement of a pedicle, vertebral fractures and heterogeneously enhancing epidural masses. Sclerotic metastases also appeared as low intensity lesions on both T1 and T2 weighted images. Tumours (primary neoplasia and metastasis) constituted 7.1% of the etiology of low back pain. The most common tumors seen in the study were metastasis and multiple myeloma, and they were seen most

commonly in the 61-70year and the 51-60year age ranges respectively. They were more common in males. The percentage seen was similar to that of Uganda<sup>15</sup> in which they were all males. The tumors that metastasized were mostly prostatic (Figs 4A-C) and ovarian carcinoma, others were indeterminate due to inadequate history. This is in keeping with what is obtained in literature which sited prostate cancer as one of the most common primary tumors to cause spinal metastasis; breast cancer was however the other most common tumor to metastasize to the spine.<sup>25</sup>

Multiple myeloma, in this study, was only seen in males and predominantly in the 51-60 year age range, in keeping with what had been observed in literature.<sup>28</sup> The pattern of involvement seen was mostly the focal type; seen as subtle areas of low signal on T1 weighted images. Biopsy done on these patients confirmed myeloma as similar features could be seen in metastasis and high grade lymphoma.<sup>25</sup>

The solitary case of chordoma seen in this study was at variance with what was written in literature. Known to be a primary tumor of the osseous spine, commonly presenting in the middle age (30-60 years) with a peak incidence in the fifth decade of life;<sup>97</sup> it was seen in this study in the 18-30 year age range. Sacral chordomas are also most frequently centered in the lower sacrum (S3-S4); in this patient, it extended up to the L5/S1 disc space. The MR features were similar to that observed in literature; it was seen as a midline structure extending from the spine into the paraspinal soft tissues and associated with a large mass.<sup>97</sup> It had low signal intensity and heterogeneously high signal.

Lymphomas typically occur in middle to old age and are more common in males and the onset of pain lasts from several months to 4 years<sup>30</sup>. It was seen in a male in the 61-70 year age range in this study and onset of pain was greater than 1year. The features of lymphoma (Fig 5) seen include reduced marrow signal on T1 and T2 images with large soft tissue masses seen encasing the bone without causing any cortical destruction.<sup>31</sup> These features are usually seen in primary, rather than secondary lymphoma. MRI is useful

in detecting disease when biopsy is negative and in guiding biopsy.<sup>32</sup>

MRI is the most useful imaging modality for the evaluation of spine infection and recognition of paravertebral or intraspinal abscess without the risk associated with myelography. Ledermann and coworkers<sup>88</sup> reviewed contrast enhanced MR images of 46 patients whose culture or histological examination results were positive for spondylodiscitis. Staphylococcus aureus has been found to be the dominant organism in many studies and was also the dominant one in this study, along with Mycobacterium Tuberculosis. Majority of the patients were in the 31-40 age range with a few in the others. Common features found in this study include low T1 signal intensity, high T2 signal intensity and enhancement within the affected marrow after gadolinium administration.<sup>27</sup> (Figs 6A-C) Surprisingly, none was found in the younger age group which was supposed to be the first peak in the bimodal distribution of the disease.<sup>33</sup> The predilection for males was also confirmed in this study, as its frequency has been reported in other studies to be higher in males.<sup>33</sup>

## CONCLUSION

The most common causes of low back pain in this study were intervertebral osteochondrosis, spondylosis, metastasis and spondylodiscitis. They were noted in the older age groups. The L4/L5 disc was the most affected by degenerative changes.

Magnetic Resonance Imaging (MRI) was able to detect the morphological abnormalities due to its excellent spatial resolution, high soft tissue contrast and its multiaxial, multiplanar abilities. These inferences would help improve the understanding of MRI of the lumbar spine in low back pain and thus enhance greatly the management of the patients.

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