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# Correlation between Findings on MRI and Clinical Features of Low Back Pain in Adults

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## Abstract

Low back pain (LBP) is an extremely common problem that most people experience at some point in their life. MRI is the method of choice for the evaluation of disk morphology (7) because of the good sensitivity (60 - 100%) and specificity (43 - 97%) for disk herniations. The purpose of this study is to undertake a critical review for the potential role of magnetic resonance imaging in the evaluation of low back pain and to determine if there were differences in the MRI finding and clinical findings.

A prospective, descriptive cross sectional, hospital-based study at three different hospitals; Khartoum Teaching Hospital, Fidael specialized hospital and Royal Scan Diagnostic Hospital. A total number of 100 patient who fulfilled the criteria were studied, patients were divided to three groups according to age range most of them ranked (20 - 30) years were 46%, second group from 30 to 40 account for 29% and third one 40 to 50 years account of 25%. Accuracy between clinical diagnosis and MRI diagnosis give 97% for disc prolapse regardless of site. Correlation of finding between MRI and clinical finding in patients of low back pain is important issue when considering evaluation of patient's expectation for both patients and clinicians.

***Keywords:*** *Low Back Pain; MRI; Orthopedic; Clinical Features*

## Introduction

Low back pain (LBP) is an extremely common problem that most people experience at some point in their life [1]. Over 80 percent of the population will experience an episode of LBP at some time during life [2]. For most, the clinical course is benign, with 95 percent of those afflicted recovering within a few months of onset [3]. The lifetime prevalence of low back pain ranges from 13.8 - 31% [4]. Low back pain usually appears in the 3rd decade of life, peaks between the ages of 35 and 55 years and decreases thereafter [4]. Lumbar disc prolapse is one of the common causes of low back pain seen in the working population [5].

One potential reason for the increase may be increasing rates of obesity, however, whether obesity is a risk factor for LBP, is still unclear [2]. Another possible reason is: Changes in psychosocial and physical work demands [3]. The workforce has changed over the past 15 years with decreases in the percentage of manufacturing jobs and increases in the percentage of construction and service industry jobs [6]. Other commonly reported risk factors include low educational status, stress, anxiety, depression, job dissatisfaction, low levels of social support in the workplace and whole-body vibration [1]. Back pain, which affects the bones, joints, ligaments, and muscles of the

back is a symptom that occurs primarily in middle-aged adults, but it also may occur in children and adolescents. Pathologic back pain can originate within the spine (spondylogenic or neurogenic) or outside the spine (viscerogenic, vascular or psychogenic) [5].

MRI is the method of choice for the evaluation of disk morphology [7] because of the good sensitivity (60 - 100%) and specificity (43 - 97%) for disk herniations (both protrusions and extrusion) [8]. Accidental finding of MRI is common but clinician most aware for correlation of findings and clinical symptoms. Current revolution in imaging study specially MRI in recent years in Sudan make it as second line investigation to evaluate chronic back pain in most patients.

## Purpose of the Study

The purpose of this study is to undertake a critical review for the potential role of magnetic resonance imaging in the evaluation of low back pain and to determine if there were differences in the MRI finding and clinical findings. Moreover, to correlate the abnormalities observed on MRI and clinical features of low back pain in adults in an ethnically distinct and almost homogenous population and to determine if our patients varied from those in other culture.

## Materials and Methods

A prospective, descriptive cross sectional, hospital-based study at three different hospitals; Khartoum Teaching Hospital, Fidael specialized hospital and Royal Scan Diagnostic Hospital. Total coverage of all patients attending the study area in a duration of three months were included. Young adult with back pain aging from twenty to fifty years were included while all patients with lower back pain were excluded. The data were collected by a well-structured questionnaire, all patients were examined clinically by a senior orthopedic surgeon and clinical diagnosis were proposed, then MRI image performed by senior radiologist.

In this study we describe the clinical characteristics of our sample and association including age groups, duration of LBP, severity, relieving factors and sensory or motor affection and clinical diagnosis comparing it to MRI diagnosis in Sudanese patients attending the referred clinic in Khartoum teaching hospital and sector of private clinics in Khartoum. The analysis was performed using the Statistical Package for the Social Sciences (SPSS), using chi-square test/Fisher exact test to test the relationship between the categorical variables in small samples. The relationship between independent variables was tested by the T test. Ethical approval was obtained from the ethical committee of the Sudanese Medical Specialization Board, a consent was obtained from the patients.

## Results

A total number of 100 patient who fulfilled the criteria were studied, patients were divided to three groups according to age range most of them ranked (20 - 30) years were 46%, second group from 30 to 40 account for 29% and third one 40 to 50 years account of 25%.

Patients complaints were assessed based on site and extension of the pain, duration of symptoms, pain severity, muscle power and response to analgesics. Most of the patients reported a back pain only (46%), radicular pain (41%), lower limb weakness 7% and only 6% with more than one complaint (backache, radicular pain, sensory abnormality). Regarding the duration of symptoms, most of patients' complaint range from 8 - 16 weeks (50%), while others complain for 4 - 8 weeks (29%) and those complain more than 4 months were 20%. Most of the patients describe the pain as moderate pain (61%), severe pain (22%), mild pain (7%) while 10% complain of incapacitating pain.

Patients were also asked about their response to analgesics (NSAIDS), most of these patients felt better with NSAIDS (74%) while 25% felt better with rest and only 1% felt relived with opioids and rest. Muscle power observation revealed a grade 5 power (98%) of patients, grade four (1%) and grade two (1%). Sensory levels of patient were also observed, most of them had no sensory abnormality (58%), L5 sensory abnormalities (13%), L4 sensory abnormalities (10%) and 19% of other dermatomes distributions. Concerning clinical diag-

nosis, the majority of the patients were diagnosed as disc prolapsed 97%, while 2% diagnosed as back muscle strain and 1% diagnosed as pott's disease. MRI diagnosis were studied where the diagnosis, level of the abnormality and site of the disc were assessed (Table 1).

| | | Number | Percentage |
|---|---|---|---|
| Diagnosis | Disc protrusion and nerve root compression | 80 | 80% |
| | More than one diagnosis | 17 | 7% |
| | Spondylosis and foraminal stenosis | 1 | 1% |
| | Pott's disease | 1 | 1% |
| | No abnormality | 1 | 1% |
| Level of the abnormality | More than one level | 82 | 82% |
| | L4-L5 | 11 | |
| | L5-S1 | 6 | 11% |
| | No abnormality | 1 | 6% |
| Site of the disc | Central | 49 | |
| | Paracentral | 30 | 49% |
| | Foraminal | 16 | 30% |
| | Lateral | 4 | 16% |
| | No abnormality | 1% | 4% |

***Table 1:*** *Shows MRI findings among participants.*

Cross tabulation analysis between clinical diagnosis and age (Table 2), MRI diagnosis and age (Table 3) and clinical diagnosis and MRI diagnosis (Table 4) were studied. No statistical difference found between clinical and MRI diagnosis, majority of the patients (78%) had similar clinical and MRI diagnosis, 17% of the patients were diagnosed clinically with disc prolapsed at one level while MRI showed diagnosis of more than one level, 2% of the patient diagnosed clinically with back muscle strain while MRI gave prolapsed disc, 1% diagnosed with disc prolapsed while no abnormality detected in the MRI.

| Age | Clinical Diagnosis | | | Total |
|---|---|---|---|---|
| | Back Strain | Disc Prolapse | Pott's Disease | |
| 20 - 30 years | 2 | 44 | 0 | 46 |
| 30 - 40 years | 0 | 28 | 1 | 29 |
| 40 - 50 years | 0 | 25 | 0 | 25 |
| Total | 2 | 97 | 1 | 100 |

***Table 2:*** *Shows correlation between age and clinical diagnosis.*

| Age | MRI diagnosis | | | | | Total |
|---|---|---|---|---|---|---|
| | Disc protrusion and nerve root compression | Spondylosis and foraminal stenosis | Pott's disease | More than one diagnosis | No abnormality | |
| 20 - 30 years | 38 | 0 | 0 | 8 | 0 | 46 |
| 30 - 40 years | 24 | 0 | 1 | 4 | 0 | 29 |
| 40 - 50 years | 18 | 1 | 0 | 5 | 1 | 25 |
| Total | 80 | 1 | 1 | 17 | 1 | 100 |

***Table 3****: Shows correlation between age and MRI diagnosis.*

| | MRI diagnosis | | | | | Total |
|---|---|---|---|---|---|---|
| | Disc protrusion and nerve root compression | Spondylosis and foraminal stenosis | Pott's disease | More than one diagnosis | No abnormality | |
| Back strain | 2 | 0 | O | 0 | 0 | 2 |
| Disc prolapse | 78 | 1 | 0 | 17 | 1 | 97 |
| Pott's disease | 0 | 0 | 1 | 0 | 0 | 1 |
| Total | 80 | 1 | 1 | 17 | 1 | 100 |

***Table 4:*** *Shows the correlation between clinical diagnosis and MRI diagnosis.*

## Discussion

Low back pain is one of most common complaints among young adults which may affect their life by different ways [1]. In this study we considered the finding observed in MRI done for patient presented with chronic back pain and their clinical symptoms. MRI imaging has revolutionized the diagnosis and treatment of spine-related pain syndromes. MRI scans have taken a considerable amount of guesswork out of spine surgery as they can give very accurate anatomic detail that can be used to plan surgeries.

Studies by Jarvik., *et al*. [9] and Michael T [10] concluded that back pain is common from the second decade of life, intervertebral disc disease and disc herniation are most prominent in otherwise healthy people in the third and fourth decades of life. Controversly, a study by Savage RA., *et al*. [5] found that low back pain usually appears in the 3rd decade of life, peaks between the ages of 35 and 55 years and decreases thereafter. they also found that Disc degeneration was most common at L5/S 1 and was significantly more prevalent in the older age group (52%) than in the younger age group (27%). Although LBP was more prevalent in the older subjects there was no relationship between LBP and disc degeneration. In this study, we found that low back pain is common among adults in their second decade of life (46%), this controversy seems to be due to life style and heavy duties for younger Sudanese populations.

Chronic low back pain (CLBP) prevalence varied according to the age ranges in the studies and was around three to four times higher in individuals aged over 50 compared to those aged 18 to 30. Moreover, people of lower economic status, those with less schooling, and smokers had higher CLBP prevalence compared to people with higher economic status, more schooling, and nonsmokers, respectively [10].

In our study, the most common complaint of the patients was back pain (46%), this is supported by study conducted by Britz., *et al*. [11], where lumbar disc herniation was a common cause of low back pain, but there are contradictory reports regarding the clinical significance of MRI findings in patients with LBP. The MRI is a very sensitive test for identifying disc lesions, but it is not specific [11]. While the MRI scan represents a very sensitive and accurate assessment of spinal anatomy, it cannot distinguish between painful and non-painful structures in the spine. In fact, a patient may have severe back pain and an MRI scan that shows a relatively normal-looking spine, or conversely may have no back pain but the MRI scan reveals a lot of anatomical problems. A study by Borenstein., *et al*. reported that MRI findings are not predictive of the development or duration of low back pain, and that clinical correlation is essential [12].

In 2010, Janardhana., *et al*. reported that 31 disc protrusions were central and 20 of these were asymptomatic counting 64%, 9 disc protrusions were centro-lateral counting 29% [13]. In our study most of the disc protrusions were central 49%, while 30% were paracentral, 16% foraminal 4% far lateral and 1% no abnormality.

In our study a cross analysis between clinical diagnosis and MRI diagnosis was done where 78% of our patients had disc protrusion and 2% had back strain, these result give different controversy from many study and aid by others, some studies have correlated clinical

findings with MRI findings [14], these studies also gave contrasting reports and were inconclusive. Milette., *et al*. [15] found that the loss of disc height or abnormal signal intensity is highly predictive of symptomatic tears. Presence of a disc bulge or protrusion does not have additional significance. Beattie., *et al*. [16] found that the presence of disc extrusion and severe nerve root compression at one or multiple sites is strongly associated with distal leg pain. However, Borenstein and others [12] clearly opined that MRI findings were not predictive of the development or duration of low back pain and that clinical correlation is essential.

## Conclusion

Accuracy between clinical diagnosis and MRI diagnosis give 97% for disc prolapse regardless of site. Correlation of finding between MRI and clinical finding in patients of low back pain is important issue when considering evaluation of patient's expectation for both patients and clinicians.

## Ethical Approval

Ethical approval was obtained from Sudan medical specialization board ethical committee. A written consent was also obtained from the participating patients.

## Conflict of Interest

The authors declare no financial or conflict of interest.

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