

Underlying Causes of Lumbar Disc Disease in Young Adults

GHULAM MUSFAFA WARDAK, HAMEEDULLAH KAKAR PANIZAI
NAQEEBULLAH ACHAKZAI

*Departments of Neurosurgery, Bolan Medical College (BMC)
Sandeman Provincial Hospital, Quetta – Pakistan*

ABSTRACT

Background: Rationale of the study was to gather data about the underlying causes of lumbar disc herniation in young adults as awareness of these etiological factors will help the clinician extract a relevant medical history, perform a directed physical examination, and order appropriate imaging studies. This will aid in initiating early intervention, be it conservative or operative, and achieving a favorable outcome.

Purpose: To determine the underlying causes of lumbar disc herniation in young patients.

Materials and Methods: This Descriptive Cross – sectional study was conducted at Department of Neurosurgery, Sandeman Provincial Hospital, Quetta. A total of seventy five (n = 75) adult patients of either gender less than 30 years of age with chronic back pain were included in the study. Underlying causes were ascertained through detailed history and clinical examination. Subsequently, all patients underwent MRI for the detection of the prolapse.

Results: 72% (n = 54) of patients were males and 28% (n = 21) were females 81.3% (n = 61) were found to have disc herniation due to mechanical load (trauma, RTA, weight lifting). 16.0% (n = 12) had systemic disease and 2.7% (n = 2) had a positive family history indicating genetic etiology. Out of 61 patients where underlying cause was mechanical load, 21 patients gave history of trauma, 19 had history of RTA. 14 were long distant drivers and 7 had history of heavy weight lifting.

Conclusion: In this study, mechanical load (trauma, RTA, long distant drivers and weight lifting) was found to be the major underlying cause of lumbar disc herniation in young adults.

Key Words: Lumbar disc herniation, Disc prolapsed, Etiological factors of disc herniation.

INTRODUCTION

Lumbar disc herniation is a condition in which there is a tear in the outer fibrous ring (annulus fibrosis) of intervertebral disc, which allows the soft, central portion (nucleus pulposus) to bulge out beyond the damaged outer rings.¹ Lumbar disc herniation or slipped disc accounts for less than 5% of all patients presenting with low backache but is the most common cause of nerve root pain like sciatica.² In a study conducted by Kim MS, et al, found that the percentage of disc herniation in lumbar region is 9.2%.¹ While Parisini P, et al, found the causes of lumbar disc herniation includes excessive weight, smoking, physical inactivity and trauma.⁴ Patients with lumbar disc herniation most

commonly presents with low back pain radiating to limbs, which increases with activity and relieve with rest, in some cases may present with bladder dysfunction in the form of voiding difficulties or with foot drop.⁵ On examination there will be signs and symptoms of radiculopathy including pain radiating to lower limbs, motor weakness, sensory changes, reflex changes, cauda equine syndrome, straight leg raise test will be reduced and tenderness over the sciatic notch. The investigation of choice for suspected lumbar disc herniation is magnetic resonance imaging.⁶ In a cross – sectional magnetic resonance imaging study with questionnaires on low back pain (LBP) and functional limitations conducted by Takatalo J, et al, found that

the frequency of lumbar disc herniation is 40% at L₄ – L₅, followed by 36.8% at L₅ – S₁, 13.2% at L₃ – L₄ and 13.2% had intervertebral disc prolapsed at L₄ – L₅ as well as at L₅ – S₁.⁷ Lumbar disc herniation in young adults can be extremely disabling and difficult to diagnose because of the paucity of neurologic abnormalities. It is influenced by many causes, such as genetics and systemic disorders (atherosclerosis, high cholesterol, diabetes and nutrient supply to the disc). Mechanical loading has been identified as a major extrinsic component in the onset and progression of intervertebral disc herniation. Rationale of the study was to gather data about the underlying causes of lumbar disc herniation in young adults as awareness of these etiological factors will help the clinician extract a relevant medical history, perform a directed physical examination, and order appropriate imaging studies. This will aid in initiating early intervention, be it conservative or operative and achieving a favorable outcome. The main objective of the study was to determine the underlying causes of lumbar disc herniation in young patients.

MATERIALS AND METHODS

It was a Descriptive Cross – sectional study and was carried out at the Department of Neurosurgery, Sandeman Provincial Hospital, Quetta, a tertiary care hospital at Quetta. The study was approved by hospital ethical committee. All patients of either gender with chronic backache and having age below 30 years who presented during February 2014 to May 2015 were included in the study. A total of 75 adult patients, who presented with history of backache for more than 3 months were enrolled for this study after fully informed, understood and voluntarily written consents. The lumbar disc herniation was diagnosed using Magnetic Resonance Imaging Resonance Imaging and finding of tear in the other fibrous ring (annulus fibrosis) of intervertebral disc, which allows the soft, central portion (nucleus pulposus) to bulge out beyond the damaged outer ring and its levels either L₂ – L₃, L₃ – L₄, L₄ – L₅ and L₅ – S₁. Underlying causes of lumbar disc herniation were categorized as load exerted on the spine from outside in the form of trauma, weight lifting and RTA (Mechanical loading). Systemic disorders like atherosclerosis, high cholesterol, diabetes and Genetics etc. were identified through history and clinical examination. Patients with past history of infection like spinal tuberculosis, any malignancy, previous surgery of

spine, intrathecal injection and having age above 30 years were excluded from study.

RESULTS

A total of seventy five (n = 75) patients were selected in this study after careful observation of exclusion criteria to control confounders and bias in the study results 72% (n = 54) of patients were males with the mean age of 22.63 years ± 3.58 SD and 28% (n = 21) were females with mean age of 25.58years ± 3.91 SD. Cumulative mean age was 23.34 years ± 3.84 SD. Results are presented in (Table 1). In our study sample, 81.3% (n = 61) were found to have disc herniation due to mechanical load (trauma, RTA, weight lifting), 16% (n = 12) had systemic disease and 2.7% (n = 2) had a positive family history indicating genetic etiology (Table 2). Out of 61 patients where underlying cause was mechanical load, 21 patients gave history of trauma, 19 had history of RTA, 14 were long distant drivers and 7 had history of heavy weight lifting.

Table 1: Demographic Profile of the Study Population.

Gender	Number (Percentage)	Mean Age ± SD (Years)
Male	54 (72%)	22.63 ± 3.58
Female	21 (28%)	25.38 ± 3.91
Total	75 (100%)	23.34 ± 3.84

Table 2: Causes of Lumbar Disc Herniation.

Causes	Frequency	Percent	Cumulative Percent
Mechanical Load	61	81.3	81.3
Systemic Disorders	12	16	97.3
Genetic	2	2.7	100
Total	75	100.0	

DISCUSSION

Back pain in adolescents is a rate condition but may denote a serious health problem; hence, full clinical history, physical examination and appropriate labo-

ratory studies should be obtained. These disease processes that are associated with back pain include scoliosis of various causes; spondylolysis; spondylolisthesis; traumatic injuries; disc degeneration and herniation; Scheuermann's disease; spondylodiscitis, tumors (primary, secondary, hematogenous); and miscellaneous conditions (e.g. metabolic disorders, sickle cell disease, osteoporosis).⁸ Herniated discs in children and adolescents can be extremely disabling and difficult to diagnose because of the paucity of neurologic abnormalities and the consequent suspicions of hysteria. The Lasegue sign is often the only consistent positive finding, and when persisting without remission, justifies early diagnostic studies such as CT scanning and electromyography. Rationale of the study was to gather data about the underlying causes of lumbar disc herniation as awareness of these etiological factors will help the clinician extract a relevant medical history, perform a directed physical examination and order appropriate imaging studies. This will aid in initiating early intervention, be it conservative or operative, and achieving a favorable outcome. A total of seventy five (n = 75) patients were included. Underlying causes were ascertained through detailed history and clinical examination. Subsequently, all patients underwent MRI for the detection of disc prolapsed. Our study results showed that 72% (n = 54) of patients were males with the mean age of 22.63 years ± 3.58 SD and 28% (n = 21) were females with mean age of 25.58 years ± 3.91 SD. 81.3% (n = 61) were found to have disc herniation due to mechanical load (trauma, RTA, long distant drivers and weight lifting), 16% (n = 21) had systemic disease and 2.7% (n = 2) had a positive family history indicating genetic etiology. Out of 61 patients where underlying cause was mechanical load, 21 patients gave history of trauma, 19 had history of RTA, 14 were long distant drivers and 7 had history of heavy weight lifting. Our study results are similar with the already published results on the subject. DePalma MJ, et al,⁹ in their study found that approximately 50% of adolescent athletes with persistent lumbar pain can be diagnosed with spondylolysis or spondylolisthesis. The remaining 50% will have suffered injury of the vertebral body, intervertebral disc, ring apophysis, pelvic, articular processes, spinous processes, interspinous ligament, or other soft tissues of the lumbar spine. Micheli LJ,¹⁰ determined whether there are significant differences in the causes of back pain in young athletes compared with the general adult population who presented with this complaint. In his retrospective randomized case comparison study he segre-

gated two cohorts by age and type of activity. One hundred adolescent athletes (aged 12 to 18 years; mean age, 15.8 years) with a chief complaint of low back pain were compared with 100 adults (aged 21 to 77 years; mean age, 31.9 years) with acute low back pain. They concluded that there is a significant differences in the major causes of low back pain in young athletes compared with causes of low back pain in the general adult population. Physicians diagnosing back pain in young athletes must have a specific understanding of these differences to avoid incorrect diagnosis and harmful delays in proper treatment.

Varlotta GP,¹¹ interviewed the parents of sixty – three patients who were less than twenty – one years old and who had operatively confirmed herniation of a lumbar disc regarding a history of severe back pain, sciatica and herniated disc, to determine whether aggregation of herniation of a lumbar disc occurs in families of patients in this young age – group. They found that of the patients who had herniation of a lumbar disc and were less than twenty – one years old, 32 percent had a positive family history for that lesion compared with 7 percent of the control group. Their results indicate a familial basis for herniation of a lumbar disc in patients who are less than twenty – one years old. Samartzis D,¹² performed a cross – sectional assessment of disc degeneration in juveniles as part of a population – based study and assessed the prevalence, determinants and clinical relevance associated with juvenile disc degeneration of the lumbar spine in individuals without spinal deformities. Sagittal T₂ – weighted magnetic resonance images (MRI) were evaluated for the presence and extent of disc degeneration as well as other spinal findings. They concluded that the presence of **juvenile disc degeneration** was strongly associated with **overweight and obesity**, low back pain, increased low back pain intensity and **diminished physical and social functioning**. Furthermore, an **elevated BMI** was significantly associated with increased severity of **disc degeneration**. Martinez – Lage JF, et al¹³ reviewed clinical data pertaining to two pediatric groups of patients whose main complaint was low back pain and / or sciatica, trying to identify factors that might contribute to their earlier referral and to the differential diagnosis of protruded disc and spinal neoplasm in this population. They found that the classic clinical onset in the children with herniated discs started with low back pain and sciatica, as in the children with neoplasms, although in subgroup B leg pain tended to be bilateral. The usual examination findings in both groups were spinal **rigidity** and sensory

loss, but motor weakness and impaired reflexes were found to be more frequent in the group with spinal growth ($P = 0.02$). Children with lumbosacral neoplasms also tended to present with atypical symptoms (acute onset, intracranial hypertension, subarachnoid hemorrhage and abdominal pain), while this was the exception in the group with herniated disc. Plain radiographs of the pediatric spine showed that X-ray examination is still a good tool for diagnosing spinal growths compared with their scant utility in disc herniations ($P = 0.001$).

In summary, Disc disease accompanying low back pain is a key issue both in research and clinical practice. Herniated intervertebral disc are rare in children and adolescents constituting approximately 1 – 5% of all patients undergoing surgery for lumbar and lumbosacral intervertebral disc herniation. Preceding trauma and congenital anomalies have been reported as important factors for the pathogenesis of intervertebral disc prolapses in young patients. However, in our study, mechanical load (trauma, RTA, weight lifting) was found to be the major underlying cause of lumbar disc herniation in young adults. Diagnosis of lumbar disc herniation in young children and adolescents is usually delayed because of the rarity and lack of experience with this entity and the difficulty in extracting a reliable medical history. Nevertheless, lumbar disc herniation should be considered in the differential diagnosis of any young adult presenting with a chief complaint of back pain and / or radiculopathy, especially in the setting of recent trauma. This should be coupled with a directed physical examination to elicit signs and narrow the differential diagnosis. Imaging studies, mainly magnetic resonance imaging, will help establish a diagnosis: yet radiographs are still required to exclude other spinal lesions. The initial management of lumbar disc herniation is the same as that in adults and consists of conservative treatment unless lumbar disc herniation affects the patient's motor and neurological functions in which case, early surgical treatment must be undertaken. Although the latter remains more difficult, current experience suggests a favorable outcome.

CONCLUSION

In this study, mechanical load (trauma, RTA, long distant drivers and weight lifting) were found to be the major underlying cause of lumbar disc herniation

should be considered in the differential diagnosis of any young adult presenting with a chief complaint of back pain especially in the setting of recent trauma.

Address for Correspondence:

*Dr. Ghulam Mustafa Wardak, MBBS, MS
Assistant Professor, Department of Neurosurgery,
Bolan Medical College (BMC)
Sandeman Provincial Hospital, Quetta – Pakistan
Cell: 0300-2602316
E-mail: dr.gmwardak@gmail.com*

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AUTHORS DATA

Name	Post	Institution	E-mail
Dr. Ghulam Mustafa Wardak	Assistant Professor	Assistant Professor, Department of Neurosurgery, Bolan Medical College (BMC), Sandeman Provincial Hospital, Quetta – Pakistan	dr.gmwardak@gmail.com
Dr. Hameedullah Kakar Panizai	Assistant Professor Orthopedics		
Dr. Naqeebullah Achakzai	Professor		