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Research Article

Study of Lumbar Disc Disease in Younger Population with a Focus on Physical Insults and Lifestyle-A Clinical Investigation at a Tertiary Care Hospital

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Abstract

Introduction: Lumbar disc degeneration is a multifactorial, degenerative process mostly occurring in the older population. Factors that can lead to DDD vary, ranging from genetics, lifestyle, BMI, physical insults like trauma, spinal deformities and spine surgeries. Due to high prevalence in older population, Lumbar DDD is regarded as a geriatric disease and its prevalence in the younger population is not well studied.

We conducted a retrospective cohort study to find the prevalence of Lumabr disc disease in the younger population (age 18-40) presenting to the spine clinic at one of tertiary care hospital catering to more than 1 million population. Main focus of the study was on the presence of any physical insults like direct trauma to the back, fall, sports related injuries and lifestyle of the patients.

Methodology: Retrospective cohort, After Institutional board review, we analysed the clinical record of the patients presenting in last 3 years.

Results: Total of 253 patients were selected based on the inclusion and exclusion criteria. Among the cohort, 62% of the patients had significant physical trauma prior to the disease, 21% presented with Road traffic accidents, 19% showed history of excessive weight lifting, 17% gave history of falls (in sports and occupational) and the remaining 5% showed varied histories like direct blow to the back and fall of heavy object on the back.

Conclusion: Lumbar disc disease in the younger population is not well studied, and aetiology could be different from the older cohort.

Keywords: Lumbar Disc Disease; Younger Population; Lifestyle; Clinical Investigation

Introduction

Lumbar spine plays a crucial role in maintaining the upright posture, supports body weight and provide the necessary mobility [1]. Its anatomy and physiology are evolved for the said purpose. The Lumbar spine specially the intervertebral discs and facet joints are susceptible to mechanical damage which often manifests as low back pain [2].

Degenerative disc disease is an umbrella term widely used for different types of pathologies involving the intervertebral discs. Some of the most common patterns include desiccation of the nucleus, annular bulge, tear and extrusion of the disc [3]. This condition is more common in older population and hence mostly studied in this context [4].

However, certain conditions like disc herniation without the presence of widespread degeneration is more common in younger population with no major difference based on the gender [5]. A healthy disc has high intradiscal pressure with intact healthy annular ring as compared to a degenerated disc, hence, rise in the

pressure more often leads to its herniation rather than rupture [6]. This rise in the pressure can be associated with multiple factors including body habitus as well as physical activity and trauma [7].

In this study we included young (<40 years) patients presenting to the clinic with low back pain with MRI suggestive of disc(s) herniation. After selection of the cohort, we scanned their medical records for evidence of trauma/strenuous physical activity prior to the back problem and lifestyle which can potentially result in disc problem.

Methods

- **Study design:** Retrospective cohort
- **Data collection:** Medical records of the patients spanning over 3 years were scanned and total of 253 patients were included in the study.
- **Inclusion criteria:** Age – 18-40 years, no prior spine surgery, No spine deformity,
- **Exclusion criteria:** Age less than 18 or greater than 40, Prior spine surgery, Spine deformity,
- **Outcome measures:** PRIMARY outcomes were the proportion of patients presenting with documented history of prior trauma (both acute and in distant past).
- SECONDARY objectives were demographics of the patients, patterns of trauma (recreational, occupational, accidental), time since the event, lifestyle and imaging findings.
- **Statistical analysis:** Data was recorded in the Microsoft excel, descriptive statistics were calculated for continuous data like demographics and logistic regression to analyse the association between trauma and lumbar disc herniation.

Results

Demographics

Total number of participants were 253 with mean age of 33.6 ± 4.2 years. Distribution based on age groups were as 22% (56 patients) for 18–25 years, 28% (71 patients) for 26–30 years, 30% (76 patients) for 31–35 years, and 20% (50 patients) for 36–40 years.

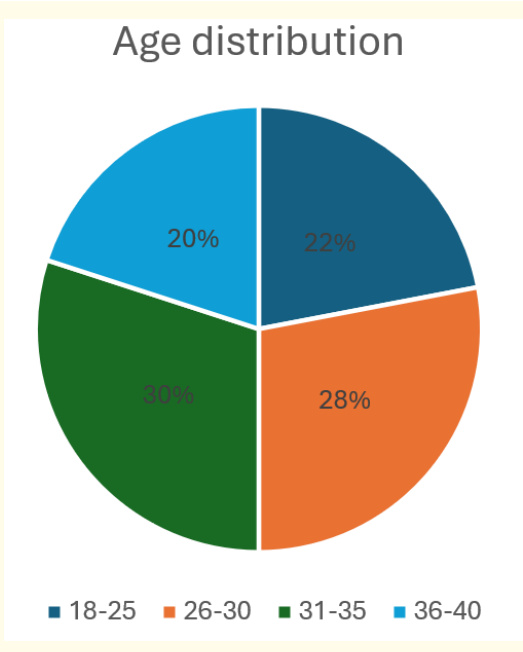

Figure a

There were 165 (65%) male patients while 88 (35%) female patients.

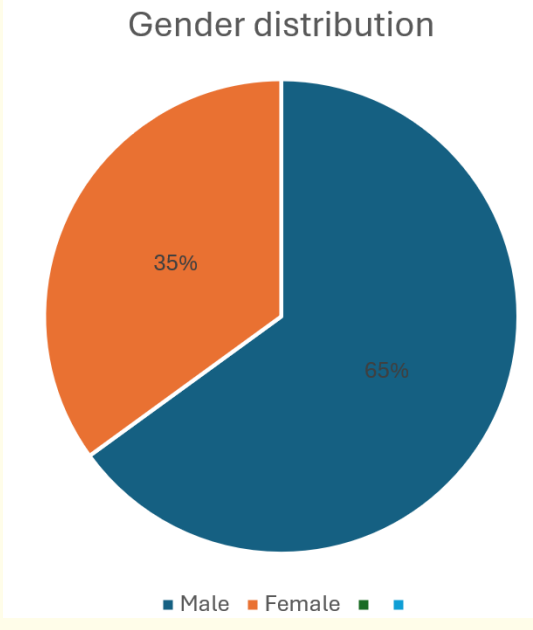

Figure b

Primary outcomes

Total of 62% (157 patients) presented with history of trauma amongst which 45% (114 patients) were with acute trauma (within one week prior to presentation) while 17% (43 patients) presented with distant past trauma (>one week).

There were 38 % (96 patients) presenting with various degrees of disc problems who did not report any trauma prior to the presentation.

Secondary outcomes

Patterns of Trauma (Among 157 Trauma Cases).

Total of 53 (21%) patients presented with road traffic accidents, 48 (19%) patients with excessive weightlifting, 43 (17%) with falls while 13 (5%) patients complained of direct blows to the back.

- **Time since trauma:** 107 (68%) patients presented within the 2 weeks of the index event while 50 (32%) patients presented at/after 2 weeks of the event.

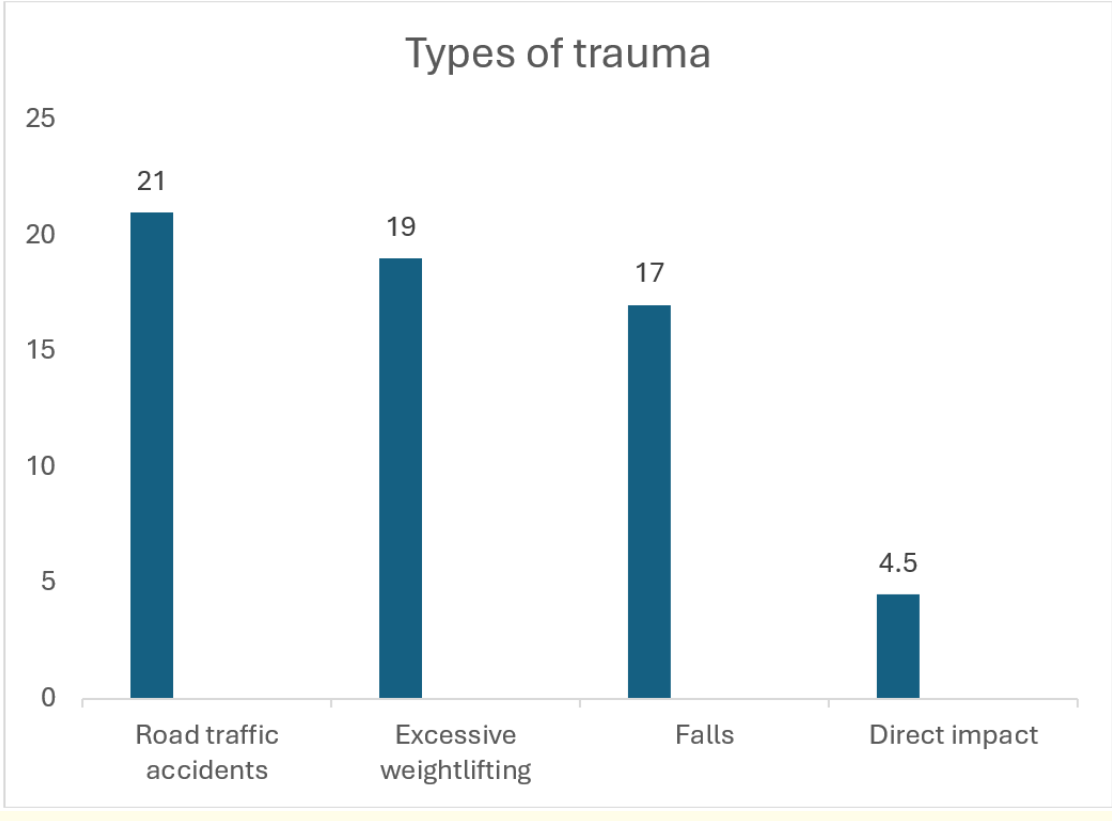

Figure c

- **Lifestyle Patterns (Across All Patients):** we also recorded lifestyle of the patients with 101 (40%) patients reporting sedentary lifestyle, 89 (35%) had active lifestyle and 63 (25%) patients were working heavy labour.
- **Imaging Findings (Based on MRI Reports):** 147 (58%) patients presented with L4-5-disc herniation, 106 (42%) had herniation at L5S1 level while 84 (33%) presented with annular tear without extrusion. A total of 63 (25%) patients presented with multi-level involvement.

Statistical Analysis

Logistic regression

- Trauma history significantly associated with lumbar disc herniation (Odds Ratio [OR]: 2.8, 95% CI: 1.8-4.3, $p < 0.001$).
- Sedentary lifestyle also contributed to disc herniation but less significantly (OR: 1.5, 95% CI: 1.1–2.2, $p = 0.03$).

Correlation

- Strong correlation between RTA and L4–L5 herniation (r = 0.76).
- Moderate correlation between weightlifting and L5–S1 herniation (r = 0.62).

Discussion

A thorough understanding of the anatomy and physiology of the Lumbar spine is paramount to understand the basis for disc problems like herniation and back pain. Lundon et al provided a comprehensive review of the Lumbar spine's anatomy, physiology where they showed that the intervertebral discs play an important role in maintaining upright posture, providing mobility and supporting the body weight but it comes at the expense of weakness in the intervertebral disc structure [8].

Exact aetiology of the disc degeneration is not well understood however certain factors like genetics, age, and lifestyle etc are thoroughly studies and shown to have strong association with degenerative disc disease. Yong-Soo Choi and the team provided a detailed review showing the impact of multiple factors leading to degeneration in the disc leading to discogenic low back pain [9].

As with other degenerative processes, degenerative disc disease is more common in aging population. A healthy disc owing to the abundant concentration of Proteoglycans maintains intradiscal pressure which in turn provides the cushion effect [10]. Degeneration is a gradual process that starts with dehydration in the nucleus, leading to annular tears and eventually results in the collapse of the disc [11].

A healthy disc in the younger population maintains the integrity of the annulus as well as the hydration of the nucleus pulposus. Sudden rise in the intradiscal pressure exerts force on the annular structure and can lead to a variety of conditions like herniation and acute rupture [12]. This condition is studied however not as thoroughly as degenerative disc disease in the older population.

The advent of better diagnostics like MRI we can diagnose disc problems like desiccation, herniation and annular tears etc at earlier stages and hence the age boundaries for detection of disc problems has blurred [9]. In this retrospective study, we accessed the medical records of the patients diagnosed with disc problems like herniation and extrusion at a younger age and recorded the presence of direct and indirect trauma. Data analysis and logistic regression models showed a strong association of the traumatic events with the development of the disc problems.

Conclusion

Both direct and indirect as well as acute and old trauma can lead to Lumbar disc problems in younger (<40 years) population. Patients presenting with low back pain and a history of trauma should be investigated with a high suspicion for disc problems. Early diagnosis and management can help ameliorate immediate and late complications.

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