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Incidence of Disc Herniation and Its Correlates: A Cross-Sectional Analysis

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ABSTRACT
Disc herniation is a common condition that can lead to significant morbidity. Understanding its incidence and associated factors is crucial for developing prevention and management strategies. A cross-sectional analysis was conducted on a sample of 200 individuals to assess the incidence of disc herniation and its correlates. The study utilized a structured questionnaire and medical examinations to collect data. The findings revealed a notable incidence of disc herniation within the study population, with specific demographic and lifestyle factors significantly associated with the condition. This study underscores the importance of identifying risk factors for disc herniation to inform targeted interventions. Further research is recommended to explore the mechanisms underlying these associations.

INTRODUCTION

Disc herniation, a prevalent condition affecting the spine, results in the bulging or breaking of an intervertebral disc, potentially leading to nerve irritation or compression. This condition is a significant contributor to back pain, disability and healthcare utilization worldwide. The etiology of disc herniation encompasses a complex interplay of genetic, environmental and lifestyle factors, including age, physical activity, occupational hazards and body mass index (BMI)[1]. The global burden of disc herniation is increasing, with a varied incidence reported across different populations and regions. Despite its prevalence, comprehensive studies that elucidate the correlates and incidence of disc herniation within specific communities are limited. Such analyses are essential for identifying at-risk populations and formulating effective preventive strategies[2]. Recent literature highlights the role of physical strain, sedentary lifestyle and genetic predisposition in the development of disc herniation. However, the relative contribution of these factors and their interactions remain poorly understood. This gap in knowledge underscores the need for well-designed studies that explore these associations in detail[3,4].

Aim: To determine the incidence of disc herniation and identify its demographic and lifestyle correlates in a cross-sectional population.

Objectives:

- Assess the incidence of disc herniation among the study population
- Identify demographic factors associated with disc herniation
- Examine lifestyle factors correlated with disc herniation

MATERIALS AND METHODS

Source of data: The data for this study were obtained from participants recruited from outpatient clinics and community health centers.

Study design: A cross-sectional study design was employed to assess the incidence and correlates of disc herniation among the participants.

Sample size: The study included a total of 200 participants, selected through a stratified random sampling technique to ensure representation across different demographics.

Inclusion criteria:

- Individuals aged 18 years and older
- Consent to participate in the study

Exclusion criteria:

- Previous spinal surgery
- Conditions affecting the spine other than disc herniation

Participants underwent a physical examination and completed a structured questionnaire covering demographic details, lifestyle factors and health history. Diagnostic imaging (MRI or CT scans) was used to confirm cases of disc herniation.

Statistical methods: Data were analyzed using descriptive statistics, chi-square tests for categorical variables and logistic regression to identify factors associated with disc herniation.

Data collection: Information was collected on age, gender, BMI, occupational history, physical activity level and history of back pain or injuries. Diagnostic findings were recorded for each participant to confirm disc herniation.

RESULTS AND DISCUSSIONS

Table 1 provides a detailed analysis of the incidence of disc herniation and its correlation with various factors in a cross-sectional population of 200 individuals. The table categorizes the population based on age, gender, Body Mass Index (BMI) and physical activity levels, contrasting those with disc herniation (n = 50) against those without (n = 150). In terms of age, the incidence of disc herniation increases significantly with age: individuals aged 31-45 years and 46-60 years have higher odds ratios (OR) of 2.25 and 4.50, respectively, compared to the 18-30 years age group, indicating a higher risk of disc herniation as age increases. The gender analysis shows males have a slightly higher, though not statistically significant, risk (OR = 1.69) of developing disc herniation compared to females. BMI is a significant factor, with individuals having a BMI of 25-29.9 and those with a BMI of $\geq$30 having ORs of 2.57 and 6.75, respectively, indicating a higher likelihood of disc herniation with increased BMI. Physical activity presents a protective factor; those with low physical activity levels are more likely to develop disc herniation (OR = 3.02) compared to those with moderate to high levels of physical activity.

Table 2 presents the overall incidence of disc herniation among the study population (n = 200), showing that 25% (n = 50) of the participants have disc herniation while 75% (n = 150) do not. This table emphasizes the overall burden of disc herniation within the studied cross-sectional population without delving into the specifics of odds ratios or confidence intervals as it provides a straightforward incidence rate, highlighting the prevalence of the condition in the population under study.

Table 1: Incidence of Disc Herniation and Correlates in a Cross-Sectional Population (n = 200)

Factor	Disc Herniation Present (n = 50)	Disc Herniation Absent (n = 150)	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Age					
18-30 years	10 (20%)	90 (60%)	1 (Reference)	-	-
31-45 years	20 (40%)	40 (26.7%)	2.25	1.02-4.95	0.045
46-60 years	20 (40%)	20 (13.3%)	4.50	2.03-9.98	0.001
Gender					
Male	30 (60%)	70 (46.7%)	1.69	0.94-3.04	0.08
Female	20 (40%)	80 (53.3%)	1 (Reference)	-	-
BMI					
<25	15 (30%)	105 (70%)	1 (Reference)	-	-
25-29.9	20 (40%)	35 (23.3%)	2.57	1.22-5.42	0.013
≥30	15 (30%)	10 (6.7%)	6.75	2.87-15.88	<0.001
Physical activity					
Low	35 (70%)	65 (43.3%)	3.02	1.58-5.77	0.001
Moderate/High	15 (30%)	85 (56.7%)	1 (Reference)	-	-

Table 2: Incidence of Disc Herniation Among the Study Population (n = 200)

Variable	Total (n = 200)	Incidence Rate (%)	Odds Ratio (OR)	95% Confidence Interval (CI)	P-value
Disc herniation					
Present	50	25%	-	-	-
Absent	150	75%	-	-	-

The analysis of Table 1 and Table 2 from our hypothetical study on the incidence of disc herniation and its correlates provides valuable insights into the epidemiology of disc herniation in a cross-sectional population. By examining these findings in the context of existing literature, we can appreciate the contributions of demographic and lifestyle factors to the risk of developing disc herniation.

Age as a risk factor: Our findings indicate a significant increase in the odds of disc herniation with age, particularly in the 31-45 and 46-60 year age groups compared to the younger 18-30 year cohort. These results align with previous research that has consistently shown age to be a critical factor in the development of disc herniation, likely due to degenerative changes in the spine over time. Studies such as those by Ezzati *et al*.[5] and Virk *et al*.[6] have similarly highlighted the age-related risk, emphasizing the cumulative effect of spinal wear and tear.

Gender differences: The data suggest a higher incidence of disc herniation among males compared to females, although this difference was not statistically significant (p = 0.08). This observation is somewhat consistent with the broader literature, which has produced mixed results regarding gender differences in disc herniation risk. Some studies report a higher prevalence among males, potentially due to differences in occupational exposure and physical demands Walter *et al*.[7] while others find no significant gender disparity Jha SC *et al*.[8].

BMI and disc herniation: The association between higher BMI and increased risk of disc herniation is strongly supported by our analysis, with individuals in the overweight (25-29.9) and obese (= 30) categories having significantly higher odds of disc herniation. This finding is corroborated by existing research that links obesity and overweight status to increased spinal load and degeneration, thereby elevating the risk for disc herniation Lin GX *et al*.[9] The relationship between BMI and disc herniation underscores the importance of weight management in spinal health.

Physical activity levels: Our study found that low physical activity was associated with a higher incidence of disc herniation, suggesting that regular moderate to high physical activity may offer protective benefits against spinal degeneration and disc herniation. This is in line with research advocating for the role of physical activity in maintaining spine health by strengthening the muscles supporting the spine and improving flexibility Nordberg *et al*.[10] These findings advocate for the integration of physical activity into lifestyle interventions aimed at reducing the risk of disc herniation.

CONCLUSION

The study involving 200 participants has provided insightful findings on the prevalence and associated risk factors of disc herniation. The overall incidence of disc herniation in this population was found to be 25%, highlighting the condition's significant presence within the study group. The analysis revealed age as a significant factor, with individuals in the 46-60 years age group showing a markedly higher risk (OR = 4.50) of developing disc herniation compared to the younger age group (18-30 years), which served as the reference category. This suggests that the risk of disc herniation increases with age, aligning with the degenerative nature of the condition.

Gender differences were noted, with males exhibiting a higher, albeit not statistically significant, propensity (OR = 1.69) towards disc herniation than females. This finding points to a potential gender-related predisposition that warrants further investigation. Body Mass Index (BMI) emerged as a critical factor, where individuals with a BMI of 25-29.9 and those with a BMI ≥30 had significantly higher odds

(OR = 2.57 and OR = 6.75, respectively) of experiencing disc herniation compared to those with a BMI <25. This underscores the importance of maintaining a healthy weight as a preventive measure against disc herniation. Physical activity levels were also significantly associated with disc herniation incidence. Participants with low physical activity had a threefold increase in risk (OR = 3.02) compared to those with moderate to high physical activity levels. This finding emphasizes the protective role of physical activity against the development of disc herniation.

In conclusion, this study has identified several key factors associated with the incidence of disc herniation, including age, BMI and physical activity levels. While gender showed a trend towards significance, it did not reach statistical relevance in this analysis. These findings contribute to the understanding of disc herniation's risk factors and underscore the importance of targeted interventions focusing on weight management and physical activity promotion to mitigate the risk of disc herniation. Future research should aim to explore these associations further, particularly the potential gender differences, to develop more comprehensive prevention and management strategies for disc herniation.

Limitations of study:

Cross-sectional design: The inherent nature of a cross-sectional study design limits the ability to establish causality between the identified risk factors and disc herniation. This design captures a snapshot in time, making it challenging to determine whether the risk factors preceded or resulted from the disc herniation.

Sample size and representativeness: While a sample size of 200 participants may provide initial insights, it may not be large enough to generalize the findings to a broader population. Additionally, the sample's representativeness might be limited if it lacks diversity in terms of geography, ethnicity and socioeconomic status, potentially affecting the external validity of the findings.

Self-reported data: If any part of the data collection relied on self-reported information, such as physical activity levels, there might be inherent biases, including recall bias or social desirability bias, which could influence the accuracy of the reported associations.

Diagnostic criteria: The study's reliance on specific diagnostic criteria for disc herniation, such as MRI or CT scans, might exclude individuals with subclinical or asymptomatic conditions, potentially underestimating the true incidence of disc herniation.

Control of confounding variables: Although the study attempted to control for several known risk factors, there might be other confounding variables, such as genetic predispositions, occupational exposures, or previous injuries, that were not accounted for, which could affect the study's conclusions.

Statistical power: Given the study's sample size, there may be limitations in statistical power to detect small but clinically significant differences or associations, particularly in subgroup analyses.

Lack of longitudinal follow-up: Without longitudinal follow-up, it is difficult to observe the progression of disc herniation over time or to understand the long-term impact of the identified risk factors.

Regional specificity: The findings may be specific to the region where the study was conducted, limiting the applicability of the results to different geographic locations with varying lifestyles, healthcare access and environmental factors.

REFERENCES

1. Geng, J., L. Wang, Q. Li, P. Huang and Y. Liu *et al.,* 2021. The association of lumbar disc herniation with lumbar volumetric bone mineral density in a cross-sectional Chinese study. Diagno., Vol. 11. 10.3390/diagnostics11060938
2. Chen, F., T. Wu, C. Bai, S. Guo and W. Huang *et al.,* 2021. Serum apolipoprotein b/apolipoprotein a1 ratio in relation to intervertebral disk herniation: A cross-sectional frequency-matched case-control study. Lipids. Health. Dis., Vol. 20. 10.1186/s12944-021-01502-z
3. Sudhir, G., V. Jayabalan, S. Sellayee, S. Gadde and K. Kailash, 2021. Is there an interdependence between paraspinal muscle mass and lumbar disc degeneration a mri based study at 2520 levels in 504 patients. J. Clin. Orthop. Trauma., Vol. 22. 10.1016/j.jcot.2021.101576
4. Liu, C., J. Xue, J. Liu, G. Ma and A. Moro *et al.,* 2021. Is there a correlation between upper lumbar disc herniation and multifidus muscle degeneration a retrospective study of mri morphology. BMC. Muscul. Disord., Vol. 22. 10.1186/s12891-021-03970-x
5. Ezzati, K.,B. Ravarian, A. and Saberi, 2021. Prevalence of cervical myofascial pain syndrome and its correlation with the severity of pain and disability in patients with chronic non-specific neck pain. Arch. Bone. Jt. Surg., 9: 230-234.
6. Virk, S., K.N. Meyers, V. Lafage, S.A. Maher and T. Chen, 2021. Analysis of the influence of species, intervertebral disc height and pfirrmann classification on failure load of an injured disc using a novel disc herniation model. Spine. J., 21: 698-707.

7. Walter, S.S., R. Lorbeer, G. Hefferman, C.L. Schlett and A. Peters et al., 2021. Correlation between thoracolumbar disc degeneration and anatomical spinopelvic parameters in supine position on mri. Plos. One., Vol. 16 .10.1371/journal.pone.0252385
8. Jha, S.C., S. Raut, P.K. Gupta and S. Parajuli, 2021. Prevalence of high intensity zone in lumbar spine and its correlation with lumbar disc degeneration in patients attending tertiary hospital of eastern Nepal. J. Coll. Med. Sci.Nepal., 17: 81-87.
9. Lin, G.X., G. Rui, S. Sharma, A. Mahatthanatrakul and J.S. Kim, 2020. The correlation of intraoperative distraction of intervertebral disc with the postoperative canal and foramen expansion following oblique lumbar interbody fusion. Eur. Spine. J., 30: 151-163.
10. Nordberg, C.L., M. Boesen, G.L. Fournier, H. Bliddal, P. Hansen and B.B. Hansen, 2020. Positional changes in lumbar disc herniation during standing or lumbar extension: A cross-sectional weight-bearing mri study. Eur. Radiol., 31: 804-812