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ORIGINAL ARTICLE

Implications of Age, Gender and Lumbar Disc Level on Symptomatic Herniated Nucleus Pulposus

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ABSTRACT

Background: A herniated-disc inside the spinal column is a condition applying displacement of nucleus pulposus from intervertebral space causing back pain.
Objective: To analyse the association of age, gender and lumbar disc level with herniated nucleus pulposus.
Study Design: Retrospective study
Place and Duration of Study: Department of Neurosurgery, Shaikh Zayed Hospital, Lahore from 1st January 2011 to 31st January 2020.
Methodology: One hundred and twenty patients to investigate association of herniated nucleus pulposus with age, gender and lumbar disc level were enrolled. Patient's demographic, clinical and radiological assessments were completed for categorizing their condition and level of lumbar disc involvement.
Results: There were 72.5% males and 27.5% females with a mean age of 48.6±1.26 years. The study revealed that 72.5% nucleus pulposus herniation cases were within the age group of 51-70 years. L5-S1 is more susceptible to nucleus pulposus herniation (62.5%) followed by L4-L5 (34.2%), L3-L4 (2.5%) and L1-L2 (0.8%).
Conclusion: Elderly population with >51 years in males is highly prone for nucleus pulposus herniation with L5-S1 to be most affected lumbar spinal segments.
Key words: Nucleus pulposus herniation, Vertebral column level, Lumbar disc level

INTRODUCTION

Disc herniation (DH) is related with displacement of the disc material. Its anatomy consists of two major structures such as nucleus pulposus (NP) and annulus fibrosis (AF).[1] Nucleus pulposus herniation (NPH) is the most common reason of sciatic related pains and also the major indication of spinal surgery over the globe.[2] The condition represents dislodgment of nucleus pulposus beyond intervertebral, disc space. The composition of NP is mainly water with type 2 collagen proteoglycans as well as chondrocyte like cells making it elastic and flexible during forces of stress. This composition also allows it to absorb the compression.[3] The annulus fibrosus formulates a fibrous tissue of type 1 collagen fibers around NP. The structure is compact from the anterior and attached with the vertebral body through Sharpey's fibers.[4] Disk herniation or disk degeneration are associated terms with NP being evolved from disk degeneration. A degenerative disk is linked with proteoglycan loss.[5]

The worldwide prevalence of herniated disk is around 1-3% with the incidence being influenced by age and gender. An increased incidence is observed in people between 30-50 years of age. Men are more frequently reported to be affected by herniation of disk than women with almost double frequency of men than women. L5-S1 holds the major body weight and wide range of body motions. The disk L5 and S1 are observed to be the most vulnerable towards herniation especially in elderly.[7,8] Nucleus pulosus herniation causes radicular pain in lumbar and cervical spinal area post spondylosis. Therapeutical conservative treatment is mainly adapted due to natural history of NPH providing positive response towards pain treatment. Nerve root steroidal injection can be administered for conservative treatment.[9,10] However in cervical herniation surgery is recommended.[11] The present study was designed to observe the effect of age, gender and level of lumbar disk level on NPH in Pakistani population, for designing better strategic treatment and management plan.

MATERIALS AND METHODS

It was a retrospective study conducted at neurosurgery department of Sheikh Zayed Medical Complex from 1st January 2011 to 31st January 2020. A total number of 120 randomly selected patients with an age >11 years and having complain of spinal pain were enrolled. Each patient was clinically and physically examined for chronic/acute complaints of back pain/sciatic lumbar disc herniation and lumbar spine spondylosis. Their demographic and clinical history was documented on a well-structured questionnaire. A radiological complete magnetic resonance index (MRI) examination revealing lumbar disc protrusion was conducted in X-ray suspected cases. In patients where MRI was contraindicated a computer topography (CT) scan myelogram was performed. The MRI reports were double checked with senior radiologist. The level of NP herniation was documented. Those patients who had ambiguous diagnosis, Bechterew's disease, spinal fractures any

history of malignancies or undergone surgery were excluded.

Data was analyzed statistically by using SPSS-24.0, where quantitative data was analyzed by mean±standard deviation and qualitative data was analyzed by chi square in terms of frequencies and percentages. P value less than 0.05 was considered as significant.

RESULTS

The present study enrolled 120 patients having NPH at various levels of lumbar disc involvement. There were 87 (72.5%) males and only 33 (27.5%) females suffering from NPH. The mean age was 48.6±1.26 years with majority of the patients between 61-70 years (38.3%) followed by 41 patients (34.2%) within the age range of 51-60 years. Only one child of 11 years came with nucleus pulposus herniation. Young adults were less affected by NPH than elderly population (Table 1).

A significant increasing trend showed that majority of the patients (n=75) were suffering from L5-S1 lumbar disc level NP herniation followed by L4-L5 lumbar disc level NP herniation (Fig. 1).

A comparative analysis between groups showed that 86.6% of males suffered from L5-S1 NPH while 13.35 females also suffered from similar lumbar disc level (L5-S1). However, with an insignificant difference the highest number of females was observed to have L4-L5 nucleus pulposus herniation. A significant number of elderly patients were affected from L4-L5 or L5-S1 lumbar disc NPH with a nominal number of patients observed in L3-L4 levels (Table 2).

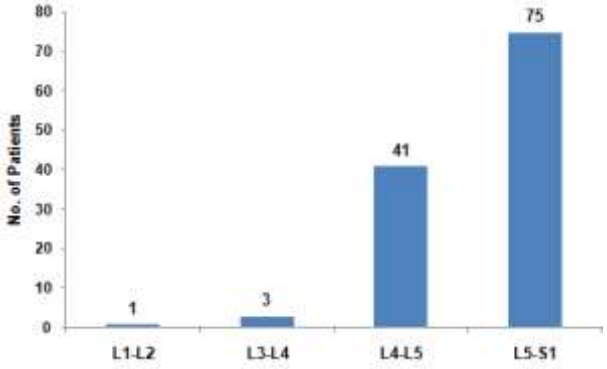
Table 1: Demographic information of patients (n=120)

Variable	No.	%
Gender		
Male	87	72.5
Female	33	27.5
Age (years)		
11-20	1	0.8
21-30	9	7.5
31-40	9	7.5
41-50	14	11.7
51-60	41	34.2
61-70	46	38.3

Table 2: Association of lumber disc level NPH with gender and age (n=120)

Variable	Lumbar Disc Level				P value
	L1-L2 (n=1)	L3-L4 (N=3)	L4-L5 (n=41)	L5-S1 (n=75)	
Gender					
Male	1(100%)	2(66.6%)	35(85.3%)	65 (86.5%)	0.09
Female	-	1 (33.3%)	6(14.6%)	10(13.5%)	0.1
Age (years)					
11-20	--	--	1(2.4%)	-	-
21-30	1(100%)	1(33.3%)	3(7.3%)	4(5.3%)	0.05
31-40	--	1(33.3%)	4(9.7%)	4(5.35)	0.1
41-50	--	1(33.3%)	5(12.1%)	8(10.6%)	0.05
51-60	--	--	13(31.7%)	28(37.3%)	0.9
61-70	--	--	15(36.5%)	31(41.3%)	0.06

Fig 1: Nucleus pulposus herniation at various lumbar disc levels



DISCUSSION

The present study showed gender bias event of NPH with males being highly prone towards nucleus pulposus herniation than females. Field et al[12] has shown that NPH is common among males with 2:1 male to female ratio respectively. A study in Poland stated contradictory to present results finding. It elaborated that female are more vulnerable towards lumbar disc herniation than males.[13] This can be completely justified as there are significant variance observed among races and ethnicity.[14] The present study enrolled 120 cases with 72.5% between the age group of 51-70 years. This predicts that elderly age is more vulnerable towards NPH than young adults. Literature had elaborated that degenerative changes starts to overcome constructive changes by the age of 50 years. The spinal ligaments (posterior-lateral surface) start losing their strengths.[15] Age advancement brings negative impact on desiccated lumbar disc turning it into herniated. Even a mild physical twist and flex can end up into NPH.[16-18]

The current study findings elaborated that maximum number of cases were reported with L5-S1 or L4-L5 lumbar disc level herniation. The reported incidence of disc herniation is five in 20 cases per thousand adults with majority in their 30s-50s.[12] Herniation of NP in lumbar spine with symptomatic finding is seen in around 1-3% of patients worldwide. Ninety fiver percent risk of NPH occurrence is around either L4-L5 disc or L5-S1.[19]

CONCLUSION

Elderly population is more vulnerable for nucleus pulposus herniation with L5-S1 and L4-L5 to be most affected spinal segments.

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