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Lumbosacral Radiculopathy – Factors Effects on It's Severity

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A B S T R A C T

Want to demonstrate factors which effect appearance and severity of lumbosacral radiculopathy. We analysed 100 electromyoneurographically examined patients. Patients were categorised on bases of their BMI (body mass index), sex, age, job type (physical or intellectual job), and chronic diseases (diabetes mellitus, arterial hypertension and hyperlipidemia). Data were evaluated using the χ^2 test with the significance of $p<0.05$. Obese patients had severe radiculopathy more often than non-obese patients ($p<0.044$). Severe radiculopathy appeared more frequently in male ($p<0.001$), elderly patients ($p<0.023$), and patients doing physically intensive jobs ($p<0.002$). No statistic significance was found in relationship between patients suffering from diabetes mellitus, arterial hypertension, and hyperlipidemia, and the severity of lumbosacral radiculopathy. Obese patients, males, elderly patients, and patients doing physically intensive jobs are at a bigger risk of suffering from severe radiculopathy. Diabetes mellitus, arterial hypertension, and hyperlipidemia do not influence the severity of lumbosacral radiculopathy.

Key words: *lumbosacral radiculopathy, obesity, job, sex, age, comorbidity*

Introduction

Lumbar radiculopathy is a common health problem among normal population, which may affect the quality of life, human working capabilities, and may sometimes even cause disability[1,2].

The pathology of the disease takes place on the nerve fibers: from their spinal cord departure to their entrance into the intervertebral foramen, and intervertebral canal, where sensory and motoric neurons gather into the spinal nerve[3].

Tingling or numbness, up to total loss of sense as the result of the tactile nerve damage, are some manifestations of syndromes. Motoric nerve root damage is harder to notice due to polyradicular innervation, and thus only coarse motoric strength and partial hypotrophy may be observed. The feeling of pain is experienced if the fibers entering the spinothalamic path are damaged[3].

The cause of the lumbar syndrome may be extensive degenerative changes of the spine, spondylosis with central canal narrowing, dorsal intervertebral disc herniation, fibrotic post surgery changes, pyriform muscle spasm, and other factors including dorsal osteophites, facet joints subluxation, and thickening of the ligamentum flavum[4]. Dorsal intervertebral disc herniations in the lumbar spine are usually medial and compression happens in the central channel affecting parallelly lying fibers of the cauda equina. The nerve root exiting one level lower is the most frequently affected nerve root. If the disc herniation is extensive enough it can compress more than one nerve root[3].

Electrodiagnostics of the radicular lesions has tradition longer than 50 years. Radiculopathy diagnosis is based on the electromyoneurographic (EMNG) finding of the neurogen lesion characterised by: rarefied innervation pattern, polyphasic action potentials, higher potentials of compensating motoric units, spontaneous activity such as fibrillation, fasciculation, and positive denervating potentials, as well as normal neurographic analysis.

In our EMNG practice, we have noticed that certain population groups are more frequently suffering from

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this disease, and therefore we wanted to analyse how body weight, type of job (physical or intellectual), age, gender, and diseases like arterial hypertension, diabetes mellitus, and hyperlipidemia, affect the frequency and magnitude of radiculopathy.

Methods and Patients

We have analysed 100 patients recommended to our electromyoneurographic laboratory on the Department of Neurology in University Hospital Osijek in years 2004 and 2005, in order to diagnostically conclude lumbar radiculopathy. Apart from measuring their body-height and body-weight, patients were interviewed regarding their job type and associated diseases (arterial hypertension, diabetes mellitus, and hyperlipidemia) suffered from during the examinations. Anamnestic data of the lumbar radiculopathy symptoms, neurological examination and EMNG examination were combined to conclude the diagnosis of radiculopathy. EMNG examinations were made on EMNG unit Synergy with concentric needle electrode. Severity of radiculopathy was established by the level of rarity of the motoric action potentials units pattern[3].

Patients were divided into two groups regarding the BMI (body mass index): obese and non-obese. According to this classification, BMI of non-obese patients ranged between 20 to 25 kg/m^2. Obese patients were divided into four groups: 1st group with BMI 26–30 kg/m^2, 2nd group 31–35, 3rd group 36–40, and the 4th group with BMI bigger than 40 kg/m^2. BMI was calculated as patient's mass in kilograms per area in square meters[5].

Furthermore, we have divided patients into two groups regarding their job type: people who dominantly do physically intensive jobs, or those who do intellectually intensive jobs. Retired people were grouped regarding the jobs they had had while they were active workers. Housewives were grouped into physically working group. Furthermore, patients were divided into three age groups: 10 to 40, 40 to 60, and over 60 years old patients. Other groups were formed regarding whether or not the patients suffered from diseases.

For comparison between the groups, χ^2 test with the significance of $p<0.05$ was used.

Results

We analysed 50 female and 50 male patients, aged between 16 and 76, with the average age of 48. Out of all patients, 69% of them were obese and 31% non-obese. While 60% of female patients were obese and 40% non-obese, 78% of all males were obese, and only 22% were non-obese. Most of the obese patients were in the 1st group of obesity regarding the BMI criteria (60.78%). A slightly smaller percentage (26.1%) of obese patients was in the 2nd group, and 3rd group (8.7%), while the minority of the obese patients was in the 4th group (4.3%).

These data show that majority of male patients were obese, with mild level of obesity. Furthermore, male patients were more often obese than female patients.

Data revealed that 72% of patients did physically intensive jobs (34% females and 38% males), and 28% of patients (16% females and 12% males) did intellectual jobs. Therefore, the majority of our patients did physically intensive jobs with an even distribution between male and female patients.

After grouping patients into two groups regarding the BMI (body mass index): the obese and non-obese ones, we analysed the frequency of the three different degrees of radiculopathy in both groups (table 1). Heavy radiculopathy was more often found in obese patients, while mild and medium radiculopathy occured more often in non-obese patients.

The difference between these two groups, regarding the degrees of the radiculopathy, is statistically significant ($p<0.044$, χ^2 test 6.24, degree of freedom 2).

The relation between gender and the severity of radiculopathy led to interesting conclusions. Our population consisted of a same number of both genders (50% female and 50% male patients). Heavy radiculopathy was more often found in men, while medium and mild radiculopathy were more often present in the female group (table 2). χ^2 test showed statistically significant difference between two genders ($p<0.001$, χ^2 test 29.6, degree of freedom 2).

The job type has been proven as one of the important factors in relation to severity of radiculopathy. All three degrees of radiculopathy were present in hard labour working group, and the biggest difference of diseased patients between these two groups was in patients with heavy radiculopathy (table 3). Statistic analysis showed

TABLE 1
DEGREES OF RADICULOPATHY DISTRIBUTION IN OBESE AND NON OBESE PATIENTS

Degrees of radiculopathy	Mild radiculopathy (observed/expected values)	Medium radiculopathy (observed/expected values)	Heavy radiculopathy (observed/expected values)
	Patients		
Non-obese	6 / 3.41	17 / 14.6	8 / 13.0
Obese	5 / 7.59	30 / 32.4	34 / 29.0

TABLE 2
DEGREES OF RADICULOPATHY DISTRIBUTION REGARDING THE GENDER

Degrees of radiculopathy	Mild radiculopathy (observed/expected values)	Medium radiculopathy (observed/expected values)	Heavy radiculopathy (observed/expected values)
	Patients		
Female	10/5.5	32/23.5	8/21
Male	1/5.5	15/23.5	34/21

TABLE 3
DEGREES OF RADICULOPATHY DISTRIBUTION RELATED TO TYPE OF JOB

Degrees of radiculopathy	Mild radiculopathy (observed/expected values)	Medium radiculopathy (observed/expected values)	Heavy radiculopathy (observed/expected values)
Patients			
Labour intensive	9/7.92	26/33.8	37/30.2
Intellectual	2/3.08	21/13.2	5/11.8

TABLE 4
DEGREES OF RADICULOPATHY DISTRIBUTION REGARDING THE AGE

Degrees of radiculopathy	Mild radiculopathy (observed/expected values)	Medium radiculopathy (observed/expected values)	Heavy radiculopathy (observed/expected values)
Patients			
10–40 y	6/3.08	14/13.2	8/11.8
40–60 y	5/5.94	28/25.4	21/22.7
>60 y	0/1.98	5/8.46	13/7.56

significant difference in-between these two groups of patients ($p<0.002$, χ^2 test 12.4, degree of freedom 2).

Table 4 shows the highest occurrence of extensive radiculopathy in the group of the oldest patients. Patients aged between 40 and 60, and the youngest group of patients, most often experienced medium radiculopathy. Statistic analysis showed significant relationship between the age and the severity of radiculopathy ($p<0.018$, χ^2 test 11.9, degree of freedom 4).

There was no statistically significant relationship in-between the severity of radiculopathy and diabetes mellitus ($p<0.4$, χ^2 test 1.83, degree of freedom 2), hyperlipidemia ($p<0.653$, χ^2 test 0.85, degree of freedom 2), or arterial hypertension ($p<0.232$, χ^2 test 2.92, degree of freedom 2) (table 5).

However, it was an interesting discovery that the difference between body-sides affected radiculopathy. Moreover, heavy radiculopathy was more frequent as left-sided (47.6%), and both sided (35.7%), than right-sided (9.5%).

Discussion

The majority of patients in our study were obese, grouped as 1st level of obesity regarding the BMI criteria. Men were more frequently obese than women. Obesity revealed itself as one of the important factors in heavy radiculopathy development. The onset of radiculopathy in obese people can be explained by the increased load of lumbar spine developing degenerative changes of the intervertebral disc and bone structures of the spine. These bulging masses furthermore damage neural structures in the spine.

It has also been shown that most of our patients did hard physical jobs, which increased radiculopathy risks. Neural injuries were a result of higher static and dynamic load of lumbar spine (heavy load lifting, irregular and compulsory body positions etc).

The distribution of jobs in the gender groups was harmonious, meaning that the same number of men and women did physical and intellectual jobs. Nevertheless, we have found that men suffered from heavy radiculopathy more often than women, and explained it with the fact that our female group consisted of a large number of housewives, whose work was not as stressful and hard as the physically intensive jobs done by men.

By analysing the severity of radiculopathy, we have found that the patients aged 60 or more, most frequently suffered from heavy radiculopathy. The process of aging included degenerative changes of cartilage and bone stru ctures, and osteoporosis provoked neural injuries.

Diabetes mellitus, arterial hypertension, and hyperlipidemia were proven to be unimportant factors for the radiculopathy development.

The big difference between the left and the right-sided radiculopathies was another interesting discovery. If we assume that most people are right-handed (their right body-side is dominant), we can explain higher left-

TABLE 5
DEGREES OF RADICULOPATHY DISTRIBUTION RELATED TO ASSOCIATED DISEASES

Degrees of radiculopathy	Mild radiculopathy (observed/expected values)	Medium radiculopathy (observed/expected values)	Heavy radiculopathy (observed/expected values)
Patients			
diabetes mellitus	2/1.98	6/8.46	10/7.56
non-diabetic pts	9/9.02	41/38.54	32/34.44
hyperlipidemia	4/2.75	11/11.75	10/10.5
normolipidemia	7/8.25	36/35.25	32/31.5
pts with arterial hypertension	6/3.63	13/15.51	14/13.86
pts with normal blood pressure	5/7.37	34/31.49	28/28.14

-sided radiculopathy prevalence with stronger paravertebral musculature of the right side of the body, which stabilizes the lumbar spine and makes it more resistant to intervertebral disc herniation. Both-sided radiculopathy may be caused by both-sided degenerative changes of the spine, and is therefore not influenced by paravertebral musculature. Further studies should be done in order to prove these assumptions.

Adiposity is one of the factors that not only increase the severity of the radiculopathy, but also the frequency of hospitalization of patients with intervertebral disc disease[6]. Obese women are more prone to lumbar pain[7]. Certain authors have found that, apart from high body-weight, high body-height increased the lumbar intervertebral disc hernia risk. The risk is significantly higher in men higher than 180 cm, and women higher than 170cm. In shorter people, the risk does not depend on the body height. It has been noticed that heavy adiposity (BMI>30 kg/m^2) is less risky than medium adiposity regarding the intervertebral disc herniation[8]. Our data supported this thesis.

Kostova and Koleva have not found the relationship between physical work and back-pain syndrome, and explained it with the absence of hard work done by the studied population[1]. Other authors have found that lumbar radiculopathy is more frequent at older age (50–59), especially in old men, people who did physically intensive jobs, housewives, and clerks.[9] Adiposity and physically intensive work do not affect only the onset and the severity of radiculopathy, but also the need of surgical treatment as well[10]. High blood level of cholesterol has not been proven as a risk factor for lumbar radicular syndrome[1].

On bases of results of our study, we can conclude that obese, male patients, older individuals, and people who do physically intensive jobs are at a greater risk of developing heavy radiculopathy of the lumbar spine. Heavy radiculopathies are more often left-sided and both-sided, than right-sided. Diabetes mellitus, arterial hypertension, and hyperlipidemia do not influence the severity of the lumbosacral radiculopathy.

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RADIKULOPATIJA – FAKTORI KOJI UTJEČU NA NJEZINU TEŽINU

SAŽETAK

Željeli smo prikazati faktore koji utječu na pojavu i težinu lumbosakralne radikulopatije. Analizirali smo 100 bolesnika obrađenih elektromioneurografskom obradom Bolesnike smo razvrstali prema njihovom BMI (indeks tjelesne mase), spolu, dobi, vrsti posla (fizički ili intelekturalni posao) i kroničnim bolestima (diabetes mellitus, arterijska hipertenzija i hiperlipidemija). Podaci su obrađeni χ^2 testom sa stupnjem značajnosti $p<0,05$. Pretili bolesnici su češće imali tešku radikulopatiju u odnosu na nepretile ($p<0,044$). Teška radikulopatija se češće javljala u muškaraca ($p<0,001$), starijih bolesnika ($p<0,023$), i bolesnika koji su obavljali fizički posao ($p<0,002$). Nema statističke značajnosti u bolesnika oboljelih od diabetes mellitusa, arterijske hipertenzije i hiperlipidemije i težine lumbosakralne radikulopatije. Pretili, muškarci, stariji bolesnici i bolesnici koji obavljaju fizički posao su pod većim rizikom da obole od teške radikulopatije. Diabetes mellitus, arterijska hipertenzija i hiperlipidemija ne utječu na težinu lumbosakralne radikulopatije.