

RISK FACTORS FOR DEVELOPING CHRONIC INTERVERTEBRAL DISK DEGENERATION AND CHRONIC NECK PAIN

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Abstract

Men and women equally experienced a similar degree of chronic pain. Analysis of the results show that there is no significant difference in the level of chronic neck pain due to the age of the respondents. Regarding the impact of body mass index on the degree of chronic pain, the resulting analysis showed that the differences between patients with normal and excessive degree index in chronic pain are not statistically significant. Expression of chronic neck pain were equally represented among smokers and non-smokers. None of respondents practiced exercise activities including weightlifting. There was not large enough number of respondents to statisstically compare differences among groups in domain of education level. Anyway, researches should be continued.

Key words: *education, degeneration, cervical vertebra, chronic neck pain*

Introduction

The modern sedentary lifestyle, long-hour work at the computer, long car rides, and physical inactivity are just some of the factors that encourage mechanical disorders of the cervical spine structures and result in the appearance of painful conditions. In all these positions head is tilted forward and this strains the back of the neck where the muscles, tendons, joint ligament, small joints and discs are located. Also, causes of pain in the cervical spine can be sudden movements and generally poor posture (Adams et al., 2000; Pećina, 2000) 2). Cervical spine consists of seven vertebrae that are interconnected with intervertebral discs, articular surfaces of the vertebrae themselves and ligaments and muscles. In the structure of the cervical spine key location have functional units called vertebral dynamic segments. This segment consists of units of two adjacent vertebrae, intervertebral disc, intervertebral joints, intervertebral apertures (which pass through the blood vessels and nerves), transverse and spinous processus, spinal canal and ligaments, tendons, connective tissue and paravertebral muscles. The anatomy of the cervical spine has some specific provisions relating to the structure of the first two vertebrae, the atlas and the axis. The transverse extensions of these vertebrae are split into two lumps from which nerves pass, and through the openings in these extensions undergo blood vessels. Intervertebral disc is a complex joint that is macroscopically divided into at least three components: 1. The nucleus pulposus, centrally located, gelatinous and homogeneous mass; Second anulus fibrosus which consists of concentrically arranged layers of the collagen fibers within which is located the anulus; Third cartilaginous surfaces separating anulus and nucleus of the adjacent vertebral bodies (Krpmotić-Nemanjić & Marušić, 2000). Any change in the structure of one of these components can compromise the function of the intervertebral disc. In time, the nucleus becomes more compact and

firmer with loss of liquid component, and within the annulus fissures and ruptures may occur (Pećina, 2001; Hoenen-Clavert et al., 2007; Karchevsky et al., 2005; Bogduk, 2012). Extensive degenerative changes with time lead to ankylosis of the dynamic segment that can be a cause of pain in the neck (Adams et al., 2000; Karchevsky et al., 2005; Peterson et al., 2007). Chronic neck pain lately indicates an increase in prevalence in the general population. Magnetic resonance imaging (MRI) is crucial in discovering the cause of pain in the neck. MRI has enabled a better understanding of the biomechanics of the complete spine. Biomechanics of the cervical spine, taking into account the effect of force on the nucleus pulposus of the intervertebral disc is as follows; flexion the body to the back, nucleus pulposus also moves backward and in flexion of body forward, nucleus pulposus also moves forward. When bending counterclockwise, nucleus pulposus can not be moved and high contact pressure on the fibrous rings is created, which can cause rupture of the fibrous ring, and it may be the cause of disc prolapse. Over time, these loads accumulate and induce degenerative changes in intervertebral discs. Studies have proved that the position which most strains on the entire spine is sitting with mild ante flexion. This is largely correlated to posture when reading, writing or working on the computer (Bogduk & Mercer, 2000). At the same time MRI shows us today lesions, pathological and physiological changes (Weidenbaum et al., 1992). Korean researchers have recently undergone MRI research on asymptomatic subjects to detect the frequency of MRI changes before the onset of clinical symptoms (Lee et al., 2013). Chronic neck pain occurs according to research in Iran among recent graduates dentists and dental students with the prevalence of 41.8%. The cause is considered to be a long duration of studies and hard practical work that requires longterm standing (Movahhed et al., 2013).

In the past various methods for classification and diagnosis of degenerative intervertebral discs were used. By this we mean various atlases of MRI images, more or less detailed classification and other instruments. But no classification or method did not set a standard or excluded option of mistakes by reader of MRI findings (Jarosz et al., 1997; Raininko et al., 1995; Brant-Zawadzki et al., 1995; Griffiths et al., 1997). But Pfirrmann and his colleagues published a 2001 MRI classification of degenerative intervertebral discs of the lumbar spine (Pfirrmann et al., 2001; Zhou et al., 2013). For Oswestry questionnaire assesses the limitations in daily activities of patients suffering from chronic pain in the neck. It contains ten questions in the following areas: severity of pain, personal care, lifting, reading, headaches, concentration, work, driving, sleeping and recreation. Replies dedicating points in such a way that the first response values zero points, while each subsequent answer values one more point. Final sum of points means that we can get next results; from zero to four points, the patient is not limited due to pain; five to fourteen points there is a mild limitation; from fifteen to twenty-four points there is moderate limitations; from twenty-five to thirty-four there is a serious limitation; over thirty-five points there is a total limitation and disability due to pain in the neck (Wheeler et al., 1999; Kara & Arda, 2013; Pillastrini et al., 2009; Simmons et al., 1996). Patients report that the pain is usually more pronounced in the morning, spreading from neck to shoulders, arms or head, there are headaches and altered curvature of the spine, prolonged sitting or driving the car increase symptoms. Chronic pain in the neck and degenerative changes of intervertebral discs of the cervical spine can be defined as part of the condition that in English literature is called "DDD", which stands for degenerative disc disease. The condition affects young adults and middle-aged people who are active and otherwise good health. Smokers have a higher risk, also certain professions and hereditary component cannot be excluded and some experts input weightlifting in the fitness gyms in the risk factors (Simmons et al., 1996).

Problem and aim

Previous studies, according to the available literature, show a small number of research related to the incidence of degenerative intervertebral discs of the cervical spine depending on the level of education. Research aim is to determine the influence of the level of education as a risk factor in the frequency of the appearance of degenerative changes of intervertebral discs and chronic neck pain. Also we want to determine are smoking, overweight or weightlifting significant risk factors for the appearance of degenerative changes of intervertebral discs and chronic neck pain.

Methods

The study will be included patients referred for magnetic resonance imaging (MRI) of the cervical spine.

Exclusion criteria from the study are tumors, trauma, autoimmune and inflammatory diseases. The research will be conducted at the Department of Radiology. MRI searches will be carried out on the unit for the magnetic resonance of the 3.0 T (Siemens, Skyrim, Erlangen, Germany) using the coil for head and neck (Head and Neck coil). The study will include at least 10 respondents with tertiary education, level VII. / 1 and more. The control group will be 10 respondents with completed secondary education, degrees III. to V. Assessment of the degree of degeneration of the intervertebral discs will be made by Pfirrmann classification. Assessment of chronic neck pain will be made using the Oswestry questionnaire. All participants will be familiar with the purpose and method of research. Prior to joining study the patients will fill out a questionnaire and informed consent form. The first part of the questionnaire is validated Oswestry questionnaire to assess chronic neck pain. The second part of the questionnaire includes questions that will give us the socio-demographic patient data (gender, age, height, weight, level of education, duration of education after high school, occupation, data on cigarette smoking and exercise that involves lifting weights). Designed questionnaires participants will be fill out voluntarily with the help of collaborators and researchers.

Research hypothesis

In patients with higher level of education, degenerative changes of intervertebral discs of the cervical spine are more frequently developed, and they more frequently suffer from chronic neck pain.

Scientific contribution

Due to the works on this topic are rare, scientific contribution is seen in the determination of the impact of education level as risk factor in the degenerative changes of intervertebral discs and chronic neck pain. In the literature, the impact of education level as a risk factor is mentioned rarely, and is almost entirely unexplored. This reflects the ability of this study to contribute to science.

Professional contribution

Study can be useful for two reasons. First, it can be a tutorial for getting started in usage of Pfirrmann's classification for assessing the degeneration of intervertebral discs in everyday radiological practice, which has not been the case in the University Clinical Hospital Mostar (SKB Mostar). And secondly, the introduction of this classification can be useful in clinical application with specialists in neurology, neurosurgery, orthopedics and sports medicine as it gives a detailed insight into the real situation of the patient.

Respondents

In the study sample participated in 5 men (25%) and 15 women (75%). The age range was 16-65 years old (Mdn = 52; Q1-Q3 = 41.50 to 58.50). Given the age of the respondents they were divided into two groups: young adulthood (up to 50 years) and older adulthood (over 50 years).

Young adult group had 8 respondents (40%; Mdn = 36.50; Qy-Q3 = 26 to 47.50), and older age group had 12 respondents (60%; Mdn = 58; Q1-Q3 = 52.50 to 59, 50). Among the tested respondents 9 of them (45%) were normal weight (normal body mass index), while 11 of them (55%) were overweight. As for smoking, 14 respondents (70%) belonged to the group of non-smokers, and 6 respondents (30%) group of smokers. None of respondents practiced exercise activities including weightlifting. We have also concluded that there is not large enough number of respondents to statistically compare differences in domain of education level.

Statistical data processing

In data analysis, symmetry of the examined variables (gender, age, BMI, smoker / non-smoker, and pain in the neck) was tested by Kolmogorov-Smirnov test. The resulting distribution of the results significantly deviated from normal (p <0.05) for which it was not justified use of parametric statistical methods. Since the distribution was significantly deviated from the normal display of mean values and a measure of dispersion using the median and lower dispersion (25%) and upper (75%) quartile. For statistical analysis of the data obtained a computer program StatSoft, Inc. (2004). STATISTICA (data analysis software system), version 7. www.statsoft.com was used.

Results

Analysis of the results was tested considering degree of chronic neck pain. A roughly equal percentage of respondents with moderate and severe degree of chronic neck pain was established (Table 1).

Table 1 Expression of chronic neck pain – total

Degree of chronic neck pain	n	%
Moderate symptoms (mild pain)	10	50
Severe symptoms (severe pain)	10	50

By using the chi-square test differences between men and women in the prevalence of chronic neck pain were tested (Table 2). As in the individual cells of the expected frequency were lower than 5 Yates correction was applied. Chi-square test did not confirm statistically significant differences in the severity of chronic pain among men and women. In other words, men and women equally experienced a similar degree of chronic pain. Although slightly higher tendency manifests pronounced pain in a sample of women, but moderate on a sample of men can not truly be said that there is a difference as it was not statistically significant.

However, it should be noted that the significance of differences largely depends on the number of degrees of freedom and the sample size. Therefore, with a large enough sample, small differences can be statistically significant (Kolesarić, 2006). To test the difference between representation and expression of moderate and severe chronic neck

pain in people of different ages Mann-Whitney nonparametric test was applied. Analysis of the results show that there is no significant difference in the level of chronic neck pain due to the age of the respondents (Table 3).

Regarding the impact of body mass index on the degree of chronic pain, the resulting analysis showed that the differences between patients with normal and excessive degree index in chronic pain are not statistically significant (Table 4).

Table 2. Comparison of representation of chronic neck pain in a sample of men and women

Gender	Degree of chronic neck pain		Total	
	Moderate	Severe		
male	N	3	2	5
	%	60%	40%	25%
female	N	7	8	15
	%	46,67%	53,33%	75%
Total	N	10	10	20
	%	50%	50%	100%

χ^2 test=0,00; df=1; p=1,00

Table 3. Comparison of representation and expression of level in chronic neck pain in sample of different ages

Degree of chronic neck pain	Age	Z	p	
Moderate pain	Mdn	51	-0,90	0,36
	Q1-Q3	35-58		
Severe pain	Mdn	53	-0,90	0,36
	Q1-Q3	50-59		

Table 4. Comparison of representation of chronic neck pain with a sample of normal and excessive body mass index

Body mass index	Degree of chronic neck pain		Total	
	Moderate	Severe		
Normal	N	5	4	9
	%	55,56%	44,44%	45%
Excessive	N	5	6	11
	%	45,45%	54,55%	55%
Total	N	10	10	20
	%	50%	50%	100%

χ^2 test=0,00df=1; p=1,00

Table 5. Comparison of representation of chronic neck pain with a sample smokers and non smokers

Smoking status	Degree of chronic neck pain		Total	
	Moderate	Severe		
Smokers	N	4	2	6
	%	66,67%	33,33%	30%
Non smokers	N	6	8	14
	%	42,86	57,14%	70%
Total	N	10	10	20
	%	50%	50%	100%

χ^2 test=0,24; df=1; p=0,62

Finally, we have checked the possible differences between smokers and nonsmokers in the degree of chronic pain. Chi-square test differences were not statistically significant (Table 5). Expression of chronic neck pain were equally represented among smokers and non-smokers.

Discussion and conclusion

There is still to continue the research that we have to increase number of respondents in continuation of this study, and our plan is to include 50 respondents with tertiary education, level VII. / 1 and more, and control group of 50 with secondary education, degrees III. to V. Also, there is to consider is exercise including weightlifting a risk or prevention factor. Men and women equally experienced a similar degree of chronic pain. Analysis of the results show that there is no significant difference in the level of chronic neck

pain due to the age of the respondents. Regarding the impact of body mass index on the degree of chronic pain, the resulting analysis showed that the differences between patients with normal and excessive degree index in chronic pain are not statistically significant.

Expression of chronic neck pain were equally represented among smokers and non-smokers. None of respondents practiced exercise activities including weightlifting. There was not large enough number of respondents to statistically compare group differences in domain of education level.

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ČIMBENICI RIZIKA ZA RAZVOJ KRONIČNE DEGENERACIJE INTERVERTEBRALNOG DISKA I KRONIČNIH BOLOVA U VRATU

Sažetak

Muškarci i žene jednako doživljavaju sličan stupanj kronične boli. Analiza rezultata pokazuje da ne postoji značajna razlika u razini kroničnih bolova u vratu, u odnosu na uzrast ispitanika. Što se tiče utjecaja indeksa tjelesne mase na stupnju kronične boli, rezultati analize pokazali su da razlike između bolesnika s normalnim i pretjeranim stupnjem indeksa za kronične boli nisu statistički značajne. Izražavanje kroničnih bolova u vratu su jednako zastupljeni među pušačima i nepušačima. Nitko od ispitanika ne prakticira sistematsko vježbanje uključujući dizanje utega. Nije bilo dovoljno velik broj ispitanika bi statistički usporediti razlike među skupinama u domeni razine obrazovanja. U svakom slučaju, istraživanja treba nastaviti.

Ključne riječi: *edukacija, degeneracija, vratni kralješci, kronična bol u vratu*

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