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SPINAL COLUMN DEFORMITIES IN PATIENTS WITH LUMBAR PAIN

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(Original scientific paper)

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Abstract

Introduction: Lumbar pain is one of the most frequent painful conditions of the modern human being and becomes a serious healthy, social and economic issue. Objective: To demonstrate the distribution of frequency of the deformities of the spinal column as well as to establish the difference in terms of the outcome of the therapy treatment given to the patients with low lumbar pain. Methods: The study has covered 200 patients with low lumbar pain, treated with medical and physical therapy that, according to the given therapy, were divided into two groups and examined before and after completion of the treatment. Oswestry Index was used for assessment of disability caused by lumbar pain. As for assessment of the deformity, visual approach for identifying the functional status of sagittal and frontal plane was used, as well as X-ray images. Results: The patients were with an average age of 53.8 years, most of whom were females (62 %). About 43.5 % of them had job that does not require physical activity; 29 % of them having a job position that mostly involves seating, 20 % of them physical activity and 7.5 % of them had job that requires standing, whereby they have normal body weight, BMI (22.6). 72 % of the patients had deformity of the spinal column, to whom the applied physical therapy gives 3.5 times better results in comparison with the results of medical therapy X2 = 14.286 ($p<0.05$). Conclusion: The high percentage of presence of deformities indicates that they represent risk factor for occurrence of the lumbar syndrome, requiring special attention during prevention and timely medical treatment of the same, by introduction of special physiotherapy programme at schools and work post.

Key words: low lumbar pain, disability, deformity.

Introduction

Very rare are people who at least once in their life they had no problem with the spine, both men and women. Lumbar pain is one of the most common painful conditions of modern human being and is one of the most common reasons for lost working days (1). Approximately 70% of patients have it heavier forms of lumbar disc disease in the most productive working age, ie. between 30-50 years. 7% to 10% of the patients who have had acute pain in the cross converts to chronic, and these patients spend 80% of their money on health and social funds (2.4)In 70% of all cases of mechanical lumbar pain it owes to the degenerative changes in the discuses and facet joints (5,6). The degenerative changes in the lumbar intervertebral discus are accelerated under the influence of the genetic factors and constitutional weakness in the constitution of the discus, biochemical changes in its structure, the excessive biomechanical, static and dynamic pressures, among which are the excessive pressures related to the job, as well as the individual factors (age, nicotine, excessive body weight, weak bearing of the body, reduced level of fitness etc.) (7,8,9).

Studies show that school children often have abnormal posture. According to various authors their number ranges from 5% to 95% (6,10). Any anomaly of posture which acts on the spine can cause an irregular load in a particular segment of the spine, which is prematurely damaged and leading to a temporary illness on the disk. Asymmetric workload causes disruption in metabolism on the loaded side of the disk which is characteristically changing, the ring is damaged early.That part suffers the whole burden that otherwise, under normal load, is distributed to the entire disk.The poorer nutrition of the suppressed disc structures and the thrust is the reason for occurrence of less stable tissue, cracking, core migration and

herniation (7). The purpose of the study was to show the prevalence of spinal deformities in patients with lower lumbar pain, as well as to determine the difference in outcome of the therapy.

Material and Methods

The study is observational, descriptive and longitudinal, was performed on two occasions, that is, at two different time periods in the studied population . It has encompassed 200 respondents, patients with low lumbar pain registered in five (doctor's) surgeries for general medicine and three surgeries for physical therapy in Skopje. The selection of the patients was done randomly, by using method of random sample from different municipalities. The observational-descriptive part of the study covered collection, processing and assessment of the data of all respondents that participate in the study. Specially prepared survey questionnaire was used for the needs of the study, which was filled in by the examiner. The design and the composition of the questionnaire was based on case-control study anamnestic investigation (epidemiological and demographic characteristics: sex, age, place of residence, profession and social status; functional status: body mass index (BMI), functional status of the spinal column and manual muscular test; type of applied therapy: physical procedures and medication therapy).

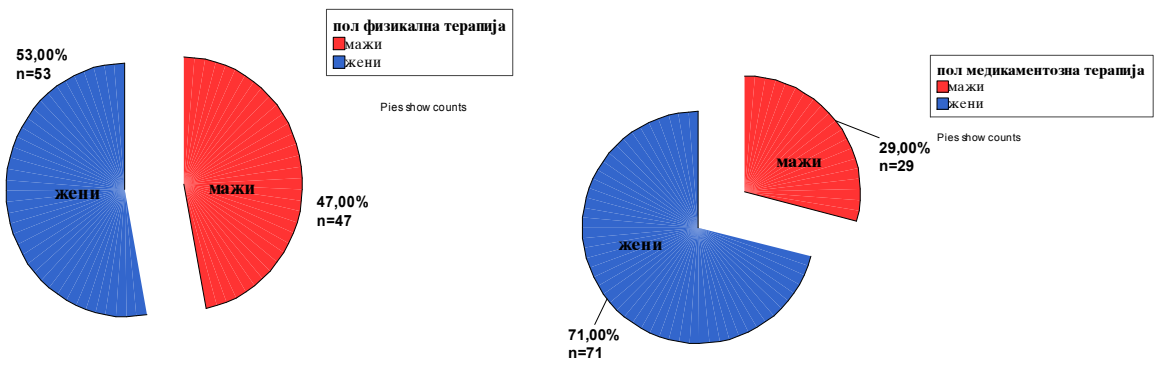
The longitudinal examination was carried out in two phases, at the beginning and after completion of the treatment applied to the examined study population, which on the basis of the applied treatment (physical therapy or medication) were divided into two groups: 1. Examined group – (Case), 100 respondents, with low lumbar pain who asked for medical assistance in (doctor's) surgeries for physical therapy and were treated with physical procedures, and 2. Control group – (Control), 100 respondents, with low lumbar pain who asked for medical assistance in surgeries for general medicine, addressing to their general practitioners (GPs) and were treated with medication therapy. The respondents were asked to fill in a survey questionnaire so called, Oswestry Index, a special questionnaire for assessment of disability associated with lumbar pain.

Due to statistical processing and analysis of the obtained data, appropriate statistical methods were used. The statistical significance of the differences was established by use of appropriate statistical tests: Pearson's X^2 test; Student's t-test; Pearson's (r) correlation coefficient and Levene's test for equality of variance. Kolmogorov-Smirnov test (K-S test) of correspondence, from the group of nonparametric statistical tests, was used as well. Moreover, uni-variant logistic regression analysis and multi-variant logistic regression analyses were used, too. The statistical significance was defined for $p<0.05$. The study was prepared by using statistical programme SPSS, version 14.

Results

In the analysis of distribution of frequency used to the respondents that have undergone physical therapy according to the variable sex, 53 (53%) out of 100 patients are female and 47 (47%) are male patients. Out of the total 100 respondents that received medical therapy, 71 (71%) are female and 29 (29%) are male. Out of the total 200 respondents from both examined groups, most of them are female patients (62 %), (graph 1).

Graph 1.Distribution of frequency of the respondents treated with physical / medication therapy according to sex variable.



The analysis of the variable BMI in patients treated with physical therapy or medical therapy gives data that the average index of body mass in patients treated with physical therapy is 22.8, with standard deviation 3.938 and standard error 0.394. The average BMI in patients treated with medication therapy is 22.4, with standard deviation 3.060 and standard error 0.306.

From what has been said above it can be concluded that the average BMI in both groups show that in average the patients are with normal body mass (tab.1). The examination of statistical significance of the differences between the indexes of body mass in patients treated with physical therapy or medication therapy was carried out with Levene's Test for Equality of Variances. Test statistic (F) has value = 5.532 and p-value (significance level) = 0.020, which implies they differ statistically significant. However, the t-test=0.786 with df=0.786 and p=0.433, indicates of absence of statistical significance of the differences.

The respondents treated with physical therapy were with average age of 51.84 years. The lower limit is 49.13 years, whilst the upper limit is 54.55 years. The standard deviation is 13.635, with a standard error of 1.364. The youngest patient is 18 years, while the oldest is 80 years old (table 1). The average age of the respondents that underwent medication therapy is 55.86 years. The standard deviation is 13.946, with a standard error of 1.395. The youngest respondent is 21 years, while the oldest is 91 years old (tab.1). The examined groups are with average age of 53.8 years; t-test showed that there is statistical significance of the differences between the average age of the respondents ($p<0.05$).

Table 1. Distribution according to sex, age and BMI and deformities

Sex				I group	II group
female				53(53%)	71(71%)
male				47(47%)	29(29%)
Age	average	minimum	maximum		± St.Dev.
I group	51,8 years	18 years	80 years		13,6 years
II group	55,9 years	21 years	90 years		13,9 years
Body mass index (BMI)		average			± St.Dev.
I group		22,8			3,9
II group		22,4			3,1
deformities		Yes (n %)		No(n %)	
physical therapy		84(84%)		16(16%)	
medication therapy		60(60%)		40(40%)	

According to the analysis of distribution of frequencies used to the respondents that had undergone physical therapy, calling upon type of occupation as a variable, it was established that highest percentage of the patients had a occupation with physical inactivity 36%, job which involves sitting 32%, occupations related to physical activity 23%, and 9% are occupations related to standing. Most of the respondents treated with medication therapy, according to the variable type of profession, 51% are patients whose work is with physical inactivity, 26% have a job which involves sitting, occupations related to physical activity 17%, and 6% are occupations related to standing. Kolmogorov-Smirnov test of correspondence shows that the differences are statistically significant ($p<0.05$).

According to the presence of deformities, the study showed that a higher percentage of patients had deformities in both groups. In patients treated with physical therapy, spinal deformities were found to be 84%, while without deformities 16%. In patients treated with medication therapy, with deformities are 60%, while without deformities are 40% (graph 2). According to X^2 test = 14.286, there is a statistic significance of differences according to the outcome of the applied therapy and the presence or absence of deformities on the spine in the respondents ($p <0.05$) and a contingency coefficient of 0.258. The cross-over or preference ratio is OR = 3,500 (1,795 <OR> 6,824 CI95%), we conclude that the use of physical therapy is 3.5 times more effective than the medication therapy of respondents with spinal deformities.

The results from the univariant analysis of the factors deformities in respondents and age in respondents represent predicative values which independently, statistically significantly, are associated with the type of the therapy (physical/medication), at significance level $p<0.05$. It can be concluded that the outcome does not depend on the patient's sex, whereas there is insignificant negative correlation between the age and the BMI (tab.3).

Graph 2.Distribution of frequency of the respondents treated with physical / medication therapy according to the variable presence / absence of deformities.

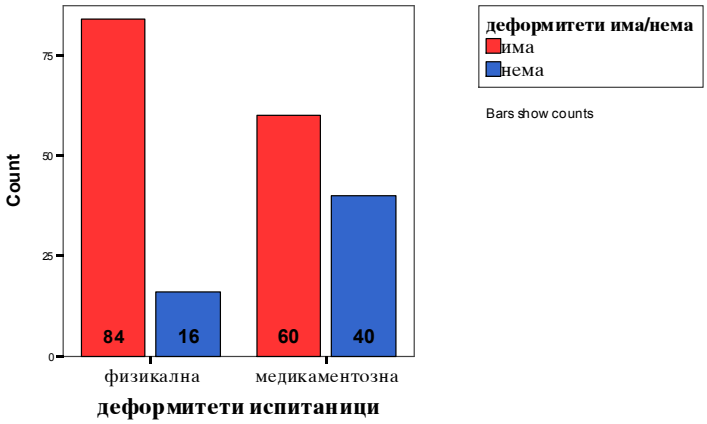


Table 2**.** Coefficients in multi-variant logistic regression analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	,574	,190		3,020	,003	,199	,948			
	deformities YES/NO	,353	,076	,317	4,631	,000	,203	,503	,267	,314	,310
	type of profession of the respondents	,043	,027	,108	1,567	,119	-,011	,096	,118	,111	,105
	age of the respondents	,007	,003	,184	2,619	,010	,002	,012	,145	,184	,175

Discussions

In the both investigated groups in this work, higher number of the respondents are females, which corresponds to data from the Institute of Public Health of R. Macedonia and to the results of analysis of the distribution of frequencies of registered dorzopathies (for period of 1998-2006 1998). However, the sex-related indicator is different in case of lumbar syndrome, as some recent studies have shown, therefore, it might be concluded that there is no real sex-related disposition of these diseases (2,3,4).

Patients with lumbar syndrome are usually of an age at which they are the most productive (5,11). Several authors reported that the development of the degenerative changes of the lumbar spine is closely related to the profession of the patients. Factors as recurrent microtrauma, cumulative effect of flexible and compressive injuries to the spine (7), work associated with frequent bending and rotation of the spine (12), prolonged sitting and standing at work or at home (13,14), exposure to vibration, (especially for too long car or truck driving) (15), contribute importantly to its development. Regarding the association of the lumbar syndrome and the obesity, according to the analyzes of a body mass index in patients with lumbar syndrome, most of the authors concluded that the majority of the patients were overweight (4,16).

Analysis of a presence of deformities among the respondents with lumbar syndrome showed that the percentage of patients with lumbar syndrome that suffer deformities is very high and require special attention from a health point of view. Mostly, the deformities proceed from the adolescence period; however, smaller proportion was related to the occupation type or with poor body and spine posture (6). According to data from the Institute of Public Health of the R. Macedonia, the orthopedic deformities are widely present among pupils and students in the R. Macedonia and this is becoming a serious health, social and economic problem. This requires to screen regularly the health conditions of this population. The

regular medical check performed in 2006 of the pupils and students have shown that more than 1/3 (36.7%) of them have already poor posture and spine deformities. During the regular medical examination of one group of children from age of 7 in 1995 to age of 18 in 2006, there was an 24.1 % increase in poor posture, and 86.2 % increase in a spine deformities.

Immediately after the medical check-up, the student with diagnosed poor posture or/and spin deformities should be referred to the appropriate health care organization for treatment. These students have to obtain individualized approach with corrective gymnastics in physical education classes. The school inventory should be adapted to the age of the students in accordance with the prescribed standards and norms. Furthermore, the teachers must be trained how to correct the wrong sitting in the school benches and how to prevent the bad posture (17).

Most authors agree that special training programs for spine column are much more effective if applied within the companies. Throughout instructions about the body biomechanics, ergonomics and further fitness activities, it strives towards proper spine load and strengthen the muscles to prevent spine deformities in the workplace. Healthy and strong muscles allow the body to withstand daily efforts (18).

Conclusion

The high percentage of spinal deformities in patients with lumbar pain indicates that they are important cause of lumbar syndrome and require special attention in the prevention, early detection and timely treatment by introducing a special physiotherapy program in the schools and the workplace, ergonomic improvements and organizational interventions. These measures are aimed at preventing the severe consequences that are occurring, reducing the number of chronically ill people and prolonging the human life.

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