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Lower Back Pain, Physical Activity and the Quality of Life

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Abstract: *Lumbar pain is one of the key problems that affects people with reduced physical activity. This study aims at identifying different frequencies of pain in patients with lumbar syndrome and to determine differences in their quality of life. From a total sample of 202 subjects (93 men and 109 women, mean age 47.5 ± 13.85 years), 3 subsamples of respondents were stratified depending on the frequency of back pain: those with occasional back pain, those with frequent episodes of back pain and those whose episodes of back pain occur very often. The data in the study were collected using a measuring instrument, which is intended to be used for self-assessment of the quality of life. The non-parametric statistical method Chi-squared test was used to determine the differences between groups of subjects. Statistically significant differences (p = 0.00) were identified in three analyzed variables: I can declare that my quality of life is, How would you assess your physical fitness and How often do you walk continuously for 60 minutes, whereby the survey results obtained for the variable assessing the quality of life significantly differ in favor of respondents who only occasionally experience pain compared to the other two groups of respondents who reported frequent or very frequent incidences of back pain. Respondents occasionally affected with lower back pain had a better assessment of their lives, their physical fitness was at a higher level and were shown to be more active when it came to continuous walking for 60 minutes.*
Keywords: *lumbar syndrome, frequency of pain, quality of life*

Introduction

Increasing inactivity in people nowadays is a significant risk factor associated with our health, and thus our quality of life. Insufficient movement is one of the causes of many chronic diseases. Chronic lower back pain, i.e. Lumbar Syndrome (LS), is one of the most common painful conditions that affects both women (58%) and men (45%). In addition to the appearance of chronic pain, people suffering from LS, also experience insufficiency of the functionality of the locomotor system, restriction of motion, and movement. As a limiting disease, LS affects the efficiency of an individual's everyday activities but also social and economic aspects of the life of a person suffering from LS.

A lumbar syndrome is a health problem with the most frequent incidence after respiratory infections and is among the leading causes of limitations of activity, and a significant factor in cases of sick leave. A lumbar syndrome is defined as pain or discomfort located below the level of the twelfth rib, and above the gluteal sulcus, with or without the presence of pain in the legs. Pain that occurs continuously for up to six weeks is considered acute, while most authors believe that lower back pain present for at least three or more months may be characterized as chronic pain. The chronic lower back pain as the pain presents for at least seven to twelve weeks, while other authors believe that chronic lower back pain must be understood as the pain that continues for as long as six months or more (Silva et al, 2004; Walker et al, 2004; Almeida et al, 2008). In almost 85% of cases, the etiology of most types of lower back pain is unknown (National Guide for General Practitioners, 2004), while in 50% of cases the pain appears without a clear cause, which indicates its multifactorial nature. Numerous causes of LS, associated with congenital or acquired conditions, can be classified into several groups, biomechanical disorders of the spine, diseases of other organs and organ systems in which the disease affects the lumbar spine (Popović, 2003), as well as with injuries of muscles, ligaments, soft connective tissue, cartilage and blood vessels of the lumbar vertebrae (Božić, 2017).

A lot of studies dealt with the apparent absence of an organic basis for chronic lower back problems and other syndromes of chronic pain. As previously mentioned, as many as 85% of cases of lower back problems do not have a definitive pathoanatomical diagnosis. In that regard, two conclusions have been proposed in the medical literature (McGill, 2007): 1. Many patients with LS show "inorganic signs" that suggest psychological disorders as the cause of

their condition; 2. Poor diagnostic techniques, applied either on the part of inadequately trained physicians or because of the limitations of widely used diagnostic technology, resulted in frequent misdiagnoses.

The characteristic pain that accompanies LS, may occur occasionally or it may regularly reoccur and is identified already in the population of people between 20 and 40 years of age. However, in people over 50 years of age, the symptomatology of lumbar syndrome is much more intense than in the younger population (Romanov & Radak, 2013). Although almost 85% of the world population experiences lower back pain at least once in their life (Nachemson & Jonsson, 2000), this matter was not yet the subject of a serious study (Lopez et al, 2006). Back pain as a limiting factor of both work performance and usual daily activities affects not only the individual but also their family, as well as the wider social community (professional activities, health care, etc.) (Thelin, Holmberg & Thelin, 2008). For example, in the United States, in terms of costs of medical treatment, LS is in third place, behind malignant tumors and heart conditions (Thelin, Holmberg & Thelin, 2008).

Until about ten years ago, it was widely believed that lumbar syndrome was limited to Western countries, highly developed countries with a higher standard of living. However, an increasing number of studies indicate that lower back pain is also a major problem in underdeveloped countries, countries with lower and average standards of living (National Guide for General Practitioners, 2004). Lumbar syndrome as a cause of unfitness for work occurs in more than 25% of the working-age population, and its relapses occur in at least 50% of those who have undergone treatment (Middleton & Fish, 2009; Barkhordari, Halvani & Barkhordari, 2013). The treatment of lumbar syndrome involves a multidisciplinary team of experts (physiatrist, neurologist, neurosurgeon, psychologist, physiotherapist, occupational therapist, social worker), but with exception to therapy with medications, surgical treatment, physical therapy, the movement therapy (exercise) which contributes to the reduction of pain and improvement of health in general, has a principal place in the treatment of LS (Mačak-Hadžiomerović et al, 2009).

Some studies point out that the prevention of lumbar syndrome is associated with targeted and continuous physical exercise (Henewer et al, 2011). Insufficient strength of the back muscles is one of the causes of pain in the lower back, that is, it is also the cause of recurrence of painful episodes (Lee et al, 2012). Segmental stabilization exercises applied (Franca et al, 2012) in the context of targeted exercise, are directed at the global (*erector spinae, external obliques, quadratus lumborum, rectus abdominis*), and the local (*multifidus, transversus abdominis, internal obliques*) lumbar-core stabilizer muscles. Exercising is also significant in the treatment of LS, especially in the treatment of chronic conditions (Hayden et al, 2005; Van Tulder et al, 2006; Chou et al, 2007). Exercising can prevent the recurrence of pain, it can reduce pain, improve the functioning of locomotor apparatus, reduce effects of a possible ongoing condition (Sherman et al, 2005; Mailloux et al, 2006; Van Middelkoop et al, 2011) and thus prevent the appearance of the negative socio-economic context reflected in certain aspects of the quality of life of people with LS. On the other hand, quality of life, as a multidimensional aspect of a person, represents an individual's perception of their position in the context of the value system in which they live with regard to their own goals, expectations, personal standards, and interests. Such a broad concept in the most general sense includes basic determinants such as the physical health of an individual, their psychological state, economic independence, social relations, and attitude towards significant events in their environment. With this in mind, the goal of this study was to distinguish the category of the population prone to a lumbar syndrome as well as to identify several facets of LS that can be related to certain aspects of an individual's quality of life, with their physical fitness and self-assessment of quality of their life.

Patients and Methods

In this empirical non-experimental transversal study, we have identified a number of factors that may influence certain aspects of the quality of life of individuals affected with lumbar syndrome primarily through physical activity and exercise. The sample of respondents in this study consisted of a total of 202 people (M = 93; F = 109) affected with a lumbar syndrome, who at the time the survey was conducted were undergoing physical treatment in the centers for physical medicine and rehabilitation in four cities of the Autonomous Province of Vojvodina, Serbia (Novi Sad, Subotica, Kanjiža and Bačka Palanka). Out of the entire sample of respondents, depending on the frequency of back pain, we have stratified three respondent subsamples: the ones with occasional pain (133 respondents or 55.94%), the ones with frequent pain (48 respondents or 23.76%), and the ones with very frequent episodes of pain (41% or 20.30%). The mean age of the respondents in the study was 47.5 ± 13.85 years old.

Data obtained in this survey were collected using a measuring instrument, a questionnaire specifically designed

for this research. In designing the survey instrument, we have used the items of the questionnaires whose construct was based on the modified version of the WHOQOL-BREF questionnaire (World Health Organization Quality of Life Questionnaire - BREF) (The WHOQOL group, 1998) and the PAL questionnaire (Perception of Active Lifestyle) (Nešić, 2016), which are designed for the quality of life self-assessment. The questionnaire covered four determinants that outline the concept of the quality of life: physical health (8 items), mental health (7 items), social relations (5 items), and the environment (9 items). We used the following variables from the questionnaire the *Perception of Active Lifestyle - Self-assessment of quality of life* (Nešić, 2016):

1. *I experience lower back pain?* (occasionally, frequently, and very often) - was a categorical variable in the study,
2. *I can declare that my quality of life is* (bad, average, good, very good, much better than a majority of people) – health self-assessment,
3. *How would you rate your overall physical fitness?* (bad, on a satisfactory level, good, excellent) and
4. *How often do you walk continuously for 60 minutes?* (every day, two to three times a week, only on weekends, occasionally, never).

For all variables of the survey questionnaire, the frequencies and the percentage values were calculated using the results of the entire sample of respondents. The results of the study were given in percentages and presented in tables. A non-parametric statistical method - the chi-squared test with a level of statistical significance of $p \leq 0.05$, was used to determine differences in the life habits of people affected by the LS. The collected data were processed using the statistical package SPSS.20 (Statistical Package for the Social Sciences, V.20; SPSS Inc., Chicago, Illinois, USA).

Results

Self-assessment of the Quality of Life

The results shown in Table 1 point to the existence of significant statistical differences in an individual's self-assessment of health manifested through the variable "*I can declare that my quality of life is*" ($p = 0.00$) at the value of $\chi^2 = 36.75$. The notable difference goes in favor of respondents who reported that they occasionally experience back pain, because 14.16% of them rated their lives as *much better than of majority of people*, compared to 4.17% of respondents who frequently experience back pain and 4.87% who experience episodes of back pain very often. The highest percentage of respondents who also declared that their quality of life is good had occasional back pain (43.37%), followed by respondents who frequently have back pain (29.27%), and in third place were respondents who experience episodes of back pain very often (18.76%).

The greatest percentage of respondents who rated the quality of their life as *bad* were from the group of respondents with frequent back pain (10.41%) (Table 1).

Table 1. *Differences in values with regard to frequency of back pain and health self-assessments*

	I can declare that my quality of life is					Total
	Bad	Average	Good	Very good	Much better than that of the majority of people	
Occasionally	1 (0.88%)	31 (27.43)	49 (43.37)	16 (14.16)	16 (14.16)	113 (100.0%)
Frequently	5 (10.41%)	31 (64.58%)	9 (18.76%)	1 (2.08%)	2 (4.17%)	48 (100.0%)
Very often	3 (7.32%)	21 (51.22%)	12 (29.27%)	3 (7.32%)	2 (4.87%)	41 (100.0%)
Total	9 (4.46%)	83 (41.09%)	70 (34.65%)	20 (9.90%)	20 (9.90%)	202 (100.0%)

$\chi^2(df=8, 202)=36.75, p=0.00$

χ^2 – chi-squared test value; p – the level of statistical significance of the chi-squared test; df - degrees of deviation

The results of the chi-squared test survey given in Table 2 show significant statistical differences in the survey of the variable for assessing the quality of life "*How would you rate your overall physical fitness*" ($p = 0.00$) at the value of $\chi^2 = 34.73$. A notably higher percentage of respondents with occasional back pain rated their overall physical

fitness as *excellent* (7.96%) compared to respondents who frequently experience back pain (4.17%) and those who experience back pain very often (0%), which may be due to the possibility to exercise and move without pain on the part of those who only occasionally experience back pain, and therefore we may note a significant statistical difference in the results obtained through the survey of this variable. 25.66% of respondents with occasional back pain rated their overall physical fitness as *good*, while respondents who frequently have back pain (8.33%) and those who experience back pain very often (12.2%) had much lower percentages in this category of their fitness assessment.

Table 2. *Differences in values concerning the frequency of back pain, and the "How would you assess your overall physical fitness?" variable*

	How would you rate your overall physical fitness?				Total
	Bad	Satisfactory	Good	Great	
Occasionally	17 (15.04%)	58 (51.34%)	29 (25.66%)	9 7.96%	113 (100.0%)
Frequently	19 (39.58%)	23 (47.92%)	4 (8.33%)	2 (4.17%)	48 (100.0%)
Very often	24 (58.54%)	12 (29.26%)	5 (12.2%)	0 (0.0%)	41 (100.0%)
Total	60 (29.70%)	93 (46.04%)	38 (18.81%)	11 (5.45%)	202 (100.0%)

$\chi^2(df=6, 202)=34.73, p=0.00$

χ^2 –chi-squared test value of; p – the level of statistical significance of the chi-squared test; df - degrees of deviation

Given the evidence in Table 3 significant differences in values in self-assessment of quality of life manifested are manifested in the variable "*How often do you walk continuously 60 minutes?*" ($\chi^2 = 33.86$, p = 0.00). Respondents with occasional back pain walk continuously for 60 minutes every day account for 17.70% of the sample, while 12.19% of them very often experience back pain and only 8.33% of respondents who frequently experience back pain take continuous walks every day. The respondents with occasional back pain (23.89%) were in the majority of those who declared that they take continuous walks two or three times a week. Only 8.85% of the respondents experiencing occasional back pain have reported that they never skip their 60-minute walks.

Table 3. *Differences in values concerning the frequency of back pain, and the "How often do you walk continuously 60 minutes?" variable*

	How often do you walk continuously for 60 minutes?					Total
	Every day	2-3 times a week	Only on weekends	Occasionally	Never	
Occasionally	20 (17.70%)	27 (23.89%)	9 (7.96%)	47 (41.60%)	10 (8.85%)	113 (100.0%)
Frequently	4 (8.33%)	3 (6.25%)	9 (18.75%)	19 (39.58%)	13 (27.09%)	48 (100.0%)
Very often	5 (12.19%)	4 (9.76%)	2 (4.88%)	13 (31.71%)	17 (41.46%)	41 (100.0%)
Total	29 (14.36%)	34 (16.83%)	20 (9.90%)	79 (39.11%)	40 (19.8%)	202 (100.0%)

$\chi^2(df=8, 202)=33.86, p=0.00$

χ^2 – chi-squared test value; p – the level of statistical significance of the chi-squared test; df - degrees of deviation

Discussion

The conducted study aimed at analyzing the differences in quality of life with regard to overall physical fitness, frequency of walking, and self-assessment of quality of life in persons with a different incidence of lumbar pain (back pain). For that purpose, respondents filled out a survey that is a part of the standardized questionnaire the *Percep-*

tion of Active Lifestyle - Self-assessment of quality of life (Nešić, 2016). For the study, we have used questions from the first part of the questionnaire, which deal specifically with the assessment of the quality of life. The t sample consisted of a total of 202 respondents from the Autonomous Province of Vojvodina. Degenerative processes on the spinal column begin around the age of 20, so after the age of 50 the intervertebral disc becomes completely fibrous and surrounded by connective tissue (Von Waldburg & Van Elegem, 2003). The average age of the respondents in this study was 47.5 ± 13.85 years, therefore one of the causes of lumbar pain in the respondents may be attributed to the physiological aging process, because with increasing age the intervertebral disc contains less water, loses strength, elasticity, and thus its function in dampening of pressure decreases as well. This causes the formation of microtraumas, which gradually lead to fissures and cause rupture of *annulus fibrosus*, resulting in intervertebral disc herniation (Von Waldburg & Van Elegem, 2003).

All the respondents in this study have had a history of lumbar pain, which means that they were fully affected by the their condition, firstly by pain, followed by all the accompanying facets of this pathological condition, e.g. limited motion range, that cause extreme discomfort, and collectively affect the quality of everyday life of a person. The survey conducted using the variable "*I can declare that my quality of life is*", which directly reflects the quality of life, resulted in significantly different ($p = 0.00$) statistical scores of the three groups of respondents that have a varying frequency of back pain. The largest number of respondents who have reported that their quality of life is better than of majority of people was from the group that occasionally experiences back pain (14.16%), and only 0.88% of respondents from the same group rated their life as *bad.* Since it was found that a considerable number of patients affected with LS suffer from relapses of their condition that require renewed treatment (Itz, Geurts, van Kleef, Nelemans, 2013), the respondents of this study understood the role of physical activity in reducing the risk factors that lead to a recurrence of lumbar pain episodes. This is most likely the reason why 17.70% of the respondents of the study who occasionally experience back pain exercise in the form of continuous 60-minute walks every day, while 23.89% of them exercises two to three times a week. Additionally, through regular performance of physical activities, the appearance of muscle imbalance which, along with other risk factors, would lead to the appearance of lumbar pain, is reduced to a minimum. The explanation for the above conclusion should be sought through the assessment of the fitness of the musculature and the occurrence and frequency of pain in the other two groups of respondents. The respondents who occasionally experience back pain had the best score (41.60%) even in the survey of the category *Occasional, continuous 60-minute walks,* compared to the respondents who frequently experience back pain (39.58%) and those whose episodes of back pain occur very often (31.71%). Physical activity has a positive effect on reducing the occurrence of lumbar syndrome, while time spent doing sedentary activities, such as watching television and working on a computer for more than 15 hours a week will contribute to the appearance of pain in the lumbar vertebrae (Sjolie, 2004).

By correlating the third variable for the assessment of the quality of life *How would you rate your overall physical fitness?* we have established a statistically significant difference of the results in favor of the respondents with the occasional back pain when compared to the other two groups of respondents. It was determined that most of the respondents in the study rated their physical fitness as *excellent*, and the least of them rated their physical fitness as *bad*. Most of the respondents with very frequent back pain rated their physical fitness as *bad*, and least of them assessed their physical fitness as *excellent*, which is certainly a consequence of the appearance and frequency of pain in this group of respondents and the fact that their condition certainly has a chronic nature and affects the quality of their daily life. Since these respondents experience very long and frequent episodes of lumbar pain, their ability to perform everyday physical activities is reduced, they are not able to move without difficulties or to continuously walk, and thus their level of fitness was assessed by them as *very bad*.

The evidences of this study suggest that respondents with a varying incidence of lumbar pain have a poorer quality of life than those with a less frequent incidence of lumbar pain. The six-month monitoring study indicated that as many as 70.7% of respondents with lumbar pain experienced a decline in their quality of life, and that occurrence of lumbar pain is in direct correlation with the quality of life and physical activity (Nolet, Kristman, Côté, Carroll & Cassidy, 2015). Exercises for activation of the muscles of the torso often applied in the treatment of people who experience back pain, have been proved in numerous studies to be successful in reducing back pain. This study has shown that back pain could be a limiting factor of normal physical activity, fitness, and it can even affect the performance of ordinary daily activities, which supports the findings of the study conducted by Thelin, Holmberg & Thelin, (2008).

The subject of this study was the assessment of the quality of life through a survey of three variables of the above questionnaire. Based on the results obtained in the study, we noticed that there are significant statistical differences in quality of life in favor of respondents who only occasionally feel back pain, compared to respondents who experience back pain frequently or very often. This conclusion is in line with the findings of the study conducted by Bošković et al. (2009). The afore-named authors concluded that the quality of life of patients with lumbar radiculopathy was reduced only in the domain of its physical components and that the quality of life decreases as episodes of lower back pain become more frequent and last longer. Disruptions in overall physical fitness and quality of life were reported in 64% of patients with nonspecific (occasional) lumbar pain, (Veresciagina, Spakauskas, & Ambrozaitis, 2010), which is a slightly higher percentage compared to 55.94% of the respondents from our study. Nevertheless, we may consider that all the respondents affected with back pain (lumbar pain or lumbar syndrome) are experiencing similar problems.

Presuming that exercise (targeted physical activity) is one of the treatments proven to be effective in the treatment of lumbar syndrome (Maher, 2004), we can infer that the respondents with the reported rarest incidence of back pain are also the physically most active ones, as confirmed by the study. The results have confirmed that the respondents who occasionally feel back pain were the physically most active ones, so we can assume that exercise, physical activity, and regular movement resulted not only in the lower incidence of lumbar pain but also in a better quality of life of this group of respondents. The respondents who reported the occasional back pain were exactly the ones who rated their quality of life as *great,* their physical fitness was at the highest level, and were physically most active. Since physical activity has a positive effect on the reduction of incidence of the lumbar syndrome (Sjolie, 2004), consequently the quality of life in the respondents who frequently or very often experience pain in the lumbar region is at the lower level. Perhaps the frequent episodes of lumbar pain in other two groups of respondents occur due to insufficient or inadequate performance of physical activities, while not taking into account the influence of factors that have not been assessed and which were not the subject of this study. While conducting this study, we have found significant statistical differences between the three groups of respondents, and therefore we may take note of the fact that the respondents who reported higher values of the physical component had a lower recurrence of back pain. Numerous studies where the respondents were people affected with lumbar pain proved that physical activity has a positive effect on the quality of life (Teyhen et al, 2008).

Physical activity is any bodily movement produced by skeletal muscles that results in energy consumption (Caspersen, Powell & Christenson, 2008). The term physical effort or physical activity, however, is often used in everyday speech to express many related concepts such as physical labor, physical exercise, sports activities, competitive sports, playing, physical education, physical culture. According to the World Health Organization, physical activity, along with a healthy diet and abstaining from smoking, is a major component in the prevention of chronic diseases (WHO, 2013). Regular physical activity results in numerous benefits to physical, mental, and social health, and therefore it improves the quality of life not only of people affected by lumbar pain or by some other type of back pain, but it also improves the quality of life of healthy people. By reviewing many relevant articles we may find a correlation between normal physical activity during adolescence (Froberg & Andersen, 2005) and adulthood, and long-term positive health effects throughout adult age (Hills, King & Armstrong, 2007; Must & Tybor, 2005).

One group of physical exercises, which are the spinal stabilization exercises, is particularly effective when it comes to the improvement of the quality of life of people affected by lumbar pain. The goal of these exercises is to improve the function of critical muscles of the torso, and at the same time to protect the spine from suffering damage. The majority of traditional approaches to creating exercises for the back emphasizes restoring or improving the range of motion of the spine and muscle strength. This approach, generally, has not been effective enough in reducing the occurrence of back problems and the latest review of expert findings suggests that people with a greater range of motion of the spine are at greater risk of experiencing future health problems, while endurance, rather than strength is associated with reducing of symptoms of back problems (McGill, 2001). We should always have in mind what goal we want to achieve by exercising. In fact, there are no safe or dangerous exercises, but only exercises that are poorly prescribed (McGill, 2009).

One of the causes of lumbar pain is, among other things, muscle imbalance, low level of flexibility of muscles and tendons from the back of the thigh, structural changes in the spine (degenerative changes in the spine), as well as inadequate training (dosage, intensity of training). During our growth, muscles and ligaments cannot properly ac-

company the growth of bones, which leads to muscle imbalance and the appearance of lumbar pain. The functional spinal unit (or motion segment), is the structure of two adjacent vertebrae and the intervertebral disc together with the adjoining structure of ligaments and muscles. Favoring one or more muscle structures while neglecting the others, leads to muscle imbalance and mutual dysfunction. Muscle imbalance occurs when a certain agonist muscle is significantly stronger than its corresponding antagonist muscle, or when one or the other is shortened or elongated beyond their physiological limits. Decreased static endurance of the abdominal and lumbar musculature influences the occurrence of the muscle imbalance in the lower back region, which over time causes the appearance of lumbar syndrome - LS (McGill, 2001).

Conclusion

The main limitation of this study can be referred to the subjectivity in self-assessment for the given categorization of answers. For this reason, the conclusions refer primarily to the perception of the respondents, and not to the directly measured condition. The respondents with occasional lower back pain had a better perception of their life, their fitness was at a higher level, and they have shown greater physical activity when it came to continuous walking for 60 minutes. Therefore, we may conclude that the quality of life could and must be related to the current health condition and frequency of pain in this population of respondents. The respondents who reported only an occasional incidence of back pain during the previous year had a higher quality of life and assessed their life as *better*. Further monitoring and studying of this group of respondents is still deemed necessary because there is a possibility that in some individuals the episodes of acute pain may prolong and turn into a chronic condition, followed by a possible decline in the quality of their life. In a practical sense, the results of this study may indicate that occasional pain in the lower back does not necessarily reduce the quality of life, so prevention and physical activity programs can be adapted to encourage continuous movement and preserve the functional readiness of the subjects.

Taking everything into account, the results of this study in a practical sense may indicate that occasional pain in the lower back does not necessarily reduce the quality of life, and that prevention and physical activity programs can be adapted to encourage continuous movement and preservation of functional fitness.

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