Significance of body mass reduction in rehabilitating patients with LBP

Znaczenie redukcji masy ciała w usprawnianiu pacjentów z bólami dolnego odcinka kręgosłupa

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Wprowadzenie. Ból dolnego odcinka kręgosłupa (LBP) wiązany jest m.in. z nadmierną masą ciała. Standardowa terapia nie obejmuje jednak zmian nawyków żywieniowych. Pacjent z LBP rzadko jest świadomy konieczności podjęcia odpowiedniej aktywności fizycznej, która mogłyby przyczynić się do redukcji nadmiernej masy ciała.

Cel badań. Określenie w jaki sposób redukcja nadmiernej masy ciała wpływa na jakość życia pacjentów z LBP.

Materiał i metoda. Obserwacji poddano 285 osób z dyskopatią na poziomie L4-L5 lub L5-S1 (52 osoby z prawidłową masą ciała, 233 osoby z nadwagą lub otyłością). Jakość życia pacjentów określano za pomocą kwestionariusza Rolanda i Morrisa dwukrotnie: w momencie pojawienia się dolegliwości oraz po 6 miesiącach. Pacjenci z nadmierną masą ciała byli edukowani na temat zdrowego odżywiania i zachęcani do systematycznych ćwiczeń aerobowych.

Wyniki. Zgodnie z zaleceniami 137 osób zredukowało masę ciała o 5 kg lub więcej. W momencie pojawienia się dolegliwości, stopień niesprawności był większy u pacjentów z nadwagą i z otyłością, w porównaniu do tych z prawidłową masą ciała. Po 6 miesiącach największa poprawę sprawności zanotowano u pacjentów, którzy schudli co najmniej 5 kg.

Wnioski. 1. Redukcja nadmiernej masy ciała ma znaczący wpływ na poprawę sprawności pacjentów z LBP. 2. Standardowe postępowanie terapeutyczne dotyczące dyskopatii odcinka lędźwiowego u osób otyłych lub z nadwagą powinno być łączone z edukacją na temat zmiany nawyków żywieniowych i zwiększenia aktywności fizycznej.

Słowa kluczowe: *ból kręgosłupa, otyłość, jakość życia, dyskopatia*

Introduction. The LBP syndrome is associated, among others, with being overweight. The standard therapy does not include changes in dietary habits. The patient with LBP is rarely made aware of the need of taking up appropriate physical activity that would help reduce excess body weight.

Aim. To assess how the reduction of excess body weight influences the quality of life in patients with LBP.

Material & Method. The following groups of patients were observed: 285 people with disc herniation L4-L5 or L5-S1 (52 people with normal body mass; 233 people with overweight or obesity). The quality of life of the patients was measured twice using the Roland and Morris Questionnaire: when the problems appeared and after 6 months. The overweight patients were educated about changes in dietary habits and encouraged to undertake aerobic exercise systematically.

Results. Following the advice, 137 people reduced their body mass by at least 5 kg. At the time the problems appeared, the degree of dysfunction was greater in overweight or obese patients then in those with normal body mass. After 6 months the greatest improvement in physical condition was noticed in those patients who had lost 5 kg or more.

Conclusions. 1. The reduction of excess body mass has a significant influence on the improvement of physical function in LBP patients. 2. The standard treatment of overweight or obese people should be combined with education aimed at changing eating habits and increasing physical activity.

Key words: *low back pain, obesity, quality of life, disc herniation*

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Introduction

Low back pain syndrome (LBP) is an etiological and symptomatic inhomogeneous affliction. It develops as a consequence of various damages to anatomical structure. The complicated structure of lumbosacral spine facilitates LBP. The main symptom of LBP is pain which at its greatest intensity can be excruciating [1-4]. A dramatic increase of back pain has been reported in medical literature. It is estimated that 30-60% of the population experience back pain, 80% in the lumbar spine [1]. About 18% of adult Americans suffer from chronic LBP [4], and in Poland 80% of people between the age of 30-40 years experienced LBP at least once. In the elderly the problem is even

more frequent [5]. The condition affects mainly relatively young people who are professionally and socially active. LBP is a significant health problem in developed countries. Back pain is one of the most common reasons for work absence, which leads to great costs connected with lowered efficiency of employees and the costs of their treatment [1].

The individual's experience of the complaints, especially if long-lasting, affect the quality of life of LBP patients. The balance between the patients' life expectations and what they can achieve is upset [6]. The condition leads to restrictions affecting professional, social, cultural and family life [7]. In order to increase preventive effectiveness, the LBP risk factors should be explicitly stated. Decreased physical activity is stated to be one of these factors, which is related to obesity, being rated as a worldwide epidemic [8]. There is no explicit opinion relating BMI and LBP so far. Some authors see such a relation [9-12] but other studies do not confirm it [13-15]. The aim of this study was to assess how the reduction of excess body weight influences the quality of life in patients with disc herniation.

Material and methods

285 patients with low back pain took part in the study. They all were patients of the Neurosurgical Clinic at St. Lukas's Provincial Hospital in Tarnow. It was assumed that potentially all patients aged between 30 and 75 years who would be diagnosed by a neurosurgeon with discopathy at the L4/L5 or L5/S1 level based on an MRI examination and qualified for preventive treatment, would qualify for the study. The data was being gathered for six consecutive months. The agreement of the local bioethics committee was also obtained.

Excluded were the patients with diseases of the central nervous system or peripheral nerves, after spinal fracture, with hip or knee osteoarthritis, mental disorders as well as the patients who did not sign a consent to participate in the study. The quantitative disproportion between individuals with normal and excess body mass was not intended. By itself the proportion confirms that LBP is related to excess body mass.

The study was conducted twice with the same people: before introducing preventive treatment (Study I) and after 6 months of this treatment (Study II). In the first study 52 people had normal body mass, and 233 were diagnosed with overweight or obesity. During the first visit to the clinic the patients were educated in appropriate healthy lifestyle, the aim of which was, above all, weight loss. The patients were educated at their convenience. In case of additional questions concerning (e.g. diet, physiotherapy) the patients were provided with a professional specialist's consult (of physiotherapist, dietician, etc.).

In the second study the body mass was measured again and the patients were divided into three groups: control group (C) – the patients with normal body mass both at the beginning and during the study (BMI<25); RBW group (reduced body weight) – the patients with overweight (BMI>25) or with obesity (BMI>30) who reduced their body weight by at least 5kg; and NonRBW group – the patients who were diagnosed with overweight of obesity, who neither reduced body weight nor put on weight. The Roland and Morris back pain questionnaire was used to evaluate the quality of life. RMDQ consisted of 24 YES/NO questions concerning the patient's state of health on the day of the study. The statements were related to daily physical activities, their limitations, means of compensation and also emotional state. For the answer 'YES' one point was given, and the answer 'NO' gained zero points. The overall score could range from 0 to 24 points.

The results were submitted to the statistical analysis. The program Statistica PL (version 10.0) produced by StatSoft was used to analyze the results. ANOVA and the post hoc Tukey test were used to compare within and between groups. The statistical variance was significant at $p<0.05$.

Results

From the 285 patients eligible for the study, 50 had normal body mass (group C) and 233 were diagnosed with overweight or obesity. Six months after the problems appeared, 137 patients with overweight lost at least 5 kg (group RBW). The average decrease in body weight was 7.65 kg. The greatest weight loss was 20 kg. 96 patients whose BMI level also indicated overweight or obesity did not change their body weight by more than 1kg (NonRBW). The average BMI values for all the groups are shown in Table I.

The combined points obtained from all the questions made it possible to specify the degree of dysfunction in those studied (Table II). At the time of conducting the first study the lack of dysfunction was found in just under 6% of the patients from the C group and RBW group as well as in over 8% of the

Table I. BMI of patients during first visit to the doctor and after 6 months (intra-group comparison, ANOVA, p=0.05)

Group	Term of study	Mean	Medium	Min	Max	St Dev	p
RBW n=137	First term	29.42	29.0	25.0	39.0	3.24	0.0000*
	After six months	26.87	26.0	21.0	33.0	3.58	
NonRBW n=96	First term	28.45	28.0	25.0	39.0	2.65	0.48
	After six months	28.43	28.0	24.0	39.0	2.69	
C n=52	First term	22.05	23.0	17.0	24.0	1.96	0.32
	After six months	21.99	23.0	17.0	24.0	1.97	

*statistically significant differences

Table II. Degree of dysfunction of patients according to each studied group

Roland-Morris Questionnaire	RBW group		NonRBW group		C group	
	First study n (%) Mean+SD	After six months n (%) Mean+SD	First study n (%) Mean+SD	After six months n (%) Mean+SD	First study n (%) Mean+SD	After six months n (%) Mean+SD
lack of disability 0-3points	8 (5.84) 2.12+0.83	11 (8.03) 2.18+0.87	8 (8.33) 1.6+0.91	10 (10.42) 1.9+0.99	3 (5.77) 2.66+0.57	3 (5.77) 2.66+0.57
low degree of disability 4-10 points	50 (36.50) 7.58+2.12	88 (64.23) 7.37+1.97	33 (34.37) 7.9+1.95	43 (44.79) 7.88+1.7	27 (51.92) 7.25+1.76	32 (61.53) 6.81+1.67
moderate degree of disability 11-17 points	63 (45.98) 14.03+1.83	36 (26.28) 12.77+1.35	45 (46.88) 13.93+2.08	43 (44.79) 13.11+1.78	15 (28.85) 13.06+1.43	12 (23.08) 12.83+1.46
high degree of disability 18-24 points	16 (11.68) 19.43+1.45	2 (1.46) 21.5+1.07	10 (10.42) 20.2+1.61	0 (0.00) –	7 (13.46) 20.28+1.49	5 (9.62) 20.4+1.14
all groups	137 (100)	137 (100)	96 (100)	96 (100)	52 (100)	52 (100)

patients in the NonRBW group. A low degree of dysfunction was diagnosed in around 1/3 of people with excess body weight as well as somewhat over a half of the people with normal BMI. Moderate or high dysfunction was noted in 42% of the patients from the C group as well as about 57% of the patients from the RBW and NonRBW groups.

After 6 months the number of people from the C group without symptoms of dysfunction was unchanged, however there was a 2% increase in the RBW and NonRBW groups. The proportion of patients with slight dysfunction increased in the C and NonRBW groups by about 10%, and more than 27% in the RBW group. In every group the number of patients with moderate and high degree of dysfunction decreased: in the C group by almost 10%, in the NonRBW group by over 12%, and in the RBW group by almost 30%. 6 months after the appearance of the complaints the highest number of people with a high degree of dysfunction was noted in the patients with normal body mass (C group).

A comparison of the answers given by the patients to questions from the Roland and Morris questionnaire indicated that in the first study the RBW group patients had a greater dysfunction as compared to people from the NonRBW and C groups in 10 items. The people from the NonRBW groups turned out the worst in 5 items, and people from the C group in 6 items (Table III). The statistical analysis indicated significant intergroup differences in the first study only in relation to the following statements: 'Because of back pain, I use a handrail to get upstairs' ($p=0.023$) as well as 'I have trouble putting on my socks because of back pain' ($p=0.013$) between the C and RBW groups. The symptoms of dysfunction in the RBW group appeared mainly with a frequent necessary change of position, in order to feel comfortable, avoiding more demanding housework as well as a slower walking pace. The people from the NonRBW and C groups complained mainly about the necessity of changing position frequently in order to feel more comfortable, problems during more demanding housework as well as bending over and kneeling.

A significant improvement in ability was noted between the first and second study within 6 months in relation to the activities described in 21 items of the Roland-Morris questionnaire in the RBW group, 13 items in the NonRBW group and 4 items in the C group. The greatest improvement was walking pace, the possibility of standing up and walking longer, in all groups, and in the RBW group the possibility of getting up from a soft sofa. Summing up all the points gained in the Roland and Morris questionnaire the level of ability of the patients from all three groups studied increased significantly between the first and second study.

There was no significant difference between the groups in the pain intensity described by the patients on the VAS scale in the first study ($p>0.05$). After 6 months the pain level was reduced significantly in each group (Tab. III), and one-way ANOVA and Tukey post hoc tests revealed a significant difference between RBW and NonRBW ($p=0.01$).

Discussion

The study involved 285 PJM patients, which is the most common cause of LBP [16-18]. The degree of dysfunction during the first study was stated as high for 33 patients (11.6%), moderate for 123 patients (43.1%) and low for 110 patients (38.6%). The lack of dysfunction was found in 19 people (6.7%). Kiernozek and Zajt-Kwiatkowska [19] conducted a similar study in a group of 32 patients being treated for back pain. This study found that the level of dysfunction in the group was, according to RMDQ: very low – 44%, serious – 19%, very high – 22%. Similar observations were made by Czaja and co-authors [20].

The functional condition, as measured by the Roland and Morris questionnaire, was significantly improved between the first and second study within six months. According to the authors, the reduction of excess body weight was one of the factors which led to an improvement in the quality of life. The role of overweight and obesity as a risk factor leading to

Table III. Results of Roland and Morris questionnaire at the time complaints appeared and after 6 months (ANOVA, p=0.05)

Roland and Morris Questionnaire	RBW n=136			NonRBW n=96			C n=52		
	First study Mean+SD	After six months Mean+SD	Change	First study Mean+SD	After six months Mean+SD ev.	Change	First study Mean+SD	After six months Mean+SD	Change
I stay at home most of the time because of back pain	0.25+0.43	0.18+0.38	0.07	0.22+0.42	0.18+0.39	0.04	0.19+0.39	0.17+0.38	0.02
	p=0.007*			p=0.133			p=0.187		
I change position frequently to try and make my back comfortable	0.84+0.36	0.75+0.42	0.09	0.76+0.42	0.7+0.45	0.06	0.86+0.34	0.82+0.38	0.04
	p=0.05*			p=0.073			p=0.47		
I walk more slowly than usual because of back pain	0.76+0.42	0.44+0.49	0.32	0.73+0.44	0.48+0.5	0.25	0.65+0.48	0.5+0.5	0.15
	p=0.0000001*			p=0.000003*			p=0.013*		
Because of back pain I am not doing any of the jobs that I usually do around the house	0.52+0.5	0.39+0.49	0.13	0.52+0.5	0.45+0.5	0.07	0.4+0.49	0.36+0.48	0.04
	p=0.0001*			p=0.02*			p=0.36		
Because of back pain I use a handrail to get upstairs	0.3+0.45	0.21+0.4	0.09	0.25+0.43	0.18+0.39	0.07	0.11+0.32	0.11+0.32	0
	p=0.002*			p=0.059			p=1		
Because of back pain I lie down to rest more often	0.52+0.5	0.38+0.48	0.14	0.44+0.49	0.36+0.48	0.08	0.48+0.5	0.44+0.5	0.04
	p=0.00019*			p=0.012*			p=0.47		
Because of back pain I have to hold onto something to get out of an easy chair	0.61+0.49	0.39+0.49	0.22	0.62+0.48	0.54+0.5	0.08	0.5+0.5	0.42+0.49	0.08
	p=0.000003*			p=0.071			p=0.067		
Because of back pain I try to get other people to do things for me	0.19+0.39	0.13+0.34	0.06	0.12+0.43	0.06+0.24	0.06	0.13+0.34	0.11+0.32	0.02
	p=0.038*			p=0.027*			p=0.089		
I get dressed more slowly than usual because of back pain	0.69+0.46	0.48+0.5	0.21	0.64+0.48	0.59+0.49	0.05	0.55+0.5	0.51+0.5	0.04
	p=0.000004*			p=0.73			p=0.047		
I only stand for short periods of time because of back pain	0.61+0.48	0.36+0.48	0.25	0.67+0.47	0.46+0.49	0.21	0.73+0.44	0.53+0.5	0.2
	p=0.000001*			p=0000008*			p=0.044*		
Because of back pain I try not to bend or kneel down	0.75+0.43	0.61+0.49	0.14	0.77+0.42	0.67+0.47	0.1	0.78+0.41	0.75+0.43	0.03
	p=0.00005*			p=0.007*			p=0.47		
I find it difficult to get out of a chair because of back pain	0.36+0.48	0.19+0.39	0.17	0.35+0.48	0.27+054	0.08	0.25+0.43	0.23+0.42	0.02
	p=0.000003*			p=0.013*			p=0.65		
My back is painful almost all the time	0.49+0.5	0.36+0.48	0.13	0.42+0.49	0.35+47	0.07	0.4+0.49	0.32+0.47	0.08
	p=0.00003*			p=0.023*			p=0.013*		
I find it difficult to turn over in bed because of back pain	0.53+0.5	0.36+0.48	0.17	0.5+0.5	0.41+0.44	0.09	0.4+0.49	0.38+0.49	0.02
	p=0.00003*			p=0.013*			p=0.37		
My appetite is not very good because of back pain	0.11+0.32	0.08+0.28	0.03	0.19+0.4	0.16+0.48	0.03	0.19+0.39	0.19+0.39	0
	p=0.13			p=0.24			p=1		
I have trouble putting on my socks (or stockings) because of back pain	0.67+0.46	0.55+0.49	0.12	0.68+0.46	0.58+0.49	0.1	0.46+0.5	0.4+0.49	0.06
	p=0.00002*			p=0.004*			p=0.24		
I only walk short distances because of back pain	0.64+0.48	0.36+0.48	0.28	0.62+0.48	0.44+0.37	0.18	0.65+0.48	0.48+0.5	0.17
	p=0.0000*			p=0.0001*			p=0.007*		
I sleep less well because of back pain	0.5+10.5	0.42+0.49	0.09	0.57+0.49	0.48+0.49	0.09	0.48+0.5	0.48+0.5	0
	p=0.0014*			p=0.013*			p=1		
Because of back pain I get dressed with help from someone else	0.09+0.29	0.08+0.27	0.01	0.11+0.32	0.08+0.49	0.03	0.09+0.29	0.09+0.29	0
	p=0.47			p=0.24			p=1		
I sit down for most of the day because of back pain	0.19+0.39	0.14+0.35	0.05	0.23+0.42	0.2+0.5	0.03	0.26+0.44	0.25+0.43	0.01
	p=0.048*			p=0.24			p=0.54		
I avoid heavy jobs around the house because of back pain	0.77+0.41	0.69+0.45	0.08	0.77+0.42	0.74+0.4	0.03	0.78+0.41	0.75+0.43	0.03
	p=0.004*			p=0.24			p=0.47		
Because of back pain I am more irritable and bad tempered than usual	0.38+0.48	0.31+0.46	0.07	0.37+0.48	0.35+0.44	0.02	0.38+0.49	0.34+0.48	0.04
	p=0.009*			p=0.47			p=0.47		
Because of back pain I go upstairs more slowly than usual	0.58+0.49	0.47+0.5	0.11	0.61+0.48	0.55+0.48	0.06	0.42+0.49	0.38+0.49	0.04
	p=0.0005*			p=0.041*			p=0.47		
I stay in bed most of the time because of back pain	0.19+0.39	0.16+0.36	0.03	0.21+0.41	0.19+0.49	0.02	0.19+0.39	0.17+0.38	0.02
	p=0.13			p=0.47			p=0.47		
Totally	11.72+4.96	8.63.79	3.12	11.65+.11	9.69+3.91	1.91	10.4+2.0	9.26+4.87	1.16
	p=0.0000*			p=0.0000*			p=0.0001*		
VAS (points)	6.96+2.14	3.26+1.79	3.7	6.86+2.54	3.93+1.52	2.93	6.57+2.27	3.3+1.52	3.23
	p=0.0000*			p=0.0000*			p=0.0000*		

*statistically significant differences

lumbar pain has not been completely understood. Leboeuf-Yde [21] undertook an analysis of 65 reports which focussed on the possible influence of excess body weight on lumbar spine problems. 32% of studies underscored the connection between excess body weight and lumbar back syndrome, whereas others could see no such connection [22, 23]. There is also no evidence for the theory that excess body weight has an influence on the quality of life of people with LBP [23]. On the other hand, the authors of such studies agree that the reduction of excess body weight may both facilitate and speed up the therapy process [21]. The analysis of this study results may lead to the conclusion that together with the therapy the reduction of body weight has notable benefits for the patient. A significant improvement in ability was noted between the first and second study within six months in comparison to the activities evaluated in the Roland and Morris questionnaire. The number of people with moderate and high level of dysfunction was reduced. The most notable improvement was noted in the group of people who decreased their body weight.

In the study of the group of sick patients the activities which caused the greatest difficulties were noted (I change position frequently to try and make back comfortable, I walk more slowly than usual because of back pain. I avoid heavy jobs around the house because of back pain, I try not to bend or kneel down) and also those on which LBP had less significant influence.

In the second study there was a significant increase in the estimates of overall points scored in the Roland and Morris questionnaire in the level of ability in all three analyzed groups. Similar results were obtained by Cecchi et al [24]. The level of dysfunction of the studied group was found to be moderate. It amounted to 11.35 +5.08 points. For comparison, Table IV presents the results of the studies by Crombez et al. [6], Kovacs et al. [25] and Takeyachi et al. [26] concerning the level of dysfunction of patients with back pain according to RMDQ.

The second study noted a significant improvement in particular parts also in NonRBW group. This could be an effect of the attempt to change the lifestyle through educational instruction. Even though the reduction of body weight by at least 5 kg was not achieved, introducing lifestyle changes (diet and increased physical activity) improved the quality of life.

Table IV. Level of dysfunction according to RMDQ in light of this and other studies [25, 26, 27]

	Number studies	RMDQ Mean+SD	Level of dysfunction
Author's studies	285	11.35+5.08	Moderate
Crombez et al.	35	14.1+5.3	Serious
Kovacs et al.	195	10.04+5.01	Low
Takeyachi at al.	816	15.7+4.85	Serious

Sedula et al [27] and Bish [28] had similar observations. Accordingly the results of educational instruction indicated that people who spent their free time actively had statistically significant BMI and WHR points which correlated with a better functional condition and decrease in the pain intensity. Such a correlation was not found in people who preferred spending their free time passively. In the study of Cecchi et al. [24] following a specialized exercise program seemed to be the key to the reduction of dysfunction associated with back pain. Regular physical activity did not guarantee long-term improvement in specific abilities.

Apart from the standard medical diagnosis, the assessment of the patient with lower back pain should account for the subjective judgment of the pain intensity, as well as the level of functional condition. This assessment is necessary, since improved quality of life is influenced by the degree of pain elimination, and everyday activities can be done with greater ease. The treatment of overweight patients with disc herniation without the reduction of body weight decreases pain but is not effective enough to improve ability and prevent the recurrence of the problems. It is recommended to guide patients towards healthy eating habits and safe and systematic physical activity.

Conclusions

LBP leads to disorders in daily functioning. The majority of patients showed moderate and low levels of dysfunction. The reduction of excess body weight has a significant influence on the improvement of physical function in LBP patients. The standard treatment of overweight or obese people should be combined with education aimed at changing eating habits and increasing physical activity.

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