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Evaluation of daily outpatient multidisciplinary rehabilitative treatment of patients with musculoskeletal, neurological and traumatic disorders in a municipality outpatient setting

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ABSTRACT

Background and objective: Musculoskeletal, neurological, and traumatic injuries are a considerably increasing problem. There is a lack of studies evaluating the results of outpatient rehabilitative treatment of patients with the abovementioned diseases. The aim of this study was to determine the effectiveness of daily outpatient multidisciplinary rehabilitation.

Materials and methods: This observational study enrolled 223 adult people undergoing outpatient rehabilitation performed in a municipality outpatient clinic during 14 days. The functional assessment of disability was performed by using the Barthel index (BI), functional performance was estimated by the modified Keitel functional test (MKFT), and pain perception was evaluated by the visual analogue scale (VAS). The mean scores of the tests were compared before and after outpatient multidisciplinary rehabilitation.

Results: Significantly reduced disability and pain perception as well as increased functional performance were documented after outpatient rehabilitation. The mean scores of BI, MKFT, and VAS before and after rehabilitation did not differ significantly among patients ranked to each cluster of diseases. Increased functional performance of patients had a moderate-to-weak association with decreased disability and pain perception. The positive changes in health status considering disability, functional performance, and pain perception were documented after 14-day rehabilitation.

Conclusions: Multidisciplinary outpatient rehabilitation can be considered as effective treatment. However, it is necessary to implement specific, well-adapted consuming assessment

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instruments in order to evaluate the outcomes of daily multidisciplinary outpatient rehabilitative treatment.

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1. Introduction

Musculoskeletal conditions encompassing a wide spectrum of diseases such as age-related osteoarthritis, spine disorders usually of unclear etiology, and those related to neurological disorders and traumatic injuries are notably increasing medical, social, and economic problems among the populations of industrialized and developing countries due to high direct and indirect costs. Chronic pain is especially considered to be the most prominent symptom among patients with musculoskeletal diseases representing an important cause of physical limitation, reduced functions of daily life, and disability [1–4].

A multidisciplinary rehabilitation program involving physical therapy, physiotherapy, occupational therapy, and psychosocial support has been developed to restore such functions as physical and occupational abilities, significantly improve skills to cope with pain, and encourage patients to take responsibility for the management of their health conditions. Therefore, the improvement of pain and body function over the multidisciplinary rehabilitation could be estimated using different assessment instruments and methods. However, obtained information may not necessarily reflect the real capacity of a patient's performance, and there is a lack of consensus how an important improvement should be defined and which specific measure is best to evaluate the outcomes [5–8].

The aim of this study was to determine the effectiveness of daily outpatient multidisciplinary rehabilitative treatment in an outpatient setting in accordance with the evaluated scores of disability, functional performance, and pain perception using the approved assessment tools in Lithuania.

2. Materials and methods

A sample of 223 adult people with neurological, musculoskeletal, and traumatic diseases undergoing outpatient rehabilitation in a Šilainiai municipality outpatient care setting, Kaunas, Lithuania, from September 2011 to July 2012 was investigated. The examined sample consisted of 93 men (41.7%) and 130 women (58.3%). Adult patients aged 18 years and more were subjected to outpatient rehabilitation according to the Lithuanian National Guidelines after daily treatment in outpatient and inpatient departments of musculoskeletal and neurological diseases as well as included in the study population. Rehabilitation was performed in a strict frame of the national legal regulation. In concordance with it, the duration of outpatient rehabilitation was 14 days, and multidisciplinary comprehensive rehabilitative treatment for each patient included individualized physical exercises, physiotherapy, occupational therapy, hydrotherapy, massage, and psychological and social counseling. A standardized form was used to collect the data on history and demographic characteristics (age, sex, occupation, etc.). Health-related data were obtained from the daily medical records completed by three physiatrists leading the teams of rehabilitation specialists; therefore, the study design was observational. Diseases were classified by the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10).

The patients were examined before and after outpatient rehabilitation by using approved and validated tools for disability, functional assessment, and evaluation of pain perception in Lithuania: the Barthel index (BI), modified Keitel functional test (MKFT), and visual analogue scale (VAS).

The BI was used for the evaluation of patient independence considering the disability. The BI assesses 10 activities of daily life, 8 of which can be described as self-care activities, and 2 as mobility-related activities. The scores for each of the item are summed up to compute a total score from 0 (total dependence) to 100 (total independence). Independence is defined as no need in assistance in daily living and mobility. The BI is among the most widely used tools to measure functional status, providing great validity, reliability, and sensitivity [9,10].

The KFT, a functional performance test, is a tool to assess mobility that evaluates functions of the hands, wrists, shoulders, trunk, and low limbs by 24 simple movement patterns. The score ranges from 0 to 100 points. An adapted and approved version of the KFT with 21 movement patterns and a maximum value of 95 points is used in Lithuania. In both the versions, the maximum value presents no functional limitation. The MKFT that indicates functioning of upper extremities (maximum value, 50 points), and lower extremities and trunk (maximum value, 45 points), respectively was applied [11,12]. The VAS was employed to assess pain intensity (0, no pain; 10, unbearable pain). This scale has been shown to have excellent reliability and validity [13].

Statistical analysis was performed using the statistical software package SPSS 17.0 for Windows. The analysis was performed separately for men and women. Data were expressed as mean and standard deviation. The differences in the distribution of qualitative variables were assessed by the chi-square test. Correlation was used to identify the relationship between two continuous variables; the strength of the association between them was measured by the Pearson correlation coefficient (r). The difference was considered to be significant when $P < 0.05$.

3. Results

3.1. Characteristics of the study population

The mean age of the patients undergoing outpatient rehabilitation was 49.55 ± 12.72 years. The mean age of women and

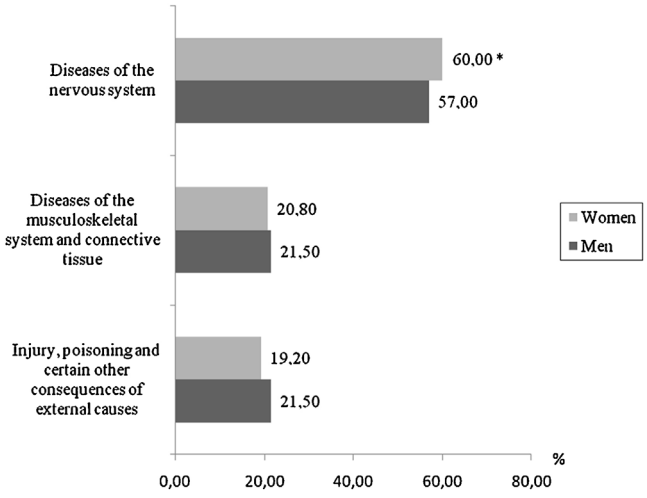

Fig. 1 – Distribution of women and men by health disorders. $\chi^2 = 4.77$; $P = 0.029$; $df = 1$.

men was 52.89 ± 10.71 and 44.88 ± 13.85 years, respectively. Women and men with neurological diseases were oldest. The mean age of women and men was 52.24 (SD, 10.38) and 47.45 (SD, 12.04) years, respectively ($P = 0.016$).

Neurological disorders (G12.2–G57.3) accounted for the greatest part of all the diseases, i.e., 58.7%, while musculoskeletal (M05.5–M75.8) and traumatic (S14.3–S93.2 and T02.0–T02.8) disorders made up 21.1% and 20.2%, respectively. There were significantly more women than men in the group of neurological diseases (60% vs. 57%), while the distribution of men and women in other groups of disorders did not differ significantly (Fig. 1).

Patients with neurological diseases (mean age, 48.19 years; SD, 11.3) suffered mainly from lumbar and lumbosacral disorders (G55.1). In the group of patients with this diagnosis, there were 64.1% of women (mean age, 51.20 years; SD, 8.88) and 83.0% of men (mean age, 47.25 years; SD, 11.55), but the difference in the mean age was not significant ($P = 0.069$) (Table 1).

According to the social status, the working population accounted for the greatest percentage ($n = 176$; 78.9%; 43.8% of men and 56.2% of women). The retired people made up 11.2% ($n = 25$), and the rest participants were ranked by the social status as follows: 4.8% of the studied population had impaired working ability; 2.2%, were registered in the labor exchange; and 0.4%, were students.

3.2. *Evaluation of disability, functional status, and pain perception*

The overall mean scores of disability, functional performance, and pain perception were similar and there were no statistically significant differences between both sexes before and after rehabilitative treatment. However, in the whole population, the mean scores of BI, MKI, and VAS differed significantly before and after rehabilitation ($P < 0.000$ in all cases) (Table 2).

The mean values of disability and functional performance did not differ significantly between men and women in the groups of musculoskeletal and traumatic disorders (Table 3).

Table 1 – Distribution of women and men according by diagnosis in each group of health disorders.

Group of disorders	Sex	Diagnosis	Prevalence, %	Age, mean (SD), years
Neurological	Female	G55.1	64.1	51.20 (8.88)
	Male	G55.1	83.0	47.25 (11.55)
Musculoskeletal	Female	M17	33.3	56.11 (6.13)
	Male	M51.1	25.0	46.20 (16.11)
Traumatic	Female	S52.5	32.0	52.25 (14.64)
	Male	S83.7	20.0	30.0 (16.43)

Table 2 – The mean scores of disability, functional performance, and pain perception before and after outpatient rehabilitation in men and women.

Scale	Sex	Mean (SD)	P_1	P_2
BI1	Men	87.77 (3.948)	0.544	<0.000
	Women	87.46 (3.590)		
BI2	Men	95.76 (3.550)	0.866	
	Women	95.85 (3.794)		
MKFT1	Men	33.28 (3.639)	0.300	<0.000
	Women	32.64 (3.702)		
MKFT2	Men	38.76 (2.995)	0.570	
	Women	38.47 (3.149)		
VAS1	Men	6.00 (1.485)	0.867	<0.000
	Women	5.96 (1.318)		
VAS2	Men	2.65 (1.512)	0.065	
	Women	2.29 (1.341)		

BI, Barthel index; MKFT, modified Keitel functional test; VAS, visual analogue scale; 1, before outpatient rehabilitation; 2, after outpatient rehabilitation; P_1, significance level comparing the mean scores between men with women; P_2, significance level comparing the mean scores before and after rehabilitation in the entire population.

Table 3 – Comparison of the mean scores of disability, functional assessment and pain perception among females and males in each group of diseases.

Group of health disorder	Sex	MKFT1	MKFT2	BI1	BI2	VAS1	VAS2
Neurological	Women	33.77 (2.03)	38.89 (2.71)	87.05 (3.55)	96.22 (4.04)	5.95 (1.46)	2.25 (1.22)
	Men	33.64 (3.05)	38.64 (1.91)	88.02 (3.15)	95.66 (3.25)	6.51 (1.07)	2.96 (1.37)
	P	0.817	0.619	0.112	0.405	**0.014**	**0.003**
Musculoskeletal	Women	31.91 (3.18)	38.32 (3.32)	87.96 (3.99)	95.56 (3.49)	5.97 (0.80)	2.09 (1.00)
	Men	33.40 (5.85)	39.07 (4.38)	87.63 (4.82)	96.32 (4.36)	5.34 (1.76)	2.08 (1.84)
	P	0.323	0.558	0.800	0.515	0.103	0.986
Traumatic	Women	27.83 (5.81)	36.00 (4.73)	88.20 (3.19)	95.00 (3.22)	6.10 (1.34)	2.60 (1.92)
	Men	31.46 (4.37)	38.85 (4.16)	87.25 (4.99)	95.50 (3.59)	5.35 (1.66)	2.40 (1.35)
	P	0.147	0.201	0.443	0.626	0.101	0.695

Values are mean (standard deviation).
BI, Barthel index; MKFT, modified Keitel functional test; VAS, visual analogue scale; 1, index before outpatient rehabilitation; 2, index after outpatient rehabilitation.

In the cluster of neurological disorders, only pain perception among men was significantly higher as compared with women before and after outpatient rehabilitation.

The overall mean scores of BI, MKFT, and VAS before and after rehabilitation among patients ranked to each group of diseases did not differ significantly with few exceptions. The mean score of MKFT1 was significantly higher in people with neurological disorders compared with those having traumatic diseases, and the mean score of VAS1 was significantly higher among patients with neurological diseases compared with the group of patients with musculoskeletal disorders (Table 4). The mean scores of BI in the groups of neurological, musculoskeletal, and traumatic diseases increased by 9.8%, 9.2%, and 8.5%, respectively. The mean score of MKFT increased by 15.0%, 18.8%, and 25.2%, respectively. The mean score of VAS decreased by 58.9%, 63.3%, and 56.5%, respectively.

The data of correlation analysis performed in the group of neurological diseases showed that BI1 and BI2 had a moderate correlation with MKFT2 ($r = 0.633$ and $r = 0.586$, respectively). VAS2 expressed a weak negative correlation with BI2 ($r = -0.398$). No significant correlation was found between the scores of functional performance and pain perception (Table 5).

The mean score of disability after rehabilitation had a moderate correlation with the scores of functional performance before and after rehabilitation ($r = 0.487$ and $r = 0.618$,

Table 4 – Comparison of the mean scores of Barthel index, modified Keitel functional test, and visual analogue scale among all groups of health disorders.

Scale	Musculoskeletal diseases	Neurological diseases	Traumatic disorders	P
BI1	87.83 (4.30)	87.44 (3.42)	87.78 (4.07)	NS
BI2	95.87 (3.85)	95.99 (3.74)	95.22 (3.36)	NS
MKFT1	32.51 (4.45)	33.71 (2.59)	30.32 (5.01)	0.000*
MKFT2	38.62 (3.74)	38.76 (2.34)	37.95 (4.43)	NS
VAS1	5.70 (1.32)	6.15 (1.34)	5.77 (1.52)	0.049**
VAS2	2.09 (1.40)	2.53 (1.32)	2.51 (1.68)	NS

* The group of neurological diseases compared to the group of traumatic disorders.
** The group of musculoskeletal diseases compared to the group of neurological diseases
NS, not significant.
Values are mean (standard deviation).
BI, Barthel index; MKFT, modified Keitel functional test; VAS, visual analogue scale.

Table 5 – Pearson's correlation between the scores of disability, functional performance, and pain in the group of neurological diseases.

Variables	BI1	BI2	MKFT1	MKFT2	VAS1	VAS2
BI1	1	0.440*	0.363*	0.633*	0.053	0.059
Bl2	0.440*	1	0.115	0.586*	−0.096	−0.398*
MKFT1	0.363*	0.115	1	0.693*	−0.023	0.189
MKFT2	0.633*	0.586*	0.693*	1	0.143	−0.132
VAS1	0.053	−0.096	−0.023	0.143	1	0.599*
VAS2	0.059	−0.398*	0.189	−0.132	0.599*	1

* $p < 0.01$ (2-tailed).
BI, Barthel index; MKFT, modified Keitel functional test; VAS, visual analogue scale; 1, index before outpatient rehabilitation; 2, index after outpatient rehabilitation.

Table 6 – Pearson's correlation between the scores of disability, functional performance, and pain in the group of musculoskeletal diseases.

Variables	BI1	BI2	MKFT1	MKFT2	VAS1	VAS2
BI1	1	0.755**	0.472**	0.501**	−0.222	−0.390**
Bl2	0.755**	1	0.487**	0.618**	−0.331*	−0.353*
MKFT1	0.472**	0.487**	1	0.783**	−0.433**	−0.121
MKFT2	0.501**	0.618**	0.783**	1	−0.446**	−0.317
VAS1	−0.222	−0.311*	−0.433**	−0.446**	1	0.692**
VAS2	−0.390**	−0.353*	−0.121	−0.317	0.692**	1

* $P < 0.05$ (2-tailed).
** $P < 0.01$ level (2-tailed).
BI, Barthel index; MKFT, modified Keitel functional test; VAS, visual analogue scale; 1, index before outpatient rehabilitation; 2, index after outpatient rehabilitation.

respectively). A weak negative correlation was also established between BI2 and VAS ($r = -0.331$ and $r = -0.353$, respectively) in the cluster of musculoskeletal diseases. MKFT1 and MKFT2 had a negative weak correlation with VAS1 (Table 6).

BI2 had a moderate correlation with MKFT1, MKFT2, VAS1, and VAS2 in the cluster of traumatic disorders. The mean scores of MKFT before and after rehabilitation had a negative moderate correlation with VAS1 ($r = -0.617$ and $r = -0.546$, respectively). There was a strong negative correlation between MKFT before and after rehabilitation and VAS2 ($r = -0.795$ and $r = -0.890$, respectively) (Table 7).

The correlation analysis performed for the scores of disability, functional performance, and pain perception of all patients revealed a weak correlation between BI1 and MKFT before and after rehabilitation; however, BI2 had a moderate correlation with MKFT2 ($r = 0.577$). BI2 and MKFT2 had a weak negative correlation with VAS before and after rehabilitation (Table 8).

4. Discussion

To our knowledge, this study was the first to be performed in a municipality outpatient setting in Lithuania, which evaluated the outcomes of outpatient rehabilitative treatment with regard to physiatrist's daily practice by using approved and easy applied assessment tools. The majority of worldwide studies were performed on the university basis in order to evaluate rehabilitative treatment using various assessment instruments. Only few studies in Lithuania analyzed the

Table 7 – Pearson's correlation between the scores of disability, functional performance and pain in the group of traumatic disorders.

Variables	BI1	BI2	MKFT1	MKFT2	VAS1	VAS2
BI1	1	0.535**	0.277	0.179	−0.361*	−0.197
Bl2	0.535*	1	0.499*	0.589**	−0.489**	−0.566**
MKFT1	0.277	0.499*	1	0.892**	−0.617**	−0.795**
MKFT2	0.179	0.589**	0.892**	1	−0.546**	−0.890**
VAS1	−0.361*	−0.489**	−0.617**	−0.546*	1	0.642**
VAS2	−0.197	−0.566*	−0.795**	−0.890**	0.692**	1

* $P < 0.05$ (2-tailed).
** $P < 0.01$ level (2-tailed).
BI, Barthel index; MKFT, modified Keitel functional test; VAS, visual analogue scale; 1, index before outpatient rehabilitation; 2, index after outpatient rehabilitation.

Table 8 – Pearson's correlation between the scores of disability, functional performance, and pain perception of all patients.

Variables	BI1	BI2	MKFT1	MKFT2	VAS1	VAS2
BI1	1	0.528**	0.379**	0.481**	−0.118	−0.118
BI2	0.528**	1	0.287**	0.577**	−0.214**	−0.417**
MKFT1	0.379**	0.287**	1	0.766**	−0.204*	−0.045
MKFT2	0.481**	0.577**	0.766**	1	−0.190*	−0.310**
VAS1	−0.118	−0.214**	−0.204*	−0.190*	1	0.630**
VAS2	−0.118	−0.417**	−0.045	−0.310**	0.630**	1

* $P < 0.05$ (2-tailed).
** $P < 0.01$ level (2-tailed).
BI, Barthel index; MKFT, modified Keitel functional test; VAS, visual analogue scale; 1, index before outpatient rehabilitation; 2, index after outpatient rehabilitation.

effectiveness of similar comprehensive rehabilitation programs and were conducted on the university basis [14,15]. However, the sample sizes in these studies were significantly smaller (48 and 135 patients, respectively) and these studies covered only the problem of low back pain related to spine disorders.

Low back pain is a common complaint mainly caused by the problems of lumbar intervertebral discs such as disc herniation, displacement or degeneration, compression of nerve roots caused by spinal stenosis, and inflammatory conditions such as arthritis. Therefore, most of these disorders can be coded with the diagnoses of M51.1, G54.4, and G55.1 according to the ICD-10.

Across the different studies, the mean age of the studied population with low back pain varies. The study by Pinnington et al. carried out in the United Kingdom examined 614 patients with low back pain, with the mean age being 42 ± 12.0 years [16]. According to the data of the cross-sectional Spanish Health Service survey performed in Spain ($N = 648$), the mean age of the studied population was 46.45 ± 15.5 years [17]. In the study by Rabini et al. performed in an outpatient setting ($N = 108$), the mean age of patients was 45.5 ± 15.8 years for the male population and 60.1 ± 23.8 years for the female population [10]. In our study, men and women with lumbar and lumbosacral disorders (G55.1) were older (mean age, 47.25 years; SD, 11.55; and mean age, 51.20 years; SD, 8.88; respectively) compared with their counterparts of the above-mentioned trials, with the exception of women in the study by Rabini et al. where women were older. The findings of other study performed in Lithuania showed that patients with low back pain were older (51.73 ± 11.32 years), but the sample size was considerably smaller ($N = 48$) and there were 62.5% of women and 37.5% of men [15].

The incidence and prevalence of osteoarthritis (OA) increases dramatically between the age of 40–50 years, particularly among women; however, some studies have shown that the prevalence of knee OA is higher among 70–74 year olds. It affects 9.6% of men and 18% of women aged 60 years and more [18,19]. A study by Cubucku et al. in Turkey investigated a sample of 114 patients with knee OA attending who attended the Physical Medicine and Rehabilitation Clinic at the Pamukkale University. The mean age of the study population was 56.98 ± 8.25 years and this is in line with our data [20]. The higher prevalence of knee OA in women could be explained by the changed hormonal status, menopause, and imbalance in the formation and destruction of bone. Occupational status (job nature, duration, physical intensity, etc.) could play an additional, but very important role in the development of knee OA aside the main endogenous and exogenous factors [3]. To verify this hypothesis, the study population should be stratified according to the occupational status in studies.

In the group of musculoskeletal disorders, M51.1 was the most frequent diagnosis among men in our study population. The mean age of these men was similar to those diagnosed with G51.1, whereas both diagnoses are considered to be nearly related. It has been reported that hospitalization rates for back disorders are high for several physically strenuous industries and occupations [21].

Fractures of the distal radius, also known as Colles' fractures, account for approximately 14% of all fractures and are the most common fractures among women aged up to 75 years in the United States and Northern Europe. The fractures have a bimodal age distribution as young adults and the elderly are most commonly affected. In the elderly, these traumatic disorders result more commonly from low-energy than from high-energy trauma. As much as 85% of women who sustain distal radius fractures have been shown to have low bone mineral density and 51% have osteoporosis [22]. Women with Colles' fractures in our study population were in the menopausal period; therefore, the potential bone mineral deficit and disorders of hormonal status could predispose to trauma.

Traumatic disorders such as injury to multiple structures of the knee (S83.7) are mainly related to sports activities, and a young age of our patients does not contradict these data [23].

Our data related to pain perception are controversial. Men had a slightly higher perception of pain before and after rehabilitative treatment compared with women in the group of neurological diseases. However, other epidemiological studies have reported that women are more likely than men to report acute and chronic pain and use pain-relieving medication significantly more frequently [24]. Rabini et al. indicated significantly higher scores of general health, vitality, and mental health among men compared with women in the sample of patients with low back pain, but slightly higher scores of bodily pain among men showed no statistically significant difference [10].

Our findings revealed that outpatient multidisciplinary rehabilitation was an effective tool of rehabilitative treatment for treated men and women based on increased functional performance as well as decreased disability and pain perception. The moderate-to-strong evidence of higher effectiveness for multidisciplinary interventions was established in a systematic review of randomized controlled trials in regard to multidisciplinary treatment of chronic pain [25]. Patients with chronic back pain tended to profit more substantially than patients with chronic pain of diverse origins regarding coping strategies, emotional strain, health-related quality of life, disability outcomes, and pain perception; however, inpatient programs were much more intensive than outpatient programs [25]. Similar data were presented by van Middelkoop et al. in a systematic review evaluating the effectiveness of physical and rehabilitation interventions for chronic non-specific low back pain [26]. Long-term multidisciplinary treatment was found to reduce pain intensity and disability at short-term follow-up with moderate evidence; however, no statistically significant differences were found comparing outpatient and inpatient multidisciplinary treatment where the principal intervention was back school rehabilitation [26].

Striking results in diminishing low back pain and disability by 12-week documentation-based care (DBC) program of functional rehabilitation were presented in Italy [5]. This study enrolled 55 consecutive patients with low back pain and included evaluations of pain intensity (VAS), disability, ranges of motion in flexion-extension, lateral rotation and flexion, and fatigability in flexion-extension. An improvement in pain and disability among studied patients ($N = 55$) was documented for women (67.7–50 and 19.0–15.9, respectively) and men (51.9–43.6 and 15.7–13.3, respectively). The international averages in DBC rehabilitation ($N = 6986$) showed reductions

in pain from 55 to 31.5 and disability from 14.4 to 9.8 [5]. A study by Henchoz et al. in Switzerland investigated a sample of 109 patients with nonspecific low back pain randomized to either a 3-week functional multidisciplinary rehabilitation program or 18 sessions of active outpatient physiotherapy during 9 weeks. Both methods decreased disability and improved isometric endurance of the trunk extensor and flexor muscle and aerobic exercise capacity. However, functional multidisciplinary rehabilitation was better in improving functional status than outpatient physiotherapy as lumbar flexion and extension range-of-motion quantified by the modified Schöber test was more favorable in short terms for the patients attending outpatient physiotherapy compared with those undergoing functional rehabilitation [27].

A study by Angst et al. involved patients with knee (N = 164) and hip (N = 88) OA, who received in 3-week comprehensive, multidisciplinary inpatient rehabilitation [28]. To measure the outcomes, the Medical Outcomes Study 36-Item Short-Form Health Survey and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) were used. Knee OA showed a corrected effect size of 0.43–0.62 in pain, 0.19–0.51 in function, and 0.19–0.30 in psychosocial health. Thus, inpatient rehabilitation resulted in small-to-moderate, statistically significant, and clinically important improvements in pain, function, and psychosocial health [28]. Similar results were achieved in study carried out by Loza et al. among 226 patients (75% of women; mean age, 63 years) with knee OA in a 12-month follow-up care program based on clinical evidence and expert opinion implemented in primary care settings. Recommendations on diagnosis, management, and follow-up were included in treatment approaches. At the end of the study, 78% of patients achieved pain relief of ≥20 points on the WOMAC pain subscale [29]. The duration of outpatient multidisciplinary rehabilitative programs for patients with low back pain or OA reviewed above was significantly longer than rehabilitative treatment in our study. Furthermore, diverse methods of rehabilitative treatment and different instruments to estimate recovery from low back pain and OA or to evaluate the outcomes were used. Thus, due to these reasons, we are not able to compare correctly our and other models of multidisciplinary rehabilitation.

Several outcome instruments are currently used to measure treatment effect in the population with chronic low back pain and OA. However, there is a lack of consensus on what constitutes a ''successful'' outcome and which outcome measure best captures the effectiveness of therapeutic interventions for the population with chronic low back pain. Maugham and Lewis indicated that the pain self-efficacy questionnaire and the patient-specific functional scale reflected more responsiveness than the other scales (the Oswestry disability questionnaire, numerical rating scale, Roland–Morris disability questionnaire) in measuring changes in patients with chronic low back pain [8]. However, this study included a small sample and only single intervention were applied, so the results should be interpreted with caution. The modified Schöber test of spinal mobility, VAS for pain perception, Oswestry disability questionnaire, modified Zung questionnaire, and modified somatic perception questionnaire should be used in epidemiological and other surveys to measure outcome after low back pain management in consideration of the WHO recommendations. Unfortunately, this set of methods is not applied in daily evaluations of patients [30].

Authors consider that outcome evaluation in the daily rehabilitative process of patients with musculoskeletal, neurological, and traumatic diseases is necessarily urgent. However, sometimes the lack of an agreed definition for recovery (e.g. from low back pain) contributes to inconsistency among outcome measures in rehabilitative low back pain treatment [8]. Limited time for a consultation with a physiatrist in an outpatient setting and possible usage of an improper instrument for the assessment of patient functional performance can predispose to the biased results or incorrect interpretation of findings; therefore, the chosen methods should be easy to administer, inexpensive, not time consuming and available in the native language [7–9].

The main limitation of our study is an observational study design as all the patients had to receive appropriate rehabilitative treatment and a control group could not be made in the framework of daily outpatient rehabilitation. The restricted usage of more specific assessment instruments that are not appropriately adapted in the Lithuanian language and not introduced in everyday outpatient rehabilitative practice also limit the interpretation of our findings.

5. Conclusions

Multidisciplinary outpatient rehabilitation can be considered as an effective approach of rehabilitative treatment in everyday practice of a physiatrist in a municipality outpatient setting. However, it is necessary to implement specific, well-adapted, and not time-consuming assessment instruments in order to evaluate the outcomes of daily multidisciplinary outpatient rehabilitative treatment. Furthermore, multidisciplinary programs should be implemented internationally in order to guarantee generally good and well-comparable outcomes during outpatient rehabilitation of patients with neurological, traumatic, and musculoskeletal diseases.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

[1] Woolf AD, Vos T, March L. How to measure the impact of musculoskeletal diseases? Best Pract Res Clin Rheumatol 2010;24(6):723–32.
[2] Hochberg MC. Osteoarthritis year 2012 in review: clinical. Osteoarthr Cartil 2012;20(12):1465–9.
[3] Sakalauskienė G, Jauniškienė D. Osteoarthritis: etiology, epidemiology, impact on the individual and society and the main principles of management. Medicina (Kaunas) 2010;46 (11):790–7.
[4] Haldeman S, Kopansky-Giles D, Hurwitz EL, Hoy D, Mark Erwin W, Dagenais S, et al. Advancements in the management of spine disorders. Best Pract Res Clin Rheumatol 2012;26(2):263–80.

[5] Taimela S, Negrini S, Paroli C. Functional rehabilitation of low back disorders. Eura Medicophys 2004;40(1):29–36.
[6] Lillefjell M, Krokstad S, Espnes GA. Prediction of function in daily life following multidisciplinary rehabilitation for individuals with chronic musculoskeletal pain; a prospective study. BMC Musculoskelet Disord 2007. Available from: http://www.biomedcentral.com/1471-2474/8/65 [cited 2013 June].
[7] Smeets R, Koke A, Chung-Wei L, Ferreira M, Demoulin Ch. Measures of function in Low Back Pain/Disorders: Low Back Pain Rating Scale (LBPRS), Oswestry Disability Index (ODI), Progressive Isoinertial Lifting Evaluation (PILE), Quebec Back Pain Disability Scale (QBPDS), and Roland-Morris Disability Questionnaire (RDQ). Arthritis Care Res 2011;63(11):158–73.
[8] Maughan EF, Lewis SJ. Outcome measures in chronic low back pain. Eur Spine J 2010;19:1484–94.
[9] Cohen ME, Marino RJ. The tools of disability outcomes research functional status measurements. Arch Phys Med Rehabil 2000;81:21–9.
[10] Rabini A, Aprile I, Padua L, Piazzini DB, Maggi L, Ferrara PE, et al. Assessment and correlation between clinical patterns, disability and health-related quality of life in patients with low back pain. Eura Medicophys 2007;43:49–54.
[11] Holm B, Jacobsen S, Skjodt H, Klarlund M, Jensen T, Hetland ML, et al. Keitel functional test for patients with rheumatoid arthritis: translation, reliability, validity, and responsiveness. Phys Ther 2008;88:664–78.
[12] Kriščiūnas A, Samėnienė J, Gradauskienė DM, Petrulienė Z. The problems of rehabilitation of the patients with musculoskeletal and connective tissue diseases. Medicina (Kaunas) 2003;39(5):511–8.
[13] Hurwitz EL, Morgenstern H, Chiao Ch. Effects of recreational physical activity and back exercises on low back pain and psychological distress: findings from the UCLA Low Back Pain Study. Am J Public Health 2005;95:1817–24.
[14] Samėnienė J, Morkevičius T, Medzevičiūtė R, Valančiūtė A, Brazauskaitė L, Narauskas R. The influence of back pain on patients' functional state and quality of life both its evaluation in rehabilitology. Skausmo Medicina 2005;2(11):11–3.
[15] Lenickienė S, Juocevičius A, Skvereckaitė V. Effectiveness of the out-patient comprehensive rehabilitation programme. Gerontologija 2010;11(4):211–8.
[16] Pinnington MA, Miller J, Stanley I. An evaluation of prompt access to physiotherapy in the management of low back pain in primary care. Fam Pract 2004;21:372–80.
[17] Kovacs FM, Fernández C, Cordero A, Muriel A, González-Luján L, Gil del Real MT. Non-specific low back pain in primary care in the Spanish National Health Service: a prospective study on clinical outcomes and determinants of management. BMC Health Serv Res 2006;6:57.
[18] Altman RD. Early management of osteoarthritis. Am J Manage Care 2010;16:41–7.
[19] Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. Bull World Health Organ 2003;646–56.
[20] Cubukcu D, Sarsan A, Alkan H. Relationship between pain, function and radiographic findings in osteoarthritis of the knee: a cross-sectional study. Arthritis 2012;2012:984060.
[21] Leino-Arjas P, Kaila-Kangas L, Notkola V, Ilmo K, Mutanen P. Inpatient hospital care for back disorders in relation to industry and occupation in Finland. Scand J Work Environ Health 2002;28(5):304–13.
[22] Blakeney WG. Stabilization and treatment of Colles' fractures in elderly patients. Clin Interv Aging 2010;5:337–44.
[23] Logerstedt DS, Snyder- Mackler L, Ritter RC, Axe MJ, Godges JJ. Knee stability and movement coordination impairments: knee ligament sprain. J Orthop Sports Phys Ther 2010;40(4):A1–37.
[24] Paller CHJ, Campbell CM, Edwards RR, Dobs AS. Sex-based differences in pain perception and treatment. Pain Med 2009;10(2):289–99.
[25] Scascighini L, Toma V, Dober-Spielmann S, Sprott H. Multidisciplinary treatment for chronic pain: a systematic review of interventions and outcomes. Rheumatology 2008;47:670–8.
[26] Van Middelkoop M, Rubinstein SM, Kuijpers T, Verhagen AP, Ostelo R, Koes BW, et al. A systematic review on the effectiveness of physical and rehabilitation interventions for chronic non-specific low back pain. Eur Spine J 2011;20:19–39.
[27] Henchoz Y, de Goumoëns P, So AK, Paillex R. Functional multidisciplinary rehabilitation versus outpatient physiotherapy for non-nonspecific low back pain: randomized controlled trial. Swiss Med Wkly 2010;140:w13133.
[28] Angst F, Verra ML, Lehmann S, Benz T, Aeschlimann A. Effects of inpatient rehabilitation in hip and knee osteoarthritis: a naturalistic prospective cohort study with intra individual control of effects. Arch Phys Med Rehabil 2013;94(11):2139–45.
[29] Loza E, Benito-Ruiz P, Blanco F, de Miguel E, Román JA. ARTROACAS study group, Spain. Feasibility and efficacy of a multidisciplinary health care programme for patients with knee osteoarthritis. Clin Exp Rheumatol 2011;29(6):913–20.
[30] Ehrlich GE. Low back pain. Bull World Health Organ 2003;81:671–6.