SPINE Volume 25, Number 14, pp 1809–1816

The Role of Physical Exercise and Inactivity in Pain Recurrence and Absenteeism From Work After Active Outpatient Rehabilitation for Recurrent or Chronic Low Back Pain

A Follow-Up Study

Simo Taimela, MD, DMSc,* Carlo Diederich, PT,† Marc Hubsch, PT,† and Michel Heinricy, PT†

Study Design. An observational follow-up.

Objectives. To analyze the role of physical exercise and inactivity on the long-term outcome after active outpatient low back rehabilitation.

Summary of Background Data. There is considerable evidence documenting the efficacy of exercise in the conservative treatment of chronic low back pain, but the role of exercises after the guided treatment period on the long-term success and maintenance of the results is not known.

Methods. One hundred twenty-five patients with low back pain, who had participated in a 12-week active low back rehabilitation program, were asked about subjective pain and disability on the average of 14 months after the treatment. The outcomes were defined as a recurrence of persistent pain and work absenteeism, and a survival or failure analysis was performed between those who had continued exercising and who had been physically inactive.

Results. Recurrences of persistent pain during the follow-up period were fewer ($P = 0.03$) among those who had maintained regular exercise habits after the treatment than among those who had been physically inactive. Similarly, work absenteeism was less ($P < 0.01$) among physically active than among physically inactive persons. However, patients with good outcome in pain reduction after low back pain rehabilitation were more likely to participate in physical exercise.

Conclusions. Exercises are beneficial after guided treatment in the maintenance of the results of active treatment for recurrent chronic low back pain in the long term, but those with less favorable outcome in rehabilitation are less likely to participate in exercises afterward. In active treatment programs, it is recommended that exercises be incorporated after the guided treatment. [Key words: absenteeism, functional restoration, long-term follow-up, low back pain, pain, rehabilitation, spine] **Spine 2000;25:1809–1816**

Musculoskeletal disorders, of which back pain accounts for more than half, are now the most common cause of chronic incapacity in industrialized countries.[2] Subjects with chronic low back pain (LBP) make up the minority of those with back pain, but they account for most of the costs associated with repeated treatment, long-term work absence, and early retirement.[2] There is therefore a pressing need to evaluate the effectiveness of interventions for management of chronic LBP. There is now considerable evidence documenting the efficacy of exercise in the conservative treatment of chronic LBP.[2,16,27] Exercise is a relatively inexpensive, easily administered treatment and has appeared to be an efficacious solution for patients whose pain appears to be resistant to many other treatment options. However, its usefulness has not gone entirely unchallenged, and a number of questions regarding the method of its application and exact prescription still remain to be answered.[27] For example, it is not known how permanent the exercise-induced benefits are in the long term, and the impact of self-dependent exercising after the guided treatment period on the long-term success and maintenance of the results is unknown. These are important issues to resolve to build up effective treatment programs.

In the present study, the authors analyzed the effect of both guided and self-administered physical exercises on the long-term outcome after exercise-based outpatient low back rehabilitation. The outcomes were measured as self-reported pain recurrence and work absenteeism. The initial hypothesis was that regular physical exercise protects the patient from pain recurrence and absenteeism. In addition, differences between groups with good and bad outcome were analyzed regarding pain, impairment, strength, and mobility, and the predictive power of these variables at baseline was assessed.

Methods

The study design was an observational follow-up after active outpatient LBP rehabilitation (Figure 1).

Subjects. From June 1995 through January 1998, 156 consecutive patients with recurrent or chronic back pain participated in a 12-week active low back rehabilitation program at an outpatient physiotherapy unit (DBC Mondorf, Luxembourg). They were invited to answer a questionnaire and to participate in a follow-up examination. One hundred forty-one (90%) patients were reached by phone, of which 16 refused to participate. Thus, the participation rate was 80%. Of the 125 patients followed-up (76 women, 49 men), 102 returned a questionnaire and participated in examinations and measurements,

From *DBC International, Vantaa, Finland; and †DBC Luxembourg, Mondorf, Luxembourg.
Acknowledgment date: March 31, 1999.
First revision date: August 19, 1999.
Acceptance date: September 10, 1999.
Device status category: 2.
Conflict of interest category: 13.

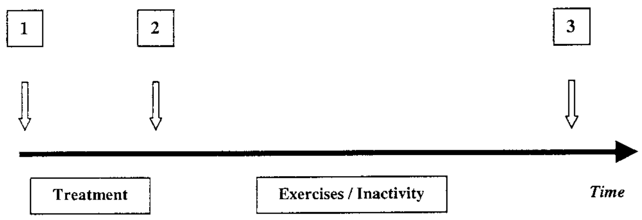

Figure 1. Study design. The numbers denote completion of the questionnaires and participation in the measurements: 1 = baseline, 2 = at the end of guided treatment, and 3 = at the end of the follow-up. Duration of guided treatment was 12 weeks. Duration of follow-up was a mean of 14 months (range, 2–30 months).

whereas the remaining 23 subjects were interviewed by phone. The participants are described in Table 1.

Physicians had referred the patients to the treatment because of LBP. All patients with recurrent or chronic LBP (>3 months) were included in the present study according to the following specifications.

Contraindications for active treatment were: acute neural tissue compression (spinal cord or nerve root compression); severe cardiovascular disease (untreated hypertonia, severe coronary heart disease, vascular anomalies); back disorders that prevent physical stress (severe instability or osteoporosis, fresh fracture); recent major surgery; and the patient's inability to cooperate. In the majority of patients with chronic LBP, a detailed specific diagnosis cannot be made.[5,26] Consequently, a detailed specific diagnosis explaining the cause of the chronic LBP was not required as an indication for the study treatment, but patients were accepted into the study who were classified as having a nonspecific backache.

Measurements. The subjects answered a structured questionnaire, and their back extension and flexion peak strength and total rotational mobility were measured at the beginning of the study, at the end of the guided treatment, and at the end of the follow-up. Specially trained physiotherapists at the outpatient unit were responsible for the interviews and measurements. The outcome measurements were made from January 1998 through July 1998. The duration of follow-up was on the average 14 months (range, 2–30 months) after the end of the active rehabilitation program.

Questionnaire. The questionnaire variables inquired about the following:

- habitual physical leisure-time activity during follow-up (no exercises, self-administered home exercises, self-administered resistance training, ongoing guided training in the outpatient treatment unit once a week)
- LBP intensity (100-mm visual analogue scale, [VAS] for average pain during the past 6 weeks)
- LBP regularity (no pain, sporadic, recurrent, continuing pain) and pain drawings
- use of pain medication
- physical impairment in daily activities
- number of days absent from work because of back pain during the preceding 6 months

Strength Testing. Two specially designed measuring and training units (DBC International, Vantaa, Finland) were used to measure the maximum isometric strength of the trunk muscles in flexion and extension.[25] The reliability of test results in the devices is acceptable, with test–retest correlations being higher than 0.90.[4] The results were recorded as the torque produced around the axis of the movement arm in proportion to the patient's upper body weight (in Newton-meters per kilogram). Thus, the results of patients of different sizes and weights are comparable.

Mobility Testing. Trunk rotation mobility was measured with a corresponding unit.[25] The movement amplitude and fixation mechanisms of the device were adjusted to focus the movement on the lumbar spine. The results were recorded as deviations from the neutral position (degrees).

Active Rehabilitation. The duration of the progressive, active outpatient rehabilitation program for all patients was 12 weeks with 24 treatment visits.[25] The subjects answered a structured questionnaire, and their back extension and flexion peak strength and total rotational mobility were measured both at the beginning and end of the 12-week rehabilitation period. Specially trained physiotherapists at the outpatient unit were responsible for the interviews and measurements. The questionnaire variables inquired about the following:

- demographic and anthropometric variables such as sex, age, height, weight, educational status
- LBP intensity (100-mm VAS for average pain during the past 6 weeks[10,11]
- LBP regularity (no pain, sporadic, recurrent, continuing pain) and pain drawings
- physical impairment in daily activities

Table 1. Subject Characteristics at the Beginning of the 12-Week Outpatient Active Back Rehabilitation

	Male (n = 49)		Female (n = 76)			
	Mean	SD	Mean	SD	T	p
Age (yr.)	43.9	11.5	40.1	10.0	1.9	0.06
Weight (kg)	85.3	13.2	65.6	11.9	8.5	<0.0001
Height (cm)	180.6	7.8	167.2	6.6	10.1	<0.0001
Low back pain duration (yr)	6.1	8.0	6.0	7.7	0.1	0.93
Pain intensity VAS (mm)	56	23	63	23	−1.6	0.11
Physical impairment score (0–33)	11.0	5.2	12.0	5.4	−0.9	0.36
MVC in extension (Nm/kg)	2.3	0.7	1.6	0.5	6.3	<0.0001
MVC in flexion (Nm/kg)	1.7	0.4	1.2	0.3	8.0	<0.0001
Rotational mobility (degrees)	88.2	16.1	85.5	18.7	0.8	0.40
Depression score (RBDS, 0–21)	2.8	3.7	3.9	4.6	−1.3	0.19

SD = standard deviation; MVC = maximal voluntary contraction; RBDS = Rimon's Brief Depression Score[14]; VAS = visual analogue scale.

Table 2. Average Changes in Pain, Self-Experienced Impairment, Trunk Strength, Mobility and Depression Score During the 12-Week Outpatient Active Back Rehabilitation

Variable	Change	SD_{change}	F_{sex}	P_{sex}	$F_{intervention}$	$P_{intervention}$
Pain intensity VAS (mm)	−30	21	0.1	0.74	174.2	<0.0001
Physical impairment score (0–33)	−4.3	4.4	0.2	0.65	96.0	<0.0001
MVC in extension (Nm/kg)	+0.64	0.55	50.7	<0.0001	148.2	<0.0001
MVC in flexion (Nm/kg)	+0.41	0.24	72.0	<0.0001	303.8	<0.0001
Rotational mobility (degrees)	+32.8	13.8	0.56	0.45	577.8	<0.0001
Depression score (0–21)	−1.9	3.5	0.4	0.54	19.8	<0.0001

VAS = visual analogue scale.

- habitual leisure time physical activity[1,28]
- depressive symptoms (Rimon's Brief Depression Score).[15]

Exercise program. The treatment included exercises to improve lumbar stability and coordination, with specific equipment applying loading against resistance (DBC International, Ltd.) as described before.[14,25] Stretching and relaxation was applied after each specific lumbar exercise, and functional muscle and coordination exercises (*e.g.*,sit-ups) were included in the program during the last 6 weeks. The active program was guided by physiotherapists. The treatment was mainly based on training with back-specific devices. Correct loading and range limiters ensured that exercises were performed in a painless range of motion and that they found the target in the lumbar spine. Restoration included controlled movements in lumbar and thoracic flexion, extension, rotation, and lateral flexion. Treatment was planned on the basis of initial strength and mobility measurements and interviews, and records were kept of the progress. The treatment was begun on low loads for the first 4 weeks with the object of improving mobility and especially teaching proper coordination of the lumbar spine. The load was gradually increased so that only at the sixth to eighth weeks was subjectively strenuous loading first applied. The load was further increased in a gradual and controlled manner until, at the end of the 12 weeks, the patients were instructed to continue an individual secondary prevention program once or twice a week, with or without guidance depending on their individual needs.

Ergonomics Guidance and Education. Individualized ergonomics guidance was given in four to six sessions by the physical therapists. Advice on correct sitting, standing, lifting, and other daily life activities was transmitted without encouraging the fear of back pain. In addition, behavioral support was provided by the therapists during each treatment session using discussions concerning the benign nature and good prognosis of LBP. The vocational support emphasized a positive approach to low back trouble by a reduction of negative beliefs and attitudes. More specifically, patients were encouraged to be active after the treatment and to use their spines in a controlled way without fear. Positive results achieved during the treatment program in loading capacity and range of movement were used to motivate the patient.

Outcomes. A recurrence of persistent pain was defined *a priori* as pain intensity VAS score (previous 6 weeks) higher than 30 mm, indicating at least moderate pain,[3] and pain frequency categorized as continuous. Work absenteeism was defined as the self-reported number of days of absenteeism more than 1 during the previous 6 months.

Data Handling and Statistical Analysis. The data collected were recorded on specific data cards and stored to computer files with a data check. The initial statistical analyses included appropriate parametric and nonparametric tests including t tests, χ^2 test for cross-tables, and analysis of variance. Physical exercise categories of self-administered home exercises and resistance training, as well as the categories of ongoing guided training, were combined to form a single category of exercise (yes) and others as no exercise (no). A Kaplan–Meier survival function estimation was used to establish the form of "percentage hazard" function for recurrence of persistent pain and work absenteeism between these groups. After the hazard percentages were established, a Cox–Mantel test was used to explore the statistical significance of the slopes. Respective survival function estimations with Gehan's Wilcoxon test were repeated for three groups of physical exercise (none, individual self-administered exercises, ongoing guided training in the outpatient treatment unit with back-specific devices). Repeated-measures analysis of variance was used with a grouping factor of success or failure to analyze the differences between the two groups in baseline measurements and success of the treatment. Stepwise multiple regression (forward stepwise; to enter $P = 0.15$, to remove $P = 0.10$) was used in the analysis of the predictors of physical exercise or inactivity and success or failure. The margin for statistical significance was set as $P < 0.05$. The data were analyzed by computer (Statistica for Windows 5.0, StatSoft, Inc., Tulsa, OK).

Results

Initial Analysis

The average changes during the 12-week rehabilitation program in pain intensity (VAS during the previous 6 weeks on average), physical impairment score, flexion and extension strength, rotational mobility, and depression score are shown in Table 2. Statistically discernible improvements were noted in all these variables during the intervention. No significant gender–intervention interactions were noted, and the data from men and women are therefore combined.

The average duration of the follow-up after the outpatient treatment was 14.0 ± 6.8 (SD) months (range, 2–30 months). Twenty-five subjects of the 125 observed (20%) had been physically inactive during the follow-up, 36 subjects (29%) had practiced individual home exercises, 21 (17%) had participated in fitness training, and 43 (34%) had participated in ongoing training once a week in the outpatient treatment unit with back-specific

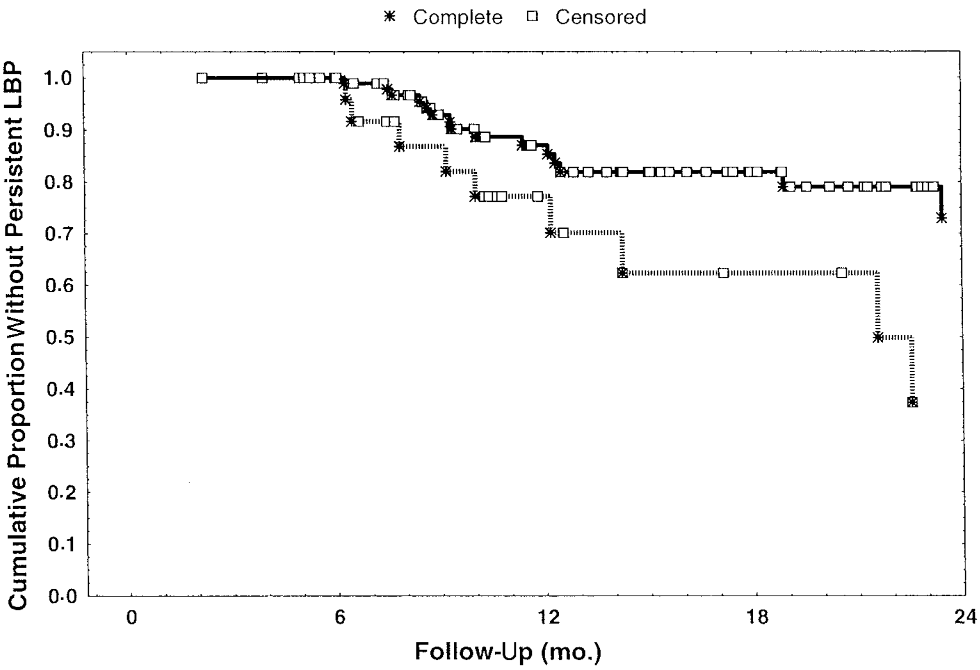

Figure 2. Survival patterns (Kaplan–Maier) without persistent low back pain of physical exercise groups after the active outpatient rehabilitation. Solid line (above) denotes the group with any physical activity; dotted line (below) denotes the physically inactive group. The group difference was statistically significant ($P = 0.03$).

devices. The mean pain intensity VAS scoring during the past 6 weeks on average was 29 ± 25 (SD) mm and current pain intensity VAS now was 18 ± 20 mm. Back pain frequency at the end of the follow-up was reported as follows: no back pain by 22 (18%) participants, occasional back pain by 32 (26%), recurrent by 36 (29%), and continuous by 35 (28%). At the end of the follow-up, use of pain medication was reported by 24 participants (19%), whereas the remaining 101 subjects reported no use of medication for back pain. Fourteen subjects (11%) reported having been out of work more than 1 day because of back pain.

The potential differences were analyzed at the end of the outpatient treatment—that is, at the beginning of the follow-up— between withdrawals and those who attended the follow-up. No statistically discernible differences ($P > 0.10$) were noted in age, weight, height, LBP duration, LBP intensity, physical impairment, trunk extension or flexion strength, or rotational mobility. A significant difference was noted in the depression score, the withdrawals having a higher score than those who attended the follow-up (2.9 ± 4.0 *versus* 1.4 ± 2.2, respectively, $P = 0.012$).

Lifetable Analysis of Physical Activity

Hazard functions were calculated for the two- (no exercise, any exercise) and three- (no exercise, individual self-administered exercises, ongoing guided training in the outpatient treatment unit with back-specific devices) exercise groups.

The hazard profile in Figure 2 shows that recurrences of persistent pain during the follow-up period were fewer (test statistic = 2.2; $P = 0.03$) among those who had maintained regular exercise habits after the treatment than among those who had been physically inactive. The hazard profile in Figure 3 shows that work absenteeism was less also (test statistic = 2.6; $P = 0.009$) among the physically active than among the physically inactive participants. No statistically discernible differences were noted between the three exercise groups in recurrences of persistent pain ($\chi^2 = 5.4$; $P = 0.07$) or work absenteeism ($\chi^2 = 4.6$; $P = 0.10$). However, the tendency toward recurrence of persistent pain was in favor of ongoing training once a week in the outpatient treatment unit with back-specific devices.

The differences between baseline and the treatment outcome were analyzed between those who participated in physical training and those who did not. No statistically discernible differences were noted ($P > 0.10$) at baseline in pain duration, pain intensity VAS, physical impairment score, depression score, lumbar flexion or extension strength, or rotational mobility between those who participated in physical training and those who did not.

Physical inactivity at baseline did not predict physical inactivity during follow-up. At baseline, 40% of the patients reported physical inactivity. Nineteen percent of them remained inactive during follow-up, whereas 81% of the inactive participants at baseline reported physical activity during follow-up. Of the 60% of the patients reporting physical activity at baseline, 21% reported physical inactivity during follow-up, and the remainder (79%) reported continued physical activity during follow-up (McNemar test A/D $P < 0.001$, B/C $P = 0.002$).

During the treatment, there was a significantly better treatment outcome concerning pain intensity among those who later participated in physical training than among those who did not (VAS at the end of treatment program 30 ± 22 mm *versus* 43 ± 25 mm, respectively; $F = 7.4$, $P = 0.008$). No statistically discernible differences were noted ($P > 0.10$) during the treatment in changes in physical impairment score, depression score, lumbar flexion or extension strength, and rotational mo-

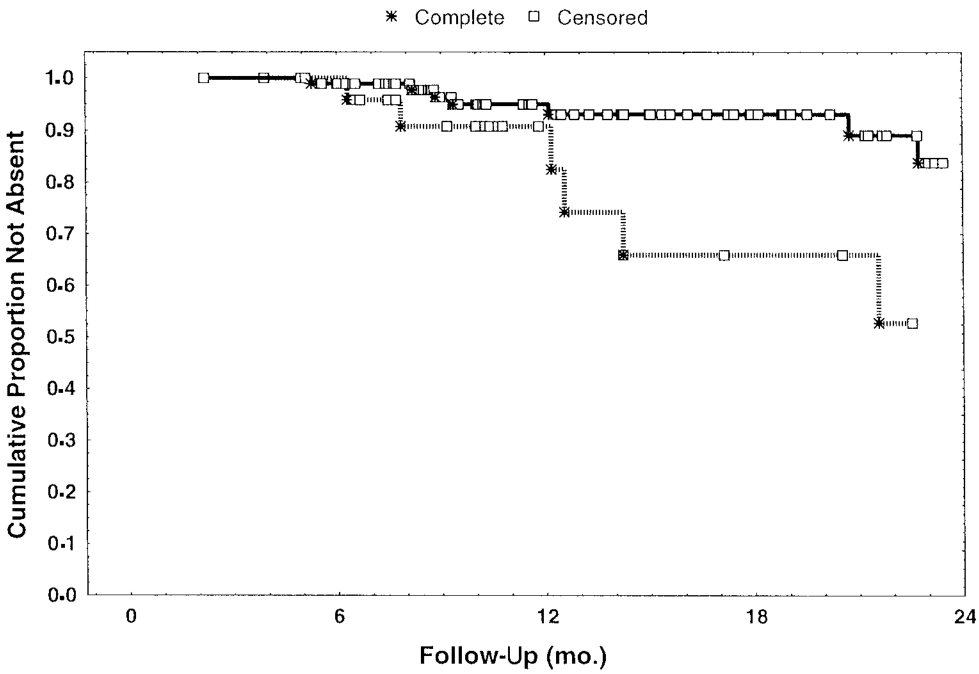

Figure 3. Survival patterns (Kaplan–Maier) without work absenteeism due to low back pain of physical exercise groups after the active outpatient rehabilitation. Solid line (above) denotes the group with any physical activity; dotted line (below) denotes the physically inactive group. The group difference was statistically significant ($P < 0.01$).

bility between those who participated in physical training and those who did not.

Group Differences and Predictors of Failure

Failure was defined as a recurrence of persistent pain or absence from work of more than an occasional day at the end of the follow-up. Table 3 shows the differences between the success (n = 95) and failure (n = 30) groups in pain, self-experienced physical impairment, and physical characteristics at baseline, at the end of the treatment, and at the end of the follow-up. At the end of follow-up, there were major differences in pain (by definition), self-experienced physical impairment, and rotational mobility. The differences between the groups in pain and self-experienced physical impairment were, however, already obvious both before and after the treatment (Table 3).

The significance of the predictors of a failure were analyzed with a multiple forward stepwise regression. Independent variables included were LBP duration, pain intensity, physical impairment score, depression score, trunk extension and flexion strength, rotational mobility, and physical inactivity or activity (scored as 0 or 1, respectively) at the beginning and the end of the guided treatment. The statistically discernible predictors of failure were high physical impairment, low rotational mobility, and high pain intensity VAS score at the end of the treatment (the beginning of the follow-up), explaining altogether 29% of the variability of success or failure.

■ Discussion

The current study was an observational follow-up after active outpatient rehabilitation for recurrent or chronic LBP, with special emphasis on the role of physical activity in the maintenance of the long-term results of rehabilitation. The study was performed as well as was practicable to ensure that it was scientifically sound and that the findings were statistically and clinically relevant. It was not possible to randomize the patients to the type of exercise that they performed after the treatment, nor was it possible to blind them from expectation bias about the efficacy of the exercise. Although these factors are considered to threaten the methodologic quality of clinical trials, it is common to face such limitations in studies designed to evaluate exercise or physical therapies.[27] Although the participants did not come from a random sample of the workforce in Luxembourg, they were, in general terms, a reasonably representative subset of working-age population that has recurrent or chronic back pain. They came from different workplaces, were both men and women, and were employed in office work or manual labor. They displayed pain and disability characteristics comparable to those of the typical patients with chronic back pain described in many previous studies.[7,19,25] At the beginning of the outpatient rehabilitation their average pain duration was 6 years; average pain intensity was 60 mm on a 0–100 VAS scale, and 82% of them had recurrent or continuous pain. Moreover, the patients involved in the study were not specially recruited on a voluntary basis, which may have attracted a group with good self-motivation to alleviate their prevailing symptoms, but the study was observational and considered long-term results among patients whom different physicians had referred for back rehabilitation.

The primary findings in the current study were that regular exercise after outpatient active treatment was related to better outcome in the long-term regarding both the recurrence of chronic LBP and work absenteeism. To the authors's knowledge, such findings have not been published before. Notably few subjects also reported total physical inactivity during follow-up, and baseline

Table 3. Group Differences By Success/Failure. Failure Was Defined as a Recurrence of Persistent Pain or Work Absenteeism at the End of the Follow-Up. The Intervention Induced Significant Changes in the Repeated-Measures ANOVA in All the Variables ($P < 0.0001$) and the Information is, Therefore Not Disclosed. Post-Hoc Testing Denotes Statistical Significance Between Groups in Each Time Point. Post-Hoc Testing was Done in Case the Group Main Effect or Interaction was Significant. n.s. Denotes That Statistical Significance was $P > 0.05$

	Failure (n = 30)		Success (n = 95)		Group		Interaction		
	Mean	SD	Mean	SD	F	P	F	P	Post-hoc
LBP duration					0.2	0.7			
At baseline	6.6	9.4	5.8	7.3					
Average pain intensity VAS (mm)					36.6	<0.0001	8.1	0.0005	
At baseline	71.3	17.8	56.5	23.6					†
After treatment	49.3	17.9	27.8	22.3					†
After follow-up	56.6	14.4	19.4	19.7					†
Pain intensity now VAS (mm)					73.4	<0.0001			
After follow-up	40.5	16.9	10.5	14.8					
Physical impairment score (0–33)					29.8	<0.0001	10.2	<0.0001	
At baseline	13.9	5.1	10.8	5.2					†
After treatment	12.0	5.1	5.6	4.3					†
After follow-up	14.5	4.8	6.7	5.4					†
Depression score (0–21)					2.3	0.13	0.1	0.71	
At baseline	4.9	5.4	3.0	3.8					
After treatment	2.5	2.1	1.0	2.1					
Back extension strength (Nm/kg)					2.1	0.15	1.1	0.33	
At baseline	1.8	0.7	2.0	0.7					
After treatment	2.4	0.9	2.6	0.8					
After follow-up	2.4	0.9	2.7	0.8					
Trunk flexion strength (Nm/kg)					3.2	0.08	0.7	0.51	
At baseline	1.4	0.4	1.4	0.4					
After treatment	1.8	0.4	1.9	0.4					
After follow-up	1.7	0.5	1.8	0.4					
Rotational mobility (degrees)					9.4	0.003	5.8	0.004	
At baseline	83.0	21.4	87.8	16.1					n.s.
After treatment	112.0	18.3	121.5	17.2					*
After follow-up	99.2	21.4	117.2	19.0					†

VAS = visual analogue scale.
* $P < 0.05$; † $P < 0.01$.

physical inactivity did not predict inactivity later. It seems that the differences between the groups in treatment success or failure start to accumulate especially after 1 year (Figures 2 and 3). However, insufficient results of treatment concerning reduction in pain and impairment predict poor outcome later, and lower grade pain reduction during the treatment was also related to physical inactivity after the treatment. Thus, the relation between ongoing physical activity and long-term success is not straightforward but is modified by the initial treatment success. It may be difficult to modify behavior toward an active lifestyle among subjects who consider the outcome of the treatment less satisfactory or who have pain that partly prevents physical activity.

The outcome in the active treatment in the current study was comparable to previous studies with the same treatment method published before,[14,25] or with results obtained with other active outpatient treatment methods.[7,18,20]

The only physical variable that differed between the groups of success or failure at the end of the treatment or at the end of the follow-up was rotational mobility. This is in concordance with results in a previous study with the same treatment method in which the only statistically significant physical determinant for poor outcome regarding pain reduction was lower grade increase in rotational mobility.[25] Rotational mobility has been related to good outcome in previous studies also.[18,21,23] Trunk strength or its changes were not related to treatment success in the current study either in the previous ones.[22,23,25] It seems that self-experienced benefits regarding pain and function are more important indicators of success in low back rehabilitation than measurements of strength and mobility. Psychological and psychosocial factors and patient's belief in control over pain[12,13] or satisfaction with the overall treatment outcome[8,9] have been more important predictors of outcome including return to work than objective physical and biomechanical findings in previous studies, as well. However, the failure can in some patients be due to a pathoanatomic or physiologic reason not measurable with available techniques or because of unknown social or psychological prognostic factors, resulting in an *a priori* allocation to the failure category.

There is considerable evidence documenting the efficacy of exercise therapy in the conservative treatment of subacute and chronic LBP.[2,27] Exercise can be a relatively inexpensive and easily administered treatment modality, although a number of questions regarding its exact prescription and method of application still remain to be answered. The current results indicate that there is an additional role of exercises in the maintenance of the low back rehabilitation results. The most efficacious exercise modality, especially in cost–benefit ratio, for posttreatment exercise remains to be shown. An additional issue is that the patients in the current study with less favorable outcome in treatment were less likely to participate in exercises. This may be because they were not motivated, because the initial exercise-based intervention did not relieve the pain sufficiently, or the pain was simply preventing them from participating in subjectively vigorous exercises. In general, it is unknown which are the most applicable education methods in health counseling to change exercise behavior in patients with chronic LBP. Health education and counseling are often rated as easy, but the translation of these factors into a program to change behavior and the evaluation of such programs are more difficult in practice.[6,17,24]

There is a need for studies to identify the most efficacious exercise modality and the health education and counseling methods for changing exercise behavior in patients with chronic LBP during and after active low back treatment. Randomized study settings would be the most desirable to evaluate these questions.

In conclusion, the application of exercises in the maintenance of treatment results after outpatient active rehabilitation seems highly recommendable. However, insufficient treatment results were related with poorer compliance in performing exercises, which must be taken into account when designing exercise programs for patients with LBP.

■ Key Points

- Recurrences of persistent pain and work absenteeism were fewer among those who maintained regular exercise habits after an active treatment for recurrent chronic LBP than among those who were physically inactive.
- Exercises were beneficial in the maintenance of the treatment results in the long term, but those with less favorable outcome in treatment were less likely to participate in exercises afterward.
- It is recommended that exercises be incorporated after the guided back treatment.

Acknowledgments

The authors thank Johanna and Tom Asklöf for their help during the preparation of the manuscript.

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Address reprint requests to

Simo Taimela, MD
DBC International
PO Box 125
FIN-01511 Vantaa, Finland
E-mail: simo.taimela@dbc.fi