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Multidisciplinary Group Rehabilitation *Versus* Individual Physiotherapy for Chronic Nonspecific Low Back Pain

A Randomized Trial

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Study Design. A randomized trial.

Objective. To evaluate the effectiveness of a semi-intensive multidisciplinary rehabilitation for patients with chronic low back pain in an outpatient setting.

Summary and Background Data. Systematic reviews have shown that there is strong evidence that intensive multidisciplinary treatment (>100 hours), which includes functional restoration, improves function among chronic patients with low back pain, and moderate evidence that it reduces pain but contradictory evidence regarding improvement of working ability. However, there is paucity of data whether semi-intensive outpatient multidisciplinary rehabilitation in groups is more effective than individual physiotherapy.

Materials and Methods. A total of 120 women employed as healthcare and social care professionals with nonspecific chronic low back pain were recruited from two occupational healthcare centers. The patients were randomized into two intervention programs. Multidisciplinary rehabilitation (n = 59) was conducted in groups and comprised of physical training, workplace interventions, back school, relaxation training, and cognitive-behavioral stress management methods for 70 hours. The individual physiotherapy (n = 61) included physical exercise and passive treatment methods administered for 10 hours. Main outcome measures were: back pain and sciatic pain intensity, disability, sick leaves, healthcare consumption, symptoms of depression, and beliefs of working ability after 2 years.

Results. There were no statistically significant differences between the two treatment groups in main outcome measures just after rehabilitation, at 6-, at 12-, or 24-month follow-up. In both intervention arms, however, the before-and-after comparison showed favorable effects, and the effects were still maintained at 2 years follow-up.

Conclusions. The results of this study indicate that semilight outpatient multidisciplinary rehabilitation program for female chronic low back pain patients does not offer incremental benefits when compared with rehabilitation carried out by a physiotherapist having a cognitive-behavioral way of administering the treatment.

Key words: chronic low back pain, randomized controlled trial, multidisciplinary rehabilitation. **Spine 2006; 31:371–376**

It is generally accepted that the origin of pain in chronic low back pain (cLBP) is largely unknown. Probably the etiopathogenesis of this nonspecific LBP is multifactorial and all innervated spinal tissues can be potentially a source of pain.[1] It is unrealistic to expect markedly more efficient treatment methods for chronic LBP before progress in basic research concerning pain mechanisms. Improved understanding of the psychosocial aspect of suffering in chronic pain has however, led to improvement in effectiveness of rehabilitation programs.

The longer the disabling LBP persists, the more psychological, social, and occupational factors are involved, in the development of chronicity.[2] Multidisciplinary rehabilitation (MR) programs have therefore been developed to improve functional capacity and coping strategies among patients with cLBP.[3] The aim of the MR programs is to provide accurate information about back pain, to lend attitudes favorable towards self-care, to reduce fears and worries, to assist patients in developing personalized action plans to manage their back pain, and to improve functional outcomes. In brief, the aim of the MR is to provide effective coping strategies despite of persisting bothersome pain. The pain relief is desirable but only a secondary goal of the MR since it can be only partly modified by rehabilitation. The intensive MR programs have, however, been criticized because of their high costs and contradictory evidence, regarding improvement of working ability.

The aim of the present study was to evaluate the effectiveness of low-cost semi-intensive outpatient multidisciplinary rehabilitation compared with individual physiotherapy (IP) conducted by physiotherapist alone.

Materials and Methods

Recruitment of Subjects. Patients were recruited from two occupational healthcare centers (Helsinki University Central Hospital and Helsinki City Health Department), responsible for occupational health care of about 20,000 employees by general practitioners, occupational nurses, or physiotherapists who were trained to identify patients eligible for the study. The patients received detailed written information about the study and the interventions. Patients willing to participate and fulfill-

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Table 1. A Medical Diagnostic Classification Based on the Quebec Task Force Recommendations

	Multidisciplinary Rehabilitation Group (n = 59)	Individual Physiotherapy Group (n = 61)
Group 1, LBP > 7 wk, working	31	28
Group 1, LBP > 7 wk, on sick leave	0	1
Group 2, LBP > 7 wk, working	1	6
Group 2, LBP > 7 wk, on sick leave	0	0
Group 3, LBP > 7 wk, working	13	10
Group 3, LBP > 7 wk, on sick leave	3	2
Group 4, LBP > 7 wk, working	5	7
Group 4, LBP > 7 wk, on sick leave	0	0
Group 9.2 (symptomatic), LBP > 7 wk, working	5	7
Group 9.2 (symptomatic), LBP > 7 wk, on sick leave	1	0

Group 1 = pain in lumbar area without radiation below the gluteal fold; Group 2 = pain in lumbar area with radiation proximally but not beyond the knee; Group 3 = pain in the lumbar area with radiation distally beyond the knee but without neurologic signs; Group 4 = pain in lumbar area with radiation to a limb and with the presence of neurologic signs; Group 9 = postsurgical status, >6 mo after operation (9.1 = asymptomatic; 9.2 = symptomatic). Work status: working/on sick leave. Duration of symptoms: a) <7 days or less; b) 7 days to 7 wk; c) >7 wk.

ing inclusion criteria were contacted by telephone by the research physician (E.H.K., specialized in rehabilitation medicine) who arranged an appointment at the Department of Physical Medicine and Rehabilitation in Helsinki University Central Hospital in order to ensure that patients fulfilled the study inclusion criteria. In addition, a medical diagnostic classification based on the Quebec task force recommendations was performed[4] (Table 1).

We targeted 22- to 57-year-old employed patients in various health and social service professions. Ninety-eight percent of patients were women and 2% were men. They had had daily or nearly daily LBP with or without sciatica during the preceding year. Subjects were excluded if they had clinical symptoms suggesting an acute disc prolapse accompanied by nerve root entrapment (less than 3 months), recent (less than 6 months) back surgery, severe cardiovascular or other disorder interfering with active rehabilitation, specific back disorder, severe mental illness (psychosis or severe depression), more than 90 days off work because of LBP during the preceding year, pension in the near future (within 2 years), pregnancy, and ongoing or planned low back pain rehabilitation. Because the rehabilitation was carried out during working hours, there was a prerequisite for participation in rehabilitation. In addition, the positive attitude of the superiors was necessary.

Randomization. Patients who agreed to participate in the study were referred to Finnish Back Institute where they were asked to complete baseline questionnaires (Table 2), and a series of functional assessments of spinal mobility, muscle strength, and cardiovascular fitness were carried out by an independent research physiotherapist (to be reported elsewhere). The physiotherapist then randomized each patient into one of the two groups by opening an opaque sealed envelope. The randomization list was generated by an independent biostatistician using a table of random numbers, and the randomization results were kept in sealed envelopes, one for each patient. All the envelopes were numbered consecutively to avoid rearrangement of the order. To ensure equal treatment numbers, blocks of 20 patients were used to produce the list. The physiotherapist was not aware of the block size and, therefore, could not predict the group assignments. After randomization, participants filled the questionnaires assessing their expectations for treatment benefit of a given intervention program.

Interventions. The physiotherapist who performed the MR and IP program were different. The patients in IP and MR program did not meet each other and could not discuss or compare the different rehabilitation programs. Duration of both interventions was planned so that the resources needed per each patient were the same: IP lasted 10 hours and MR rehabilitation lasted 70 hours. MR rehabilitation was conducted in groups of 7 patients; therefore; 70/7 = 10 hours were needed per each patient. The costs of MR rehabilitation were slightly higher because the salaries of the psychologist and the physician were higher than the salary of the physiotherapist.

MR. The MR was conducted in the rehabilitation center of Finnish Back Institute in Helsinki. The goal of the MR was to restore the physical and occupational condition of the patients, improve their skills to cope with pain, and encourage them to take the responsibility for the management of their back pain. The programs were conducted in groups of 6 to 8 patients by an experienced rehabilitation team: a physiotherapist, two occupational physiotherapists (one from the Finnish Back Institute and one from an occupational healthcare center), a psychologist, and a physician specialized in the rehabilitation medicine.

Table 2. Baseline Data of Patients

	Multidisciplinary Group (n = 59, all females)	Individual Physiotherapy (n = 61, all females)
Age (mean, SD)	46 (7.9)	46.5 (7.0)
Married (%)	61	54
Body mass index (mean, SD)	25 (4.8)	26.5 (4.7)
Smokers (%)	34	28
Length of ongoing back pain (mo) (mean, SD)	16 (25)	14 (23)
Self-rated health status for age: quite or very good (%)	39	43
Leisure time physical activity: twice or more a week (%)	47.5	54
Blue-collar workers (%)	45	49
Satisfaction with own work:		
Quite or very satisfied (%)	68	63
Work is very or extremely burdensome physically (%)	40.7	31.6
Work is very or extremely burdensome mentally (%)	39.4	47.5

The rehabilitation was carried out as an outpatient setting, integrated into the normal daily living of the patients. The 8-week intervention consisted of 70 hours rehabilitation program, including intensive period of 5 days (6 hours per day), home-training of 2 weeks, and semi-intensive period of 5 weeks (two times 4 hours per week). The intervention comprised three main parts: cognitive-behavioral stress management and applied relaxation sessions, back school education including occupational intervention, and physical exercise program.

Psychological intervention comprised cognitive-behavioral stress management methods (rational emotive psychotherapy) and applied relaxation[5] were used leaded by the psychologist during 10 hours (10 × 1 hour). Applied relaxation is a behavioral treatment method developed at the Psychiatric Research Centre, University of Uppsala, from 1978 onward by Lars-Göran Öst. The purpose of this treatment method is to teach the patient a coping skill that can be applied rapidly and in practically any situation. To use a relaxation technique effectively for pain or stress management, it needs to be quick and portable, not requiring any special circumstances or complicated procedures.

The Back School program was based on the Swedish back school principles.[6] Positive reinforcing information and advantages of physical activity were emphasized. Lessons were carried out by physiotherapist (7 hours), occupational physiotherapist (4 hours), and a physician specialized in rehabilitation medicine (4 hours). The patients were informed about the details of basic anatomy, functions of the muscles and the spine, and active treatment methods of the back disorders. The usually good prognosis of the disorder, and of the importance of avoiding bed rest, remaining active and exercising daily was strongly emphasized. During individual appointment (physiatrist 30 minutes), radiograph, CT, or MR imaging findings were explained and causes of back pain were clarified as far as possible. If necessary, medications were prescribed or changed.

Patients were also instructed of appropriate work ergonomics.[7] The occupational healthcare physiotherapist visited the patient's workplace, videotaped the most harmful work tasks, and evaluated the patient's physical, social, and psychological environment at work, proposed or made minor task-related ergonomic adjustments, and implemented a more ergonomically appropriate way of using the back at work. In the Finnish Back Institute, videotapes were analyzed and discussed in a group format as a part of back school leaded by an occupational physiotherapist.

The physical exercise program was planned individually based on the physiotherapeutic examination and the baseline measurements of cardiovascular fitness, muscle endurance, and spinal mobility.[8–10] The program was carried out in groups under the supervision of the experienced physiotherapist. The purpose of the physical exercise program was to improve the overall physical condition of the patients, encourage the patients to add their daily physical activities, and help them to control the pain with active pain relief methods. The program consisted of:

1. General fitness exercises including ergometer-bicycling, low impact and step aerobic, ordinary and Nordic walking. Exercises were performed at a moderate level of intensity, lasting from half an hour to 1 hour per session.
2. Muscle strengthening exercises performed for all main muscle groups of the trunk and lower limbs. Exercises were carried out by special training devices. Load, speed, and repetitions of every movement were individually adjusted, and they were increased gradually.
3. Special exercises to correct mobility of the spine and hip joints, activate the stabilizing muscles of the spine, and increase flexibility of the lower limb muscles.
4. Functional exercises to improve postural control, dynamic body balance, and coordination.
5. Progressive relaxation exercises to normalize muscle tension.

The MR included 2- to 3-hour physical exercises and 20-min progressive relaxation therapy per day. Patients were encouraged to perform their physical exercises two to three times per week during their home-exercise period. Training was controlled by exercise diaries. Passive physical treatment was not included.

IP. The IP was carried out in the rehabilitation center of the Finnish Back Institute in Helsinki. The purpose of the physiotherapy treatment was to bring relief to back pain and help the patients return to normal daily activities. Experienced physiotherapists were conducted the treatment based on the physiotherapeutic examination and the baseline physical tests. Intervention consisted of ten 1-hour treatment sessions of 6 to 8 weeks. Each session included 30- to 40-minute passive pain treatment (combinations of massage, spine traction, manual mobilization of the spine, and TNS/therapeutic ultrasound) and 15- to 20-minute light active exercise (muscle stretching, spine mobilization, and deep trunk muscle exercises). Patients were advised to progressively increase their regular daily activities. General physical training, such as swimming and ordinary or Nordic walking, was recommended. Patients also got a light home-exercise program, including 8 to 12 instructions about lower limb stretching, spine mobilization, and deep trunk muscle activation.

Outcomes. The primary outcomes were low back pain intensity (rated on a scale of 0–10), sciatic pain intensity (rated on a scale of 0–10), back specific disability (Oswestry),[11] subjective working capacity (rated on a scale of 0–10), sick leave due to back pain (classified scale: 0 days, 1–30 days, over 30 days during past 12 months), healthcare consumption due to back pain (total amount of visits to physician, physiotherapist, nurse, and other health professionals), symptoms of depression (DEPS, a sum score range 0–30),[9] general well-being after given back rehabilitation (questionnaire with 8 statements, the scoring is on a 4-point Likert scale forma, a sum score range of 0–32) and beliefs of working ability after 2 years (rated on a scale of 0–10).

Statistical Analyses. Power calculation were carried out to attain a power at least equal to 0.90 at a significance level of 0.05. Clinically significant differences between the groups in the primary outcomes, working ability (scale 0–10), and intensity of back pain (scale 0–10) were considered to be 2.0 (SD, 2.7 and 2.25). Accordingly, this required 37 and 39 patients to each group. With an estimation of 15% dropouts, 45 patients per group, and a total amount of 90 patients were needed.

All patients were included in the analysis on the basis of their intervention allocation. Missing values in questionnaires were not substituted for. Continuous baseline variables were analyzed by an independent samples *t* test. In cases of skewed distribution of the data, Mann-Whitney U test was used. Per-

centages for the categorical variables were calculated using cross tabulation.

One-way analyses of variance with repeated measures (analysis of variance) was used as on overall test for the effects of treatment and the comparison between the treatment groups from the baseline to each follow-up assessment (after rehabilitation and at 6, 12, and 24 months of follow-up). Sick leave (three categories) was analyzed by the Mann-Whitney U test and general well-being (measured once, after rehabilitation) by the independent samples *t* test. Significance was accepted at the level of 0.05 and all *P* values were two-sided. Statistical analyses were performed using SPSS version 10.0 for Windows software.

Ethical Considerations. The study was approved by the ethical committee of the Helsinki University Central Hospital. Patients were provided detailed written and oral information about the study and the interventions according to the Declaration of Helsinki[13] before being asked to sign an informed consent.

■ Results

Altogether, 132 patients were included in the trial between November 1996 and January 1999. Figure 1 shows the flow diagram of patient screening, enrollment, follow-up, and reasons for exclusion. In total, 96% (6 months follow-up), 89% (12 months follow-up), and 79% (24 month follow-up) of the included patients provided follow-up information that could be used in the analysis at follow-up. At baseline, patients were comparable in each treatment arm (Table 2). Five patients from both intervention groups (altogether, 10 patients) were excluded from the trial during the rehabilitation process as shown in Figure 1.

In both intervention arms, the before-and-after comparison showed improvement in main outcome measures, and the effects were still maintained at the 2-year follow-up. In the MR group, statistically significant differences (at least $P < 0.05$) were found during the 24-month follow-up in Oswestry index, subjective working ability now, beliefs in future working ability, and in healthcare consumption. Respectively, in the IP group, statistically significant differences were found in Oswestry index, low back pain intensity, and in healthcare consumption. There were, however, no statistically significant differences between the two treatment groups after rehabilitation, 6-, 12-, and 24-month follow-up in main outcome measures: low back pain intensity, sciatic pain intensity, back specific disability, subjective working capacity, sick leave due to back pain, beliefs of working ability after 2 years, and symptoms of depression (Tables 3 and 4). General well-being was, however, statistically better in the MR group just after rehabilitation ($P = 0.02$). Healthcare consumption tended to decrease more in the MR group than in the IP group.

■ Discussion

The aim of this study was to assess the effectiveness of a low-cost semi-intensive outpatient multidisciplinary rehabilitation compared with rehabilitation carried out by a physiotherapist alone. In both intervention arms, the before-and-after comparison showed favorable effects in main outcomes and the effects were still maintained at the 2-year follow-up. The results of the study indicate that the MR program for female cLBP does not offer incremental benefits when compared with IP assessed by main outcome measures: intensity of back and sciatic pain, disability, subjective working ability, sick leaves, healthcare consumption, symptoms of depression, and beliefs concerning future ability to work. General well-being after MR rehabilitation was, however, significantly better. At baseline, the patients had only moderate to mild symptoms, which may have contributed to the lack of effectiveness. Probably more distressed patients benefit more from MR programs. However, these patients may have less energy to participate in active outpatient programs.

In this study, two potentially effective treatment programs were compared. Patient expectations for treat-

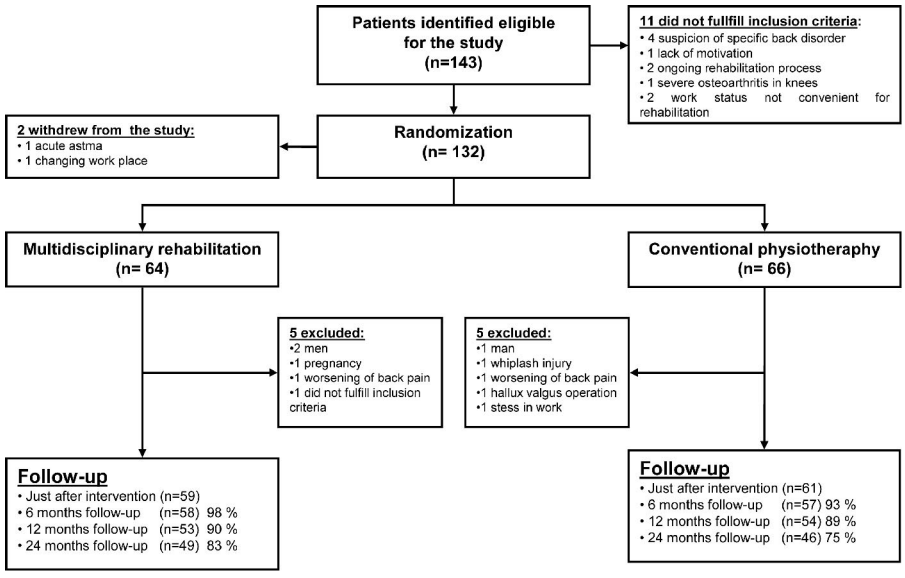

Figure 1. Flow diagram of patient screening, enrollment, and follow-up.

Table 3. Main Outcomes: Before and After Rehabilitation, 6-, 12-, and 24-Month Follow-up

	Follow-up	Multidisciplinary Rehabilitation	Individual Physiotherapy	*P*
Low back pain intensity (scale 0–10)*	Baseline	4.6 (1.9)	5.0 (2.6)	0.71
	After rehabilitation	3.3 (2.5)	3.4 (2.4)	
	6 mo	3.3 (2.5)	3.4 (2.5)	
	12 mo	3.6 (2.7)	3.4 (2.5)	
	24 mo	3.5 (2.6)	4.0 (2.9)	
Sciatic pain intensity (scale 0–10)*	Baseline	2.7 (2.7)	3.1 (3.1)	0.39
	After rehabilitation	2.2 (2.7)	2.0 (2.6)	
	6 mo	2.3 (2.8)	1.8 (2.3)	
	12 mo	2.5 (3.0)	2.0 (2.5)	
	24 mo	2.1 (2.8)	2.7 (2.9)	
Oswestry Disability Index (scale 0–100)	Baseline	25.4 (10.6)	23.8 (11.7)	0.71
	After rehabilitation	20.9 (10.1)	21.6 (11.4)	
	6 mo	20.4 (11.6)	18.0 (11.5)	
	12 mo	18.9 (12.8)	18.5 (12.4)	
	24 mo	19.7 (14.3)	19.3 (13.1)	
Subjective working capacity (scale 0–10)†	Baseline	3.9 (2.6)	3.6 (2.8)	0.33
	After rehabilitation	2.3 (2.4)	2.8 (2.6)	
	6 mo	2.8 (2.6)	2.6 (2.4)	
	12 mo	2.8 (2.8)	2.7 (2.5)	
	24 mo	2.9 (2.8)	3.5 (2.8)	
Beliefs of working capacity after 2 yr (scale 0–10)†	Baseline	3.7 (2.3)	3.8 (2.7)	0.83
	After rehabilitation	2.5 (2.2)	3.0 (2.4)	
	6 mo	3.0 (2.6)	2.9 (2.9)	
	12 mo	3.0 (2.5)	3.0 (2.7)	
	24 mo	3.2 (2.7)	3.3 (3.0)	
General well-being (scale 0–32)¶	After rehabilitation	7.74 (5.45)	9.83 (5.4)	0.02§
Depression index (scale 0–30)‖	Baseline	7.5 (5.2)	6.7 (5.5)	0.73
	After rehabilitation	5.5 (5.5)	5.7 (5.2)	
	6 mo	5.7 (4.6)	5.8 (5.7)	
	12 mo	6.6 (5.8)	5.0 (4.0)	
	24 mo	6.7 (5.3)	5.7 (4.7)	
Healthcare consumption during past 12 mo‡	Baseline	12.0 (12.0)	9.5 (9.4)	0.19
	12 mo	5.8 (9.9)	5.4 (8.2)	
	24 mo	3.4 (7.0)	5.3 (8.6)	

Values are mean (standard deviation).
*Pain intensity, scale 0–10 (0 = no pain; 10 = unbearable pain).
†Subjective working capacity, scale 0–10 (0 = excellent working capacity; 10 = completely unable to work).
‡Total amount of visits to physician, physiotherapist, nurse, and other health professionals during last 12 mo.
§Statistically significant.
¶General well-being, scale 0–32 (0 = excellent; 32 = poor).
‖Symptoms of depression, scale 0–30 (0 = not at all; 30 = very much).

ment benefit were assessed before starting the treatment program, and the results showed equally positive expectations in both treatment groups.[14] Using a control group without any intervention causes disappointment among patients and may cause a false-positive outcome in favor of the treatment method studied.

The long recruitment process, the strict inclusion criteria, and highly selected cLBP patient population (only women from healthcare and social care professionals) may have influenced the generalizability of the results. The delayed recruitment was probably at least partly due to a period of financial depression in the heathcare field, especially when temporary workers were afraid to go on sick leave and to rehabilitation during working hours. Therefore, we think that in this study sick leaves were not a reliable outcome measure for the effect of the interventions. Furthermore, because sick leaves were asked on categorical scale, minor differences between the groups were not possible to detect.

Table 4. Sick Leaves During the Last Year

Days on Sick Leave	Multidisciplinary Rehabilitation (%)	Individual Physiotherapy (%)	*P*
1 yr after rehabilitation			0.65
0 days	61.5	56.4	
1–30 days	32.7	34.6	
>30 days	5.8	9.0	
2 yr after rehabilitation			0.74
0 days	68	63.8	
1–30 days	20	25.6	
>30 days	12	10.6	

The strength of this study was that an experienced enthusiastic multidisciplinary rehabilitation team, including physiotherapist, occupational physiotherapist, psychologist, and a physician specialized in rehabilitation medicine, performed the MR program. All therapists were pioneers of MR program in Finland. The intervention contrast between the IP and MR groups was, however, somewhat decreased by the instructions of exercise treatment according to current clinical guidelines in the IP group. In addition, the physiotherapists who performed the IP were trained to work in a multidisci-

plinary rehabilitation team and therefore had a cognitive-behavioral way of administering the treatment.

Furthermore, some subjects, particularly those doing physically hard work, perceived participation during working hours in MR program as burdensome: both exercising and educational discussions demanded keen concentration and active participation. The patients who were randomized to IP were able to choose the timing of rehabilitation themselves, the rehabilitation required much less active involvement, and participation was less "stressful." These factors may have lessened the effectiveness of MR. Our study is also limited by lack of male LBP patients. Among healthcare and social care professionals, the majority of workers are women. Because only 3 men entered the study, we decided to exclude them from the study, although they were randomized and participated in the rehabilitation program. The results according to intention to treat did not differ from those reported in the paper. According to numerous observations, men and women should be analyzed separately in trials concerning pain treatments because of different responses to pain treatments between genders.[15]

The results of this study are in concordance with a recent systematic review,[16] which concluded that only intensive (>100 hours) multidisciplinary rehabilitation has favorable effects on the course of cLBP. Our results were also in line with the findings of Skouen *et al* who showed that in women no significant differences were found between light or extensive MR compared with treatment as usual. However, in men significantly better results were found for light MR and the controls, but no differences were found between extensive MR and treatment as usual.[17]

It seems likely that some subgroups of cLBP patients benefit from MR programs while others do not. A recent literature review by McCracken and Turk concludes that highly distressed patients who see their pain as an uncontrollable and highly negative life event derive less benefit than other patients.[18] Low expectations for return to work predict both poor program compliance and worse outcome.[19] In the future, more research work is needed to identify factors that modify the intervention effects of MR programs.

■ Key Points

- Systematic reviews have shown that there is strong evidence that intensive multidisciplinary treatment improves function, and moderate evidence that it reduces pain among chronic patients with low back pain.
- The results of this study indicate that a semi-intensive multidisciplinary treatment program for female patients does not offer incremental benefits when compared with rehabilitation carried out by a physiotherapist alone.
- Further research is needed to identify those subgroups of patients that might benefit from multidisciplinary programs.

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